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Articles

- Filipino Nursing Students' Health Promoting Behaviors during Pandemic
- Women's Knowledge of Sexually Transmitted Diseases in Telafer City, Iraq
- Correlating Demographics and Well-being among Rural College Students in the Philippines
- Resilience-related Breast Cancer: A Concept Analysis
- Parents' Experiences of Caring for Children with Congenital Rubella Syndrome (CRS) in Remote and Rural Areas of Indonesia
- Effects of Patient and Family-Centered Care on Quality of Care in Pediatric Patients: A Systematic Review
- Postpartum Depression and Its Contributing Factors among Mothers during the COVID-19 Pandemic in North Jakarta, Indonesia
- The Prevalence of Nurses' Emotional Exhaustion during COVID-19 Pandemic: A Systematic Review and Meta-Analysis
- Self-Management and Relating Factors among Chronic Kidney Disease Patients on Hemodialysis: An Indonesian Study
- Perception of COVID-19 Vaccination Based on Health Belief Model and the Acceptance of COVID-19 Booster Vaccination
- Health Care Providers' Perceptions of the Ministry of Health's Organisational Readiness for Change

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ORIGINAL RESEARCH

Association Between Sources of Social Support and Depression Among Nursing Students During the COVID-19 Pandemic



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Abstract

Background: Nursing students have a higher risk of depression due to their high academic burden, social isolation, pandemic loneliness, abrupt online learning, and financial difficulties during the COVID-19 pandemic lockdown. Although the disruption of social network patterns during the pandemic has been observed in previous studies, it is still not fully understood which source of social support is associated with depression among nursing students.

Purpose: This study aimed to assess the correlations between sources of social support and depression among nursing students during the COVID-19 pandemic.

Methods: An online cross-sectional study was conducted between May and September 2021. Nursing students (n=734) from seven universities across four provinces in Indonesia were recruited as participants using convenience sampling methods. Data were obtained through online questionnaires consisting of the Multidimensional Scale of Perceived Social Support (MSPSS) to assess social support and the Patient Health Questionnaire-9 (PHQ-9) to assess depression. Spearman-Rank correlation tests were used to examine the correlations between sources of social support and depression.

Results: Most of the nursing students (85.1%) were female, with a mean age of 19.94 years (SD=1.42). Many nursing students (n=313; 42.6%) experienced depression. Most of the students (n=465; 63.4%) perceived high family support, moderate friends (n=415; 56.5%) and significant others' support (n=437; 59.5%). Of the three sources of social support (family, friends, and significant others), only family support had a significant inverse correlation with depression (Rho=-0.492, p<0.001).

Conclusion: Family support had a significant inverse and moderate correlation with depression among nursing students during the COVID-19 pandemic. Our findings provided information to nursing educators to incorporate a strategy to maintain robust family support and regular depression assessments as part of the online learning curriculum. Therefore, it can be used to ameliorate depression among nursing students.

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1. Introduction

Depression, a mood disorder characterized by either persistent sadness or loss of interest in daily activities, or both (Ng et al., 2016), is the most prevalent mental health condition that often remains undiagnosed and untreated. Depression is regarded as a major mental health problem worldwide and among the world's leading causes of disability (Njim et al., 2020; Tung et al., 2018). Globally, it is estimated that depression affects 350 million people every year (Njim et al., 2020; Tung et al., 2018). Depression was among the top global disease burdens in 2020 (Lim et al., 2018) and is predicted to be the leading cause of global mental disease in 2030 (Hock et al., 2012). Depression presents debilitating symptoms that could substantially impair an individual's productivity, causing reduced occupational potential (Stewart et al., 2003), which is associated with poor quality of life. In its most severe condition, depression can lead to self-harm and suicide (Lim et al., 2018; Njim et al., 2020; Orsolini et al., 2020).

Substantial evidence demonstrated that the nursing education curriculum, which was characterized by a hectic course schedule, tons of assignments, and various theoretical and practical examinations (Karaca et al., 2019; Sakai et al., 2022), had put nursing students under tremendous and prolonged stress throughout their education stages (Karaca et al., 2019; Sakai et al., 2022). As a result, nursing students must be able to adapt and cope effectively with tremendous academic burdens besides the regular stressors experienced by youth and general university students (Karaca et al., 2019). Findings from numerous empirical studies also elucidated that nursing students had a higher prevalence of mental health issues compared to the non-healthcare student population and the general population (Karaca et al., 2019; Sakai et al., 2022).

The emergence of the COVID-19 pandemic, followed by the implementation of a lockdown and social distancing policy to prevent viral transmission before the mass vaccination programme became widely available, has caused numerous negative consequences among students, such as COVID-19-specific worries, social network isolation, loneliness, lack of emotional support and interaction, difficulties to attend online learning (Fitriawan et al., 2023a), and financial difficulties due to job loss of their family member which may cause their education to discontinue. When combined with already high academic stressors, those negative consequences could potentially increase depression symptoms among nursing students (Elmer et al., 2020). Previous empirical studies revealed that the prevalence of depression among nursing students during the COVID-19 pandemic ranged from 39% to 50% (Fitriawan et al., 2023b; Hung et al., 2022; Kim et al., 2022; Kwak et al., 2022), higher than before the COVID-19 pandemic (34%) (Tung et al., 2018). Depression could cause substantial negative impacts on nursing students, such as lower attendance rates in their courses, lower cumulative grade point averages (GPA) (Abu Ruz et al., 2018), substance use, tobacco smoking, and alcohol consumption (Esmaelzadeh et al., 2018), and increased risk of suicide (Fitriawan et al., 2023b; Moraes et al., 2021; Njim et al., 2020).

The lockdown policy followed by university closure and online learning implementation during the pandemic also changed the students' social networks, where interaction and co-studying networks plummeted, and more students were studying alone (Elmer et al., 2020; Kulcar et al., 2022), which in turn potentially changed the social support pattern they received. Social support is defined as any support received by individuals from their social network in their time of need (Li et al., 2021). In contrast, perceived social support is defined as an individual's subjective perceptions regarding the support they received during their time of need from the social network members around them (Li et al., 2021). Social support can come from a variety of sources, whether natural (e.g., family members, friends, romantic partners, neighbours, community members, co-workers) or more formal (e.g., health professionals or community organizations), that are available in times of need to give support (Amoah, 2019) in the form of instrumental, emotional, informational, companionship, validation or other support (Li et al., 2021). Through its stress buffering mechanism, social support provides emotional and psychological support to the individual, elevates their psychological resilience, and ameliorates their stress (Ozbay et al., 2007), which is considered a major factor in maintaining psychological well-being (Hailey et al., 2023; Zysberg & Zisberg, 2022).

Previous studies elucidated that family support increased students' coping mechanisms and ameliorated stress, contributing to positive mental health status (Mai et al., 2021). Likewise, social support from another source, such as peers and teachers, can also elicit similar beneficial effects on students' mental health (Zhou et al., 2022). It is necessary to assess which sources of social

support contributed mostly to maintaining mental health (Coventry et al., 2004) since evidence from previous empirical studies has demonstrated that the association between different sources of social support and mental health has been inconsistent (Alsubaie et al., 2019; Mustanski et al., 2011; Wise et al., 2019). A previous study elucidated that family support, but not friend support, was associated with posttraumatic stress disorder (Wise et al., 2019) and depression symptoms (Alsubaie et al., 2019). Contrarily, another study found that friends' social support was more effective than family social support in preventing psychological distress (Mustanski et al., 2011) and depression (Kugbey et al., 2015; Perret et al., 2021).

The elevation of depression during the COVID-19 pandemic has been demonstrated in previous studies (Fitriawan et al., 2023b; Hung et al., 2022; Kim et al., 2022; Kwak et al., 2022). Additionally, previous studies also demonstrated the disruption of social network patterns among students during the pandemic (Elmer et al., 2020; Kulcar et al., 2022). However, currently, there is no published study exploring the source of social support associated with depression severity among nursing students in the context of the COVID-19 pandemic situation. Addressing the lack of evidence on this topic is crucial for developing more effective prevention strategies and interventions. Early identification of depression and its risk factors is a critical step to ameliorate the negative consequences of depression among nursing students. To fill these gaps in the literature, the present study aimed to explore the association between sources of social support and depression among nursing students in Indonesia during the COVID-19 pandemic.

2. Methods

2.1. Research design

A cross-sectional study was performed to assess the correlations between the sources of social support and depression among nursing students during the COVID-19 pandemic. A cross-sectional study design is a type of observational study in which the outcome and the exposures of the study participants are measured at the same time. This study design is suitable for population-based surveys, is relatively faster, and is cost-effective while still allowing the investigator to obtain information regarding the prevalence of outcomes or exposures and the association between exposures and outcomes (Setia, 2016).

2.2. Setting and samples

The researchers conducted this study at seven well-accredited universities that provide nursing education across four provinces on Java Island, Indonesia. These universities were closed during the COVID-19 pandemic, implemented fully online learning during the pandemic, used a Moodle-based learning management system to implement online learning, especially for content distribution and digital resources, and used WhatsApp groups for communication among teachers and students. Moreover, a previous study conducted during the early phase of the COVID-19 pandemic suggested that nursing students from these universities experienced numerous barriers during the online learning implementation (Achmad et al., 2021). The undergraduate nursing education system in Indonesia is a four-year program, and the total number of first-year to fourth-year undergraduate nursing students in these seven universities was 2,264. All nursing students had a WhatsApp account and joined the students' WhatsApp groups at their universities. Data collection was conducted from May until September 2021 during the second wave of the COVID-19 pandemic in Indonesia and the implementation of large-scale social restrictions and university closures.

The minimum sample size calculation for this study was achieved using G*Power software version 3.1.9.7 for correlation: bivariate normal model with the assumption of $\alpha=0.05$, power level=0.85, and an effect size of 0.1 (Kwak et al., 2022). Based on this equation, a minimum sample size of 716 was needed for this study. In this study, the participants were recruited using a convenience sampling technique. Convenience sampling was adopted in this study due to its ability to target particular groups of the population and its cost-effectiveness compared to other sampling methods (Galloway, 2005). Moreover, our study was conducted during a significant increase in the number of Variant of Concern SARS-CoV-2 delta infection cases and death tolls in Indonesia (regarded as the second wave of the COVID-19 pandemic), coupled with the fact that the SARS-CoV-2 vaccination program was still not widely available in the country at the time of the data collection period (Tenda et al., 2021). Moreover, a recent study demonstrated that during the second wave of the COVID-19 pandemic, most nursing students in Indonesia still had not

received the full dose of the SARS-CoV-2 vaccine, suggesting they had not acquired an immunoprotective phenotype against SARS-CoV-2 (Fitriawan et al., 2023c). In such conditions, convenience sampling is the most feasible method during the pandemic lockdown policy, where social distancing is mandatory but still acceptable as a sampling technique to assess association studies (AlHajri & Mohamed., 2022) including depression, as demonstrated by previous studies (Achmad et al., 2023; Al-Zawaadi et al., 2021).

The inclusion criteria for nursing students to be able to participate in this study were: first-year to fourth-year undergraduate nursing students with active academic status, participated in fully online learning during the data collection period, had a WhatsApp account that could be contacted, and joined the students' WhatsApp groups at their respective universities. The students who were taking academic leave or did not fill out the study questionnaire completely were excluded from the study.

2.3. Measurement and data collection

The researchers used self-reported standardized instruments in the Indonesian language to assess the study variables, and the instruments consisted of three sections: 1). sociodemographic questionnaire; 2). the Multidimensional Scale of Perceived Social Support (MSPSS), and 3). the Patient Health Questionnaire-9 (PHQ-9). Before data collection, permission to use the instruments and the Indonesian version was provided by the original author and translator.

In the first section, the sociodemographic profiles of the participants were assessed using an eight-item sociodemographic questionnaire adopted from a previous study (Kapasia et al., 2020), which consisted of gender, age, academic year, monthly family income, type of residence, the financial status of the family, difficulties in attending online learning, and satisfaction with academic performance.

In the next section, the social support among nursing students was measured using the Indonesian version of the Multidimensional Scale of Perceived Social Support (MSPSS) (Laksmi et al., 2020). Developed by Zimet et al (1990), the MSPSS is a standardized self-reported instrument consisting of 12 question items and is widely used to measure perceived social support adequacy from three sources: family, friends, and significant others (Zimet et al., 1990). Each item is measured on a 7-point Likert scale ranging from "very strongly disagree" (1 point) to "very strongly agree" (7 points). The MSPSS consisted of three subscales intended to assess the different sources of social support: the MSPSS-Family subscale was assessed using 4 items (items 3, 4, 8, and 11), the MSPSS-Friends subscale was assessed using 4 items (items 6, 7, 9, and 12), and MSPSS-Significant Others subscale was assessed using four items (items 1, 2, 5, and 10). The MSPSS total score ranges from 12-84, and higher scores indicate higher social support as perceived by an individual. The social support mean score on each of the three subscales (family, friends, and significant others) can be obtained by adding the items in each subscale and then dividing by 4 (Laksmi et al., 2020). Based on the social support mean score of each subscale, the social support level from each source (family, friends, and significant others) can be categorized as follows: a mean score of 1 - 2.9 is regarded as low support, the mean score of 3 - 5 is regarded as moderate support, and the mean score of 5.1 - 7 represents high support (Samson, 2020). Based on the previous study, the Indonesian version of MSPSS is a valid and reliable instrument. Validity using Confirmatory Factor Analysis (CFA) demonstrated the goodness of fit between the observed data and the hypothesized model, where $\chi^2/df = 2.468$, RMSEA = 0.070, GFI = 0.935, CFI = 0.948, TLI = 0.933, and SRMR = 0.047. Using standardized estimates, the factor loadings ranged from 0.49 to 0.80, and all of them were significant ($p < 0.05$). This instrument also demonstrated high internal reliability, as indicated by a Cronbach α of 0.81 for the MSPSS-Family subscale, 0.82 for the MSPSS-Friends subscale, and 0.75 for the MSPSS-Significant Others subscale (Laksmi et al., 2020).

In the last section, depression among nursing students was assessed using the Indonesian version of the Patient Health Questionnaire-9 (PHQ-9) (van der Linden, 2019). Developed by Kroenke et al (2001), the PHQ-9 is a brief self-reported instrument widely used to screen for depression in both clinical and non-clinical populations (Kroenke et al., 2001), including depression among nursing students (Mcdermott et al., 2020; Achmad et al., 2023). This instrument consisted of 9 question items, and each item asked about depression symptoms experienced by respondents in the last 2 weeks. They were asked to choose the answer on a 4-point Likert scale ranging from 0 (never at all) to 3 (almost every day). The PHQ-9 total score

ranges between 0-27, and higher scores indicate higher depression severity levels (Kroenke et al., 2001; Mcdermott et al., 2020; Tin et al., 2015). Based on the PHQ-9 total score, the depression status can be categorized as follows: no depression (PHQ-9 total score <10) and depression (PHQ-9 total score \geq 10) (Mcdermott et al., 2020; Tin et al., 2015). Based on the previous study, the Indonesian version of PHQ-9 is a valid and reliable instrument. Validity using the Spearman correlation between PHQ-9 and BDI demonstrated a correlation coefficient (Rho) of 0.53 when BDI was enrolled as a dependent variable. Cronbach's α value of 0.84 indicates that this instrument has high internal reliability (van der Linden, 2019).

In this study, an online questionnaire was created using Google Forms to collect the data due to the large-scale social restrictions enforced by the Indonesian government at the time of the study. The data collection process is shown in Figure 1.

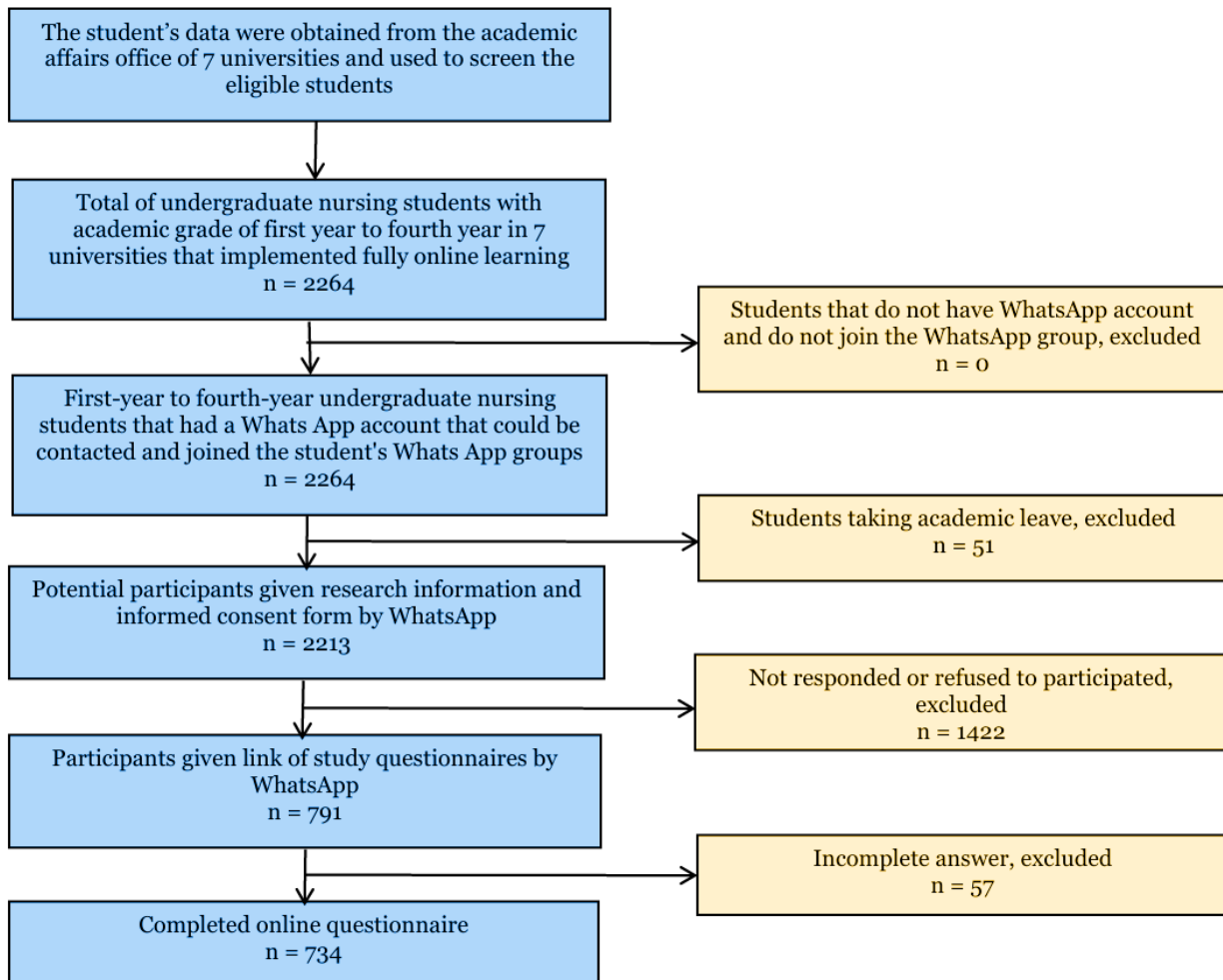


Figure 1. Flow chart of the data collection process

The researchers accessed the nursing student's data, including name, student ID number, academic year, academic leave status, and WhatsApp number from the academic affairs of the selected universities as a basis for screening eligible participants. The academic affairs of the selected university also gave the research team permission to be enrolled in student WhatsApp groups. A total of 2,264 first-year to fourth-year undergraduate nursing students had a WhatsApp account and joined the student's WhatsApp groups at their respective universities. Of them, 51 nursing students were taking academic leave and excluded from the study, and 2,213 nursing students were eligible as study participants. Firstly, the researchers distributed a Google Form link consisting of research information and informed consent through student's WhatsApp groups. Less than half of the nursing students agreed to participate in the study by completing online informed consent (n=791; 35.7%). After that, the researchers sent the Google Form link consisting of the study questionnaires to each of the students who had completed the informed

consent through a WhatsApp message, and they were instructed to fill out the questionnaires completely. The researchers also informed the participants that they could contact the researchers through WhatsApp if they had any questions regarding the questionnaires, and the researchers would be happy to respond. Additionally, the researchers informed the participants that they had one week to complete the study questionnaires after receiving them. Only 734 nursing students (33.2%) completed the questionnaires, while 57 (7.8%) had missing data on one or more of the study questionnaires and were excluded from the study. Hence, the final number of participants included in the statistical analysis was 734, exceeding the minimum sample size required.

2.4. Data analysis

For univariate analysis, frequency and percentage were used to describe the categorical data, whereas mean and standard deviation were used to describe the numerical data. Each of the three social support subscales and depression scores had abnormally distributed data as indicated by the Kolmogorov-Smirnov test with $p < 0.05$. Spearman's rank test was used to examine the correlation between the three sources of social support (family, friends, and significant others) with depression, and $p < 0.05$ was considered statistically significant. Correlation coefficients (r) were obtained to assess the correlation's direction and strength. The statistical analysis was conducted in IBM SPSS for Windows Version 24 (IBM Corp, Armonk, NY) and GraphPad Prism 9 for macOS Version 9.5.0 (GraphPad Software, LLC, Armonk, NY).

2.5. Ethical consideration

The Medical and Health Research Ethics Committee of Universitas Gadjah Mada, Indonesia, granted ethical clearance for this study protocol (approval number: KE/FK/1067/EC/2020). Prior to data collection, each participant gave their informed consent. Throughout the study, all participant information was guaranteed to remain confidential.

3. Results

3.1. Sociodemographic characteristics of the study participants

A total of 734 undergraduate students completed the survey, and their sociodemographic characteristics are shown in Table 1.

Table 1. Sociodemographic characteristics of the study participants (n=734)

Characteristics	Frequency (f)	Percentage (%)
Age (years) - Mean(Standard Deviation)	19.94(1.42)	
Gender		
Male	109	14.9
Female	625	85.1
Monthly family income (Indonesian Rupiah/IDR)		
<3 million	479	65.3
≥3 million	255	34.7
Academic year		
First-year	353	48.1
Second year	136	18.5
Third year	131	17.8
Fourth-year	114	15.5
Type of residence		
Living in own home	597	81.3
At another place	137	18.7
Financial problems at the time of the COVID-19 pandemic		
No	158	21.5
Yes	576	78.5
Difficulties in attending online learning during the COVID-19 pandemic		
No	232	31.6
Yes	502	68.4
Satisfaction with academic performance		
Satisfied	247	33.7
Dissatisfied	487	66.3

As seen in Table 1, the mean age of the participants was 19.94 years (SD=1.42), and most were female (n=625; 85.1%). The undergraduate nursing education program in Indonesia took four years to complete, and in this study, most of the participants were first-year students (n=353; 48.1%). Most participants had a monthly family income of less than IDR 3 million (n=479; 65.3%) and reported financial difficulties during the pandemic (n=576; 78.5%). Most of the participants living at their own homes during the COVID-19 pandemic (n=597; 81.3%) had barriers during online learning implementation (n=502; 68.4%) and were not satisfied with their academic performance (n=487; 66.3%).

3.2. Profile of social support among nursing students

The level of family support, friends support, and significant others support based on MSPSS was shown in Table 2. Most of the nursing students perceived the family support they received as high (n=465; 63.4%), whereas most of them perceived the friends' support (n=415; 56.5%) and significant others' support (n=437; 59.5%) received as moderate.

Table 2. Profile of social support among nursing students (n=734)

Source of Social Support	Frequency (f)	Percentage (%)
Family support		
High	465	63.4
Moderate	253	34.4
Low	16	2.2
Friends support		
High	299	40.7
Moderate	415	56.5
Low	20	2.7
Significant others support		
High	217	29.6
Moderate	437	59.5
Low	80	10.9

3.3. Severity of depression among nursing students

Table 3 shows detailed information about depression among nursing students based on PHQ-9. Our study revealed that 313 students (42.6%) experienced depression, as indicated by a total PHQ-9 score ≥ 10 .

Table 3. Depression among nursing students (n=734)

Depression	Total PHQ-9 Score Range	Frequency (f)	Percentage (%)
No Depression	0-9	421	57.4
Depression	10-27	313	42.6

3.4. Correlation between the source of social support and depression

The correlation between sources of social support and depression was analysed using Spearman's rank tests, and the results were shown in Figure 2.

The Spearman's rank test results showed no significant correlation between the MSPSS - Friends mean score and MSPSS - Significant Others mean score with PHQ-9 score ($p=0.104$ and $p=0.920$, respectively). This finding suggests that social support from friends and significant others did not significantly correlate with depression among nursing students. Spearman's rank test results demonstrated a significant inverse and moderate correlation between MSPSS - Family mean score and PHQ-9 score ($p<0.001$; $Rho= -0.492$). This result indicates the significant inverse correlation between family support and depression among nursing students during the pandemic lockdown. The students with lower family support levels were more likely to have higher depression severity, and vice versa.

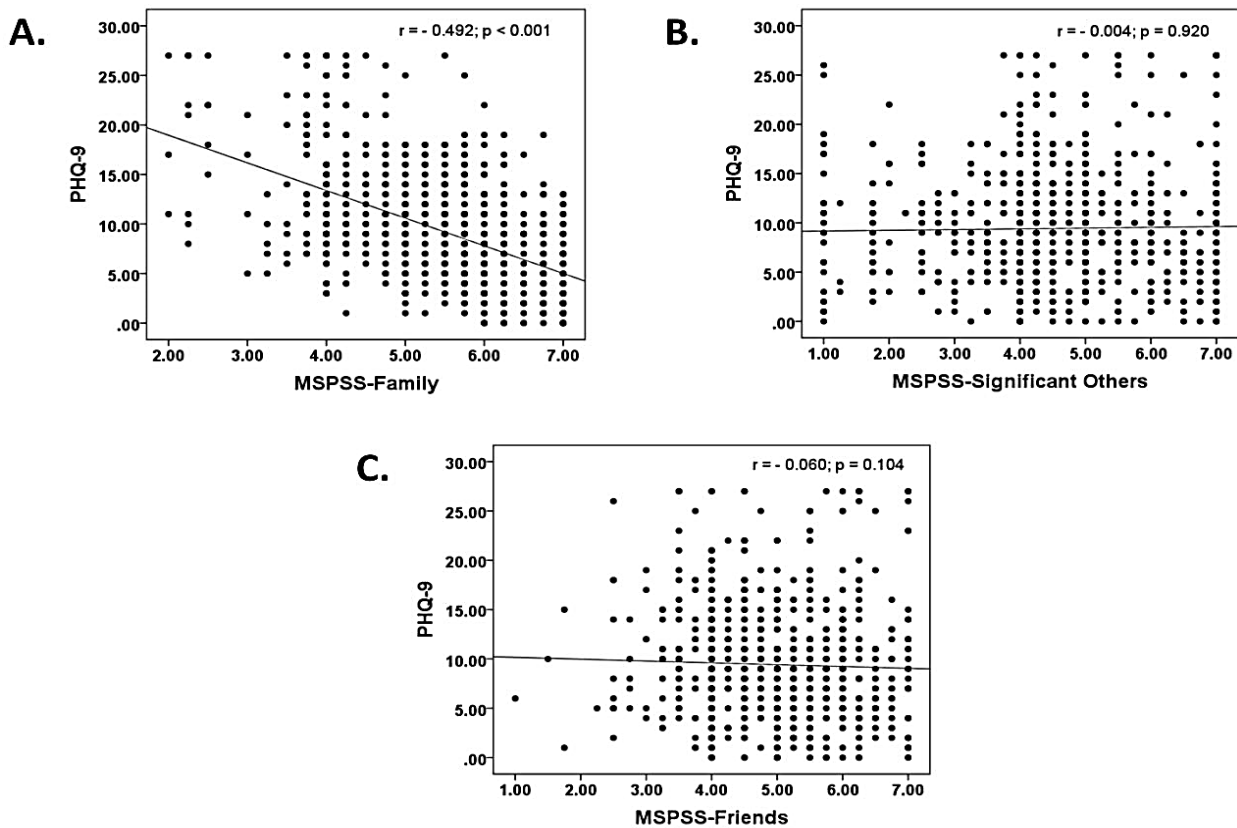


Figure 2. The correlation between sources of social support and depression

As shown in Figure 2, of the three sources of social support, only family support had a significant inverse correlation with depression among students during the lockdown; A. Family support had a significant moderate inverse correlation with depression ($p < 0.001$); B and C. There is no significant correlation between significant others and friends' support with depression ($p = 0.920$ and $p = 0.104$, respectively).

4. Discussion

This study investigated the status of perceived social support based on its sources (family, friends, and significant others) and the prevalence of depression among Indonesian nursing students during the COVID-19 pandemic lockdown, as well as the associations between different sources of social support and depression. The results revealed a high prevalence of depression among Indonesian nursing students. In this unprecedented situation, nursing students reported a high level of family support, while they reported moderate support from friends and significant others. Furthermore, this study also demonstrated the protective effect of higher family support against depression.

Our study elucidated that 42.6% of nursing students had depression during the COVID-19 pandemic. This prevalence was remarkably higher compared to several other studies conducted in Brazil (19.2%), China (28.7%), the United States (26%), and Cameroon (26.4%) (Facioli et al., 2020; Mcdermott et al., 2020; Njim et al., 2020; Zeng et al., 2019). A previous systematic review found that the global depression prevalence among nursing students was 34% (Tung et al., 2018). The prevalence of depression in our study was higher than in those studies, probably related to the unprecedented disruption derived from the COVID-19 pandemic when this novel pathogenic human coronavirus emerged and generated fear in everyone. The previous study was conducted before the COVID-19 pandemic, whereas our study was conducted during the enforcement of the lockdown policy coupled with distance learning implementation in the midst of the second wave of the COVID-19 pandemic in Indonesia. The prevalence of depression is expected to increase, especially when compared to before the COVID-19 pandemic. Although substantial evidence before the pandemic suggested that depression is a complex phenotype and its development involving complex interactions between biological (epigenetic, genetic polymorphism/single

nucleotide polymorphism, molecular), psychological, and social factors (Remes et al., 2021), recent findings demonstrated that unprecedented disruption in the students daily lives during the COVID-19 pandemic, such as a fear of COVID-19, sparser social network and social isolation, online learning issues, and financial difficulties negatively impacted their mental health and contributed to depression (Al-Tammemi et al., 2020; Kurniawan et al., 2024). A previous study demonstrated that a higher level of fear of COVID-19 was linked with more severe depression symptoms among university students (Yao et al., 2023). Another study found that loneliness that arises as a consequence of the pandemic lockdown policy was positively associated with depression among students (Bokszczanin et al., 2023; Elmer et al., 2020; Hager et al., 2022), and this relationship was mediated by boredom and negative thinking (Hager et al., 2022). Factors related to online learning have also been found to contribute to depression during the COVID-19 pandemic, such as self-study, negative effect on knowledge level, low online learning motivation (Rutkowska et al., 2022), the perception that the internet quota for online learning is expensive, poor Internet connection, and low self-efficacy and readiness in online learning (Fitriawan et al., 2023a). Comparatively, the prevalence of depression among nursing students during the COVID-19 pandemic ranged from 39% to 50% (Fitriawan et al., 2023b; Hung et al., 2022; Kim et al., 2022; Kwak et al., 2022). This finding further supports the negative consequences of the pandemic crisis on nursing students' mental health in Indonesia.

Our study also found that most nursing students perceived high family support during the COVID-19 pandemic. On the other hand, most of them perceived moderate support from friends and significant others. Consistent with our findings, another study conducted during the COVID-19 pandemic demonstrated that university students had a high level of perceived family support as well as a moderate level of perceived friend support (Cahuas et al., 2023; Sun et al., 2023). In contrast, a recent study in the US found that university students reported a high level of significant other support (Cahuas et al., 2023). Our study was conducted during the social restrictions policy and online learning implementation due to the significant increases of the variants of concern SARS-CoV-2 delta infection cases in Indonesia when 81.3% of the participants in our study were living in their own homes. A previous study demonstrated that students' interaction with their peers and their co-studying networks had become sparser, and most students were studying alone during the lockdown compared to before the COVID-19 pandemic (Elmer et al., 2020). Another study elucidated those students had difficulties building new and maintaining existing friendships during the pandemic (Kulcar et al., 2022). The decreased interaction with their friends could lead to lesser social support provided by their friends. In lockdown conditions, the family became the most intimate environment for students, and the family was the only social network available and ready to provide social support in times of need.

Based on the source of social support, our study demonstrated that family support had a significant moderate inverse correlation with depression. Our results provided evidence regarding the positive effect of family support on students' mental health during the COVID-19 pandemic. Consistent with our results, several previous studies provided some evidence for the theoretical relationship between perceived family support and mental health. The higher quantity and quality of family support had a protective effect against depression (Alsubaie et al., 2019; Samrock et al., 2021; Wang et al., 2021), with family dysfunction and less family support strongly associated with depression (Guerrero-Muñoz et al., 2021; Wang et al., 2021). In their study, Kamen et al. (2011) found that higher family support was associated with lower depression severity and higher recovery from depression among depressed individuals. Through its stress buffering mechanism, family support acts as a buffer that protects individuals from the negative impacts of stressful life events regardless of their history of depression (Manczak et al., 2018). Family support preserves positive mental health status by buffering loneliness (Li & Xu, 2022) and increasing self-esteem (Huang et al., 2022). Another study found that family support increased students coping mechanisms, ameliorated stress, and prevented mental health problems, thereby maintaining their mental health status (Mai et al., 2021).

Interestingly, our study found no significant relationship between friends' and significant others' support with depression. Contrary to our findings, several studies showed that social support from friends and significant others had a significant inverse relationship with depression (Alsubaie et al., 2019; Kugbey et al., 2015; Perret et al., 2021) and social support from friends is more important for university students compared to support from family and significant others (Kugbey et al., 2015). Another study also demonstrated that friend support was positively

correlated with resilience (Putri & Nursanti, 2020), positive achievement emotions (Lee et al., 2021), learning satisfaction (Lee et al., 2021), and psychological well-being among students (Zhou, 2020). This difference could be due to the different study periods. Those previous studies were conducted before the COVID-19 pandemic when the education process was conducted using traditional face-to-face learning. In such conditions, students' interactions with their friends were more intensive than with their families. Being away from family and relatives makes friends become the most intimate environment for nursing students (Putri & Nursanti, 2020). Adolescents are searching for the social support they need from sources that are familiar, mature, and, most importantly, trustworthy (Camara et al., 2017). Our study was conducted during the lockdown policy coupled with university closure and online learning implementation. Similar to our finding, previous studies conducted during the COVID-19 pandemic demonstrated no association between friend support and depression (Liu et al., 2022; Padmanabhanunni et al., 2023). Lockdown and social distancing resulted in lesser student interaction with their peers, lesser perceived friends' support, and lesser protective effect of friends' support on students' mental health during the pandemic. Without close social interaction with friends, students might experience an increased sense of loneliness, which in turn contributes to depression (Liu et al., 2022). Although online interaction with friends was still possible during the pandemic, a previous study demonstrated that nursing students in Indonesia experienced poor internet connection and a limited internet quota due to financial hardship (Achmad et al., 2021), which limited their online interaction with friends.

5. Implication and limitation

This study's findings emphasize the need to develop and strengthen the student's mental health services at the university level that can provide offline and online mental health care and develop programs to detect depression and ameliorate depression among undergraduate nursing students. These findings also demonstrated the protective effect of family support against depression among nursing students during the pandemic lockdown, indicating that more proactive strategies to improve family support and providing effective support systems during the lockdown policy and implementation of distance learning could be useful to ameliorate depression among nursing students.

However, the current study is subject to at least four caveats that should be considered. First, the study participants were recruited using convenience sampling, a non-probability sampling type, hence limiting our findings' generalizability. Second, all data were collected using online questionnaires due to the social restrictions policy at the time of data collection. This could result in sample selection bias, wherein nursing students without internet access could not participate in our study. Third, since self-administered questionnaires were used as the study instrument, our study was prone to recall and social desirability biases. Fourth, the history of mental illness among participants was not considered, which could affect the study results.

6. Conclusions

Our study provides evidence that the prevalence of depression among nursing students in Indonesia in the midst of the COVID-19 pandemic is high, with most of them regarded as having mild depression. Moreover, family support had a significant inverse correlation with depression. Our findings emphasize the need to develop mental health services at the university and programs to assess and ameliorate depression among nursing students. These findings also highlight that a strategy to improve family support and provide support systems during the pandemic lockdown could be useful in ameliorating depression among nursing students.

The findings of this study could be used as a basis for future studies to investigate effective methods to maintain robust social support and ameliorate depression symptoms among nursing students during distance learning. Since depression is regarded as a complex multifactorial phenotype, future studies to identify other possible protective factors and risk factors of depression during distance education should be conducted with more robust methods that address the limitations of this study.

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Author contribution

Conceptualization: DK, ASF, WAWS; Methodology: DK, ASF, WAWS; Investigation: DK, ASF, ANW, EBW, ES, GS, BFA, PES; Data curation: LNR, PES; Formal Analysis: BFA, GS; Visualization: WAWS, LNR; Writing-Original draft: DK, ASF, WAWS; Writing-Review and Editing: DK, ASF, WAWS; Project Administration: LNR, PES.

Conflict of interest

We declare that there is no conflict of interest.

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ORIGINAL RESEARCH

First-line Nurse Managerial Competence and Its Influencing Factors in Public Jordanian Hospitals



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Abstract

Background: First-line Nurse Managers (FLNMs) occupy pivotal positions within healthcare systems and are responsible for various administrative and caregiving functions. While FLNMs are integral to efficient healthcare services, their competencies and the factors influencing them still need to be explored in Jordan. In light of the need for more research on FLNM competencies in Jordan, this study is paramount for advancing healthcare in the country.

Purpose: This study aimed to analyze FLNM competence and its influencing factors within the unique context of Jordan's healthcare system.

Methods: As a cross-sectional study, this research leveraged online platforms to distribute questionnaires to 130 FLNMs across three public hospitals in Jordan's central region using a random sampling method. Univariate analysis comprised numerical data (Mean, median, mode, SD) and categorical data (percentage and proportion). Pearson, independent t-test, and multiple linear regression were used to analyze the data.

Results: Based on responses from 130 FLNMs, the study's results demonstrate their average age to be approximately 37.8 years, with a significant proportion holding master's degrees, indicating a highly educated cohort. Notably, many FLNMs are charge nurses, reflecting their extensive experience and commitment to enhancing their leadership competencies. The study found no significant correlation between age and FLNM competencies, suggesting that competence is not solely contingent upon years of experience or age ($p > 0.05$). The research revealed that the highest to the lowest significance in FLNM performance were leadership training ($b = 21.15$, 95% CI = 7.70-34.60, $p = 0.002$), gender-based disparities ($b = 16.50$, 95% CI = 4.41-28.58, $p = 0.008$) and social status ($b = 7.86$, 95% CI = 1.13-14.60, $p = 0.02$), respectively.

Conclusion: FLNMs exhibit high competence, influenced by leadership training, gender disparities, and social status. The research highlights the need for tailored training and support programs to improve the competencies of FLNMs in Jordan's healthcare system, highlighting gender-based differences and the need for personalized healthcare management strategies to improve healthcare quality.

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1. Introduction

First-line nurse managers (FLNM) is a term that refers to broad positions in health care systems, such as head nurse, charge nurse, in-charge nurse, senior nurse, and counter nurse (Gunawan & Aunguroch, 2017). First-line nurse managers play a crucial role in operating the nursing services by adopting staff management (Lee & Cummings, 2008), estimating the unit budget, and dealing with challenges and conflicts (Richey & Waite, 2019). However, the ability of the FLNM to deal with different issues at a synchronized time required further revisions.

One area that requires further revision is the FLNM's ability to effectively manage staff. Staff management involves tasks such as scheduling, assigning duties, and ensuring adequate staffing levels (Klaes, 2018; Solbakken et al., 2020). It also includes supporting and developing the nursing staff through mentoring, training, and performance evaluations. The FLNM must be able

to effectively communicate with and motivate the staff, address any performance issues or conflicts that arise, and create a positive and cohesive work environment (Gunawan et al., 2023; Smama'h et al., 2023). Additionally, the FLNM must have the skills to estimate the unit budget accurately. This involves analyzing the unit's needs, forecasting expenses, and making budgetary decisions that align with the goals and objectives of the organization (Aydas et al., 2022; Choi et al., 2022). The FLNM should also have strong problem-solving skills to identify cost-saving opportunities and optimize resource allocation (Saporito et al., 2023; Xu et al., 2023). It is crucial for the FLNM to collaborate with other department heads and stakeholders to ensure that the unit's budget aligns with the overall financial goals of the organization (Solbakken et al., 2018; Vasset et al., 2023). By effectively managing the unit budget, the FLNM can ensure that the necessary resources are available to provide high-quality patient care and maintain a well-functioning nursing unit.

Within a dynamically reformed healthcare system such as that which exists in Jordan, there is a need to describe the competencies required of FLNMs. First-line nurse managers are tasked with balancing their resources to meet administrative requirements (policies, procedures) and their staff's needs to provide appropriate patient care (Saaweh, 2018; Shuman et al., 2020). There is still a need to determine whether or not FLNMs in Jordan are capable of handling all of these responsibilities. That makes it more difficult to improve their credentials so they can deal with these challenges or figure out which training programs are necessary (Isobe et al., 2020).

A previous systematic review found that educational level, gender, age, managerial experience, training, and role influence FLNM competence (Gunawan et al., 2018). Some studies proved that educational level, age, training, and role significantly impact managerial competence. However, two studies revealed that gender does not influence managerial competence (Gunawan et al., 2021; Liou et al., 2022). Thus, it is important to investigate those factors in the context of Jordanian FLNM. Despite this, no study is currently investigating the FLNM competencies in Jordan. As a result, this particular study aimed to evaluate the FLNM competence and its influencing factors in the hospitals located within the Hashemite Kingdom of Jordan. Evaluation of the FLNM competencies will significantly impact Jordan's efforts to develop its health care system further.

2. Methods

2.1. Research design

This cross-sectional study evaluated FLNM competence and its factors using a one-time measurement. The FLNM measurement tool was administered online, and samples of FLNMs were collected from public hospitals in Jordan.

2.2. Setting and samples

The total number of hospitals in the middle area of Jordan is seven, and the number of FLNM is estimated to be around 550 nurses (Ministry of Health, 2019). The middle area of Jordan was chosen because it covers several important areas and the capital of Jordan. According to these premises and by utilizing the G*power software (Kang et al., 2015) on the test family exactly with a power of 95% and effect size of 0.3, the estimated sample size was 115. The online formats were sent to 200 FLNMs, and 130 responses were collected. Inclusion criteria were FLNM, which included senior counter and head nurses with at least one year of experience in their position and an understanding of English. FLNMs were excluded if they were not facing the patient directly.

2.3. Measurement and data collection

The current study adopted the FLNM questionnaire developed and tested on Indonesian nurses (Gunawan et al., 2019). The scale consists of 43 items categorized into seven dimensions: applying quality care improvement, self-management, leadership, facilitating spiritual nursing care, utilizing informatics, staffing and professional development, and financial management. A 5-point rating scale was used (5-Always, 4-Quite often, 3-Sometimes, 2-Once in a while, and 1-None of the time). Based on similarities in the public health care systems in both Jordan and Indonesia, the authors agreed to adopt the same instrument in the English language. The tool is available in Bahasa Indonesian and English, as the English language is the professional language for communication among nurses in Jordan (Khalaf, 2013) and all nurses have to show a minimal level of competencies in reading, writing, and understanding the English language. The study

adopted the original English format with the help offered on the online survey in case any explanation is required from the author. The reliability of the tools employed in this study yielded an alpha coefficient of 0.91, and the I-CVI values for each item ranged from 0.81 to 1, while the S-CVI/Ave was 0.976 and the S-CVI/UA was 0.859 (Gunawan et al., 2019), deemed acceptable within the realm of nursing research.

The instrument creator approved its utilization in the current study. Subsequently, a questionnaire was meticulously organized by integrating demographic questions with the FLNM competency instrument hosted on Microsoft Forms for data collection. Sample selection involved a random process, wherein random numbers ranging from 01 to 20 were drawn and matched with the corresponding positions of FLNM within the administrative records of each hospital's director of nursing. Subsequently, the questionnaire access link was exclusively distributed to the selected staff members, who received it via their official e-mail addresses. The data collection phase commenced on 12 March 2023 and concluded on 22 June 2023.

2.4. Data analysis

The data were analyzed by using univariate and bivariate analysis. Univariate analysis comprised numerical data (Mean, median, mode, SD) and categorical data (percentage and proportion). Pearson correlation was used to measure the age, experience as FLNM, and FLNM competency score. The differences among variables were tested to support the impact factors. The data had a normal distribution, as shown by the skewness and kurtosis values being lower than 3 (Mishra et al., 2019). In addition, the homogeneity showed that the variance was equal ($p > 0.05$) (Otsu & Taniguchi, 2020). An Independent t-test was conducted to check the different gender and leadership training to FLNM competency. Analysis of variance to explore FLNM competency score among hospitals, positions, and social status, was conducted. Multiple linear regression was also done to investigate the impact of those factors.

2.5. Ethical considerations

Ethical clearance was approved by the Notational Ethics Committee of the Institutional Review Board (IRB) in the Ministry of Health under approval number (MBA/ERC/21739). The ethical principles were applied during the study by providing complete information about the study, including the benefits and the risks of the study, voluntary participation, freedom to withdraw during data collection, confidentiality of information, and maintaining justice. The informed consent presented information about the research team, the purpose of the study, and the expected benefits. The informed consent was presented in the English language.

3. Results

A total of 130 FLNMs actively participated in this survey, representing a commendable response rate of 65% out of the 200 FLNMs initially contacted via e-mail. A noteworthy observation is that most respondents, constituting 78%, hailed from remote hospitals, while 30% originated from the Amman region, and the remaining respondents were affiliated with Z hospital.

3.1. Social demographical characteristics of the participants

The respondents' average age was 37.8 years, with a standard deviation of 5.47. Additionally, the survey revealed that 74.15% of the participants held master's degrees, and 60% were employed in peripheral hospitals. A significant portion, accounting for 64.60%, reported working in medical-surgical inpatient units. Furthermore, the marital status of the respondents indicated that 76.15% were married, with an average of 4.06 dependents relying on their support, including children and parents.

Regarding their professional roles, the study unveiled that a substantial cohort of 84 individuals served as charge nurses (senior of counter). These experienced nursing professionals displayed an average of 11 years of experience in the nursing field, with a mean tenure of 7.05 years in their current positions. Notably, most respondents reported having undergone leadership training, as elaborated in Table 1, highlighting their unwavering commitment to augmenting their leadership competencies in the realm of nursing.

Table 1. Social demographical characteristics and FLNM competency score of the participants (n=130)

Sample Characteristics	f	%	M	SD
Age			37.8	5.47
Gender				
Male	58	44.6		
Female	72	53.4		
Educational Level				
PhD	2	1.5		
Master	97	74.6		
BSN	15	11.5		
Diploma	18	13.8		
Hospital				
X	15	11.5		
Y	99	76.2		
Z	16	12.3		
Unit scope of service:				
Medical-Surgical	78	60 %		
Intensive care	84	64.60%		
Outpatient	24	18.46		
Emergency	22	16.92		
Social Status				
Single	18	13.84		
Married	99	76.15		
Divorced	9	6.92		
Widowed	4	3.07		
Number of dependents			4.06	2.67
Position				
Charge nurse (Senior counter)	84	64.6		
Head nurse	24	18.46		
Nurse manager	22	16.92		
Experience in nursing before the current position (Years):			11	7.32
Experience in the current position (Years)			7.05	7.32
Leadership training in the last two years				
Yes	94	73.3		
No	36	27.7		
FLNM competence score			138.4	37.26

Notes: f=Frequency, %=Percentage, M=Mean, SD=Standard Deviation

As shown in Table 1, the overall FLNM competency score based on the questionnaire was found to have a mean score of 138.4 and a standard deviation of 37.26.

3.2. Correlation between age, experience as FLNM, and FLNM competency score

Further analysis, as delineated in Table 2, revealed no significant correlations between age ($r=-0.08$, $p=0.36$), the number of dependents ($r=-0.1$, $p=0.25$), prior experience ($r=0.04$, $p=0.59$), or current administrative position experience ($r=0.04$, $p=0.64$). However, a noteworthy gender disparity emerged in the FLNM competency scores.

Table 2. Correlation between age, experience as FLNM, and FLNM competency score

Variables	FLNM competency score	<i>p</i>
Age	-0.80	0.36
Number of dependents	-0.10	0.25
Experience before being FRLNM	0.04	0.59
Current experience as FLNM	0.04	0.64

Note: *Significance of correlations ($p<0.05$)

3.3. Differences in gender and leadership training variables related to FLNM's competence

Table 3 illustrates this discrepancy, with female FLNMs achieving significantly higher scores on average ($M=146$) in comparison to their male counterparts ($M=127$) ($t(128)=2.96$, $p=0.002$). Similarly, a significant difference was observed among those managers who had undertaken administrative leadership training in the last two years ($t(128)=3.41$, $p=.001$).

Table 3. Differences in gender and leadership training related to FLNM competency

Variables	FLNM Competency				
	M	SD	t	p	df
Gender					
Male	127.96	32.72	2.96	.002*	128
Female	146.68	38.75			
Leadership training					
Yes	145.07	38.89	3.41	.001*	128
No	121.08	25.89			

Note: *Significance $p<0.01$, t-test analysis

Employing an ANOVA test, the research findings underscored substantial differences concerning social status ($F=7.06$, $p<0.01$). Conversely, no significant variances were observed concerning professional positions and hospital affiliation, as displayed in Table 4.

Table 4. Analysis of variance regarding FLNM competency score among hospitals, positions, and social status

Variables	FLNM Competency Score				
	Sum of Sq	Df	Mean Sq	F	Sig
Hospital					
Between groups	970.56	2	485.28	.35	.70
Within groups	178205	127	1403		
Position					
Between groups	18843.46	10	1884.43	1.39	.19
Within groups	160332.40	119	1347.33		
Social status					
Between groups	17892.93	2	8946.46	7.06	.001**
Within groups	161282.94	127	1269.94		

Note: *Significance $p<0.01$, ANOVA

3.4. Factors influencing FLNM competency score

The analysis further revealed that 16% of the FLNM competency score was influenced by leadership training ($b=21.15$, $95\%CI=7.70-34.60$, $p=0.002$), gender-based disparities ($b=16.50$, $95\%CI=4.41-28.58$, $p=0.008$) and social status ($b=7.86$, $95\%CI=1.13-14.60$, $p=0.02$) (Adjusted $R^2=0.16$) (Table 5).

Table 5. Analysis results of factors influencing FLNM competency score

Variable	Beta	SE	95% CI		B	p
			LL	UL		
Gender	16.50	6.108	4.41	28.58	.22	.008*
Social status	7.86	4.40	1.13	14.60	.19	.02*
Leadership training	21.15	6.80	7.70	34.60	.25	.002*
R^2	0.18					
Adjusted R^2	0.16					

Note: *Indicates significance $p<0.05$

4. Discussion

By throwing light on FLNM competencies and factors within the context of Jordan's healthcare system, this study aims to fill a large knowledge vacuum that has been identified. Based

on the results of the questionnaire, it was discovered that the overall FLNM competencies score had a mean score of 138.4, with a standard deviation of 37.26. The previous study found lower scores in Egypt Hospital (124.16 ± 41.07) (Ahmed & Abd-ElGhani, 2021). There is no substantial association between FLNM competency and factors such as age, the number of dependents, or experiences. A substantial disparity was noted in terms of gender and the number of individuals who had participated in administrative leadership training during the past two years. In the meantime, no discernible differences were found regarding professional roles or hospital affiliation. In addition, the FLNM competency score was affected by a model that took into account gender, socio-economic position, and participation in a leadership training course.

FLNMs constitute a pivotal force within healthcare systems worldwide, serving as the linchpin that drives the intricacies of the healthcare machinery (Kagan et al., 2021). In this context, our current study delves into the competencies of FLNMs within the unique framework of Jordan's healthcare system. In this landscape, these professionals are tasked with navigating an intricate web of administrative demands, patient care obligations, the prevailing nursing shortage, and resource constraints (Choi et al., 2022). Given the paucity of research into FLNM competencies in the Jordanian context, this study stands as a significant contribution to our understanding of this crucial role and its potential implications for healthcare enhancement as the first study to adopt the current measurement tool in Jordan and the first adoption for the current tool among Arabic health care system.

Within the sample of FLNMs under investigation, it is notable that a relatively youthful demographic emerged when compared to their counterparts in other regions, such as Indonesia and Canada, where FLNMs tend to skew older (Brousseau et al., 2019; Gunawan et al., 2018). There are several antecedent factors for getting the younger generation into managerial positions in Jordan compared to other nations as the younger populations the nursing immigration to the Gulf (AbuAlRub et al., 2013) or Western countries, which puts the liner managerial in Jordan in changing conditions. This shows the need for additional monitoring of the actual status of the nursing managerial competencies in the first line.

Furthermore, a substantial proportion of these FLNMs possessed master's degrees, signifying a high level of educational attainment within this cohort. However, it is imperative to recognize that multiple factors converge to facilitate an individual's transition into the FLNM role (Gonzalez-Garcia et al., 2021). These encompass personal readiness, hospital policies, and the creation of conducive working conditions. Given the financial and social incentives associated with FLNM positions, nurses may be more motivated to invest considerable effort in striving for these roles. Also, the competencies at FLNM enhance the nursing chance for working abroad and additional chances for economic advancements (Hussam & Alnjadat, 2022).

A noteworthy revelation in this study pertains to the unwavering commitment of FLNMs toward augmenting their leadership proficiencies, as substantiated by their enthusiastic participation in leadership training initiatives. This commitment aligns seamlessly with the evolving expectations placed upon FLNMs as they endeavor to harmonize their managerial obligations with the imperative of delivering exceptional patient care (Mudd et al., 2023). The impact of leadership training and related efforts appears to wield substantial influence over FLNM competencies, with gender and social status falling beyond the purview of these factors. Also, there are additional cultural factors in Jordan as part of Arabic traditional culture, which values leadership power and the need to control others to be a committed leader (Smama'h et al., 2023). However, caution must be exercised in ascribing causality to these associations between training and competencies. It would be imprudent to hastily infer that the reported commitment to leadership training unilaterally translates into enhanced competencies, as various agencies administer training programs for diverse purposes (Pursio et al., 2023). Additionally, the lack of standardized nursing training programs tailored specifically to FLNM competencies further complicates any causal assertions, as indicated in a personal communication with the general secretary of the Jordan Nursing Council. Nonetheless, the observed variations in competency levels serve as a valuable foundation for future investigations and interventions to advance the professional development of FLNMs.

Surprisingly, our study did not identify a significant correlation between age and FLNM competencies, implying that competence is unrelated to years of experience or age. Conversely, our study unveiled substantial gender-based disparities in FLNM performance. Female FLNMs exhibited notably higher competency scores than their male counterparts, suggesting the need for

in-depth exploration into the factors contributing to this gender disparity. Importantly, this gender-based impact on competencies needed to be evident in previous studies (Penconek et al., 2021). The current results may be influenced by cultural aspects within the Jordanian context, the unique nature of the healthcare system, or evolving societal norms concerning the roles of females in nursing—an area ripe for further exploration, particularly as the role of women in the nursing context continues to evolve across generations. These salient findings illuminate the intricate and multifaceted nature of FLNM positions, which are subject to numerous influencing factors within the healthcare system. These results unmistakably underscore the critical influence of socioeconomic determinants on FLNM skills, inspiring a comprehensive investigation into the intricate web of variables that underlie these connections (Ulrich et al., 2019). It is essential to emphasize that these results deviate from the trends observed in previous research (Herttuala et al., 2023), underscoring the distinctiveness and novelty of this study's contribution to the field. The Jordanian context's unique characteristics, nurses' perceptions of the FLNM role, and the implications for the broader healthcare landscape warrant further exploration.

5. Implication and limitations

This research fills a significant information vacuum by shedding light on First-line Nurse Managers' (FLNMs) competencies in Jordan's complex healthcare system. The findings strongly underscore the need for targeted training and support programs to improve FLNM capabilities and Jordan's healthcare quality. Our study revealed gender-based differences that require more research to achieve gender equality in nursing leadership and professional progress. Furthermore, our study's findings can inform Jordan's healthcare policy and best practices, not just academically. These findings benefit healthcare workers and patients because better healthcare management improves patient care and system efficacy. Only through concentrated study and legislative action can we optimize FLNMs' contributions to healthcare.

Despite this study's value, its limitations must be acknowledged. First, cross-sectional research limits the demonstration of causal relationships. This methodology, although efficient, may be subject to limitations such as potential social desirability bias and the absence of follow-up assessments. FLNM competencies and correlations have been measured; however, we cannot prove causation. Self-reported data may add social desirability bias because participants may have felt driven to portray themselves as knowledgeable, good, or professional leaders. Online data collection is successful, but it may limit the amount of information. We could not follow up or review responses in person. These constraints emphasize the need for caution when evaluating results and suggest that future research should examine FLNM abilities in Jordan in greater detail, employ more trustworthy study designs, and account for potential biases since Jordan has no FLNM framework.

6. Conclusion

This study addresses a significant knowledge gap by providing preliminary insights into FLNM competencies within Jordan's healthcare system. The findings revealed that FLNMs show a high level of competence, which is affected by leadership training, gender-based disparities, and social status. This study underscores the need for tailored training and support programs to enhance FLNM capabilities, ultimately improving healthcare quality in Jordan. The gender-based differences observed warrant further investigation to promote gender equality in nursing leadership roles. Additionally, the significant variations among FLNMs based on social status, professional positions, training attendance, and hospital affiliations emphasize the need for personalized healthcare management and leadership development strategies. These insights can inform policy formulation and guide best practices within Jordan's healthcare sector, benefiting both healthcare professionals and their patients. Other factors, such as roles, leadership type, and leadership skills, could be explored for further studies. In addition, a bigger sample size across Jordan could generalize the results.

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Author contribution

ASI: conceptualization (lead), methodology (lead), writing-original draft (lead), data collection (lead) review (lead) and editing (lead); SM: conceptualization (supporting), data collection (lead), data analysis(lead), and writing-developed draft (supporting); YA: review (lead), discussion (equal) and writing-developed draft (supporting); JG: review (equal), discussion (equal) and writing-developed draft (supporting); IGJ: review (equal), discussion (equal), writing-developed draft (supporting) and editing (lead).

Conflict of interest

We declare that there is no conflict of interest.

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ORIGINAL RESEARCH

Spiritual Leadership Enhances Caring Behaviour: The Mediating Role of Calling



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Abstract

Background: Caring behaviour is essential for patient health; however, it is often not practised optimally. Therefore, spiritually-based leadership is required to encourage this behaviour. Unfortunately, research investigating the ability of spiritual leadership to enhance caring behaviour through spiritual well-being is limited.

Purpose: This study aimed to examine the impact of spiritual leadership and spiritual well-being in the form of calling and membership on caring behaviour.

Methods: This study employed an explanatory quantitative design with a cross-sectional approach. One hundred fourteen inpatient nurses who provided comprehensive patient care were selected using a total sampling technique. Data were collected using the Spiritual Leadership Questionnaire and the Caring Behaviours Inventory. The analysis adopted partial least squares structural equation modelling (PLS-SEM) using a second-order reflective-formative model.

Results: The findings demonstrate that spiritual leadership has a significant direct effect on caring behaviour ($t=3.976$, $p=0.000$), calling ($t=4.672$, $p=0.000$), and membership ($t=2.845$, $p=0.005$). However, the direct impact of membership on caring behaviour was insignificant ($t=1.298$, $p=0.194$). Calling proved to mediate the effects of spiritual leadership on caring behaviour ($t=3.145$, $p=0.002$), while membership could not function as a mediator ($t=1.197$, $p=0.231$).

Conclusion: This study emphasizes the importance of spiritual leadership in nursing care, particularly in enhancing nurses' caring behaviours. Healthcare organizations should implement training programs on spiritual leadership to encourage calling nurses to perform their duties with dedication. Developing nurse membership should be considered, but the main focus must be on strategies that strengthen nurses' calling, as this is an essential factor in providing quality and empathetic care.

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1. Introduction

The contribution of nurses to the overall functioning of hospitals is of utmost importance (Zoromba & Emad, 2021). These individuals' responsibilities encompass attending to patients' healthcare needs, administering nursing care, and overseeing various duties within a fiercely competitive healthcare setting (An et al., 2020). Throughout the day, nurses engage in multiple interactions with patients, and the compassionate demeanour exhibited by nurses significantly influences the standard of nursing care, ultimately resulting in exceptional service (Adams, 2016; Antón-Solanas et al., 2022). According to Abdurrouf et al. (2022), a positive correlation exists between patient satisfaction and the alignment of nursing treatment with caring principles.

The concept of nurse-caring behaviour pertains to establishing a connection between nurses and patients rooted in fundamental human values, such as compassion and empathy (Turkel et al., 2018). Cultivating optimal caring behaviour has been shown to enhance patient trust and competence, leading to improvements in service quality and patient safety (Abdurrouf et al., 2022). Alternatively, in the absence of appropriate caring behaviour, there is a potential decline

in the quality of nursing services (Sitzman et al., 2019), as well as a negative impact on individual health and well-being (Alligood, 2021; De Chesnay & Anderson, 2019). Furthermore, manifesting caring behaviour establishes a conducive atmosphere that cultivates a constructive rapport between the healthcare professional and the individual receiving care. This condition will engender a sense of comfort and acknowledgment in patients (Watson, 2021).

Caring conduct is an integral part of care delivery and plays a vital role in enhancing patient health. However, its implementation looks to be suboptimal. Several study findings reflect this, demonstrating that nurse caring behaviour still needs to be improved. According to Oluma and Abadiga (2020), the proportion of nurses with robust and caring behaviour perceptions is low. Kibret et al. (2022) discovered that nurse-caring behaviour was unacceptable and that a supportive work environment, adequate time, and resources are required to improve nurse-caring behaviour. Similarly, Handayani and Kuntarti (2022) said there are continuous challenges in Indonesia connected to low nurse caring behaviour. Several approaches, including leadership, are required to increase nurse caring behaviour in healthcare organizations.

The role of leadership in an organization's capacity to adapt to change and attain sustainability has been widely acknowledged (Hughes et al., 2018; Lee et al., 2020; Subhaktiyasa & Sintari, 2024). The influence of leadership on all facets of an organization is a critical and pivotal factor (Alblooshi et al., 2021; Subhaktiyasa, 2023). Crosby and Bryson (2018) and Rudolph et al. (2018) show that leaders can motivate and guide individuals toward attaining common objectives. Therefore, within the realm of nursing management, the implementation of effective leadership practices has the potential to inspire and direct nurses toward the demonstration of exemplary caring behaviour while simultaneously cultivating a professional atmosphere that is conducive to the provision of optimal patient care (Huber, 2017). It underscores the necessity of a leadership approach emphasizing good, humanistic conduct rooted in ethical and moral principles. The importance of spiritual leadership becomes evident in light of the abovementioned factors and the prevailing global diversity issues (Subhaktiyasa et al., 2023).

Although recent studies suggest that spiritual leadership can provide benefits in improving care and overall well-being (Hidayat et al., 2019; Ribeiro et al., 2021; Wu & Lee, 2020), empirical evidence explicitly exploring its impact on caring behaviours is limited. Oh and Wang (2020) noted that most existing studies have not profoundly explored the mechanisms linking spiritual leadership to caring behaviour in healthcare settings. Previous studies have only provided an overview of the benefits of spiritual leadership in a broader context. According to Yang and Fry (2018), Fry et al. (2016) and Subhaktiyasa (2024), spiritual leadership can play a crucial role in assisting nurses in comprehending their goals and missions, fostering a connection and involvement with patients, and delivering care that addresses the spiritual, emotional, physical, and psychological well-being of patients. It can result in nurses practising effective, caring behaviours and improving patients' health and quality of life. Spiritual leadership provides direction based on strong moral and spiritual values, enhancing nurses' spiritual well-being and strengthening their caring behaviour. Hence, there is a need for further research that fills this gap to understand the more concrete impact of spiritual leadership on nurses' caring behaviour.

The comprehension of the notions of calling and membership is crucial in gaining insight into the influence of spiritual leadership on the caring behaviour exhibited by nurses. Calling is described as a nurse's belief in pursuing a higher purpose and mission in providing patient care. On the other hand, membership relates to a nurse's sense of belonging and engagement with patients and fellow nurses, which fosters a sense of belonging in the nursing community (Baixinho et al., 2022; Kallio et al., 2022; Ricciardi & Shofer, 2019; Ziedelis, 2018). Hence, spiritual leadership in the context of nurses' caring behaviour is paramount in enhancing the overall quality of care inside healthcare institutions. Nevertheless, research on the capability of spiritual leadership to enhance caring behaviour through the dimension of spiritual well-being is limited and requires further exploration. Currently, no studies comprehensively integrate spiritual leadership, spiritual well-being, and caring behaviour in one holistic research model, which provides a deeper understanding of the role of spirituality in nurses' caring behaviour. Findings from previous studies indicating low levels of caring behaviour among nurses point towards further exploring the spiritual aspect of nursing care. Therefore, the primary objective of this study is to investigate the impact of spiritual leadership on caring behaviour, focusing on the dimensions of calling and membership. The results of this study are expected to enrich the academic literature and provide practical guidance for health managers in implementing spiritual

leadership to create a more humanistic work environment that supports optimal caring behaviour.

2. Methods

2.1. Research design

This study used an explanatory quantitative design with a cross-sectional approach to examine the effect of spiritual leadership on nurses' caring behaviour, considering the calling and membership dimensions as mediating variables. This design was chosen as it allows for predicting cause-and-effect relationships between predetermined variables and measuring and analyzing data numerically through hypothesis testing (Hair et al., 2019). This approach is also appropriate for exploring how spiritual leadership influences nurses' spiritual well-being and caring behaviour by providing robust empirical evidence through multivariate statistical analysis (Hair et al., 2021).

Figure 1 illustrates the conceptual framework employed in this investigation. The hypotheses of this study are derived from the theoretical overview, relevant research findings, and the specified framework (Baixinho et al., 2022; Fry et al., 2005; Fry et al., 2016; Kallio et al., 2022; Yang & Fry (2018), including H1: Spiritual leadership has a significant positive effect on caring behaviour; H2: Spiritual leadership has a significant positive effect on calling; H3: Spiritual leadership has a significant positive effect on membership; H4: Calling has a significant positive effect on caring behaviour; H5: Membership has a significant positive effect on caring behaviour; H6: Calling mediates the influence of spiritual leadership on caring behaviour; and H7: Membership mediates the influence of spiritual leadership on caring behaviour.

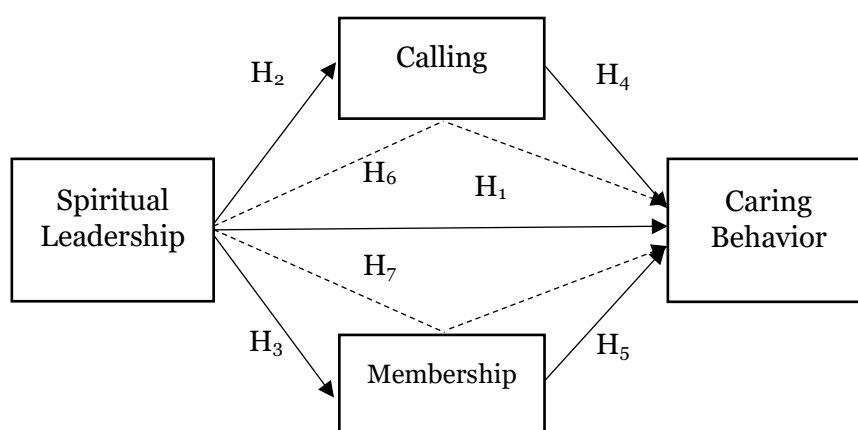


Figure 1. Research framework model

2.2. Setting and samples

This study was conducted at a government hospital in Denpasar, Bali, Indonesia. The facility is one of the leading referral hospitals in the region, providing comprehensive care services for both inpatients and outpatients. The context of this study focused on nurses serving in inpatient care units, which offer a range of healthcare services such as observation, diagnosis, therapy, medical rehabilitation, and other medical interventions. A total of 114 nurses working in inpatient care units of hospitals were selected as the target population in this study based on their extensive exposure to patients with various medical conditions, which provides a comprehensive view of the influence of spiritual leadership on caring behaviour. Sample determination refers to non-probability sampling with a purposive sampling technique through the total sampling process (Creswell & Creswell, 2018; Narayan et al., 2023). Inclusion criteria for this study included nurses who had worked in the inpatient care unit for at least one year and were willing to participate. Exclusion criteria were applied to nurses who were on leave or off duty during the data collection period. The hospital was approached through coordination with the management to obtain permission and ensure full support in the data collection process. All study participants were explained the purpose of the study and their rights as respondents before the data were collected. The sample size of 114 was appropriate for multivariate research based on the inverse square root method, which considers the power of the statistical test, the path coefficient, and the significance

level (Kock & Hadaya, 2018). This number has met the statistical power of 80% with a path coefficient level of 0.21 - 0.3 and a significant level of 1%, as shown in Table 1 (Hair et al., 2021).

Table 1. Minimum sample sizes for different levels of minimum path coefficients (ρ_{\min}) and a power of 80%

ρ_{\min}	Significance level		
	1%	5%	10%
0.05–0.1	1004	619	451
0.11–0.2	251	155	113
0.21–0.3	112	69	51
0.31–0.4	63	39	29
0.41–0.5	41	25	19

2.3. Measurement and data collection

The variables in this study included spiritual leadership (X1) as the independent variable, calling (M1) and membership (M2) as the mediating variables, and caring behaviour (Y) as the dependent variable. The operational definition of spiritual leadership refers to a collection of ideals, attitudes, and behaviours that catalyze an individual's and others' intrinsic motivation. The variable in question was evaluated utilizing the Spiritual Leadership Questionnaire developed by Fry et al. (2005). This questionnaire comprises three distinct dimensions, namely vision (X1), faith/hope (X2), and altruistic love (X3), each consisting of a total of 14 indicators. The attribute of calling is a fundamental quality nurses hold in high regard and employ to inspire themselves and their colleagues in fulfilling necessities. Membership can be characterized as the subjective experience of being comprehended, esteemed, and integrated within a group or network in a professional setting. Calling was measured through 4 indicators, and membership through 5 indicators by Fry et al. (2005). The caring behaviour variable, defined as the acts performed by nurses to deliver care that aligns with the needs and preferences of patients to improve and restore their health, was assessed using the Caring Behaviours Inventory. This inventory, developed by Wolf et al. (1994), consists of 42 items.

All questionnaires in this study have been translated into Indonesian and measured using a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). This scale was chosen to provide sufficient response variation and support in-depth statistical analysis (Wang & Krosnick, 2020). The construct validity results of these translated tools were tested through measurement evaluation using the PLS-SEM method, which includes convergent validity, discriminant validity, and reliability. The measurement model evaluation results show that convergent validity has been achieved, as indicated by the outer loading value exceeding 0.7 and the average variance extracted (AVE) value above 0.5. Discriminant validity also met the criteria, as seen from Heterotrait-Monotrait Ratio (HTMT) value below 0.9. The instrument's reliability also met the criteria with a composite reliability (CR) value greater than 0.7. Thus, all instruments used in this study have demonstrated strong validity and reliability.

Data were collected through in-person visits to nine inpatient wards from December 2022 to February 2023. Nurses were approached based on the inclusion criteria and explained the purpose of the study and the potential benefits of participation. The researcher emphasized voluntary participation and explained how to keep respondents' data confidential. Nurses willing to participate were given informed consent and asked to complete the questionnaire. The researcher also provided detailed guidance on the questionnaire completion methodology to ensure a proper understanding of each question. The data collected were only used for research purposes and could only be accessed by the researcher to maintain the integrity and confidentiality of the information.

2.4. Data analysis

The data underwent analysis using Partial Least Squares Structural Equation Modeling (PLS-SEM) methodology, facilitated using Smart-PLS 3.0 software. The evaluation of the second-order reflective-formative model in this study was conducted by referencing Hair et al. (2019). The initial phase of assessing the measurement model (outer model) entails examining its construct validity, encompassing both convergent and discriminant validity. The assessment of

construct validity in the reflective model involved an examination of the loading value, AVE, HTMT, and CR. On the other hand, the formative model underwent evaluation by considering the external weight and the collinearity among the indicators. The second phase encompasses the assessment of the structural model, also referred to as the inner model, by applying diverse criteria. These criteria include the R-squared value, statistical significance, confidence intervals, and the adequacy of the standardized root mean square residual (SRMR) value (Hair et al., 2019; Hair et al., 2021).

2.5. Ethical considerations

This study was conducted following the established protocol, and ethical clearance was obtained from the Health Research Ethics Committee of Wangaya Regional General Hospital with reference number 070/5697/RSUDW. Participants were given a full explanation of the purpose, procedures, benefits, and potential risks of participating in this survey. Written informed consent was obtained from each participant after they received clear information and understood their rights to withdraw from the study without any consequences. Data collected from participants were kept confidential and used only for this study under the research ethics guidelines. All steps were taken to protect participants' rights and privacy.

3. Results

3.1. Respondent characteristics

Table 2 presents the characteristics of the 114 nurses, of which 14 were male and 100 were female. The age distribution of the participants in the study spanned from 23 to 53 years, with 61 individuals possessing a formal nursing education and 53 holding a diploma in nursing. A total of 12 nurses had accumulated fewer than five years of work experience, while 51 nurses had worked for a duration ranging from 5 to 10 years. Additionally, another 51 nurses had accumulated over 10 years of professional experience.

Table 2. Respondent characteristics

Demographics	Frequency (f)	Percentage (%)
Gender		
Male	14	12.3
Female	100	87.7
Age range (years)		
17 - 25	4	3.5
26 - 35	68	59.6
36 - 45	39	34.2
46 - 55	3	2.6
Latest education		
Diploma	53	53.5
Bachelor and profession	61	46.5
Length of service in years		
< 5	12	10.5
5 - 10	51	44.7
> 10	51	44.7

3.2. Evaluation of measurement model

There are three latent variables: vision, faith/hope, and altruistic love, which are measured using a one-stage approach (first-order construct). Meanwhile, the spiritual leadership variable is a latent variable measured using a two-stage method (second-order construct). The first stage of the outer model assesses the loading, CR, AVE, and HTMT (Heterotrait-Monotrait Ratio of Correlations) values for each item from constructs vision, faith/hope, and altruistic love. Table 3 displays the items of the first-order model that meet the criteria of loading >0.7 , CR value >0.7 , and AVE value >0.5 , as recommended by Hair et al. (2019).

HTMT approaches are utilized to guarantee discriminant validity. The HTMT value is less than 0.90, as demonstrated in Table 4. The initial assessment of validity involved conducting a first-order validity test, which produced latent variable scores for vision, faith/hope, and altruistic

love. These scores were used in the second-order validity test for the spiritual leadership variable, whose results are presented in Table 5.

Table 3. Assessment of the measurement model (first-order)

Indicator	Item	Loadings	CRs	AVE
Vision	I understand and am committed to my organization's vision	0.846	0.963	0.838
	My workgroup has a vision statement that brings out the best in me	0.896		
	My organization's vision inspires my best performance	0.951		
	I have faith in my organization's vision for its employees	0.921		
	My organization's vision is clear and compelling to me	0.957		
Faith/hope	I have faith in my organization, and I am willing to do whatever it takes to ensure that it accomplishes its mission	0.710	0.913	0.678
	I persevere and exert extra effort to help my organization succeed because I have faith in what it stands for	0.871		
	I always do my best in my work because I have faith in my organization and its leaders	0.909		
	I set challenging goals for my work because I have faith in my organization and want us to succeed	0.826		
	I demonstrate my faith in my organization and its mission by doing everything I can to help us succeed	0.786		
	Altruistic love	My organization really cares about its people		
My organization is kind and considerate toward its workers, and when they are suffering, it wants to do something about it		0.702		
The leaders in my organization "walk the walk" as well as "talk the talk."		0.795		
My organization is trustworthy and loyal to its employees		0.878		
My organization does not punish honest mistakes		0.818		
The leaders in my organization are honest and without false pride		0.873		
The leaders in my organization have the courage to stand up for their people		0.845		

Table 4. Assessment of discriminant validity using HTMT (first-order)

	Altruistic love	Faith/hope	Vision
Altruistic love			
Faith/hope	0.813		
Vision	0.797	0.862	

Table 5 presents the results of evaluating the second-order formative model of spiritual leadership variables. The evaluation is based on the outer weight and collinearity between indicators. There are two significant indicators, vision and faith/hope, with p -values less than 0.05. The altruistic love indicator has a p -value of 0.119, greater than 0.05, indicating non-significance. However, the loading factor value for altruistic love is 0.868, which is greater than 0.5, so it is not removed from the model, as Hair et al. (2019) advised. A high loading factor value indicates a robust absolute contribution in explaining the variance of the latent variable, so eliminating these measurement items can reduce the ability of the latent variable to represent the theoretical construct as a whole. Therefore, retaining items with high loading factors despite their insignificant outer weights is essential to maintain the validity and reliability of the overall model.

The outer VIF value assesses the collinearity between the indicators that comprise the spiritual leadership variable. The test results indicate that the VIF values for vision, faith/hope, and altruistic love are 3,099, 3,012, and 2,530, respectively, which are smaller than 5, as referred to by Hair et al. (2019). Hence, it can be concluded that there is no multicollinearity.

Table 5. Assessment of outer weight

Indicator	Original Sample	Sample Mean	Standard Deviation	T Statistics	P-value
Vision	0.467	0.497	0.194	2.410	0.016
Faith/hope	0.368	0.337	0.181	2.039	0.041
Altruistic love	0.254	0.246	0.163	1.560	0.119

The convergent validity of the second-order formative model of the calling, membership, and caring behaviour variables is displayed in Table 6. The evaluation begins with examining the required loading value, which should be above 0.7. The results showed that several indicators in the caring behaviour variable did not meet this requirement and were thus removed from the model. The outer loading value below 0.7 indicates that the indicator is less effective in representing the latent variable because the contribution is weak, so it is removed to maintain the validity and reliability of the model and ensure that only indicators with strong and consistent relationships are retained (Hair et al., 2019).

Table 6. Assessment of the measurement model (second-order)

Variable	Indicators	Loading	CRs	AVE
Calling	The work I do is very important to me	0.907	0.963	0.868
	My job activities are personally meaningful to me	0.952		
	The work I do is meaningful to m	0.968		
	The work I do makes a difference in people’s lives	0.897		
Membership	I feel my organization understands my concerns	0.790	0.944	0.771
	I feel my organization appreciates me and my work	0.780		
	I feel highly regarded by my leadership	0.928		
	I feel I am valued as a person in my job	0.937		
	I feel my organization demonstrates respect for me and my work	0.941		
Caring Behaviour	Attentively listening to the patient	0.779	0.977	0.635
	Helping patient grow	0.748		
	Making the patient physically or emotionally comfortable	0.814		
	Being sensitive to patient	0.823		
	Being patient or tireless with patient	0.828		
	Helping patient	0.814		
	Giving instructions teaching the patient	0.794		
	Being confident with patient	0.781		
	Using soft gentle voice with patient	0.794		
	Watching over patient	0.759		
	Talking with patient	0.762		
	Encouraging patients to call if there are problems	0.746		
	Meeting patient’s stated and unstated needs	0.866		
	Responding quickly to patient’s call	0.839		
	Appreciating patients as human beings	0.875		
	Helping to reduce patient’s pain	0.811		
	Showing concern for the patient	0.824		
	Giving patients treatment and medications on time	0.786		
	Paying special attention to patients during the first time, as hospitalization, treatments	0.735		
	Spending time with the patient	0.783		
	Putting patient first	0.820		
Giving good physical care	0.866			
Touching patients to communicate caring	0.736			
Being hopeful for patient	0.712			

Additionally, the evaluation continued by evaluating the CR value above 0.7, indicating that each indicator measuring the variables of calling, membership, and caring behaviour was consistent and reliable. Finally, the AVE value for each variable was above 0.5, indicating good convergent validity. The HTMT value for each pair of variables is less than 0.90, indicating that this approach has also achieved discriminant validity.

3.3. Evaluation of structural model

The second-order convergent and discriminant validity test findings have satisfied the established standards. Hence, the measurement model (inner model) can be assessed to establish the connections between the latent variables of spiritual leadership, calling, membership, and caring behaviour. The results of this assessment are illustrated in Figure 2.

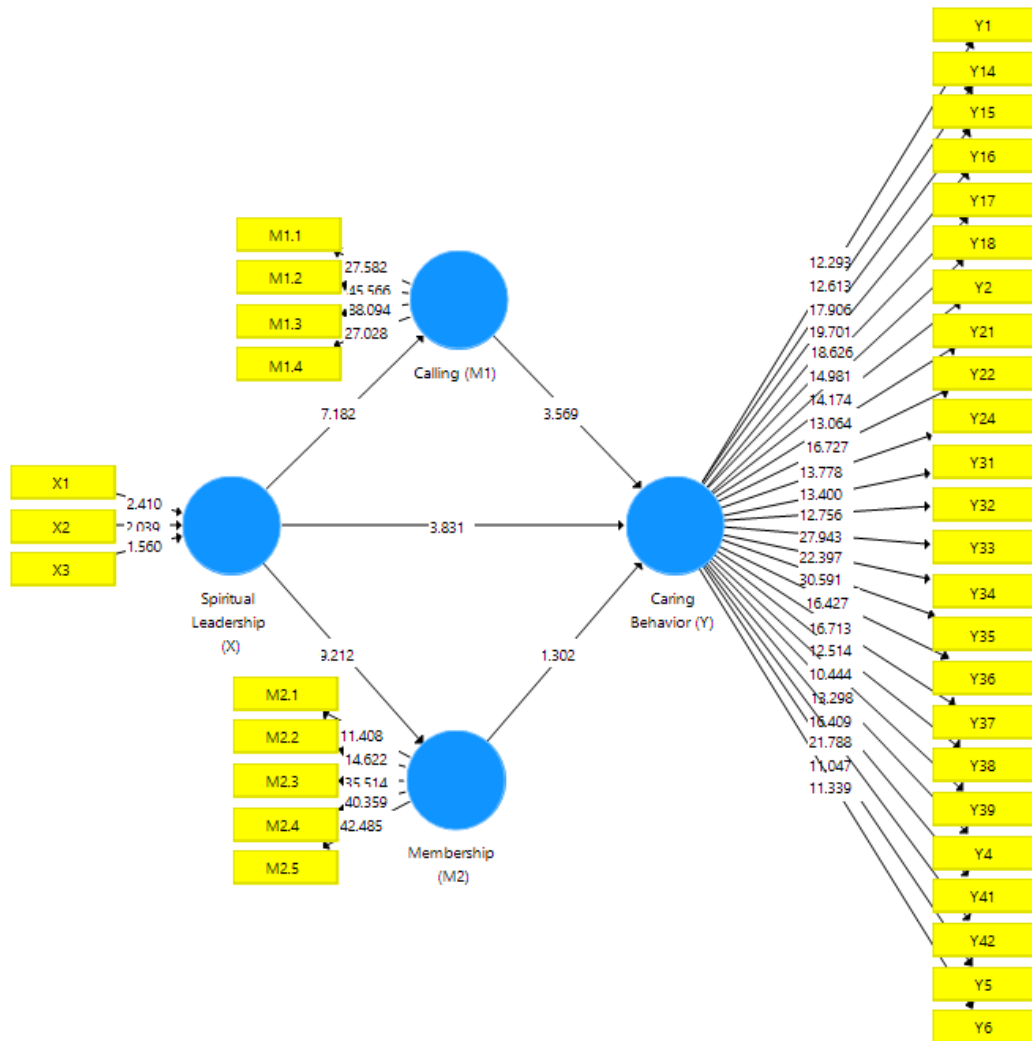


Figure 2. Research measurement model

The goodness of the model, or model fit, is demonstrated by the SRMR value, which should be less than 0.08, according to Hair et al. (2021). The test results show a value of 0.076 or less than the requirement, indicating that the proposed model is consistent with the empirical data. In addition, the R-Square value of calling is 0.342, meaning that spiritual leadership can explain the variability of the calling variable only by 34.2%, which is classified as a weak influence and indicates that other factors may have a more significant impact on the variability in calling. R Square membership is 0.535, indicating that spiritual leadership can explain the membership variable by 53.3%, which is classified as a medium influence. Likewise, the R Square caring behaviour of 0.519 indicates that spiritual leadership, calling, and membership together can explain 51.9% of caring behavior, which is classified as a medium influence. It shows a significant

but not thoroughly dominant contribution. Furthermore, Table 7 presents the direct and indirect impacts among variables to examine the research hypothesis. The direct effect between variables demonstrates a t-statistic greater than 1.97 and a p-value of 0.00 or lower than 0.05, indicating it is considered significant. However, the direct effect between the membership variable and caring behaviour is insignificant, with a t-statistic of 1.298 or lower than 1.96 and a p-value of 0.194 or above 0.05.

Regarding indirect effects, the results indicate that calling can mediate the effect of spiritual leadership on varying behaviour, as indicated by the t-statistic value of 3.145 or greater than 1.97 and the p-value of 0.002 or lower than 0.05. Conversely, membership does not function as a moderator, as indicated by the t-statistic value of 1.197 or lower than 1.97 and the p-value of 0.231 or above 0.05. In addition, spiritual leadership has the highest impact on caring behaviour compared to calling and membership, as evidenced by the original sample value of 0.509.

Table 7. Assessment of path analysis and hypothesis testing

	Original Sample	Standard Deviation	T-Statistics	P-Values	Decision
Spiritual leadership → Caring Behaviour	0.509	0.132	3.852	0.000	H1 supported
Spiritual Leadership → Calling	0.584	0.081	7.208	0.000	H2 supported
Spiritual leadership → Membership	0.731	0.079	9.263	0.000	H3 supported
Calling → Caring Behaviour	0.417	0.115	3.611	0.000	H4 supported
Membership → Caring Behaviour	-0.158	0.122	1.298	0.194	H5 not supported
Spiritual leadership → Calling → Caring Behaviour	0.244	0.077	3.145	0.002	H6 supported
Spiritual leadership → membership → Caring Behaviour	-0.116	0.097	1.197	0.231	H7 not supported

4. Discussion

The study suggests a substantial relationship between spiritual leadership and calling, membership, and caring behaviour variables. The findings of this study support Hypothesis 1, which posits that spiritual leadership has a significant role in fostering nurses' empathic and compassionate disposition, resulting in increased levels of care and concern towards others. Ribeiro et al. (2021) argue that incorporating a spiritual dimension in nursing leadership is necessary within nursing practice. Implementing managers' spiritual leadership can address nurses' spiritual requirements and enhance the implementation of holistic care methods. According to the study conducted by Hidayat et al. (2019), it was observed that the implementation of spiritual leadership in the role of the inpatient room supervisor promotes the development of growth, intuition, and risk management. Subhaktiyasa et al. (2024) also assert that spiritual leadership can increase work motivation and employee performance. Nurses with elevated levels of spiritual leadership demonstrate an increased propensity for displaying caring behaviour and compassion towards individuals. Pio and Tampi (2018) determined that spiritual leadership significantly impacts nurse job satisfaction and organizational citizenship behaviour. This finding suggests that spiritual leadership is crucial in fostering positive and compassionate behaviour among nurses.

The findings of the study confirm Hypotheses 1 and 2, demonstrating that spiritual leadership has a significant and positive influence on both calling and membership in relation to spiritual health. Spiritual leadership facilitates the discovery of a transcendent purpose in life and the attainment of significance in nursing, enabling nurses to discern their vocation and cultivate a profound sense of enthusiasm for their occupation. The findings by Wu and Lee (2020) support the notion that spiritual leadership impacts the spiritual well-being of nurses, specifically in relation to their sense of calling. Spiritual leadership facilitates nurses' comprehension of the societal impact of their profession and empowers them to effect positive change in the lives of others. The findings presented in this study align with the research conducted by Zou et al. (2020),

which emphasizes the significance of leadership in the workplace regarding the impact on nurses' spirituality and subjective well-being.

In the membership context, spiritual leadership is pivotal in fostering improved interpersonal connections. The reason behind the positive impact of spiritual leadership is its ability to facilitate personal growth and the growth of others. Individuals who possess elevated degrees of spiritual leadership have heightened empathy and understanding, enabling the cultivation of more robust interpersonal connections. Additionally, it facilitates a sense of belonging and fosters a stronger sense of affiliation within social collectives, enabling individuals to become integral members of a broader community. This statement aligns with the spiritual leadership understanding proposed by (Fry et al., 2016; Subhaktiyasa, 2024; Subhaktiyasa & Sintari, 2024). These scholars assert that one's sense of purpose and belonging can facilitate attaining spiritual well-being. These findings are consistent with the studies conducted by Fry et al. (2016) and Hunsaker (2016), which validate the capacity of spiritual leadership to foster spiritual well-being, augmenting individual and organizational performance.

Contrary to the initial hypothesis, this study's results reveal no significant effect between the membership variable and caring behaviour. Hypothesis 5 states that membership, defined as an individual's perception of a sense of attachment to a particular group or community, will positively impact caring behaviour. It is assumed that individuals with a strong affiliation with their workplace tend to show a higher commitment to their professional duties and have a sense of responsibility towards coworkers and patients. However, the results of this study are not in line with previous research that emphasizes the importance of membership in strengthening nursing practice (Kim et al., 2022; Peña et al., 2022) and existing literature in the field of organizational behaviour that shows variations in organizational citizenship behaviour based on membership status (Hunsaker, 2016; Subhaktiyasa et al., 2022). Several factors could explain this discrepancy in results. One possibility is that individual personality characteristics, such as introversion or emotional stability, may moderate the extent to which a sense of attachment translates into caring behaviour. In addition, an individual's values and motivations in driving caring behaviour may be more dominant than the influence of group membership, suggesting that some individuals may exhibit high levels of caring independently of a sense of affiliation with the group. The social environment and organizational culture can also play an important role; if the organizational culture does not strongly reinforce or model caring behaviour, the impact of membership on such behaviour may be weakened. Variations in caring behaviour may also be influenced by contextual factors such as workload, stress levels, or organizational support, which could reduce the impact of membership on caring behaviour. Furthermore, this finding supports the refutation of Hypothesis 7, positing that the relationship between spiritual leadership and caring behaviour could be mediated by membership. Additional research should be undertaken to explore the implications of these findings within an organizational environment, specifically focusing on aspects such as organizational culture.

The act of calling within the nursing profession has been found to have a favourable impact on caring behaviour, thus supporting Hypothesis 4. The concept of calling refers to an individual's subjective experience of perceiving a distinct purpose or mission in life that is integral to their sense of self, hence serving as a motivational force that guides their actions in alignment with this purpose (Fry et al., 2016). The nursing profession is often driven by a strong sense of duty and compassion, which can inspire nurses to deliver exceptional levels of care and demonstrate empathy towards their patients. This profession has the potential to provide nurses with a sense of significance and direction in their professional endeavours, and in certain instances, it can assist them in navigating ethical predicaments that may emerge. Multiple research has supported the present study's conclusions, highlighting the significance of communication in nursing (Jung & Kim, 2020; Kallio et al., 2022; H. Kim & Han, 2019; Miller, 2019; Wu & Lee, 2020).

Furthermore, the study demonstrates the significant favourable impact of calling as a mediator, supporting Hypothesis 6. Within the realm of nursing, spiritual leadership has the potential to exert an influence on caring behaviour through the establishment of a professional identity and the cultivation of motivation to align one's conduct with professional principles. The presence of effective spiritual leadership can shape or strengthen the sense of calling among nurses and inspire them to align their actions with the core principles of the nursing profession. The findings presented in this study are consistent with prior research conducted by Wu and Lee (2020), which revealed a positive relationship between calling and work engagement among

nurses in fulfilling their professional obligations. In a similar vein, Han (2020) concluded that communication plays a significant role in facilitating the enhancement of nurses' performance.

5. Implication and limitations

The results of this study highlight the importance of integrating spiritual leadership in nursing practice, particularly in enhancing the expression of compassionate behaviours among nurses. The practical implication of these findings for nursing practice is that healthcare organizations should consider implementing training programs that specifically target spiritual leadership development to foster a sense of calling and membership among nurses. This training could include developing leadership skills that focus on spiritual values, such as empathy, gratitude, and awareness of the meaning of work, which are expected to increase nurses' commitment to patients and the organization. Furthermore, it is important to acknowledge that this study is subject to a constraint in terms of the sample size employed to evaluate the association between variables. While the PLS-SEM test can address this issue, it is recommended that future studies employ a more extensive sample drawn from various healthcare organizations. Additionally, researchers should consider additional variables, such as organizational culture, due to the influence of local wisdom infused with spiritual values.

6. Conclusion

This study examined the influence of spiritual leadership, calling, and membership on caring behaviour. The results indicated an impact between spiritual leadership and caring behavior, where spiritual leadership can increase empathy and compassion and strengthen nurses' understanding of patients' needs. In addition, spiritual leadership also has the potential to enhance the sense of calling and membership, which contribute to the spiritual well-being of nurses in healthcare organizations. Although calling was a significant mediator in the relationship between spiritual leadership and caring behavior, membership did not substantially impact caring behavior. These findings highlight the importance of further research into the role of membership, particularly in the context of an individual's affiliation with a community of shared values and objectives.

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Author contribution

Conception and design (SAKC, NKAS, PGS); Analysis and interpretation of data (PGS, SAKC, NKSA); Drafting the article (SAKC, NKAS, PGS, NLNDWP, NKC, MA); Critical revision of the article for important intellectual content (PGS, NLNDWP, NKC, MA).

Conflict of interest

The authors of this study declare that they have no conflicts of interest.

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ORIGINAL RESEARCH

Prevalence of Persistent Post-Concussion Syndrome in Adults After Mild Traumatic Brain Injury



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Abstract

Background: Although mild Traumatic Brain Injury (mTBI) is one of the primary causes of death and disability worldwide, research on the prevalence of post-concussion syndrome (PCS) after mTBI is still extremely limited. Previous studies have shown that approximately 10-15% of mTBI patients experience PCS, yet these studies often have different methodologies and sample sizes.

Purpose: This study aimed to determine and compare the prevalence of persistent PCS (more than one month post-injury) with those without PCS in mTBI patients.

Methods: This study employed a retrospective cohort design and analyzed patient data from hospital records between July and December 2022, yielding a sample of 316 participants with mTBI. Patients with complete medical record data and active health checks for one month after being treated were taken as research subjects. PCS measurement was conducted using the Rivermead Post Concussion Symptoms Questionnaire (RPQ). Data were analyzed using an independent t-test with a two-tailed distribution to compare variables between groups (groups with PCS and without PCS).

Results: The prevalence of persistent PCS in mTBI patients was 112 (35.4%) patients. The occurrence of persistent PCS was found to be most prevalent in the second month and in motor vehicle accident-related injuries, with 49 (43.7%) patients and 80 (71.4%) patients, respectively. Problems concentrating (37.5%), headache (30.3%), and light sensitivity (32.1%) were the most common symptoms of PCS.

Conclusions: A significant proportion of persistent PCS was found, with the most prevalent occurring in the second month after mTBI and involving motor vehicle-related injuries. These findings warrant better screening guidelines and practices that patients can adopt after mTBI.

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1. Introduction

Most traumatic brain injuries (TBI), accounting for more than 71%, fall into the severe category, and more than 56.4% fall into the mild category (mTBI). The frequency of admission to hospital for TBI is 10–30% (Bo & Pearkao, 2021). Yet, only a minority of persons with mTBI are admitted to the hospital upon attending the emergency room (10–25%). Furthermore, because it excludes people who do not seek or receive medical assistance, emergency department data is likely to underestimate the incidence of mTBI (Balakrishnan et al., 2019; Messé et al., 2013). Following an mTBI, a variety of physical, affective, and cognitive symptoms are frequently brought on, including headaches, depressive symptoms, and memory loss (Cancelliere et al., 2023; Voormolen et al., 2019). These symptoms can be classified as post-concussion syndrome (PCS), which is a common complication that can occur after mTBI.

Post-concussion syndrome (PCS) is a complex condition that can occur after mTBI. The prevalence of PCS after mTBI has been reported to vary significantly, with some studies indicating that approximately 10-15% of mTBI patients experience PCS (Balakrishnan et al., 2019). However, other studies have shown that the prevalence can be as high as 35.4% (Bo & Pearkao, 2021). The duration of PCS symptoms can also vary, with some patients experiencing symptoms up to a year after their injury (Polinder et al., 2018). This variability in prevalence and duration highlights the need for further research into the mechanisms underlying PCS and the development of more specific diagnostic criteria. The symptoms experienced by patients post-TBI vary, with some experiencing more symptom changes after hospitalization in approximately 5% with persistent PCS. Persistent PCS is a condition in which physical, cognitive, emotional, or behavioral symptoms that arise from mild TBI (mTBI) persist longer than usual, typically more than three months after the injury (Yue et al., 2019; Zeldovich et al., 2020).

The role of nurses in preventing persistent PCS in traumatic brain injury (TBI) patients is crucial. Recent studies have shown that nurses can play a part in reducing the risk of PCS by conducting structured interventions (Messé et al., 2013). For instance, nurses can educate and support patients and their families about PCS symptoms and how to manage them (Heslot et al., 2021). Nurses can also monitor patients to detect PCS symptoms early and provide appropriate therapy (Voormolen et al., 2019). Furthermore, nurses can contribute to reducing patient stress through relaxation therapy and education on stress management (Messé et al., 2013). A study conducted by Bo and Pearkao (2021) indicates that nurses with stress management skills can help patients reduce the risk of PCS. Therefore, the role of nurses in preventing PCS is significant in improving the quality of life of TBI patients.

The urgency to focus on persistent PCS in patients with mTBI lies in its significant impact on the quality of life and functional outcomes. Studies have shown that PCS can persist for months or even years after the initial injury, leading to long-term disability and reduced quality of life (Cnossen et al., 2018). For instance, a study by Bo and Pearkao (2021) found that 69% of patients with mTBI retained their jobs at long-term evaluations, yet 12% of these patients had to work under the adverse impacts of PCS. This highlights the importance of addressing PCS early to prevent long-term consequences. Furthermore, the prevalence of PCS is higher than previously thought, with some studies indicating that up to 35.4% of mTBI patients experience PCS (Bo & Pearkao, 2021; Cnossen et al., 2018). This underscores the need for more research into the mechanisms underlying PCS and the development of more specific diagnostic criteria. Previous studies have focused on the prevalence and characteristics of PCS, but there is still a gap in understanding the long-term impacts and the most effective interventions for managing PCS (Balakrishnan et al., 2019).

Initial assessment of post-TBI patients will provide initial information and symptoms indicating a PCS event so that preventive measures can be taken. Thus, the extent to which participants with mTBI exceeded the threshold criteria for a diagnosis of PCS was investigated in the current study. Participants were classified as having PCS when they met all RPQ criteria except the provision of previous head injury. The assessments performed determine early detection in mTBI patients with and without PCS. Accurate early results greatly determine the patient's subsequent condition, which also determines the type of action and care provided (Beauchamp et al., 2021; Cancelliere et al., 2023; Starkey, 2018). It is a good initial step to improve services and perform early detection of mTBI patients.

The research gap in the current understanding of persistent PCS lies in the inconsistent classification and variable assessment procedures used in previous studies. For instance, a study have reported prevalence rates of PCS ranging from 11% to 82%, depending on the diagnostic criteria and population assessed (Balakrishnan et al., 2019). This variability highlights the need for more standardized diagnostic criteria and comprehensive assessment tools. Furthermore, the role of pre- and post-injury factors in the development of PCS is still poorly understood, with some studies suggesting that factors such as depression, anxiety, and post-traumatic stress disorder (PTSD) may play a significant role (Mercier et al., 2018). Therefore, this study aimed to address this gap by using standard diagnostic criteria and comprehensive assessment tools to determine and compare the prevalence and characteristics of PCS with those without PCS in mTBI patients.

2. Methods

2.1 Research design

This study utilized a retrospective cohort design to examine the prevalence of persistent PCS in adults following mTBI. The specific objectives of this study were to determine the prevalence of PCS among adults who experienced mTBI and to identify the demographic and clinical characteristics associated with an increased risk of PCS. This design allows for efficient utilization of existing medical records to identify mTBI cases and monitor their outcomes over a specified 6-month period. This approach is particularly suitable for studying conditions like PCS, where longitudinal data is crucial for understanding symptom persistence and evolution over time.

2.2 Setting and samples

The sample size was calculated using G*power for one sample t-test with an effect size of 0.5 and a standard error of 5% to achieve 95% power, which resulted in 317 samples. Adding 10% of attrition yielded as many as 349 samples. Of 373 recruited m-TBI patients, a sample of 112 mTBI participants with PCS and 204 without PCS who met the inclusion and exclusion criteria was obtained (Figure 1). The sample selection in this study began with patients who had undergone hospital treatment with a diagnosis of mTBI. These patients were then assessed to determine whether they were experiencing PCS.

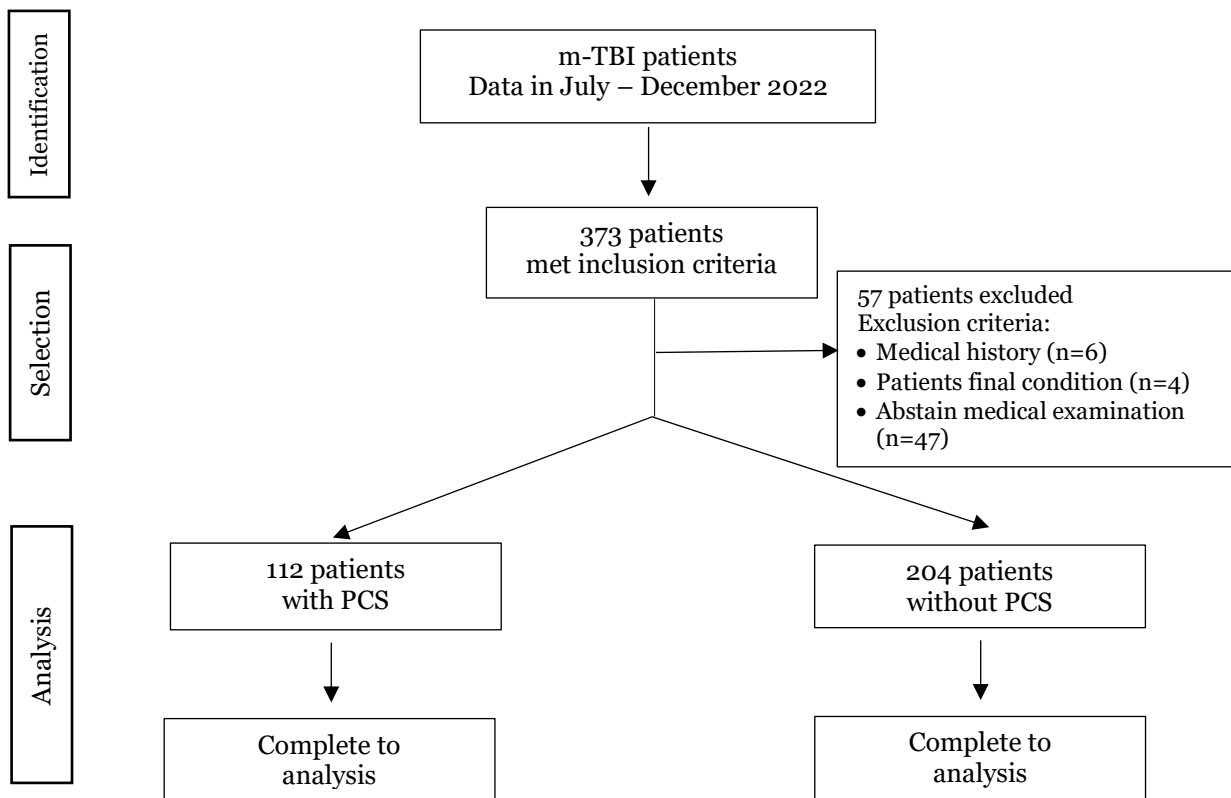


Figure 1. Flowchart of the respondents in the study

This study then employed a consecutive sampling method. All adult patients who presented to the trauma center hospital in Central Java, Indonesia, with a diagnosis of mild traumatic brain injury (mTBI) during the six-month period from July to December 2022 were included in the study. Patients were consecutively enrolled based on the availability of complete medical records and the diagnosis of mTBI. This study was conducted in a trauma center hospital located in Central Java, Indonesia. The hospital is a leading healthcare facility in the region, specializing in the treatment of traumatic injuries, including traumatic brain injuries (TBIs). It is equipped with state-of-the-art medical equipment and staffed by a team of highly skilled healthcare professionals, including neurologists, neurosurgeons, and rehabilitation specialists. The hospital

serves a diverse patient population from urban and rural areas, providing comprehensive care for a wide range of traumatic injuries. The medical record data contained demographic information, the causes of injury, length of stay, and health check compliance after being treated. The criteria for including patients in the sample of this study were patients who had been hospitalized with a diagnosis of mTBI, had complete medical records including health history, final patient condition, and no further examinations. The criteria for excluding patients from the sample were incomplete medical records and undergoing surgical interventions related to head injuries, such as skull fracture removal surgery, and patients with psychiatric problems.

2.3 Measurement and data collection

Data collection in this study was conducted by two nurses working at the hospital, who were subsequently referred to as research assistants. These assistants were responsible for collecting data from patients who had undergone hospital treatment with a diagnosis of mTBI. To ensure they collected data with consistent information, the assistants were trained beforehand on how to collect data correctly and accurately. This training included an introduction to the definition and inclusion and exclusion criteria, as well as instructions on how to fill out the data sheets. To ensure the validity and reliability of the sheets used, this study utilized data sheets that had been tested and verified previously (Cnossen et al., 2018). These sheets were designed to collect relevant and accurate data about the patient's medical history, final condition, and no further health examinations. Interrater reliability in this study was ensured by using previously verified data sheets and training the assistants who collected the data. Moreover, the collected data was processed and analyzed using previously verified methods, employing the Bland-Altman test. The results showed a p-value of 0.905 with a 95% CI of -0.51 to 0.44, indicating that the difference between assistants was much smaller than the maximum tolerable difference. Thus, this study can ensure that the data collected is valid and reliable and the results can be trusted.

Consistency and accuracy in data collection, comprehensive training and standardized procedures were implemented for research assistants involved in the study. These procedures included steps consisting of the development of detailed training materials that were created, including a data extraction manual that outlined the standard protocol, definitions of key variables, and step-by-step instructions for data entry. The manual also provided examples and scenarios to clarify potential ambiguities. Research assistants were given the opportunity to practice data extraction using a sample of medical records. During these practice sessions, they implemented the standard protocol and received direct feedback from the senior researcher. This hands-on approach helped identify and address any issues early in the process. To further ensure consistency, a calibration exercise was conducted. In this exercise, all research assistants independently extracted data from the same set of medical records. The results were then compared, and any discrepancies were discussed and resolved. This process helped align the interpretation and application of the protocol among all team members. Throughout the data collection period, the senior researcher provided ongoing support and oversight. Periodic quality control audits were conducted to ensure adherence to the protocol. A small portion of the data collected was randomly selected and re-evaluated by the senior researcher to verify accuracy and consistency.

The data for this study were extracted from patient medical records at the trauma center hospital in Central Java, Indonesia. To ensure the accuracy and reliability of the data, several verification methods were employed. A standardized data extraction protocol was developed to guide the collection of relevant information from the medical records. First, this protocol included detailed instructions on the specific data fields to be collected, definitions of key variables, and criteria for inclusion and exclusion. Second, a double data entry method was used to minimize errors. Data extracted from the medical records were entered by two independent researchers, and the results were compared. Any discrepancies were reviewed and resolved through consensus. After data extraction, the dataset underwent a rigorous data cleaning process. This involved checking for missing values, outliers, and inconsistencies. Corrections were made based on the original medical records to ensure the integrity of the data.

Observation sheets containing post-concussion symptoms, cognitive failure, anxiety, depression, sleep behavior, and post-traumatic stress disorder were used to recap data from the patient's medical record. Patients with complete medical record data and active health checks for one month after treatment were selected as research subjects. Their characteristics, including age,

adolescence, gender, time of onset of injury (hours), and mechanism of injury, were retrieved. The authors found 57 incomplete medical records, which were excluded from the study.

The Rivermead Post-Concussion Symptoms Questionnaire (RPQ) was an instrument used to measure PCS in patients who had experienced mTBI. This instrument is designed to assess common symptoms in PCS patients and consists of 16 items divided into several dimensions, such as headaches, irritability, and memory problems. These items are divided into several dimensions, each representing a specific category of symptoms associated with PCS. Dimension of headache includes items related to the frequency, severity, and impact of headaches experienced by the patient. Dimension of irritability assesses the patient's level of irritability and emotional sensitivity, including how these feelings affect their daily functioning. The last dimension, memory problems, focuses on difficulties related to memory, including problems with short-term and long-term memory. The RPQ scores range potentially from 0 to 52, where higher scores reflect greater severity of post concussive symptoms. The RPQ has been validated through several studies and has shown good validity and reliability (Barlow, 2016; Starkey et al., 2018). In this study, the instrument was translated by a language expert, and three experts reviewed it for content validity to ensure that the meaning of the items remained unchanged. The I-CVI and S-CVI of the Indonesian versions were 0.84 and 0.87, respectively. The instrument was then tested for its validity using the Pearson product-moment test on 30 respondents outside the samples used in this study. The results showed that the r -count was greater than the r -table ($r > 0.344$), indicating that the instrument was valid. The reliability test was also conducted to measure its internal consistency, with Cronbach's alpha value of 0.812. It indicated that the instrument was reliable and could be used.

2.4 Data analysis

Data were expressed as means, standard deviations (SD), medians, and interquartile ranges (IQR) in descriptive statistics. When the Kolmogorov-Smirnov test indicated that a normal distribution was assumed to hold, independent t-tests with a two-tail distribution were performed to compare variables between groups. Categorical data were presented as percentages and numbers. The independence of the post-injury existence of PCS across years was examined using the Chi-square test with $p < 0.05$ regarded as a significant value.

2.5 Ethical considerations

The research protocol received approval from the Ethics Committee of Universitas Muhammadiyah Gombong, with number 076.6/II.3.AU/F/KEPK/V/2022. Access to medical records was restricted to authorized personnel only. All patient identifiers were removed or anonymized to protect patient privacy. The data were stored in secure, password-protected databases to prevent unauthorized access. Informed consent was given to the respondents before data collection. The review board evaluated the study's protocols and ensured that the research adhered to ethical standards while safeguarding patient rights.

3. Results

3.1 Characteristics of the participants

A total of 316 patients diagnosed with head injuries were included in the study. The average PCS occurred in patients of productive age ($M=27.8$, $SD=2.02$) with a time for injuries of about 7 hours. Patients who had motorcycle accidents had a higher prevalence of PCS (71.4%). In addition, this study found that PCS events occurred most frequently in the second month post-TBI (43.7%). The prevalence of PCS, in the range of 1–6 months after concussion, was prominent in the first two months, and it started to lower significantly up to 6 months (3.6%) (Table 1).

3.2 Prevalence and characteristics of persistent PCS

Table 2 illustrates the prevalence of persistent Post-Concussion Syndrome (PCS) in mild Traumatic Brain Injury (mTBI). This study found 112 patients (35.4%) experiencing PCS and 204 (64.6%) patients without PCS. These results highlight that a significant proportion of mTBI patients continue to experience symptoms, while the majority recover without lasting effects. Furthermore, the most common symptoms found in PCS were headaches and difficulty concentrating, as seen in Table 3.

Table 1. Participant's characteristics (n=316)

Characteristics	m-TBI with PCS (n=112)		m-TBI without PCS (n=204)		p
	f(%)	M(SD)	f(%)	M(SD)	
Age (years)		27.8(2.02)		29.1(1.82)	0.712
Time from injury (hours)		7.51(5.22)		9.23(5.74)	0.774
Gender					
Male	87 (77.6)		166 (81.3)		0.872
Female	25 (22.4)		38 (18.7)		0.781
Mechanism of injury					
Fall	24 (21.4)		68 (33.3)		< 0.001
Sports related	5 (4.5)		12 (5.9)		0.512
Motor vehicle accident	80 (71.4)		117 (57.3)		<0.001
Other	3 (2.7)		7 (3.5)		0.122
PCS period					
1 month	27 (24.1)				
2 months	49 (43.7)				
3 months	15 (13.4)				
4 months	11 (9.8)				
5 months	6 (5.3)				
6 months	4 (3.6)				

Table 2. Prevalence of PCS in mTBI (n=316)

mTBI	Frequency (f)	Percentage (%)
mTBI with PCS	112	35.4
mTBI without PCS	204	64.6
total mTBI	316	100

As presented in Table 3, some symptoms of persistent PCS that appeared were headaches (30.3%), light sensitivity (32.1%), difficulty concentrating (37.5%), poor sleep (16.1%), depression (16.9%), or anxiety (14.3%). On the other hand, double vision (0.9%), restlessness (2.4%), and cognitive failure (2.4%) occurred in mTBI patients without PCS with a smaller presentation.

Table 3. Characteristics of persistent PCS symptoms (n=316)

Characteristics	m-TBI with PCS (n=112)		m-TBI without PCS (n=204)	
	f (%)		f (%)	
Headache	34 (30.3)		12 (5.8)	
Problems concentrating	42 (37.5)		8 (3.9)	
Frustration	26 (23.2)		6 (2.9)	
Dizziness	23 (20.5)		13 (6.4)	
Irritability	21 (18.7)		14 (6.8)	
Memory problems	18 (16.1)		13 (6.4)	
Depression	19 (16.9)		9 (4.4)	
Longer to think	18 (16.1)		8 (3.9)	
Light sensitivity	36 (32.1)		12 (5.8)	
Sleep disturbance	18 (16.1)		15 (7.3)	
Noise sensitivity	16 (14.3)		10 (4.9)	
Fatigue	13 (11.6)		8 (3.9)	
Nausea	15 (13.4)		7 (3.4)	
Blurred vision	12 (10.7)		8 (3.9)	
Restlessness	10 (8.9)		5 (2.4)	
Double vision	8 (7.1)		2 (0.9)	
Cognitive Failure	10 (8.9)		5 (2.4)	
Anxiety	16 (14.3)		7 (3.4)	
Sleep Behaviour	15 (13.4)		8 (3.9)	
PTSD	25 (22.3)		12 (5.8)	

4. Discussion

This study was conducted to determine the prevalence and compare patients with mTBI with PCS and without PCS. The prevalence of Post-Concussion Syndrome (PCS) in patients with mTBI was found to be 35.4%, with the most common symptoms being concentration problems, headaches, and light sensitivity. The prevalence in this study was in line with the result of a previous study. Beauchamp et al. (2021) showed that the prevalence of PCS in patients with mTBI varied from 11% to 82%, depending on the diagnostic criteria used. However, this study's result was higher than some studies that used more conservative diagnostic criteria (Cancelliere et al., 2023; Starkey, 2018). For example, Cancelliere et al. (2023) reported a lower prevalence when stricter criteria were applied. Another study conducted by Starkey (2018) showed that the prevalence of PCS was found in mTBI patients after one month of treatment, with figures ranging from 25% to 35%.

The differences between conservative and modern diagnostic criteria can indeed result in varying prevalence rates for PCS. Conservative diagnostic criteria, such as those established by DSM-IV or ICD-10, tend to be more restrictive in terms of symptoms and duration, which may lead to lower prevalence rates. Conservative criteria typically require several symptoms to persist for a specific duration after the injury to be diagnosed as PCS (Starkey, 2018). On the other hand, modern diagnostic criteria, such as those adopted in DSM-5, are more inclusive and adaptive to individual variations in symptom experiences following mild traumatic brain injury (mTBI). These criteria allow for a PCS diagnosis based on a broader range of manifestations and variability in symptom duration. Consequently, the prevalence of PCS tends to be higher when using modern criteria (Beauchamp et al., 2021; Cancelliere et al., 2023).

This discrepancy highlights the ongoing challenge in PCS research regarding the standardization of diagnostic criteria to ensure more accurate and comparable prevalence estimates. This study emphasized problems concentrating, headaches, and light sensitivity as the most common symptoms, whereas another study, such as the one by Voormolen et al. (2019), found a higher prevalence of emotional and sleep-related symptoms. This variation may be due to differences in patient populations, assessment tools, or reporting practices. The average age of 27.8 years and male predominance in our sample suggested that younger males are particularly at risk for PCS following mTBI. This finding aligns with the demographic profiles commonly seen in trauma and sports-related injuries, which disproportionately affect young men (Cancelliere et al., 2023; Voormolen et al., 2019). The prominence of concentration problems, headaches, and light sensitivity as primary symptoms underscored the cognitive and neurological impact of mTBI. These symptoms can significantly impair daily functioning and quality of life, emphasizing the need for interventions to reduce symptoms (Voormolen et al., 2019). To sum up, the variability in PCS prevalence across studies could be attributed to differences in diagnostic criteria, assessment methods, and sample characteristics.

This study found the average age of PCS patients to be 27.8 years. This is consistent with several studies that indicate a higher incidence of PCS among young adults (Losoï et al., 2016). For example, a study by Bo and Pearkao (2021) also found similar age distributions, suggesting that younger individuals might be more susceptible to or report PCS more frequently. In this study, it was found that most adolescents experienced PCS. PCS in adolescents is a significant problem because of the unique developmental stage they are experiencing. Adolescents are particularly vulnerable to the effects of mTBI because their brains are still maturing, which can exacerbate the impact of a concussion injury. Studies have shown that adolescents are more likely to experience prolonged PCS symptoms, such as headaches, dizziness, difficulty concentrating, and emotional disturbances, compared to adults (Cancelliere et al., 2023; Starkey et al., 2018). These symptoms can significantly impact their academic performance, social interactions, and overall quality of life. Furthermore, lack of prompt and appropriate intervention can lead to long-term consequences, making it critical to promptly identify and manage PCS in this age group (Voormolen et al., 2019). The higher prevalence in males observed in our study is also supported by the literature. The male predominance of PCS cases is due to higher exposure to risk factors such as exercise and accidents (Bo & Pearkao, 2021; Dean et al., 2012; Starkey et al., 2018).

The study results showed that patients with Post-Concussion Syndrome (PCS) had different clinical characteristics compared to patients without PCS. Patients with PCS often experience symptoms such as headaches, irritability, light sensitivity, and concentration issues. Patients with PCS are generally younger compared to those without PCS. Risk factors associated with PCS

include younger age, male gender, and more severe head injuries. Patients with PCS more frequently experience more severe head injuries compared to those without PCS (Balakrishnan et al., 2019; Mercier et al., 2018). Symptoms that can be used to differentiate PCS from non-PCS in mTBI patients are complaints of concentration problems and headaches. In patients without PCS, these complaints are not found simultaneously (Dean et al., 2012; Voormolen et al., 2018).

Even though the number of people with PCS decreased from 0 to 6 months, PCS still persisted in the 6th month after mTBI. This could suggest that those who have continuous symptoms of PCS more than six months after the acute injury are expected to have a chronic, unremitting syndrome (Ashina et al., 2021; Voormolen et al., 2018). This is in agreement with earlier studies that revealed that people suffering from PCS are less likely to spontaneously recover (Auclair-Pilote et al., 2021; Mayer et al., 2013). It may be useful to develop medical policies or algorithms that require anyone who visits the ED with a TBI to be screened for PCS one month after the injury, in light of the knowledge that an evaluation six months following the injury can forecast the long-term effects of the concussion (Cooksley et al., 2018; Voormolen et al., 2019).

Reducing PCS symptoms can be done by forming support groups, and online resources can be an effective solution (Rytter et al., 2019). Other alternatives, such as relaxation techniques, stress management, and education on how to manage PCS symptoms, can also be recommended (Biagianni et al., 2020; Minen et al., 2019). The rehabilitation process is carried out on patients when they show initial symptoms of treatment in the hospital or by looking at the causes and mechanisms of the injuries that they have experienced (Haider et al., 2020).

The research found out who were more likely to get PCS and, therefore, needed more attention and a stricter follow-up policy. High-speed injuries (MVA) and injuries in teenagers were risk factors for PCS (Lagarde et al., 2014; Losoi et al., 2016). In the bivariate analysis, it was not statistically significant that women were more likely to have PCS than men. Our results concur with those of other studies. Prior research has hypothesized that the increased frequency of mood and anxiety problems in this population is what makes women and adolescents more prone to PCS (Barlow, 2016; Cnossen et al., 2018). Nurses can play a role in reducing the risk of PCS by performing early and structured interventions. The study by Bo & Pearkao (2021) and Yue et al. (2019) showed that nurses skilled in stress management can help patients reduce the risk of PCS. With skills in stress management, nurses can help patients manage the physical and psychological symptoms that often occur after mild brain injury, such as headaches, fatigue, and anxiety. Early intervention by nurses, including education about PCS, regular monitoring of the patient's condition, and the use of relaxation and stress management techniques can significantly reduce the likelihood of developing PCS in patients (Cooksley et al., 2018; Dean et al., 2012).

5. Implication and limitation

The findings of this study have several important implications for clinical practice and patient outcomes. The high prevalence of PCS in patients with mTBI, as observed in this study, highlights the need for early identification and intervention for individuals at risk. Health workers, especially nurses, can play a crucial role in implementing these preventive measures. In terms of clinical practice, the identification of common PCS symptoms, such as headaches and difficulty concentrating, underscores the importance of routine screening for these symptoms in patients with mTBI. Early recognition and management of these symptoms can prevent the progression to persistent PCS. By incorporating regular assessments into standard care protocols, healthcare providers can reduce the long-term impact of PCS on patients' quality of life. In terms of economic and social aspects, the study's findings suggest that preventing PCS can lead to significant economic benefits. Patients without PCS can avoid additional medical costs associated with prolonged treatments and therapies for persistent symptoms. Moreover, enabling patients to return to work and daily activities more effectively can increase productivity and economic gains for both individuals and society.

The current study contained some limitations. First, because it was not prospective from the moment of the injury, recollection bias might have impacted the results. Second, not all medical staff were assured to complete accurate paperwork because this study relied on data from medical records. Aside from these problems, this study had a number of benefits, such as enrolling a large number of eligible patients and having full medical record data based on similar demographics.

6. Conclusion

The study found that 35.4% of patients with mTBI experienced persistent post-concussion syndrome (PCS) after one month. The occurrence of PCS was most prevalent in the second month, with 43.7% of patients experiencing it. The most common symptoms indicating PCS were problems concentrating, headache, and light sensitivity. These findings warrant better screening guidelines and practices that patients adopt after mTBI. Additionally, positive social changes can enhance access and support for patients with PCS. Establishing support groups and online resources, providing self-care guides, and developing coordinated recovery programs can assist patients in facing the challenges following mild traumatic brain injury. The rehabilitation process is carried out on patients when they show initial symptoms of treatment at the hospital or by looking at the causes and mechanisms of the injuries experienced. Future research can find predictors to minimize the incidence of PCS and take the best measures for mTBI cases in hospitals. Further prospective research studies that follow a cohort of patients from the time of injury through their recovery would be particularly beneficial. These studies should include larger and more diverse populations to enhance the generalizability of the findings. Specifically, longitudinal cohort studies that track patients over extended periods can provide detailed insights into the trajectory of PCS development and identify critical periods for intervention. Integrating validated screening tools and questionnaires into clinical practice will aid in identifying patients with potential PCS and ensuring appropriate management.

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Author contribution

PAWS conducts data collection and analysis on research results, writes manuscripts, and submits articles and manuscript revisions. FK, AO, and SKDS direct the types of research methods and provide input on the analysis and discussion in writing manuscripts.

Conflict of interest

All authors declare no conflict of interest.

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ORIGINAL RESEARCH

Work-related Experiences and Challenges of Perioperative Nurses in Southwestern Nigeria



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Abstract

Background: Perioperative nursing is highly demanding due to the long hours of complex procedures, limited support, inadequate facilities, and staffing issues. These factors contribute to fatigue, frustration, and burnout. However, there is a paucity of data on the challenges and experiences of perioperative nurses in Southwestern Nigeria.

Purpose: This study aimed to explore work-related experiences and challenges of perioperative nurses in selected hospitals in a southwestern state, Nigeria.

Methods: The study adopted a phenomenological qualitative design. Twenty perioperative nurses who had spent a minimum of six months in the operating theatres of three public hospitals were selected. Data were collected through semi-structured interviews using a key informant interview guide. The qualitative data collected were transcribed verbatim, coded, and analysed using content and thematic analysis.

Results: Findings from the study revealed two major themes: the experiences of perioperative nurses in Osun State and the challenges confronting perioperative nursing practice and perioperative nurses. The study reported perioperative nurses' personal experiences, motivational factors, and their aspirations. Findings further showed that challenges to perioperative nursing include inadequate infrastructure and equipment, a shortage of manpower, financial constraints faced by patients, and insufficient funding for perioperative nursing services.

Conclusion: The study concluded that perioperative nurses' experiences were educative and fulfilling yet challenging and frustrating due to the numerous obstacles they face in their professional roles. Therefore, stakeholders need to address these challenges to enable perioperative nurses to function optimally and improve outcomes for surgical patients.

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1. Introduction

Globally, perioperative nurses are vital members of surgical teams and play substantial roles in the success of surgical procedures at all levels of the healthcare system. These nurses provide care throughout the continuum of surgical care, which involves preoperative, intraoperative, and postoperative phases (Goodman & Spry, 2017; Rothrock & McEwen, 2019). After completing basic nursing education, perioperative nurses are trained to meet the specific needs of surgical patients, providing care for those undergoing invasive procedures.

The care of surgical patients in the operating room is distinct from other hospital settings, with high reliance on technology. Perioperative nurses play an instrumental role in preventing infection, maintaining asepsis, handling instruments, adopting medical techniques, preventing complications, managing biological preparations, and upholding surgical consciousness. Additionally, they play an essential role in planning care, collaborating with the patient, surgical team, and other healthcare providers, ensuring patient safety through proper scheduling of procedures, communication, consistency with the surgical safety checklist, monitoring the progress of surgeries, and making appropriate reports (Chellam Singh et al., 2023; Rothrock & McEwen, 2019).

Perioperative nurses deliver comprehensive patient care during surgery and other invasive procedures using the nursing process framework. They work in partnership with other healthcare professionals, including surgeons, to provide care for surgical patients and evaluate the outcomes of care. While performing these duties, perioperative nurses are uniquely positioned to assist with surgical procedures and serve as the “consciousness” for unconscious patients on the operating table (Brodin et al., 2017). They make appropriate referrals, delegate tasks, and supervise personnel to ensure safe and efficient care. Nurses in this field work in surgical suites, ambulatory surgery centres, endoscopy suites, laser centres, interventional radiology departments, mobile surgical units, and physicians’ offices across developed countries (Phillips, 2017).

Perioperative nurses must possess core nursing skills such as critical thinking, aseptic technique, and the ability to work with diverse patient populations, as well as adherence to evidence-based practices. Their role involves maintaining safety, educating patients, following legal guidelines, and ensuring ethical care. These values are the basis for the quality care that surgical patients have relied on and can expect when being cared for by any perioperative nurse. Perioperative nursing is not just technical; it requires scientific understanding to determine the appropriate care methods and when to implement them. Knowledge of surgical interventions, instruments, and equipment is essential for anticipating and preparing for the steps in a surgical procedure. Perioperative nursing is a systematic, planned process that requires nursing care skills, interpersonal abilities, critical thinking, and technical proficiency to ensure quality care. Therefore, teamwork is fundamental in the operating room and begins the moment one steps inside the unit (Meyer et al., 2016; Salazar Maya, 2022; Stucky et al., 2024).

In addition to technical skills, perioperative nurses rely on knowledge of surgical anatomy, physiological changes, intraoperative risk factors, patient injury prevention, and the psychosocial effects of surgery. This comprehensive knowledge enables nurses to anticipate surgical needs and intervene appropriately while considering the patient’s and surgical team’s perspectives (Rothrock & McEwen, 2019). Perioperative nursing also requires a blend of technical and behavioral care, underpinned by critical thinking, which is essential for providing professional patient care. Good clinical judgment arises from critical thinking, a purposeful, outcomes-directed process driven by patient needs and grounded in the nursing process and nursing science (Hong et al., 2021). Moreover, it demands knowledge, skills, and experience, all guided by professional standards, ethics, and a commitment to continuous self-evaluation, correction, and improvement (Wicker & Dalby, 2016).

While perioperative nurses’ knowledge and critical thinking skills form the foundation of their practice, these competencies vary significantly depending on work environments. The work-related experiences of perioperative nurses differ across countries (Clayton et al., 2016). For example, nurses in high-income countries such as Canada, Australia, and the United States often face different challenges compared to their counterparts in middle- or low-income countries, such as South Africa and West African nations like Nigeria and Ghana (Smith et al., 2022). In the Philippines, for instance, perioperative nurses face a range of experiences, from striving to improve performance to coping with stress, seeking professionalism, and experiencing feelings of exhaustion, dissatisfaction, and burnout (Peñasales et al., 2017).

Scholars have reported that being a perioperative nurse is both intensely challenging and exciting, as they encounter diverse experiences in the operating room setting. The pressure of meeting the expectations of different surgeons and surgical team members—each with their own preferences, demands, and personalities—can create stress and challenges. Additionally, providing perioperative nursing care is both stressful and taxing. Perioperative nurses also face issues such as overworking, understaffing, and feeling undervalued (Attri et al., 2015; Peñasales et al., 2017; Peñataro-Pintado et al., 2021). Their experiences are influenced by factors such as education, work environment, organizational policies, role performance, modern technology, and others (Shin & Kim, 2021). Schmidt and Brown (2019) emphasized that perioperative nursing is one of the most demanding nursing roles, given the challenges of managing long, complex surgeries with insufficient staff, poor remarks from superiors and administrators, and the frustration and burnout that often accompany the work. Another study highlighted that perioperative nurses are not always appreciated for their contributions during the perioperative phases of care and deserve more recognition (Peñasales et al., 2017). Excessive workloads in the operating room remain a major challenge, and this issue needs to be addressed by determining an appropriate nurse-to-patient ratio. These challenges are also evident in developing countries

like Nigeria, where perioperative nurses face poor working conditions, outdated surgical instruments, low remuneration, limited training opportunities, and heavy workloads due to insufficient staffing, often caused by nurse migration to countries like the U.S., Canada, and Europe (Ijah et al., 2023).

While studies on the experiences and challenges of perioperative practitioners are abundant in developed countries, there is a lack of empirical data from African nations. For example, Ryamukuru et al. (2018) noted a gap in the literature on the emerging roles and clinical experiences of perioperative nurses in Rwanda. Similarly, in Nigeria, the clinical experience of perioperative nursing students has been documented in a cohort study focused on educational preparation, which typically follows a basic nursing education or a bachelor's degree in nursing from a university. This is similar to what operates in Nigeria, where the training duration is currently twelve months after completing the basic or degree programme, followed by a qualifying examination organized by the Nursing and Midwifery Council of Nigeria (Auta, 2019). In contrast, educational preparation for perioperative nurses in developed countries has advanced to the postgraduate level. However, there remains a scarcity of studies on the experiences and challenges faced by perioperative nurses in developing countries, particularly Nigeria. This gap in the literature underscores the importance of this study, which aims to explore the work-related experiences of perioperative nurses in selected healthcare institutions in southwestern Nigeria.

2. Methods

2.1. Research design

This study adopted a phenomenological qualitative design to explore the experiences and challenges of perioperative nurses in selected hospitals in Osun State, Nigeria. The design was preferred to other qualitative designs because it helped to describe individual perioperative nurses' experiences (Muhammad et al., 2023).

2.2. Setting and participants

The study was conducted at three selected hospitals: Hospital A (federal government-owned university teaching hospital), Hospital B (state government-owned teaching hospital), and Hospital C (state government-owned specialist hospital). Hospital A was established by the federal government of Nigeria in 1975. The operating theatres have a population of 77 perioperative nurses spread across eleven suites where various surgical procedures are performed. Hospital B is a tertiary health institution jointly owned by the government of Osun and Oyo State. It was established in the year 2000 to provide clinical training for health professional students of a public university in Ogbomosho. It is located at the former premises of State Hospital, Idi-Seke, along Station Road Osogbo. It has seven operating suites: four in the main theatre and three shared among the labour ward, casualty, and ophthalmic units. The hospital currently has a total number of 20 perioperative nurses working in the seven operating suites. Meanwhile, Hospital C is a secondary health facility owned by the Osun state government. It was established in the mid-fifties and was formerly located at the current premises of Hospital B, but it was relocated to the Asubiaro area by the state government in the year 2000 when the teaching hospital was about to take off in Osogbo. It is the largest state-owned secondary health facility. Among the surgical treatments offered in the hospital are general surgery, urology, ophthalmic, obstetric, and gynaecological surgeries. The hospital currently has a population of 14 perioperative nurses in its theatre.

The study population comprises all available perioperative nurses currently working in operating theatres of the selected hospitals in Osun State. Perioperative nurses in these institutions serve as scrub and circulating nurses for various surgeries from different specialties. Purposive sampling was employed to select twenty (20) perioperative nursing practitioners. Although the initial intention was to select 25, data saturation was attained after the 20th interviewee. The selection took cognisance of inclusion of at least one perioperative nurse from each nursing designation, who have not less than five years in the operating theatres and have acquired experiences in various surgical specializations.

2.3. Data collection

Data were collected from the head of the selected operating theatres and other experienced perioperative nurses with the aid of a two-sectioned key-informant interview guide that was

developed by the researcher following an extensive literature review. This semi-structured interview guide has two sections: the introductory section and the main section. The introductory section has questions like ‘Can you please tell me a little about yourself, professional status, qualifications, place of work, current designation, and current position?’ The items in the main section focus on exploring the experiences and challenges of perioperative nurses. Questions such as, ‘For how long have you been practicing as a trained perioperative nurse?’, ‘How has the journey been?’, and ‘Can you describe your experience?’ were used. Probing questions were also employed to elicit more detailed or in-depth responses from the informants. The interview explored nurses’ experiences, aspirations, and challenges as professional perioperative nurses. Each interview session lasted between 15–20 minutes and was conducted by the principal investigator in the theatre at a fixed time that was convenient for the interviewees. The heads of each theatre allowed the investigator to use their personal offices for the interview. Field notes were used to document data from the participants, and all interviews were recorded verbatim. The data collection period lasted four weeks between February to March 2022.

2.4. Data analysis

All information from interview transcripts and reflective memos was brought together. The step-by-step process of qualitative content analysis (Assarroudi et al., 2018) was employed in the study. The audio-recorded field interviews were transcribed verbatim and then analysed. Given the large volume of data collected, data ordering was achieved by using codes and sub-codes. Data were coded descriptively or interpretively using concepts derived from the study objective and its theoretical framework. All pieces of data that were relevant to the research questions were identified, isolated, contextualised and labelled accordingly. Inferences were drawn from the identified themes by thinking through them (reflection) in the context of the study. The themes were derived from these keywords: work-related experiences, challenges, perioperative nursing personnel, and categories: clinical challenges, interpersonal dynamics, professional development, and team communication.

The detailed steps of data analysis included: (a) Preparing the data: Narrative data from the key informant interviews and in-depth interviews, which had been audio-recorded, were transcribed verbatim and typewritten by the researcher; (b) Defining the coding unit to be analyzed: The transcribed data were uploaded into Atlas.ti version 8 qualitative analysis software, and, with attention to the theoretical framework and research questions, files were set up for emerging codes and themes; (c) Developing categories and a coding scheme or conceptual framework: The entire transcript was read carefully again with the intent of identifying and bringing together related coding units or categories (i.e., concept mapping). After thoughtful consideration of the entire data set, the identified codes and categories were defined systematically, labeled, and organized into a conceptual framework; (d) Testing the developed coding scheme: After developing the coding scheme, its clarity and consistency were double-checked by test-running it on a section or sample of the transcript. Following this exercise, the coding scheme was slightly refined; (e) Coding all text and assessing the coding consistency: The entire transcript was read closely again, fractured, and clustered into chunks of data based on pre-identified codes. A combination of selective coding (selection of core or essential codes that closely correspond with the phenomenon observed in the field) and thematic coding was adopted. All pieces of data relevant to the research questions were identified, isolated, contextualized, and labeled; (f) Drawing conclusions from the coded data (interpreting the data): Inferences were drawn from the identified themes by reflecting on them in light of the context of the study; and (g) Reporting the methods and findings: The report encompasses a synopsis of the methods employed for data analysis and the salient findings thereof.

2.5. Trustworthiness

Trustworthiness in this qualitative research was established through a degree of rigour in the study’s conduct. Four criteria have been suggested to ensure the trustworthiness of qualitative studies: credibility, dependability, transferability, and confirmability, which serve as substitutes for internal validity, reliability, external validity, and objectivity. All interview transcripts were presented to some of the interviewees for verification of the accuracy of the accounts, and the researcher’s reflexivity throughout the study helped enhance credibility. A rich description of the study setting, the data collection method and procedure, techniques of data analysis, and how

inferences were drawn would make it possible for readers to follow the sequence of the research process and authenticate the findings (audit trail). The study, at various points, also benefited from the expertise of the research team during reflective sessions, thus ensuring the dependability of its findings. The transferability of this study was ensured through a detailed description of the setting, context was presented, and careful attention was given to the selection of study participants using a purposive sampling technique. Confirmability was ensured through the recording and verbatim transcription of the interview sessions and by the principal investigator getting immersed in the data. Peer review by the research team, audit trail, and researcher's reflexivity also enhanced the confirmability of the study.

2.6. Ethical considerations

A formal application for ethical clearance and research protocol was submitted to the Ethical and Research Committees of the selected institutions for the purpose of obtaining ethical clearance for the study. The research ethical committees of all the selected hospitals gave approval to the study after an extensive review of the study proposal (Hospital A-ERC/2019/10/09; Hospital B-LTH/EC/2019/10/436 & Hospital C- HREC/27/04/2015/SSHO/73). Permission to collect data was also obtained from the management of all the hospitals, and preliminary visits were made to the operating theatres to create rapport with prospective participants and explain the objectives of the study.

The participants were informed that participation in the study was voluntary and that they had the liberty to terminate participation at any time without penalty. They were requested to read and sign the informed consent form that clearly spelled out the study title and purpose as an indication of their willingness to participate in the study. Participants were requested to choose a pseudonym that was used during the interview, and the interviewees were pre-informed that their response was tape-recorded and transcribed verbatim for research purposes only. Their permission to tape/digitally record the interview was also obtained to ensure the accuracy of the data. Recorded audio tapes of interviews that were burnt into compact discs with copies of field notes and transcripts were kept secured in a locked cabinet. The participants were given pseudo names as P1 to P20 to ensure their anonymity and confidentiality.

3. Results

3.1. Socio-demographic features of participants

A total of 20 purposively selected perioperative nurses considered as information rich sources on quality of perioperative nursing care in selected hospitals formed the samples. Although the original plan was to interview 25 of such individuals but by the time the 20th person was being interviewed, data saturation had already set in.

As presented in Table 1, the mean age of the participants was 39.40(8.44) years, indicating that a majority of the participants were over 30 years of age. Nine are actually aged 30 to 40 years. Twelve are females, and eighteen are married. As regards their work experience, ten had between 10 to 20 years of experience as perioperative nurses; four had risen through the ranks to the post of chief nursing officers, and four were assistant directors of nursing services. The educational status of the participants showed that half (10) possessed a bachelor's degree in nursing.

3.2. Themes and sub-themes

The themes and sub-themes are presented in narrative text and supplemented with verbatim quotes from participants and a table, as needed, to corroborate the discourse. Codes (P1 to P20) symbolize pseudonyms for the perioperative nurses. It is also important to note that summative content analysis, which involves counting and comparisons, was particularly used to categorize, compare, and display the participants' demographics in a tabular form. The emerging themes and sub-themes are therefore presented in Table 2.

3.2.1 Theme 1: Experiences of perioperative nurses in Osun State

This theme explored the state of perioperative nursing practice in Osun State. It specifically inquired about the nurses' personal and collective experience in perioperative nursing practice, what motivated them to go into perioperative nursing, and what their aspirations are.

Table 1. Socio-demographic features of the participants

Variables	Frequency	Percentage
Gender		
Male	8	40.0
Female	12	60.0
Age at last birthday: Mean(SD): 39.40(8.44)		
20-30	2	10.0
31-40	9	45.0
41-50	6	30.0
51-60	3	15.0
Marital Status		
Single	2	10.0
Married	18	90.0
Religion		
Christianity	16	60.0
Islam	4	20.0
Ethnicity		
Yoruba	18	90.0
Igbo	2	10.0
Year of Experience		
1-10	4	20.0
11-20	10	50.0
Above 20	6	30.0
Qualification		
RN/RPON Only	9	45.0
Diploma and BNSc	10	50.0
Diploma and MSc	1	5.0
Cadres		
Nursing Officer II & Nursing Officer I	5	25.0
Senior Nursing Officer & Principal Nursing Officer	5	25.0
Assistant Chief Nursing Officer & Chief Nursing Officer	5	25.0
Assistant Director of Nursing Officer & Deputy Director of Nursing Officer	5	25.0

3.2.1.1 Sub-theme 1: Perioperative nurses' personal experiences

The perioperative nurses reported diverse experiences. Some described their experience as educative, wonderful, interesting, and fulfilling. This may not be unrelated to their passion for the specialty and the opportunity of witnessing the positive transformation that takes place in the health of their clients secondary to their care.

Table 2. Themes and sub-themes of the study

Themes	Sub-themes
Theme 1: Experiences of perioperative nurses in Osun State	<ul style="list-style-type: none"> - Perioperative nurses' personal experience - Motivational factors for perioperative nurses - Perioperative nurses' aspiration
Theme 2: Challenges confronting perioperative nursing practice and perioperative nurses	<ul style="list-style-type: none"> - Inadequate infrastructure and equipment - Shortage of manpower - Poverty/financial constraints on the part of the patients - Inadequate funding of perioperative nursing services

A few other nurses described their experience as challenging, rough, and frustrating. Such feelings may be emanating from the relative lack of infrastructural facilities and equipment to work with, making them improvise virtually all the time and the somewhat difficult work environment. This is evident from participants' comments like:

Well, it's been a wonderful experience. Being a perioperative nurse is something I have always longed to be. I find perioperative nursing a little different from general nursing in

the ward and outpatient departments... You know, seeing a patient in distress coming into the operating room and immediately, when they get there, they are relieved of the distress. (P1)

The journey has been fantastic and wonderful. With cooperation, we have achieved a lot because our unit is one of the unified units; hardly will you be able to differentiate between doctors, anaesthetists and perioperative nurses once we are in our scrub. (P2)

Hmmm, so far, so good; I can say that the journey has not been so easy; it has been full of ups and downs because there are a lot of challenges which we encounter. Being a perioperative nurse is not an easy job because you only know your time of resumption, as the closing time is not that certain. Anything can crop up, necessitating you to stay longer than the scheduled closing time. Beyond that, we are faced with a number of challenges; though we have been able to tackle some of them, some are still pending. Although the theatre environment is relatively okay, but it is not an ideal theatre setting. (P3)

3.2.1.2 Sub-theme 2: Motivational factors for perioperative nurses

Perioperative nurses recounted a number of factors that motivated them to go into perioperative nursing and those that have sustained their interest in the field. These include the awesome experiences they had as students while rotating through the theatre where they witnessed the quick and positive impact of surgery on patients, the zeal to impact positively on the health of patients through expert care and amelioration of patients' pain, and the ample degree of autonomy enjoyed by theatre nurses in their practice when compared with the rest of the nurses. These possibly inform the general level of job satisfaction expressed by the majority of the perioperative nurses in this study. The following excerpts from the field interview aptly buttress this assertion:

What motivated me to go for perioperative nursing was the kind of cordial relationship that I observed between the theatre nurses and other members of the surgical team during the period of jamboree surgery in Osun State... You hardly see them fighting; they are just friendly, and the atmosphere is also friendly. So, those are things that prompted me to go for the training. (P4)

I was opportune to witness a surgery performed on a woman with a ruptured ectopic pregnancy. I must say I was quite fascinated by the way the woman was rescued. I accompanied the woman from the ward to the theatre; I witnessed the operation from the beginning to the end. I even followed the woman back to the ward after the surgery, and when I saw that the woman had recovered, I felt so ecstatic. So, I made up my mind that that would be my area of specialization. (P5)

I find working with men very comfortable and more interesting than working with women on the ward because women have a tendency to gossip, while men talk about ideas, not about other people, hence my choice of perioperative nursing. (P6)

I chose perioperative nursing because I like the way perioperative nurses approach issues; it is very professional, which is quite different from the way other nurses handle matters. Another thing that motivated me is that I always like to be where it is happening. I mean, like seeing directly all that we have been taught theoretically in anatomy, medical-surgical nursing, and others. (P7)

3.2.1.3 Sub-theme 3: Perioperative nurses' aspiration

Like every upwardly mobile professional, perioperative nurses nurture some aspirations. These aspirations can be coalesced into four broad categories, viz: (a) best practice, (b) career progression and role modelling, (c) academic progression, and (d) advancement in role performance. For instance, many of the perioperative nurses expressed their desire to reach the pinnacle of their careers. They believe that reaching such status will give them the opportunity to influence the practice of perioperative nursing positively. Others opined that perioperative

nursing would have metamorphosed into a postgraduate specialisation within the next couple of years. With the advent of task shifting, some expressed their desires to function as first assistants during surgery, as independent nurse practitioners, and as nurse consultants (clinical nurse specialists). This is evident from typical participants' comments like:

My aspiration is to ensure that all surgical patients who come into the operating room have hitch-free surgery, less infection, and good surgical outcomes. I look forward to seeing the wearied patients coming out with joy, having been a recipient of best practice and holistic nursing care. (P8)

As I have mentioned earlier, it is really difficult to practice what we learnt in our present work environment. I sincerely hope that I will be able to bridge the gap between theory and practice in my little way. It is equally my intention to be like a role model and make perioperative nursing encouraging and more attractive to other people outside so that they can appreciate what we are doing. (P9)

As a perioperative nurse, I desire that we have well-developed sub-specialization like perioperative orthopaedic, and perioperative cardiac, particularly at the postgraduate level. Although I derived utmost fulfilment in what I do and I am actually aiming to be a perioperative nurse consultant, I nonetheless look forward to furthering my education in this specialty, like having my master's and PhD in perioperative nursing. (P10)

Yeah, sincerely, I want to see theatre nursing beyond what it is today. As a matter of fact, I wish there were a group known as perioperative nurse practitioners that would provide care for surgical patients from surgical outpatients. (P11)

3.2.2 Theme 2: Challenges confronting perioperative nursing practice and perioperative nurses

The nurses shared with us some of the challenges confronting them as professionals and the practice of perioperative nursing. The challenges range from unconducive environment to infrastructural challenges. They reported that the hospital administrators have perennially neglected the specialty in the area of infrastructures, equipment, staffing, surgical consumables, opportunities for in-service training, incentives, and even policies. According to many of the interviewees, perioperative nurses are not usually carried along when policies affecting their practice are being formulated. In their words, the ignoble cancellation of surgeries that have become a trademark of many of our hospitals is often a product of this abject neglect. They also attributed their long working hours and their being ordered to stay back when not on call to this neglect. These, to them, have become burdensome and overwhelming, and the impact on the quality of perioperative nursing care could be better imagined. For the sake of clarity, these challenges are considered one after the other.

3.2.2.1 Sub-theme 1: Inadequate infrastructure and equipment

The perioperative nurses interviewed cited obsolete theatre buildings and inadequate surgical instruments, which sometimes are faulty, as major challenges facing the practice of perioperative nursing. In all the selected hospitals, at least one or more of the autoclaving machines in their Central Sterile Supply Department (CSSD) were reported faulty. This will no doubt affect the supply of sterile materials (gown, gauze, drape, and even the instrument), sometimes resulting in the cancellation of surgery. Other infrastructural-related challenges reported include space constraints in the theatre, lack of running water for surgical scrubbing, insufficient surgical consumables, unavailability of needed instruments for some specialised surgeries, and sometimes lack of oxygen for surgery. Some interviewees also reported poor power supply due to faulty generators and limited or no diesel powering the generator. All these cannot but make the practice of perioperative nursing care cumbersome and frustrating. Despite these inadequacies, informants claimed that they have been able to carefully improvise with the resultant protection of patients from nosocomial infections and iatrogenic injuries. This is exemplified in the following excerpts from field interview:

We do experience challenges with equipment; we sometimes improvise to make surgeries successful. Other challenges have to do with the lack of perioperative nurses, as the entire surgical team looks forward to having perioperative nurses for the success of surgeries. We are also sometimes handicapped by inadequate surgical consumables. As the custodians of these materials, the other healthcare team members usually ask the perioperative nurses for gloves, needles, and surgical blades, and yet they are not within our jurisdiction. So this sometimes makes our work slow and, if not carefully handled, results in hitches and conflict among the surgical team. (P 12)

The challenges are enormous. Let me use our theatre as a case study. When we came on board, the initial problem we had was equipment and instrument issues; later, there were logistic problems and power outages. You may think that shouldn't create a problem, but nay. Even though we have a generating set, sometimes there is no fuel to power... Again, there are things that should be unheard of in government establishments that we sometimes encounter ...; in fact, it got to a stage where we had to buy our own scrubs. (P 13)

As theatre nurses, we have many challenges, but thank God we are able to manage. One of the challenges of the theatre nurses is the things to work with; you are already prepared to work when you leave your house in the morning; you get to the place of work, and patients to work on are there, but things you need to work with are not readily available. (P14)

3.2.2.2 Sub-theme 2: Shortage of manpower

The data reveal a gross shortage of perioperative nurses in all the selected hospitals. Interviewees reported that the situation is so bad that surgeries are sometimes canceled, and nurses have to work for longer hours and even have to stay back when not on call. This development was attributed to a combination of factors: the retirement of aging nurses, the exodus of skilled hands (including perioperative nurses) to overseas countries for greener pastures, and the non-replacement of those who have left despite the increasing patient turnout. Some of the participants claimed that the reason why quite a number of their colleagues have suffered slip disc and intractable back pain is not unconnected with these prolonged work hours. The following participants' comments aptly corroborate this:

Well, there is no practice that does not have its own challenge. One of the major challenges we have is a shortage of staff. The number of people working here is very limited, and as the people are retiring, the government is not replacing them. So, we are reducing. One perioperative nurse just died last month; I am talking about the former head of this unit. Since her demise, there has been no replacement, not even a single additional staff. Yet the number of patients we care for has not reduced, thus compounding the challenge of coming back to work when not on call, working extra hours, and doing more jobs than one needs to do. (P 15)

... In this theatre, there are not enough perioperative nurses, and we are very short-staffed because we have five theatres. It has been difficult running the five theatres at maximal capacity because of staff shortage. We can't put nurses on a permanent basis there, so what we do is allocate nurses on a temporary basis. So that is a serious challenge. (P 16)

3.2.2.3 Sub-theme 3: Poverty/financial constraints on the part of the patients

Many of the perioperative nurses reported that some of the patients who come to the theatre for surgery are not all that financially buoyant, and this constitutes a serious constraint to their care. They recalled that there have been instances where patients disappeared into thin air after knowing the cost of surgery, only to reappear when their condition has become a thing of emergency. In their words, some patients are unable to purchase extra materials needed for the success of their surgery, and some patients will even use the emergency surgery packs and fail to replace them. All these cannot but create a burden for perioperative nurses as they are the group that the other members of the surgical team look up to for solutions.

In certain cases, our patients are unable to purchase surgical consumables. Some just collect the list of materials and keep them away from the hospital, only to show up when their condition has deteriorated or become an absolute emergency. Well, thank God for the emergency pack for the CS. Unfortunately, there have been situations where the packs have been used without replacement. When we confront the patients, the story has always been there is no money now o..., we will come and pay. Empty promises hardly materialise. So, I think if medical-surgical care is subsidized, it may improve access to surgical care. However, in spite of that, the number of patients that we do has not reduced. For instance, we can operate up to six CS in a day; we can have nine patients on our surgical list on Tuesday or Thursday. (P17)

The poverty level of some of our patients is also constituting a challenge. You need to see how miserable they look when we have to refer them to the Teaching Hospital. Some will burst into tears, while some will refuse to go in spite of our insistence. At times, some of them who don't know the meaning of DAMA will do it in the morning and only come back in the evening. All these, to my mind, are traceable to abject poverty. (P18)

3.2.2.4 Sub-theme 4: Inadequate funding of perioperative nursing services

Participants reported that funding for perioperative care is grossly inadequate and has affected all aspects of perioperative nursing care. When asked how, they explained that each time they turn to the hospital administrators for support in terms of increased establishment, the need for in-service training, procurement of surgical consumables, and other surgical equipment, the slogan has always been 'no money.' They reasoned that such disposition from the administration and inadequacy of materials to work with is demoralising and cannot but negatively impact the output of care. Excerpts of comments from participants aptly attest to this:

There are lots of problems from the government and administration. They refuse to employ staff, and those currently working are neither appropriately remunerated nor adequately motivated. We have been on the same salary scale since 2009, with no promotion, no employment of new staff, and no replacement of worn-out equipment or materials. In fact, there was a three-year period when I was being paid half my salary, and the balance of the half salary is still pending; there are thirty months of half salary with the government, which is one year and three months of full salary. All this kills morale and, of course, affects productivity. (P19)

I'm looking forward to a time when you will turn on the tap and be able to scrub under running water when all our systems are working and when the generator is automatically switched on as soon as the light goes off. In fact, a time when everything will be automated in the theatre (both laughed). So, these are issues that constitute an obvious challenge to perioperative nursing practice. (P20)

4. Discussion

Perioperative nurses are a group of specially trained professionals who provide care to patients before, during, and after surgical interventions. Their primary goal is to ensure the best possible outcomes for patients undergoing surgical procedures. This study aimed to explore the work-related experiences and challenges faced by perioperative nurses in Osun State, Nigeria. Two main themes emerged: the experiences of perioperative nursing practice, which included three sub-themes—perioperative nurses' personal experiences, motivational factors, and professional aspirations—and the challenges faced in perioperative nursing, which were categorized into four sub-themes: inadequate infrastructure and equipment, manpower shortages, financial constraints among patients, and insufficient funding for perioperative nursing services.

Experiences in the operating suites are important as they are part of the ongoing learning process for perioperative nurses. The constant exposure to different scenarios in this highly specialized field prepares perioperative nurse for various challenges they may discover along the way (Peñasales et al., 2017). The perioperative nurses in Osun state have a myriad of personal positive and challenging experiences in the workplace, which are dependent on the relationship

they have with their colleagues, the cooperation that exists among different types of healthcare workers working in the theatre, and the availability of facilities and equipment. This finding is similar to that of Marais and Downing (2022), who observed that operating department assistants' positive experiences were related to the relationship they have with different healthcare workers in the theatre and their relative autonomy to carry out their assigned roles and tasks in the theatre. In spite of whatever issues that nurses face, previous research (Peñasales et al., 2017; Rouhi-Balasi et al., 2020; Uzun, et al., 2024) found that other members of the healthcare team work together to face those challenges to ensure a positive outcome. Gaudite (2015) also highlighted the importance of nursing autonomy and professionalism in the operating room as a useful tool in advocating for the unconscious anaesthetised patient. This might be due to the universal approaches to the training of perioperative nurses and a certain degree of autonomy enjoyed by this group of nursing professionals.

The perioperative nurses also recalled that their motivation to enter the field stemmed from the greater degree of nursing autonomy observed in the theatre compared to other clinical areas, the rapid clinical improvement in the health of their patients following an intervention, and the professional mien of perioperative nurses they worked with as student nurses. Their experiences may have been further influenced by their motivation and have led to the aspirations they have for themselves and their chosen specialty. Their aspirations are geared towards improving the perioperative specialty through bridging the gap between theory and practice, making the specialty a master's level programme providing holistic care to surgical patients, and ensuring sub-specialisations in perioperative nursing. These aspirations are not far-fetched and are achievable. For instance, perioperative nursing in Rwanda is not a diploma programme but a Master's level programme (Ryamukuru et al., 2018). Nurses also wish for improved training to improve the perioperative nursing experience and outlook (Peñasales et al., 2017).

Challenges are expected in different aspects of nursing. For perioperative nurses in Osun State, these challenges are not limited to infrastructural problems. The operation suites are not enough to have several surgical procedures carried out at once. Some of the necessary equipment is either not available or is faulty. Nurses have to improvise to ensure the surgeries are not cancelled, but sometimes, there are not enough sterile materials available, water is not available, and there is poor power supply. This is not peculiar to these hospitals, and it may be due to the low- and middle-income status of Nigeria, as it has also been observed in Rwanda, a country with similar status, that the power supply is epileptic, and running pipe-borne water within the theatre is almost inexistent (Ryamukuru et al., 2018). Hence, planned surgeries have to be cancelled or rescheduled. Apart from the physical problems, human resources are grossly inadequate, with the rapid loss of perioperative nurses to other countries or retirees who are being replaced. This is similar to the findings of Ryamukuru et al. (2018), where the scrub nurse is replaced by surgical residents and medical students, while the available nurse in the suite is the circulating nurse, which contravenes international standard practice. Peñasales et al. (2017) also noted that technical failures are challenges that these perioperative nurses face and can cause tension for the nurse, and negatively impact their effectiveness.

Furthermore, not all patients have the financial capacity to carry out surgical operations and seek other means of healthcare till surgical intervention is needed in an emergency. Hence, nurses have to use their scarce resources to ensure that the lives of the patient are not lost. The perioperative nursing department is poorly funded, so nurses are not sent for continuing education. Lack of continuing education can dampen the morale of the perioperative nurses, as it is expected that apart from their clinical experience, nurses should be encouraged to go for further training in their field to improve their clinical and theoretical expertise in their chosen field. This should be in recognition and appreciation of their hard work and dedication (Peñasales et al., 2017). This is similar to what operates in Osun state; perioperative nurses face similar challenges as both the state and federal government-owned health institutions are poorly funded, and perioperative nurses are not recruited when needed. They often use part of their meagre income to support poor patients, and yet they are not appreciated.

5. Implication and limitations

This study provides empirical data on the practice experiences and challenges faced by perioperative nurses, addressing a gap in documentation within a developing country like Nigeria. The findings underscore a critical need for perioperative nurses to amplify their voices to hospital

administrators and government officials, urging them to address the numerous challenges facing their specialty. Increased support will enhance the visibility and impact of perioperative nursing care in the surgical setting. A primary limitation of this study is its focus on public tertiary and secondary healthcare institutions in Osun State, Nigeria, with a relatively small sample size. This may limit the generalizability of the results, as mission and private hospitals were excluded from the study

6. Conclusion

The study concluded that the majority of participants described their experience as educative, wonderful, interesting, and fulfilling, while a few reported it as challenging, rough, and frustrating. Obsolete theatre buildings, faulty and inadequate surgical instruments, a severe shortage of perioperative nurses, and underfunding of perioperative nursing care were identified as major challenges facing the practice. Therefore, it is essential for hospital management to prioritize adequate perioperative nursing staffing to reduce workload. Additionally, implementing training programs and addressing other issues, such as the lack of sufficient surgical supplies and modern equipment, will improve surgical outcomes. It is also recommended that future studies extend to all regions in Nigeria to ensure broader coverage and generalizability of findings.

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Author contribution

OOO was involved in the study conceptualization/design, data collection, and drafting of the manuscript. EOA was involved in editing and proof reading. KEI involved in drafting of the manuscript. BRF was involved in the critical review of the manuscript.

Conflict of interest

This is to state that the manuscript has been read and approved by all the authors all authors met the requirements for authorship and that each author believes that the manuscript represents honest work of all the contributors. There is no known conflict of interest in this manuscript.

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ORIGINAL RESEARCH

Father Support, Postpartum Depression, and Breastfeeding Weaning Time: A Structural Equational Model



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Abstract

Background: Fathers are crucial to family well-being and beyond during pregnancy and childbirth. However, research on the long-term effects of father involvement during prenatal and its postpartum outcome, particularly in Indonesia, is limited.

Purpose: This study aimed to measure the direct and indirect effects of father support throughout pregnancy on postpartum depression and breastfeeding weaning time, by considering potential mediating pathways and controlling for relevant sociodemographic variables.

Methods: Prospective observational techniques were employed from January to July 2021, involving 648 consecutively selected mothers attending antenatal care in seven health clinics in Makassar. Data collection included sociodemographic factors, father support, and breastfeeding weaning time. Father support was assessed using the Father Support During Pregnancy questionnaire, administered three times at a 72-hour interval. Postpartum depression was measured using the Edinburgh Postnatal Depression Scale while breastfeeding weaning time was quantified in weeks. The analysis included Spearman's correlation and SEM using SPSS and SPSS Amos.

Result: The study identified negative correlations between maternal breastfeeding weaning time and postpartum depression ($r=-0.183$, $p<0.01$) and positive correlations with father support ($r=0.148$, $p<0.01$), parity ($r=-0.269$, $p<0.01$), and marital age ($r=0.187$, $p<0.01$). The standardized model showed a marginal rise in the overall influence of father support, parity, and marital age on breastfeeding weaning time (0.256, 0.016, and 0.123, respectively). Father support emerged as the primary contributor to postpartum depression, inversely impacting breastfeeding duration. Higher father support correlated with lower maternal depression scores and longer.

Conclusion: This study highlights the role of father support in reducing impact of postpartum depression on breastfeeding duration. Future research should incorporate objective measures of father support and comprehensive assessments of confounding variables. Intervention studies are needed to evaluate promoting father involvement in prenatal, delivery, and postpartum care. Nurses can contribute by participating in interdisciplinary research and advocating for comprehensive assessment approaches.

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1. Introduction

The significance of fathers within familial dynamics transcends mere financial provision, encapsulating a profound influence on the holistic health and development of both mothers and infants. Fathers, assuming multifaceted roles as leaders and guardians, exert a pivotal impact on the character and functioning of the family unit (Henry et al., 2020). This pivotal role is underscored by empirical investigations conducted by Wilson and Prior (2011) and Boyce et al. (2006), illuminating a spectrum of positive outcomes associated with father engagement in childcare. These outcomes span from tangible enhancements in children's cognitive faculties, such as intelligence levels, to intangible facets encompassing mental well-being, interpersonal adeptness, logistical acumen, and self-efficacy. Fathers who actively participate in prenatal care,

childbirth education classes, and discussions about birth plans contribute to a more positive birth experience for mothers (Lima et al., 2021).

Emotional support from fathers during pregnancy is associated with lower levels of maternal stress and anxiety, which may have a beneficial impact on maternal mental health during pregnancy (Chauhan & Potdar, 2022). A reported cohort study among 7,047 low-income African-American births showed that lack of perceived involvement during pregnancy from fathers was a significant predictor for preterm birth (Surkan et al., 2019). Fathers' presence during childbirth benefits the father, mother, and newborn and enhances their bond (Greenhill & Vollmer, 2019; Henry et al., 2020). Only a few fathers expressed confusion about their role in the delivery room. They generally feel pleasure rather than helplessness or trauma when witnessing their partner giving birth (Vischer et al., 2020). Although fathers do not undergo physiological transformations like mothers during the perinatal period (Martínez-García et al., 2021), their journey toward parenthood is marked by profound psychological metamorphosis, especially in the context of first-time fatherhood (Onyeze-Joe & Godin, 2020; Vismara et al., 2016).

During postpartum, primiparous mothers commonly encounter notable pressures, starting with physical recovery, sleep deprivation from breastfeeding, and demanding adaptation to motherhood (Asadi et al., 2020). In this period, fathers play an important role in supporting the mother's recovery, caring for the newborn, and household responsibilities (Negron et al., 2013; Qi et al., 2022; Xue et al., 2018). Their involvement in tasks such as changing diapers and soothing the baby can reduce maternal stress and fatigue, thereby improving the mother's mental well-being (Battle et al., 2021; Poh et al., 2014). Mothers commonly anticipate and value emotional, instrumental, and evaluative support during their breastfeeding journey, viewing these forms of support as essential components for their overall well-being and breastfeeding success (Negron et al., 2013; Syam & Musni, 2022).

Breastfeeding on the other hand, plays a crucial role not only in infant nutrition but also in maternal mental health throughout the postpartum period, including the weaning phase. While both mental health and breastfeeding physiology can influence each other (Scarborough et al., 2022), it is generally understood that poor maternal mental health can negatively impact the breastfeeding process more than the other way around (Figueiredo & Conde, 2011; Syam, Iskandar, et al., 2021). When a mother experiences mental health challenges such as anxiety, depression, or stress, it can interfere with her ability to breastfeed effectively, including shortening the breastfeeding duration (Bascom & Napolitano, 2016; Ystrom, 2012). Breastfeeding cessation or weaning may also be initiated by personal choice or external factors such as return to work or medical reasons (Gianni et al., 2019). The weaning process can be physically uncomfortable for both mother and baby, as breasts may become engorged and tender when milk production decreases. These physical discomforts can exacerbate emotional distress and may contribute to feelings of frustration or guilt if the weaning process does not progress as anticipated (Ayton et al., 2019). Additionally, the shift away from breastfeeding may coincide with changes in sleep patterns and routines, further impacting maternal stress levels (Dennis & Ross, 2005; Perrella et al., 2022). A supportive partner can help alleviate maternal stress and anxiety, promote a positive breastfeeding environment, and enhance maternal confidence and well-being.

Despite increasing recognition of the important role of father involvement in the perinatal course, empirical investigations of the long-term impact of father involvement, particularly in the Indonesian context, are still rare. Therefore, this study aimed to measure the direct and indirect effects of father support throughout pregnancy on postpartum depression and breastfeeding weaning time, by considering potential mediating pathways and controlling for relevant sociodemographic variables. By elucidating the relationship between father support, postpartum depression, and breastfeeding weaning time, this study aims to provide a nuanced understanding of the catalytic role fathers play in shaping maternal and infant health outcomes.

2. Methods

2.1. Research design

The present study was carried out utilizing prospective cohort observational techniques during the recruitment period spanning from January to July 2021. The subsequent investigation sought to elucidate the impact of father support throughout the stages from pregnancy to breastfeeding on the incidence of postpartum depression and the duration of breastfeeding cessation.

2.2. Setting and samples

The present study focuses on a cohort of mothers recruited from seven Public Health Centers in Makassar, South Sulawesi, Indonesia. Initial data indicate that the average monthly attendance for antenatal care appointments at one primary health care clinic is 128. Utilizing a 5% margin of error and a 95% confidence interval with a 50% response distribution, the sample size estimation necessitated approximately 97 participants from each location, totaling 679 minimum targeted pregnant women (Bujang, 2021). A total of 727 people met the criteria for a healthy singleton pregnancy, and were willing to follow up until the weaning period. Mothers were selected using a consecutive sampling method at antenatal visits during the late trimester period. However, during the follow-up period, there were several sample drop-outs; until the end of the study, there were 648 remaining respondents. This number was 4.5% lower than the anticipated target. Nonetheless, it is deemed that this modest shortfall in the target sample size did not exert a significant impact on the subsequent analysis. Further elucidation of the sampling enrollment is provided in Figure 1.

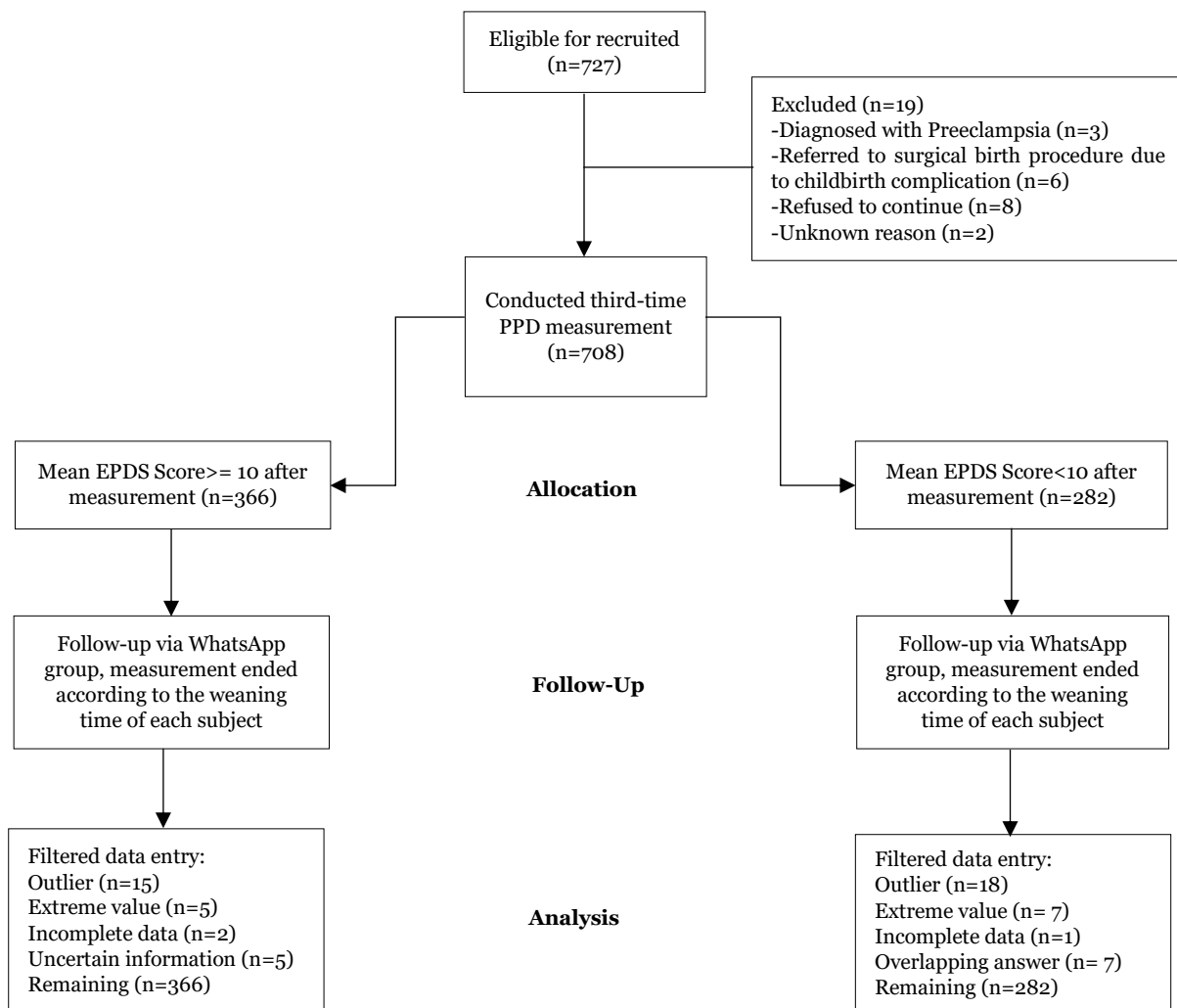


Figure 1. Sampling enrollment

2.3. Measurement and data collection

All participants were directed to adhere meticulously to various observational and interview protocols concerning sociodemographics, including parity, marital age, father support, and weaning time (the cessation of breastfeeding). The assessment of father support was conducted using the same instrument employed in a prior investigation and was administered three times with a 72-hour interval to ensure the reliability of maternal responses. Notwithstanding the

instrument's established validity, it is acknowledged that maternal responses may be subject to significant influence from variations in emotional attachment to their partners. Thus, periodic and recurrent assessments were implemented to attenuate potential scrutiny. Father support was evaluated utilizing the Father Support During Pregnancy (FSDP) questionnaire, previously validated in our antecedent research endeavours (Syam & Musni, 2022). This tool was originally developed in the Indonesian language, derived from social support theory perspectives, and consist of four dimensions of support. It comprises 10 inquiries concerning the types of support fathers offer mothers throughout pregnancy and breastfeeding, utilizing a rating scale ranging from always to never, where a higher score indicates better support. Furthermore, the EPDS, or Edinburgh Postnatal Depression Scale, was used to assess the presence and severity of postnatal depression in mothers. It consists of 10 questions that focus on various aspects of mood, such as feelings of sadness, anxiety, and guilt, as well as physical symptoms like sleep disturbances and appetite changes. Each item is scored on a scale ranging from 0 to 3, with higher scores indicating greater levels of depressive symptoms. The EPDS has been tested for its stability and consistency in the Indonesian language (Meltzer-Brody et al., 2013; Syam, Qasim, et al., 2021). The weaning time was quantified in terms of weeks from the first day the mother ceased breastfeeding.

2.4. Data analysis

A Spearman's correlation analysis was performed using SPSS (Version 25.0) to investigate the association between the variable and the measured outcome. The hypothesis was tested using SPSS Amos Modulus 24.0 in the SEM analysis. The analysis phase initiated with examining the uniformity and correlation of sociodemographic factors with the three primary variables: father support, postpartum depression, and the duration of weaning time. Any sociodemographic variables found to have significant correlations with any of the three main variables would be included in the model analysis. The study utilized Structural Equation Modelling (SEM) to investigate the predictive relationships among various factors, including direct and indirect factors, on father support, postpartum depression, and breastfeeding weaning time. The SEM demonstrated a high degree of compatibility, as evidenced by the following indices: The study reported that the model fit indices met the recommended thresholds, including a Comparative Fit Index (CFI) greater than 0.90, a Tucker Lewis Index (TLI) greater than 0.90, a Goodness of Fit Index (GFI) greater than 0.90, and a Normed Fit Index (NFI) greater than 0.90. Additionally, the model had a Root Mean Square Error of Approximation (RMSEA) less than 0.05 and a χ^2/df less than 3 with a p-value greater than 0.05 (Weston & Gore, 2006). The findings from the analysis were displayed in the form of a frequency distribution table and depicted in a structural equational model scheme.

2.5. Ethical considerations

Mothers expressing willingness to participate were provided with a concise overview of the study's aims, objectives, and the sequence of measurements to be conducted. Following this explanation, mothers were requested to sign the consent form, with their husbands serving as witnesses during the informed consent process. All the study procedures were approved by the Ethics Committee of Sekolah Tinggi Ilmu Kesehatan Nani Hasanuddin Makassar with a reference number 674/STIKES-NH/KEPK/VI/2021.

3. Results

3.1. Characteristics of the respondents

Table 1 shows that out of the 648 mothers who completed the study, most were within the healthy range of reproductive age. Despite the high population density of the urban municipality in South Sulawesi Province, Indonesia, a significant proportion of individuals, approximately one-third, still fall into marriage during early adolescence, which spans from 14 to 19 years of age. Over 50% of the mothers in our sample possess undergraduate degrees and come from households with a combined income that falls below the regional minimum wage of IDR 3 billion. This observation potentially indicates their capacity to secure a personal dwelling, as it reveals that over 50% of mothers resided in leased accommodations and cohabited with multiple family members. Upon conducting the third measurement of depression symptoms, this study determined that the prevalence of maternal depression symptoms exceeded 50%, while the rate of exclusive breastfeeding remained below 50%.

Table 1. Subject characteristics (n=648)

Subject Characteristics	Frequency (f)	Percentage (%)
Mothers Age (years)		
20 – 35	521	80.4
< 20 / > 35	127	19.6
Marital age (years)		
≥ 20	442	68.2
< 20	206	31.8
Educational Background		
Undergraduates	419	64.7
Post/Graduates	229	35.3
Occupations		
Household mothers	371	57.3
Working mothers	277	42.7
Parity		
Primipara	286	44.1
Multipara	362	55.9
Family Income		
≥ Regional minimum wage	195	30.1
< Regional minimum wage	453	69.9
Residency		
Rent	408	63.0
Own	240	37.0
Family Form		
Extended	443	68.4
Nuclear	205	31.6
Depression Symptom		
EPDS<10	282	43.5
EPDS≥10	366	56.5
Breastfeeding Term		
Exclusive	290	44.8
Other	358	55.2

3.2. The correlation between father support, marital age, parity, postpartum depression, and breastfeeding weaning time

The marital age and parity variables exhibited intercorrelation with the primary variables, prompting their inclusion in the SEM model for comprehensive causality analysis. Table 2 indicates a significant correlation ($p < 0.01$) among all variables included in the model. The study found a statistically significant relationship between parity and weaning time with postpartum depression and marital age ($p < 0.05$), with the exception of postpartum depression and marital age. The study found that there was a negative correlation between the weaning time of mothers and postpartum depression ($r = -0.183, p < 0.01$). Additionally, the weaning time was positively correlated with father support ($r = 0.148, p < 0.01$), parity ($r = -0.269, p < 0.01$), and marital age ($r = 0.187, p < 0.01$). Suggesting those with older marital age, multiple children, higher father support, and lower scores of postpartum depression symptoms were more likely to be correlated with prolonged weaning time.

Table 2. Spearman’s correlation coefficient of marital age, parity, father support, postpartum depression, and breastfeeding weaning time

	Mean	SD	1	2	3	4	5
Marital age (1)	21.1	3.8	1				
Parity (2)	2.0	1.2	-0.086	1			
Father support (3)	33.3	7.8	0.103**	0.054**	1		
PPD (4)	10.0	4.7	-0.059	-0.204*	-0.205**	1	
Weaning time (5)	18.8	14.7	0.187**	0.269**	0.148**	-0.183**	1

Note:

** $p < 0.01$; * $p < 0.05$; 1) Marital age; 2) parity; 3) Father support; 4) Postpartum Depression; 5) Breastfeeding Weaning time

Figure 2 presents the final structural equation model, which forecasts the interdependence among variables such as weaning time in breastfeeding mothers, postpartum depression, father support, parity, and marital age. The statistical analysis revealed that the final model demonstrated a satisfactory fit, as evidenced by the X^2/df value of 21.278, a p-value of 0.05, an RMSEA value of 0.177, a GFI value of 0.987, a CFI value of 0.849, and an NFI value of 0.853. The present investigation has yielded supplementary results that demonstrate the model's identification of the standardized direct impact of father support, parity, and age of marriage on postpartum depression as $B = -0.192$, -0.122 , and -0.05 , respectively. As per the research findings, the standardized direct impacts of father support, age at marriage, and postpartum depression on the duration of weaning were determined to be $B = 0.23$, 0.116 , and -0.129 , respectively. The present research shows the standardized indirect impacts of father support, parity, and age at marriage on weaning, which are $B = 0.025$, 0.016 , and 0.006 , respectively. The present study's findings indicate a marginal rise in the overall influence of father support, parity, and age of marriage on the cessation of breastfeeding. The regression coefficients for the aforementioned variables are correspondingly 0.256 , 0.016 , and 0.123 .

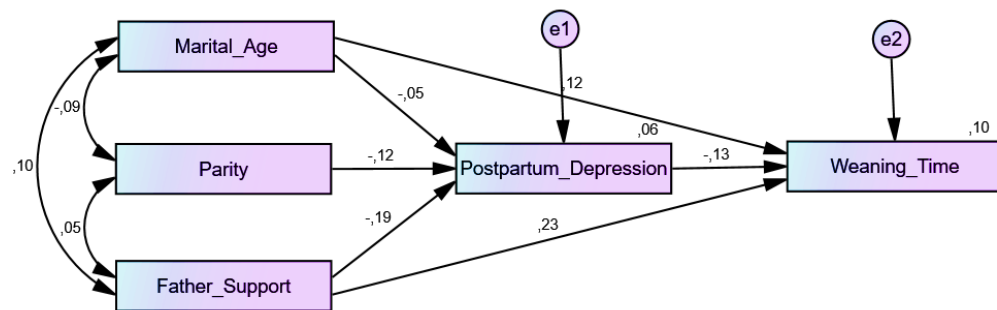


Figure 2. The structural equation model of marital age, parity, father support, postpartum depression and breastfeeding weaning time

The study's results suggest that there is a significant relationship between father support and weaning time, which is mediated by postpartum depression. The study found that father support was a significant predictor of overall impact rate, demonstrating a noteworthy improvement compared to other examined predictors. It could be posited that 25% of the decisions made during the weaning process are impacted by the degree of support provided by the father in addressing the mother's postpartum depression.

4. Discussion

This study aimed to measure the direct and indirect effects of father support throughout pregnancy on postpartum depression and breastfeeding weaning time by considering potential mediating pathways and controlling for relevant sociodemographic variables. The present study is a noteworthy contribution to the literature, as it features a substantial sample size and focuses on the context of Indonesia. According to the research, father support is the primary contributing factor to postpartum depression and has an indirect impact on the duration of breastfeeding. The study reveals that there exists an inverse correlation between the level of support provided by fathers and the incidence of postpartum depression. This inverse association serves as a protective factor, wherein a higher score of support provided by the father results in a lower mean score of potential depression in the mother. Mothers who are able to fulfil their social needs during pregnancy and the postpartum period are more likely to prevent the onset of depression. The present study validates several prior research discoveries (Duan et al., 2020; Karande & Perkar, 2012; Rempel et al., 2017; Xue et al., 2018), specifically that father participation in pregnancy and childcare amplifies the spectrum of favourable consequences for both maternal and infant well-being. Breastfeeding performance is enhanced, maternal anxiety is reduced, milk production is increased, depression onset is prevented, and the long-term quality of life of the child is improved. This present study explores the potential impact of father mediation on reducing anxiety and

depression, thereby promoting favourable breastfeeding outcomes (longer breastfeeding duration).

The model, as mentioned earlier, posits that premature cessation of breastfeeding is closely linked to postpartum depression. The pathophysiological mechanism of depression disrupts the endocrine control of lactation, leading to impaired responsiveness of lactation signalling pathways. Additionally, depression exerts an adverse impact on the immunological constituents of breast milk. These findings have been extensively deliberated in various meta-analytical and literature review studies (Dias & Figueiredo, 2015; Lee & Kelleher, 2016; Szpunar & Parry, 2017). The aforementioned are empirical observations that have been collectively agreed upon by professionals in the field. To achieve a substantial influence on the therapeutic level of an individual, it is imperative to seek hormone-based interventions that can alter the intracellular mechanism's pathway (Napso et al., 2018; Seth et al., 2016). Regarding issues related to breastfeeding, it is necessary to adopt a more comprehensive approach that takes into account the moderating influence of mothers rather than relying solely on individual therapy (Rivi et al., 2020). The provision of comprehensive solutions aimed at extending lactation duration among mothers necessitates the involvement of the community. The process of lactation is known to induce hormonal changes that have a protective effect against long-term depression. This is due to its regulation of various factors such as sleep patterns, emotional stability, and maternal self-esteem. It is of greater significance to provide assistance to mothers in sustaining lactation, as it can serve as a safeguard against the unfavourable consequences of depression in the future. The proposed model can potentially serve as a basis for community intervention by engaging fathers as a primary support system for expectant and lactating mothers within the community. Public health-based interventions (da Silva et al., 2016; Nabulsi et al., 2014) have been found to be a comparatively efficacious approach in achieving a wide-ranging impact, as opposed to individual therapies. The findings of our study also indicate that parity has a counteractive effect on postpartum depression. This suggests that mothers who have previously given birth possess knowledge about the obstacles they may encounter, have higher expectations regarding breastfeeding, and are better equipped to confront the challenges of lactation. Additionally, it imparts knowledge to individuals regarding their previous shortcomings and strategies for enhancing their breastfeeding proficiency in the long run. These findings might be the result of present investigation reports that the mean duration of weaning time for the entire sample was 18 to 19 weeks, with a predominant representation of multiple offspring.

The present study confirms the positive role of fathers during pregnancy towards postpartum depression. This is consistent with prior research (Syam & Musni, 2022), indicating that promoting regular and transparent communication between fathers and mothers could be a viable approach to addressing postpartum depression. The importance of father engagement in promoting maternal welfare is heightened by the fact that other family members have been preoccupied with the newborn. During the period of gestation and breastfeeding, it is crucial for the maternal figure to remain cognizant of her social requirements across four distinct dimensions, which include emotional, instrumental, informational, and assessment needs. In specific areas of Indonesia, involving the father in all aspects of antenatal, intra-natal, and postnatal care presents a unique difficulty. The aforementioned phenomenon can be attributed to cultural norms that strongly associate the responsibility of childbearing with the mother, potentially leading to her difficulty in expressing her emotional exhaustion (Borra et al., 2015). The societal expectations and norms surrounding the assessment of motherhood often lead to the suppression of female voices. The occurrence of frequent complaints from a mother may be considered atypical, as many mothers and even grandmothers (da Silva et al., 2016; Houghtaling et al., 2018; Negin et al., 2016) take pride in their capacity to independently manage and nurture a substantial number of children, with the father being solely responsible for providing financial support. The existence of a barrier to communication can give rise to a setting that nurtures the emergence and continuity of symptoms of depression. Therefore, it is crucial to improve the communication between partners during pregnancy to overcome language barriers. The current investigation posits that the assessment of father support is a subjective construct, as indicated by the accounts provided by both the maternal figure and the researcher. The father figure held the belief that he had met the maternal figure's social expectations through both verbal and nonverbal means despite the possibility of the maternal figure's anticipated standards differing from his own (deMontigny et al., 2018; Gebregzabihherher et al., 2017). Therefore, it is essential to

overcome the language barrier in communication during antenatal care (Hansen et al., 2018). Incorporating the father into antenatal consultations and counselling sessions can serve as an initial assessment to gauge the readiness of both partners to assume parental responsibilities, while also mitigating their own apprehension towards childbirth (Philpott et al., 2019; Vismara et al., 2016). Furthermore, the research findings indicate an inverse association between postpartum depression and the duration of breastfeeding. Specifically, a higher score on the postpartum depression scale is associated with a shorter period of breastfeeding initiation by the mother. The contention surrounding the issue has been resolved, as evidenced by our prior research, which has established that postpartum depression poses a significant obstacle to successful breastfeeding (Syam, Iskandar, et al., 2021). It is imperative to highlight that the indirect impact of father support extends the duration of the weaning period of an infant.

In the present study, marital age has a direct impact on postpartum depression and has a modest indirect impact on the decision to wean. These findings also support our previous report that examines the significant role of marital age on depressive symptoms (Syam et al., 2022). The topic of early marriage and its potential impact on breastfeeding in the later stages of life has been a subject of debate. From a normative standpoint, early marriage presents a significant challenge to the successful practice of lactation and childcare. However, the assumption that early marriage has a uniformly negative impact on minors and child care warrants careful consideration. The provision of social support during pregnancy has the potential to serve as a preventive factor for adolescent mothers. Possessing a support system that distinguishes between one's spouse and family members is highly advantageous. In Indonesia, it is common for young couples to reside with their parents. This living arrangement can offer support to young mothers through the presence of grandmothers. However, it can also present challenges, such as potential conflicts arising from the granddaughter's desire for independent decision-making (da Silva et al., 2016; Mossman et al., 2008).

5. Implications and limitations

This study highlighted several implications, specifically in nursing, as nurses can play a pivotal role in promoting father involvement in antenatal, intra-natal, and postpartum care. Educating expectant fathers about the importance of their support in preventing postpartum depression and enhancing breastfeeding outcomes can lead to more comprehensive care for mothers and infants. Nursing professionals need to be aware of and sensitive to cultural norms surrounding childbirth and parenting practices, particularly in regions like Indonesia, where societal expectations may hinder effective communication and support between partners. By fostering open dialogue and challenging traditional gender roles, nurses can facilitate improved communication and support within families. Nurses are well-positioned to identify signs of postpartum depression early on and provide appropriate interventions. By recognizing the inverse relationship between postpartum depression and breastfeeding duration, nurses can advocate for comprehensive support systems that address maternal mental health alongside breastfeeding support. The study underscores the importance of taking a holistic approach to maternal and infant care, considering not only physical health but also social and emotional well-being. Nurses can advocate for integrated care models that address the complex interplay between father support, maternal mental health, and breastfeeding outcomes.

Nonetheless, this study is also subject to certain limitations. It primarily relies on maternal reports of father support, potentially introducing bias or inaccuracies stemming from individual perceptions or experiences. Additionally, the study may not have comprehensively addressed all potential confounding variables that could influence the relationship between father support, postpartum depression, and breastfeeding outcomes, including socioeconomic status or maternal mental health history.

6. Conclusion

The present study offers reliable models that examine the interrelationships among parity, age of marriage, father support, postpartum depression, and duration of breastfeeding. Father involvement during the prenatal period up until the establishment of breastfeeding has been identified as a crucial factor in mitigating the impact of postpartum depression on the duration of breastfeeding. It is imperative to include the father in all stages of antenatal care, including intra-natal and postnatal care, in order to augment the father's involvement in childcare. Therefore,

future studies could incorporate objective measures of father support, such as direct observations or partner reports, to complement maternal self-reports and enhance the validity of findings. Researchers should strive to include a more comprehensive assessment of potential confounding variables, such as socioeconomic status and maternal mental health history, to better understand their influence on the association between father support, postpartum depression, and breastfeeding outcomes. Intervention studies could be implemented to assess the effectiveness of interventions aimed at promoting father involvement in prenatal, delivery, and postpartum care and their impact on maternal mental health and breastfeeding success. Nurses can contribute to advancing knowledge in this area by participating in interdisciplinary research teams and advocating for comprehensive assessment approaches.

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Author contribution

II conceptualized and designed the research, collected and analyzed the data, and drafted the manuscript. AS contributed to the conceptualization and design of the study, supervised the data analysis, and critically revised the manuscript for important intellectual content. Both authors are contributing equally and approved the final version of the manuscript for submission.

Conflict of interest

The authors declare no conflicts of interest.

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ORIGINAL RESEARCH

Migration Intentions, Practice Environment, and Satisfaction among Nigerian Nurses



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Abstract

Background: Nursing workforce migration is a function of the nursing practice environment and satisfaction with the general situation of their country of practice. There is a need to provide empirical data on the intent to migrate among nurses and satisfaction with the working environment in Nigeria.

Purpose: This study aimed to assess migration intention, favorability of practice environment, and level of satisfaction with the Nigerian environment among nurses in a private teaching hospital in Nigeria.

Methods: This descriptive cross-sectional study recruited participants using a simple random sampling technique. In all, 124 nurses participated in the study. Data were collected using the migration intention questionnaire, nursing practice environment scale, and satisfaction with Nigeria environment questionnaire. All ethical principles were adhered to. Data were analyzed using Statistical Package for Social Sciences version 20 in terms of frequency, percentage, mean, and standard deviation.

Results: An overwhelming majority (95.2%) had the intention to migrate to other countries, with 63.6% of them having already been in the migration process. Canada (34.8%) and the United Kingdom (33.9%) were the most sought-after countries. Nurse manager ability, leadership, and support scored highest on the favourability of the nursing practice environment ($M=2.92$, $SD=0.80$), while staffing and resources inadequacy had the lowest score ($M=2.63$, $SD=0.68$). Overall, 75.8% of the nurses described their practice environment as favourable. Political conflicts and wars were the most dissatisfying areas of Nigeria's environment. Overall, the majority (61.3%) of nurses were dissatisfied with the Nigerian environment.

Conclusion: The majority of the nurses participating in the study were planning to migrate to another country and were not satisfied with Nigeria's environment. The nurses claimed that their practice environment was unfavourable. There is a need to make the nursing practice environment more favorable to the nurses.

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1. Introduction

Human resources are important for the growth of any nation. Achieving the 3rd Sustainable Development Goal of good health and well-being requires adequate health manpower. Inadequate human resource capital delays processes of growth and development. One of the contributing factors to human resource development in developing countries is the migration of skilled human resources (Olorunfemi et al., 2020). Migration is a worldwide phenomenon (Chiamaka et al., 2020; Thompson & Walton-Roberts, 2018). Nurse migration has increased dramatically throughout the world (Buchan et al., 2022; Goštautaitė et al., 2018; Olorunfemi et al., 2020). Nurses migrate for numerous reasons, which may include pursuing better economic opportunities, escaping oppressive political climates, pursuing better education, or for adventure (Chiamaka et al., 2020; Davda et al., 2018). Similarly, community and work environment may be a reason for nurses' migration intentions as it influences their job satisfaction (Akinwale & George, 2020; Davda et al., 2018; Labrague et al., 2018).

In Nigeria, the eroding wages and salaries, unsatisfactory living conditions and exchange rates, increased crime rate, social unrest, political conflicts, and war have been attributed to contributing to migration intentions among the populace (Akinwale & George, 2020; Fagite, 2018). Other factors that have been implicated in the increasing rate of migration intentions for nurses include unfavorable conditions of service, understaffing, stress, low prospects of professional growth and development, discrimination in appointments and promotions, and unconducive environments to productivity (Chiamaka et al., 2020; Fagite, 2018; Faremi et al., 2019; Olorunfemi et al., 2020; Oyediran et al., 2022).

The consequences of this mass exodus of nurses and other healthcare workers on the health system and economy of those developing countries are huge and capable of slowing down the development of such countries (Chiamaka et al., 2020; Olorunfemi et al., 2020; Raji et al., 2018). There is generally increased workload and burnout among the few nurses that are left in the country due to the reduced workforce (Faremi et al., 2019; Olatubi & Ogunfowokan, 2020; Olorunfemi et al., 2020). Increased stress had led to reduced quality of life of the few nurses left and dissatisfaction with the job and work environment, thereby continuing the cycle of increased desire to migrate from the country (Akinwale & George, 2020; Olatubi et al., 2022; Oyediran et al., 2022).

No fewer than 7,256 trained nurses in Nigeria relocated to the United Kingdom alone between March 2021 and March 2022 (Tolu-Kolawole, 2022). This did not include the statistics of nurses who migrated to other nations. According to the Registrar, Nursing and Midwifery Council of Nigeria, in 2023, over 15,000 nurses migrated out of Nigeria; this figure is more than 50% of the new nurses produced for the year (Abuja, 2024). Nigeria mostly produced a nursing workforce for the developed nations. Nigeria, being a low-income country, uses its scanty resources to train nurses for high-income countries that entice these nurses with pull factors. Hence, there is a growing acute and chronic shortage of nursing workforce to cater to the growing Nigerian population. As a nation, Nigeria needs 800,000 nurses to meet its healthcare needs (Premium Times Nigeria, 2022). These statistics will worsen if nothing is done to turn the tide.

One of the greatest obstacles to Africa's development is the emigration of African skilled workers to developed countries (Fagite, 2018). The loss of skilled nurses not only seriously weakens the healthcare system of the source country but also affects its healthcare economy (Raji et al., 2018). Scholars have advanced reasons for nurses' mass exodus from Nigeria, but little has been empirically documented in this area. Previous studies concentrate on the pull factors (Davda et al., 2018) that developed countries use to attract nurses from developing nations, with little emphasis on the push factors, which are mainly the working environment in Nigeria that encourages emigration. The few studies on the push factors were among other health professionals, health workers in general, or students studying health-related disciplines (Akinwumi et al., 2022; Ojo et al., 2023). This study, therefore, intended to assess migration intentions, practice environment, and satisfaction among nurses in a private teaching hospital in Nigeria.

2. Methods

2.1. Research design

The study adopted a descriptive cross-sectional design. Participants were sampled once to describe their migration intentions and their satisfaction with the practice environment and the Nigerian environment.

2.2. Setting and samples

This study was conducted among nurses at a faith-based private teaching hospital in southwestern Nigeria. The hospital has existed for more than 100 years and serves as a training institution for different categories of healthcare workers. Participants were recruited using a simple random sampling technique. The nurses' duty roster in each of the wards and the unit was used to determine a sample frame for recruiting potential participants. A ballot system was then used to determine the nurses to be recruited for the study. Initials of the nurses in each ward were written on paper, and an independent person was recruited to pick the initials randomly. Only those nurses whose names were picked were recruited for the study. Nurses on annual leave or other forms of leave during the data collection period were exempted from the study. To qualify to be included in the study, the nurse must have been employed by the hospital for at least 6 months. Only those who voluntarily agreed to participate in the study after due education about the study were

eventually recruited for the study. In all, 124 nurses participated in the study. The sample size was calculated using the Taro Yamane formula for sample calculation (Yamane, 1973).

2.3. Measurement and data collection

Data were collected by two of the authors who were nurses between July and August 2022. Pen-paper-based questionnaires were used for data collection. Prospective participants were approached by the authors to explain the aim and procedure of the study in detail. Some of the participants filled out the questionnaire immediately and returned it, while the questionnaire for others was retrieved later from their ward/unit. The outcome measures were intention to migrate, satisfaction with the nursing practice environment, and satisfaction with Nigeria's environment. Data were collected using a structured questionnaire. The questionnaire consisted of three parts. It was made up of a 3-item questionnaire that assessed nurses' intention to migrate, a 30-item of McCloskey/Mueller Satisfaction Scale (MMSS) (Zheng et al., 2017), and an 11-item satisfaction with Nigeria environment questionnaire.

The migration intention questionnaire asked questions on whether the respondents would like to migrate to another country to practice nursing, whether he/she is doing anything presently about the migration intention, and the country to which they most desire to migrate. The MMSS scale consists of 4-point Likert-type questions of "strongly disagree-1", "disagree-2", "agree-3", and "strongly agree-4". Obtainable mark ranges from 30 to 120. The scale is subdivided into 5 parts. They are nurse manager, ability leadership and support (8 items); nurse participation in the workplace (8 items); staffing and resource adequacy (5 items); nursing foundations for quality care (6 items); and collegial nurse-physician relations (3 items). The Cronbach alpha score of McCloskey/Mueller Satisfaction Scale subscales varies from 0.71 to 0.87 (Lee et al., 2016), and the convergence validity of the construct is 0.44–0.74 (Juanamasta, et al., 2023). The last part of the scale is the 11-item satisfaction with Nigeria's environment scale. It is a 5-point Likert-type scale of "totally satisfied-1", "satisfied-2", "neutral-3", "dissatisfied-4" and "totally dissatisfied-5". Obtainable score ranges from 11 to 55. A high score signifies dissatisfaction with the Nigerian environment, while a low score means satisfaction with the Nigerian environment. A score of "11–46" is classified as satisfied, while "47–55" is classified as dissatisfied.

The validity of the questionnaire was ensured using face and content validity criteria. Face validity was assessed by having three experts review the questionnaires to determine if the items appeared to measure the intended construct. The result showed that both questionnaires were valid to measure the construct. The instrument then went through a content validity test, which involved more thorough reviews, where two experts ensured that the instrument covered all relevant aspects of the construct with an I-CVI of 0.83 for MMSS and 0.81 for satisfaction with the Nigerian environment. The reliability of the scales was determined by using a Cronbach alpha test on 20 nurses to measure its internal consistency. The MMSS and the satisfaction with Nigeria environment questionnaire had a Cronbach alpha score of 0.96 and 0.877, respectively.

2.4. Data analysis

Data were analyzed using Statistical Package for Social Sciences (SPSS) version 20 (IBM Corp., 2011). In the statistical analysis, descriptive statistics of frequency, percentages, mean, and standard deviations were used.

2.5. Ethical considerations

Ethical approval was sought and gained from the ethical board of the hospital where the study was carried out (BUTH/REC-691). Informed consent was obtained from all the nurses who voluntarily participated in the study. Retrieved data were stored in the personal computer of one of the authors and used only for research purposes. Strict confidentiality was maintained throughout every stage of the study.

3. Results

3.1. Participant's characteristics

Table 1 shows the characteristics of the study participants. The mean age of the nurses who participated in the study was found to be 30.64 (SD=9.06) years. Only 5.6% of the nurses were male, and more than half were single (58.9%). About half (48.4%) of the nurses have at least a first degree in nursing, while the highest qualification of 51.6% was found to be a diploma. An

overwhelming majority (90.4%) were Yoruba, while 78.2% were nursing officer II (NO II). Almost all the participants (97.6%) were registered nurses (RN), while those who were registered midwives were 33.1%.

Table 1. Characteristics of the participants (n=124)

Characteristics	f	%	Mean	SD	Min-max
Age (years)			30.64	9.06	23 – 60
21 – 30	93	75.0			
31 – 40	17	13.7			
41 – 50	4	3.2			
50 – 60	10	8.1			
Gender					
Male	7	5.6			
Female	117	94.4			
Marital status					
Married	47	37.9			
Single	73	58.9			
Widow	4	3.2			
Ethnicity					
Yoruba	112	90.4			
Igbo	6	4.8			
Others	6	4.8			
Educational Qualification					
Diploma of nursing	64	51.6			
First degree of nursing	60	48.4			
Professional qualification*					
Registered Nurse	121	65.8			
Registered Midwife	41	22.3			
Registered Public Health Nurse	15	8.1			
Registered Peadiatric Nurse	4	2.2			
Registered Mental Health Nurse	3	1.6			
Rank					
Nursing Officer II	97	78.2			
Nursing Officer I	16	13.0			
Senior Nursing Officer	1	0.8			
Principal Nursing Officer	1	0.8			
Assistant Chief Nursing Officer	4	3.2			
Chief Nursing Officer	2	1.6			
Assistant Director of Nursing Services	3	2.4			

*Some of the participants had more than one professional qualifications

3.2. Nurses' intention to migrate

Figure 1 illustrates the nurses' intention to migrate, while Figure 2 describes the destination of migration among Nigerian nurses. The intention to migrate to another country to practice nursing among the participants showed that an overwhelming majority (95.2%) of the nurses would like to move to another country to practice. Only 6 (4.8%) said they did not intend to migrate to another country. Out of those who intend to migrate to another country, results showed that 63.6% of them said they had already begun the process of migration (Figure 1). The most sought-after countries to migrate to the participants were found to be Canada (34.8%), the United Kingdom (33.9%), and the United States of America (16.9%) (Figure 2).

3.3. Nurses' satisfaction with the nursing practice environment

Overall, participants were more satisfied with "nurse manager, ability leadership and support" (M=2.92, SD=0.80), closely followed by "collegial nurse-physician relations" (M=2.91, SD=0.55), as can be seen from Table 2. On the other hand, satisfaction with "staffing and resource adequacy" was the least unfavorable to the nurses, with a mean of 2.63 (SD=0.68).

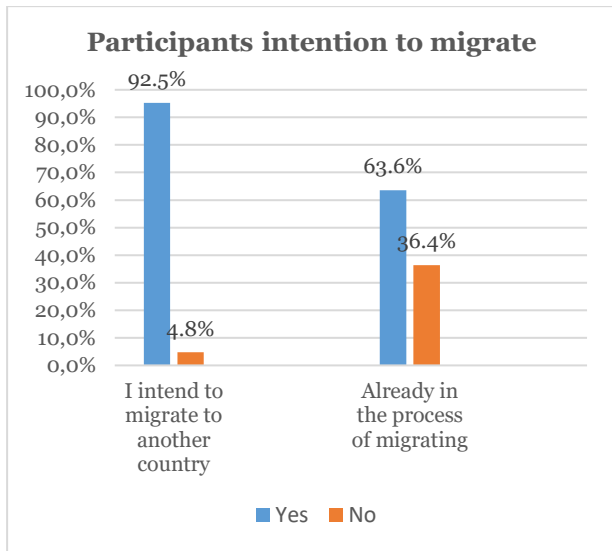


Figure 1. Nurses' intention to migrate

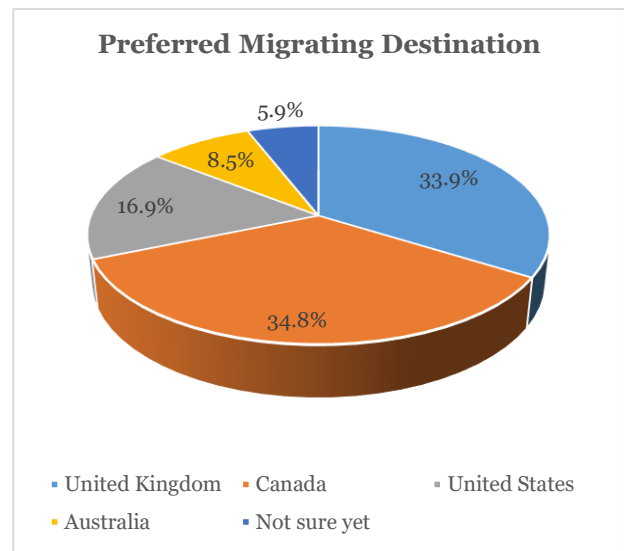


Figure 2. Preferred migrating destination

Favorability of the nursing practice environment among the participants showed that 25% opined that nurse manager, leadership ability, and support were unfavorable. According to the participants, the most favorable nursing practice environment domain was collegial nurse-physician relations (84.7%), followed by nurse participation in the workplace (76.6%). Two out of every five nurses who participated in the study were not satisfied with nursing workforce staffing and resource adequacy (42.7%) (Table 2).

Table 2. The subscales of nurses' satisfaction with the nursing practice environment (n=124)

Satisfaction subscales	Total mean	Mean per number of items	Unfavourable Practice Environment	Favourable Practice Environment
	M(SD)	M(SD)	f(%)	f(%)
Nurse manager, ability leadership and support	23.33(6.39)	2.92(0.8)	31 (25)	93 (75)
Nurse participation in the workplace	22.93(5.18)	2.87(0.65)	29 (23.4)	95 (76.6)
Staffing and resource adequacy	13.16(3.42)	2.63(0.68)	53 (42.7)	71 (57.3)
Nursing foundations for quality care	17.12(3.87)	2.85(0.64)	42 (33.9)	82 (66.1)
Collegial nurse-physician relations	8.74(1.65)	2.91(0.55)	19 (15.3)	105 (84.7)
Overall	85.28(17.28)	2.84(0.58)	30 (24.2)	94 (75.8)

Table 3 illustrates the details of nurses' satisfaction with the nursing practice environment according to each item. In the nurse manager, ability leadership, and support subscale, more nurses believed that their managers listened and responded to employee concerns (M=3.05, SD=1.01) closely, and also praised and recognized them for a well-done job (M=3.01, SD=0.90). The least satisfied aspect was the nurse manager, who backed up the nursing staff in decision-making, even if a conflict was with a doctor (M=2.8, SD=0.94). Similarly, in the nurse participation domain, nurses involved in the internal governance of the hospital scored the lowest (M=2.74, SD=0.94), while active staff development or continuing education programs for nurses scored the highest (M=2.97, SD=0.70). Items in the staffing and resource adequacy scored the least of all domains. Most nurses were not satisfied with the number of staff that they had to get work done (M=2.37, SD=0.94). However, the nurses were satisfied with their relationship with the physician (M=2.91, SD=0.54).

Table 3. Nurses' satisfaction with nursing practice environment (n=124)

Satisfaction items	Mean(SD)
Nurse manager, ability leadership and support	
A nurse manager or immediate supervisor who is a good manager and leader	2.81(1.02)
A nurse manager who backs up the nursing staff in decision-making, even if conflict is with a doctor	2.8(0.94)
A senior nursing administrator who is highly visible and accessible to staff.	2.88(0.91)
Supervisors use mistakes as learning opportunities, not criticism.	2.88(0.71)
A supervisory staff that is supportive of the nurses.	2.98(0.94)
Administration to listen and respond to employee concerns.	3.05(1.01)
Praise and recognition for a job well done.	3.01(0.90)
Nursing administrators consult with staff on daily problems and procedures	2.92(0.91)
Nurse participation in the workplace	
Career development/clinical ladder opportunity.	2.87(0.78)
Opportunities for advancement.	2.83(0.76)
Active staff development or continuing education program for nurses.	2.97(0.70)
Nurses have the opportunity to serve on hospital and nursing committees.	2.94(0.71)
Opportunity for nurses to participate in policy decisions.	2.94(0.74)
Nurses are involved in the internal governance of the hospital.	2.74(0.94)
A preceptor program for newly hired RNs.	2.86(0.69)
A senior nursing administration equal in power and authority to other top-level hospital executives	2.77(0.90)
Staffing and resource adequacy	
Enough staff to get work done.	2.37(0.94)
Enough registered nurses on staff to provide quality patient/client/ resident care.	2.51(0.92)
Adequate support services allow me to spend time with my patients.	2.59(0.92)
Enough time and opportunity to discuss patient/client/resident care problems with other nurses.	2.77(0.91)
Working with clinically competent nurses	2.92(0.86)
Nursing foundations for quality care	
Written, up-to-date nursing care plans for all patients/clients/residents.	2.62(0.90)
High standards of nursing care are expected by the administration.	2.91(0.79)
Patients/clients/residents care assignments that foster continuity of care.	2.86(0.78)
Nursing care is based on a nursing model rather than a medical model.	2.85(0.77)
A clear philosophy of nursing that pervades the patients'/clients/residents' care environment.	2.87(0.79)
An active quality improvement program	3(0.66)
Collegial nurse-physician relations	
Doctors and nurses have good working relationships.	2.88(0.72)
A lot of teamwork between nurses and doctors.	2.95(0.72)
Collaboration between nurses and doctors	2.91(0.54)

3.4. Nurses' satisfaction with Nigeria's environment

Overall, according to Table 4, the majority (61.3%) of the nurses in the study were dissatisfied with Nigeria's environment. Satisfaction with the Nigeria environment among the participants in the study showed that most participants were dissatisfied with political conflicts and wars in Nigeria (M=4.52, SD=0.58), workload placed on nurses in Nigeria (M=4.38, SD=0.64), and adequacy and satisfaction with staffing in Nigeria (M=4.37, SD=0.68). Conversely, nurses in the study were satisfied with professional growth and development (M=3.98, SD=0.83) (Table 5).

Table 4. The level of satisfaction with Nigeria's environment (n=124)

Satisfaction level	Frequency (f)	Percentage (%)
Satisfied with Nigeria's environment	48	38.7
Dissatisfied with Nigeria's environment	76	61.3
Total	124	100.0

4. Discussion

This study targeted at determining the feasibility of assessing migration intention, favourability of the practice environment, and the level of satisfaction with Nigeria environment among nurses in a teaching hospital in Nigeria. The result showed that the majority of participants were dissatisfied with Nigeria's environment and intended to migrate to other countries. Moreover, the mean age of the nurses who participated in the study showed that the majority of the nurses were in their productive years, which was essential for the growth and productivity of the country.

Table 5. The items of satisfaction with Nigeria's environment (n=124)

Satisfaction items	M(SD)
How satisfied are you with the Nigerian economy	4.12(0.95)
How satisfied are you with the Nigerian current standard of living	4.18(0.49)
How satisfied are you with your earnings as a Nigerian	4.02(0.73)
How satisfied are you with Nigeria's living conditions	4.16(0.76)
What is your opinion on Political conflicts and wars in Nigeria	4.52(0.58)
How satisfied are you with the Nigerian conditions of service	4.36(0.79)
Are the current staffing in Nigeria adequate and satisfactory?	4.37(0.68)
Low prospect of professional growth and development	3.98(0.83)
Discrimination in appointments	4.20(0.73)
How satisfied are you with the conduciveness of Nigeria's environments for productivity	4.12(0.74)
How satisfied are you with the workload placed on nurses in Nigeria	4.38(0.64)
The total satisfaction	46.42(5.61)

The findings showed that almost all the nurses who participated in the study intended to migrate to other countries to practice nursing. Scholars have documented an increasing number of highly educated and skilled professionals migrating from their home countries to developed nations of the world (Chiamaka et al., 2020; Fagite, 2018; Olorunfemi et al., 2020). Our study also showed that the majority of the nurses who intended to migrate to other countries had already initiated the process involved in moving to another country (Ipole, 2018). This showed that it was not only that the nurses intended to travel, but they were also already taking serious steps about migrating to another country. Our study corroborated the findings of a previous study on increasing turnover intention among nurses in Nigeria in recent times (Adeniran et al., 2021; Akinyemi et al., 2022).

Most nurses in the study were interested in migrating to Canada or the United Kingdom. In a systematic review and meta-synthesis of qualitative, Davda and colleagues concluded that the United Kingdom has a strong macro pull factor to attract nurses from developing nations of the world (Davda et al., 2018). Similarly, Canada has reviewed their immigration plan and policies in recent times to attract skilled professionals, including nurses, to the country (Boucher, 2019). This might have been responsible for the increasing desire of nurses to move to Canada and the United Kingdom. Among the developed countries that have continued to entice nurses from other countries, the United Kingdom has a more flexible and attractive package that allows international nurses to migrate with their families easily and start practicing almost immediately (Ojo et al., 2023). These might explain the strong desire for nurses in this study to migrate to the United Kingdom. Although the United States of America seems to be the practice desired country of many nurses in Nigeria, their immigration policy and procedure are more demanding compared to the United Kingdom and Canada. This might account for the fact that only a few participants in our study intended to migrate to the US.

Our study assessed the nurses' opinions about the nursing practice environment of the hospital where they were practicing. Findings showed that a quarter of the nurses pointed out the nurse manager, leadership ability, and support in the hospital as unfavorable. Previous studies have implicated management and leadership support-related issues fueling job satisfaction, turnover intention, and migration intention in developing nations (Akinwale & George, 2020; Goštautaitė et al., 2018; Nnah, 2020; Yakubu et al., 2022).

The study's results showed that the nurses were satisfied with their relationship with the physician. This was in contrast with the findings of the study among municipal nurses in Ghana, which showed that more than half of the nurses were not satisfied with the nurse-physician relationship (Poku et al., 2022). The reason for this might be that our study was carried out in a private, faith-based hospital. Faith-based hospitals are established on the tenet of love and strong pillars of love that promote positive interactions. However, the level of satisfaction with the nurse-physician relationship in our study was lower than what was reported in China (Chen et al., 2018). Corroborating the submission of previous researchers, the most unsatisfied area of the work environment among nurses in this study was workforce staffing and resource adequacy (Ayalew et al., 2015; Chen et al., 2018; Poku et al., 2022). This further confirmed the high level of stress among nurses and other health workers (Faremi et al., 2019; Olatubi & Ogunfowokan, 2020; Oyediran et

al., 2022) as a result of increased work burden and resource inadequacy, making practicing nursing in Nigeria uninteresting as previously reported.

The findings also showed that nurses were not satisfied with the fact that they were usually not involved in hospital governance and decision-making processes, which supports the findings of Poku and colleagues (Poku et al., 2022). This might further explain why there is a high migration intention among the nurses. Similarly, the majority of the nurses opined that when conflict occurred between them and the physician, the hospital management usually supported the physician. Therefore, the involvement of nurses in the hospital decision-making process and fair hearing during the conflict with other health workers might help in reducing the scourge of intention to migrate among nurses (Al Zamel et al., 2022).

In addition to the level of satisfaction with the nursing practice environment, the study evaluated nurses' general satisfaction with the Nigerian environment. This is important as migration intention is not only fueled by the nursing practice environment but also the general satisfaction with the community where nurses live (Chiamaka et al., 2020; Davda et al., 2018; Fagite, 2018; Goštautaitė et al., 2018; Olorunfemi et al., 2020). The findings found that most of the nurses were not satisfied with political conflicts and wars in Nigeria, supporting the submission of Chiamaka et al. (2020) that an unstable and unsatisfactory political environment is one of the factors pushing nursing migration in Nigeria. In recent years, there has been an increased level of unrest and conflict in Nigeria, resulting in a high level of internally displaced people in the country (Kamta et al., 2022). Similarly, healthcare workers have been the target of kidnapping for ransom by bandits and other criminally minded individuals (Okojie & Ahmad, 2022; Sani et al., 2024). This might have fueled the desire of many nurses and other healthcare workers to seek refuge in developed nations.

5. Implications and limitations

This study found a very high intention to migrate among the nurses, which implies that the shortage of nurses in Nigeria resulting from migration may persist. Similarly, many nurses are dissatisfied with the nursing practice and Nigerian environment, which has been documented as one of the push factors for nurses' migration. The result of this study may reflect the nursing workforce condition in Nigeria, which needs a major change for a better future for Nigerian nurses. The limitation of this study was that our study was carried out among nurses in a single hospital, which might not reflect the opinion of the general nurse population in Nigeria.

6. Conclusion

This study established the fact that the majority of young nurses had the intention of migrating and had even initiated the process of migrating. This was a result of several contributing factors, which included but were not limited to unfavorable nurse management, leadership ability and support in the hospital, political conflicts, and wars in Nigeria. To prevent the looming danger of nurses' migration, all stakeholders need to pay urgent attention to the contributing factors of the nursing practice environment and the general Nigerian living environment. This could be addressed by providing a suitable working environment to keep nurses within the country's health care system, and health policymakers should focus on formulating and implementing policies that will improve the nursing practice environment and promote satisfaction with the Nigerian environment. Future studies should be carried out on a large scale to cut across nurses in different zones of the country. Anecdotal evidence suggests that nurses in the southern part of the country migrate more than their counterparts in the northern part of the country. This needs to be empirically proven and documented. There is also a possibility that the push factor for migration may be different across the different zones of the country, which needs to be studied in the future.

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Author contribution

MIO, IEA, and MDF conceived and designed the study and participated in administering the literature search. IEA and MDF collected the data. MIO and IEA analysed the data and wrote the

first draft of the manuscript. GOA, FAF, and CBB contributed to the literature review and writing of the manuscript. All authors approved the final draft of the manuscript.

Conflict of interest

No conflict of interest was declared by any of the authors.

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ORIGINAL RESEARCH

Optimizing Antenatal Care: The Effects of a Holistic Nursing Android Application for Pregnant Women



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Abstract

Background: During the COVID-19 pandemic, face-to-face antenatal care (ANC) services were limited. Therefore, we developed the Android digital application “Guide Me” with a holistic care concept for optimizing ANC.

Purpose: This study aimed to evaluate the effect of the Android digital application “Guide Me” on optimizing ANC.

Methods: The present study used an experimental research design. The participants included 302 pregnant women selected through block randomization, with 160 in the intervention group and 142 in the control group. The intervention involved providing ANC services using a digital Android application at home, with health services visited only when treatment was necessary. The intervention group received usual care along with the Android application, “Guide Me”, which included a holistic nursing concept program, while the control group received only the usual care. Data were collected three times, and the ANC scale was used to measure ANC optimization. Repeated measures ANOVA was used to analyze the data.

Results: There were significant differences in the optimization of ANC ($F=96.887$, $df(1,300)$, $p<0.001$) between the intervention and control groups. The target of 14 T in the intervention group showed significant statistical differences over three times ($F=118.35$, $df(1,308)$, $p<0.001$) compared to the control group, with optimization of ANC increasing from 45.79 to 59.16 in the intervention group and from 44.09 to 45.77 in the control group.

Conclusions: The program effectively increased ANC optimization. Pregnant women feel more at ease in their own homes and have less time to visit a hospital. Therefore, they may accept and even appreciate online apps and telemonitoring as alternatives to ANC checks.

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1. Introduction

The majority of pregnant women express concern about COVID-19 exposure during pregnancy care at health services (Schwartz, 2020), despite the fact that neonates are generally safe from mothers with COVID-19 (DeNicola et al., 2020). A study in Chicago reported that 43.5% of pregnant women with COVID-19 exhibited no signs or symptoms during the early stages of infection. Other studies have found the COVID-19 virus in the placenta (Hosier et al., 2020) and shown that vertical transmission from mother to neonate can occur during the third trimester (Hu et al., 2020). Additionally, pregnant women have reported high levels of fear related to COVID-19 (Lebel et al., 2020; Nausheen et al., 2020; Zainiyah & Susanti, 2020), with Goldfarb et al. (2020) emphasizing the need for support and routine consultations throughout pregnancy. Given these concerns, routine consultations for pregnant women using online services are crucial to prevent complications for both mothers and their fetuses (Miller et al., 2020), particularly during the pandemic.

In response to this need, health services have rapidly adapted by offering online consultations (Rasmussen & Jamieson, 2020). These services allow pregnant women to consult healthcare providers from home, reducing their risk of COVID-19 exposure while enhancing accessibility, especially in the context of restricted mobility (Brunelli et al., 2021).

Telemedicine applications, including mobile health (mHealth) apps, have emerged as vital tools for addressing the healthcare needs of pregnant women during the pandemic. Research highlights the potential of mHealth apps and social media to significantly enhance maternal well-being (Chan & Chen, 2019). However, most applications offer limited features for pregnant women (Choi et al., 2016; Zairina et al., 2016), focusing, for example, on video calls (Borrelli et al., 2023) and video chat (Shi et al., 2023) or addressing singular issues like asthma (Zairina et al., 2016) or physical activity (Choi et al., 2016). Furthermore, the majority of research on mHealth apps to support lifestyle and healthcare in high-income nations highlights the effectiveness of these apps for reducing gestational weight gain, increasing fruit and vegetable intake, and supporting healthcare for the prevention of infections and asthma during pregnancy (Carter et al., 2019). However, these apps often fail to address the comprehensive, multifaceted needs of pregnant women, especially those in low- to middle-income settings.

Our preliminary study revealed that most pregnant women in the study area use Android mobile phones (Desmawati et al., 2020). This indicates a significant opportunity to develop Android-based digital health services tailored for Antenatal Care (ANC). While many telemedicine applications focus on specific health issues or limited maternal health education, they often do not provide holistic care addressing physical, emotional, psychological, cultural, and spiritual well-being. This gap underscores the need for a more comprehensive approach to ANC, particularly in resource-limited settings.

The “Guide Me” application seeks to address this gap by providing a holistic approach to ANC based on Holistic Nursing Theory (HNT), which recognizes the interconnected needs of pregnant women. The application includes features such as a question-and-answer platform, chat, video calls by appointment, and scheduling in-person consultations. It also offers perinatal education resources to enhance pregnant women’s knowledge about pregnancy and childbirth preparation. While the app does not provide direct physical services, such as ultrasonography (USG), blood pressure monitoring, or laboratory tests, it allows users to schedule appointments for these services. This feature ensures that pregnant women can receive necessary physical care without long waits at healthcare facilities. Additionally, the application incorporates non-pharmacologic education modes to manage pregnancy holistically, addressing physical, psychological, emotional, cultural, and spiritual needs to optimize ANC (Tendean et al., 2021). It also includes independent nurse-midwifery interventions (Desmawati et al., 2019) and offers education classes for ANC and childbirth preparation (Desmawati et al., 2020).

This study aimed to evaluate the effectiveness of the “Guide Me” Android application in optimizing ANC. The intervention involves delivering ANC services through the app, with in-person visits to healthcare facilities limited to cases requiring physical examination or treatment.

2. Methods

2.1. Research design

The design of the study was experimental. This design fits the aim of the study, which is to test the effect of the Android digital application “Guide Me” on optimizing ANC. The intervention results were compared between the intervention group and the control group. The study was conducted at antenatal clinics in four Community Health Centers (CHCs) across two districts in Indonesia.

2.2. Setting and samples

The study was conducted from July to December 2022. The sample size was calculated using G*Power version 3.1.9.7 (Faul et al., 2007), with medium effect size, power = 0.80, and a level of significance = 0.05 (Cohen, 1988). At least 84 pregnant women were needed for each CHC. With four CHCs included, a total of 336 respondents participated in the study and met the inclusion criteria at antenatal clinics. These criteria included mothers and fetuses without complications, singleton pregnancies, 12–36 weeks of pregnancy, and willingness to follow the research guidelines until the program’s completion. The exclusion criteria included not planning the baby’s delivery outside the research areas. Pregnant women who met the inclusion criteria and were willing to participate in the study provided informed consent and their mobile phone numbers.

Participants were randomly assigned to either the intervention group (IG) (n=168) or the control group (CG) (n=168) using an application that generated a specified sequence based on the block randomization formula. Pregnant women in the IG received the usual care during

pregnancy and used the “Guide Me” application. During the study, respondents were excluded if: (1) the mother developed any adverse medical conditions or psychological depression, or (2) they had to undergo a cesarean section or natural labor before completing the program and questionnaire.

2.3. Intervention

The respondents were divided into the intervention and control groups. The control group received the usual ANC, while the intervention group received the usual ANC and used an Android digital application, “Guide Me,” developed by the researcher. The application was developed based on a focus group discussion with 30 pregnant women representing four health centers in Indonesia (Cinere, Limo, Pamulang, and Ciputat). Correspondingly, the focus group discussion (FGD) results were used as references for creating the application, which was supplemented with content from related materials. After the application was completed, it was tested on ten pregnant women at a public health center. The results indicated that the application significantly helped optimize pregnant women’s ANC targets.

The application includes five features: (1) read feature, (2) question-and-answer feature, (3) chat feature, (4) video call feature, and (5) appointment scheduling feature. For the intervention group, routine ANC services included the “10 T” in Indonesian, consisting of ten items: (1) *Timbang berat badan dan tinggi badan* (weight and height measurement), (2) *Tekanan darah diperiksa* (blood pressure measurement), (3) *Tetapkan status gizi* (nutritional status assessment), (4) *Tinggi fundus uteri diperiksa* (uterine fundal height measurement), (5) *Tentukan presentasi janin dan detak jantung janin* (fetal presentation and heart rate monitoring), (6) *Tetanus vaksin* (tetanus toxoid vaccination), (7) *Tablet zat besi* (iron supplementation), (8) *Tes laboratorium rutin dan khusus* (routine laboratory tests, e.g., urine and sexually transmitted disease (STD) tests), (9) *Temu wicara* (counseling), and (10) *Tatalaksana kasus* (case management for individual pregnancy issues via the digital ANC application to reduce worry) (Rohmawati et al., 2020). With the additional program in the application, the “10 T” was expanded to “14 T” with the addition of: (11) *Senam hamil* (pregnancy exercise), (12) *Perawatan payudara* (breast care), (13) *Berikan Yodium untuk daerah gondok* (iodine supplementation for goiter-endemic areas), and (14) *Anti malaria untuk daerah endemik* (malaria prophylaxis for endemic areas).

The control group received the usual care provided by CHCs, which included measuring height and weight, blood pressure, uterine fundal height, fetal presentation and heart rate, tetanus toxoid vaccination, iron supplementation, and routine laboratory tests, e.g., urine tests and STD tests upon request. Meanwhile, respondents in the intervention group were asked to install the application and were provided with instructions on how to use it. The study was conducted over six months, with measurements taken at three points (pre-, mid-, and post-test).

2.4. Measurement and data collection

The 14 T of ANC was used to measure targets in the optimization of ANC implementation (Rohmawati et al., 2020). The study was evaluated at three points: pre-test, mid-test, and post-test. The scale was scored from 1 to 5 (1=never, 2=seldom, 3=sometimes, 4=often, 5=always), with total scores ranging from 14 to 70. A lower score indicated poor ANC practices, while a higher score reflected better ANC adherence. The reliability of the instruments used in the study was tested, with the ANC scale showing a reliability coefficient of 0.75. The Content Validity Index (CVI) for the content within the application (program) was 0.83. Participants were provided with a manual to guide them in using the home application. At the end of the study, data from 302 respondents were analyzed, including 142 respondents in the control group (CG) and 160 respondents in the intervention group (IG) (Figure 1). Data collection was conducted by the principal investigator and a research assistant.

2.5. Data analysis

Data analysis was conducted using IBM SPSS Statistics for Windows, Version 25.0 (Armonk, New York). Repeated Measures Analysis of Variance (ANOVA) was used to evaluate within-group effects before and after the intervention, while independent t-tests were performed to compare the program’s effects between the intervention and control groups. A significance level of $p < 0.05$ (two-tailed) was considered statistically significant. In this study, potential confounding factors

included the possibility of respondents using other mHealth applications and instances where pregnant women in the intervention group might discuss the “Guide Me” application with those in the control group. Although the researcher could not fully control these confounding variables, efforts were made to minimize bias by requesting participants in the intervention group to refrain from sharing information about the application with others and advising respondents not to use other mHealth applications during the study.

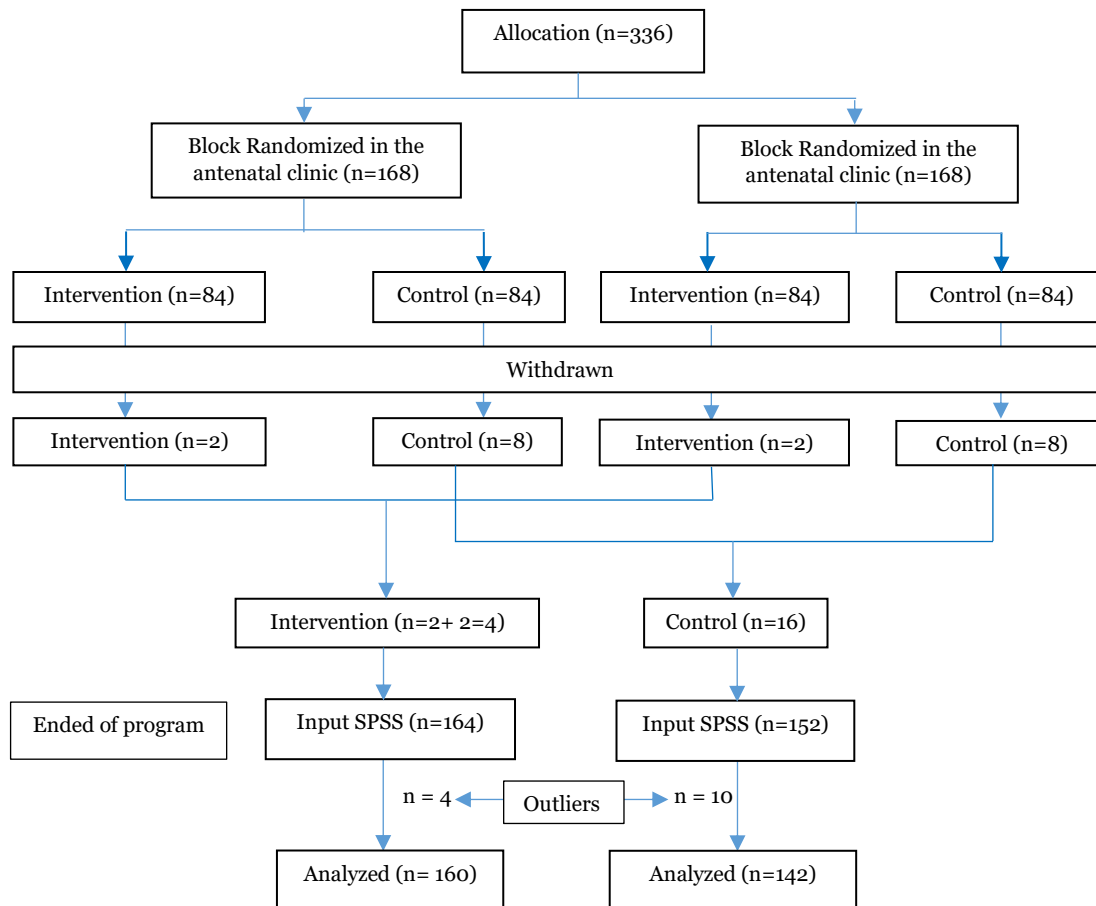


Figure 1. Flow diagram of participants during the study

2.6. Ethical considerations

This study obtained ethical approval from the ethics review boards at the University of Jember, Indonesia (reference number 137/UB25.1.14/KEPK/2022). Furthermore, pregnant women were provided with information about the study and signed a consent form. They were free to withdraw from the study at any time, and the confidentiality of their data was ensured.

3. Results

3.1. Demographic data of the respondents

Of the 336 pregnant women ($n=168$ in the control group [CG] and $n=168$ in the intervention group [IG]) with their family involvement from data collection until the completion of the study, 20 respondents dropped out (16 pregnant women in the CG and 4 in the IG) (Figure 1). They withdrew for various reasons, such as normal delivery or cesarean section, and did not complete the program. During data analysis, some outliers were found ($n=10$ in the CG and $n=4$ in the IG), resulting in a total sample of 302 respondents (160 in the intervention group and 142 in the control group). The mean age of respondents in the intervention and control groups was 28.9 and 28.2 years, respectively. Most respondents had elementary, junior, or senior high school education levels (75% in the intervention group and 80.3% in the control group). Additionally, a higher proportion of respondents in the intervention group had completed higher education

(25%) compared to those in the control group (19.7%). Furthermore, most respondents were not working (76.25% in the intervention group and 81.69% in the control group) (Table 1).

Table 1. Demographic data of the respondents in the intervention and control groups (n=302)

Variables	Intervention Group (n=160)	Control Group (n=142)
	f (%)	f (%)
Mean age (years), M(SD)	28.9 (5.26)	28.22 (5.29)
Ethnicity		
Betawinese, Sundanese, Javanese	98 (61.25)	92 (64.78)
Minangnes and others (non-Java islands)	62 (38.75)	50 (35.21)
Educational level		
Elementary, Junior, Senior High School	120 (75)	114 (80.3)
Diploma, Bachelor, Master	40 (25)	28 (19.7)
Occupation		
Not working	122 (76.25)	116 (81.69)
Working	38 (23.75)	26 (18.31)
Family's income per month (IDR), M(SD)*	4,182.92 (1,808.85)	3,809.52 (1,909.38)
Gestational Status (trimester), M(SD)	2.10(1.17)	2.02(1.01)

Note: M=Mean, SD= Standard Deviation, f=Frequency, *IDR in thousands

3.2. ANC scores of pregnant women

At the end of the study, data from 302 respondents were analyzed, including 142 pregnant women in the control group (CG) and 160 pregnant women in the intervention group (IG). All pregnant women in both groups met the assumptions for the independent t-test and repeated measures ANOVA. The distribution of the data was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests, and the result showed that the data were normally distributed. Homogeneity was confirmed by Levene's test for ANC optimization scores ($p=0.056$). The baseline demographic and obstetric data of both groups were similar. No significant differences were found in demographic and obstetric data between the control and intervention groups (maternal age $p=0.212$, gestational age at the start of using the application $p=0.572$, educational level $p=0.760$, occupation $p=0.091$, and gestational status $p=0.721$). Thus, randomization and confounding factors were controlled with a fairly homogenous sample.

As presented in Table 2, this study indicated a significantly different optimization of ANC between the CG and IG [$F=96.887$, $df(1, 300)$, $p<0.001$]. Furthermore, there were significant statistical differences over three time points for ANC optimization [$F=118.35$, $df(1, 308)$, $p<0.001$]. This revealed that the ANC score significantly increased after the program was conducted. Using repeated measures ANOVA with Greenhouse-Geisser correction, a significant difference in ANC optimization scores over the three time points was reported [$F(1.028, 1.028) = 175.797$, $p<0.001$, with partial $\eta^2=0.369$].

Table 2. Comparison of optimization ANC score of pregnant women during using ANC digital android application of the two groups (n=302) using repeated measure ANOVA

Sources of variance	Sum of Squares	Df	Mean Square	F	P-value	Partial η^2
Between-respondents						
Group(intercept)	2109876	1	210987.20	23150.63	0.000**	0.987
Group	8829.972	1	8829.972	96.887	0.000**	0.244
Error	27341.05	300	91.137			
Within respondents						
Time	8762.545	1.028	8524.313	175.797	0.000**	0.369
Group x time	5899.189	1.028	5738.805	118.352	0.000**	0.283
Error (time)	14953.37	308.3	48.489			

Note. ** $p<0.001$

A post hoc test using the Bonferroni correction showed that the mean ANC target score at the mid-test (M=49.45, SD=4.49) was more optimal than at the pre-test (M=45.79, SD=7.10), with a significant difference ($p<0.000$). The ANC target score at the post-test (M=59.16, SD=4.57) was more optimal than at the mid-test, and this improvement also resulted in a significant difference ($p<0.000$) (Table 3).

Table 3. Comparisons of mean differences in ANC optimization across the three time points using the Bonferroni correction in the repeated measure ANOVA

Comparison	Mean(Standard Deviation)				Mean difference	p
	Pre-test	1 st month	2 nd month	SE		
Pre-test and 2 nd trimester	45.79(7.10)		-	0.496	-2.666	0.000**
Pre-test and 3 rd trimester	-	49.45(4.49)		0.497	-7.526	0.000**
2 nd and 3 rd trimester		-	59.16(4.57)	0.068	-4.859	0.000**

Note. ** $p<0.001$

Table 4 presents the mean, standard deviation, and p-value of the total ANC optimization scores at each time point for the IG and CG. The mean ANC scores at the pre-test, mid-test, and post-test in the IG were higher than those in the CG. An independent t-test demonstrated that the mean and standard deviation of ANC scores in the IG were as follows: pre-test, 45.79(7.10); mid-test, 49.45(4.49); and post-test, 59.16(4.57). In comparison, the CG scores were: pre-test, 44.09 (8.25); mid-test, 45.77(8.01); and post-test, 45.77(8.01). A significant difference was found between the two groups at the mid-test ($t=4.987$, $p<0.001$) and post-test ($t=18.082$, $p<0.001$). However, there was no significant difference between the two groups at the pre-test ($t=1.917$, $p=0.058$). The study indicated significant differences in ANC optimization at the mid-test and post-test compared to the pre-test.

Table 4. Comparisons of mean scores and standard deviations of optimization ANC

Antenatal Care	Intervention Group		Control Group		T	p-value
	(n=140)		(n=162)			
	M	SD	M	SD		
Optimization ANC at pre-test	45.79	7.10	44.09	8.25	1.917	0.058
Optimization ANC at mid-test	49.45	4.49	45.77	8.01	4.987	0.000**
Optimization ANC at post-test	59.16	4.57	45.77	8.01	18.08	0.000**

Note. ** $p<0.001$, M=Mean score, SD=Standard deviation

4. Discussion

This study aimed to evaluate the effect of the Android digital application “Guide Me” on optimizing antenatal care (ANC). The findings demonstrate the application’s effectiveness in enhancing ANC for pregnant women, as ANC targets significantly increased and became more optimal after the program’s implementation. These results align with previous research, which found that most women experience positive pregnancy outcomes when using online consultations (van den Heuvel et al., 2020b). Online apps and telemonitoring are widely regarded as convenient and valuable tools for ANC, as they enable women to remain comfortable at home while minimizing the need for hospital visits. Such digital tools also contribute to maintaining, optimizing, and improving the frequency and outcomes of ANC. Additionally, remote and digital consultations, as well as home-based electronic fetal monitoring, have been shown to support quality midwifery care during the pandemic and beyond (van den Heuvel et al., 2020b).

During the COVID-19 pandemic, most countries reduced face-to-face antenatal clinic visits for pregnant women. For instance, in Italy, women found online apps useful for ANC checks except when direct treatment was required (Coxon et al., 2020; Renfrew et al., 2020). Similarly, many health services in France and the United Kingdom replaced in-person visits with virtual support. In the Netherlands, mobile or phone consultations continued for blood tests and early ultrasounds at 10–12 weeks of pregnancy, while in Spain, some hospitals transitioned to phone

consultations (Coxon et al., 2020; Renfrew et al., 2020). The current study provides a set of core principles as solutions for pregnant women during and after the pandemic. Mobile health (mHealth) apps promote healthy lifestyles and support medical care by helping prevent excessive weight gain during pregnancy, encouraging the consumption of fruits and vegetables, and assisting with smoking cessation. These apps also support healthcare efforts to prevent infections during pregnancy (Coxon et al., 2020; Overdijkink et al., 2018). Studies with large sample sizes have demonstrated the significant outcomes of digital health services. For instance, Zairina et al. (2016) reported that mHealth apps improved asthma control during pregnancy. Additionally, the Management of Maternal Obesity through Mobile Technology (MOMTech) program effectively managed maternal obesity during pregnancy, showing feasibility in clinical settings and acceptance by women, though slight modifications to recruitment, text messages, and consultation logistics may be necessary for broader implementation (Soltani et al., 2015).

This study found that after six months of using the “Guide Me” program, ANC optimization improved by 13.49%. This finding aligns with a previous study reporting that lifestyle behaviors improved by 26.3% after six months of coaching, with the platform showing high compliance and usability, and users demonstrating improvements in nutrition and lifestyle behaviors (Choi et al., 2016). Another study in the Netherlands demonstrated that the SAFE@HOME app reduced face-to-face visits while enhancing ANC services through a digital platform, resulting in increased healthcare utilization through additional digital antenatal visits (van den Heuvel et al., 2020a). The present study highlighted the application’s features, including (1) reading material, (2) a question-and-answer section, (3) chat functionality, (4) video calls, and (5) scheduling face-to-face appointments. These findings support previous studies reporting two modes of application use: (1) asynchronous, where patient information is stored and reviewed later by a nurse-midwife, similar to this study’s reading and Q&A features, and (2) synchronous, involving live interactive consultations where pregnant women interact remotely with nurse-midwives in real-time to maintain physical distancing (DeNicola et al., 2020). This synchronous approach is comparable to the chat and video call features (available with prior agreement) in the current study, which have been particularly effective during the COVID-19 pandemic.

Since the onset of the COVID-19 pandemic in 2020, the global perspective on telehealth has shifted. The world has benefited more from its use, including in pregnancy care. The American College of Obstetrics and Gynecology (ACOG) recommended the use of telehealth in February 2020 (Dosaj et al., 2021). Following this, it was reported in New York that the implementation of telehealth reduced more than half of face-to-face visits for low-risk patients (Sumarsono et al., 2023). Similarly, virtual prenatal care visits and consultations have been reported to replace most in-person visits (Zork et al., 2020). Many regimens, such as nutrition counseling, weight gain management, risk factors, vitamins, breastfeeding education, pre-term labor, preeclampsia precautions, family planning counseling, and physical exercise, can be done virtually. A study in the UK showed that implementing a remote monitoring system replaced 800 in-person appointments and achieved better compliance with ANC targets (Aziz et al., 2020). In another country, Cairo, the implementation of telehealth in maternity nursing care helped reduce the maternal mortality rate. The digital application had positive impacts, such as increased maternal knowledge, motivation, and health behavior, which helped guide pregnant women in practicing physical activities and detecting high-risk pregnancies, all while providing affordable home-based services (Kamel & El Toukhi, 2020).

Nowadays, the acceptance of telehealth services is high and continues to be appropriate post-COVID-19. Telehealth flexibilities have expanded access to care through digital means. This condition provides an opportunity to expand access to pregnancy and provide holistic nursing care for pregnant women after COVID-19.

5. Implication and limitations

The findings of this study have significant implications for nursing practice, particularly in the delivery of antenatal care (ANC). The successful implementation of the “Guide Me” Android application demonstrates the potential of digital health solutions to optimize ANC, especially when face-to-face interactions are limited, such as during pandemics or for women in remote areas. This approach offers nurses a new model of care that integrates holistic nursing concepts, enabling them to remotely monitor and guide pregnant women while still providing personalized support. The increased acceptance of telehealth services post-COVID-19 has expanded access to

care through digital platforms, creating an opportunity to improve pregnancy care and offer holistic nursing support to pregnant women beyond the pandemic.

This study has certain limitations. It focused only on normal pregnancies, which limits the generalizability of the findings to women with high-risk pregnancies. Since the intervention (the “Guide Me” Android application) was designed for home use, its effectiveness may differ for women who require more frequent in-person visits of ANC. Additionally, subjects using the app for self-practice at home could not be directly monitored by researchers. It is important to note that the study began in the second trimester of pregnancy. Antenatal care (ANC) should ideally start in the first trimester to detect and prevent complications early, including providing guidance on nutrition, controlling chronic diseases, treating infections, and managing risk factors to prevent complications such as pre-term birth, low birth weight, and maternal and infant mortality.

6. Conclusion

This study concluded that the Android digital application “Guide Me,” with a holistic care concept, effectively optimizes ANC. This app is a holistic nursing program that addresses physical, psychological, social, cultural, and spiritual needs through digital means. The program is effective and efficient in terms of time, cost, and ease of use. Moreover, women feel more at ease in their own homes, spend less time visiting hospitals, and may find online apps and telemonitoring to be acceptable and valuable alternatives to ANC checks. They can maintain, optimize, and improve ANC numbers and target checks. It is affordable, simple to use, timely, and effective. Additionally, policymakers and healthcare providers should consider implementing the program in all antenatal clinics in Indonesia. Future research should focus on developing apps to test their effectiveness for high-risk pregnancies, particularly in the field of community healthcare.

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Author contribution

All authors (DD, RI) contributed to the conceptualization of the study, data collection and processing, and manuscript preparation and revision. All authors have read and approved the final manuscript.

Conflict of interest

There is no conflict of interest among authors.

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ORIGINAL RESEARCH

Psychosocial Health of the Badjao People During COVID-19 in Jolo, Philippines: An Exploratory Study



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Abstract

Background: The Badjao, a nomadic maritime group in Southeast Asia, faces heightened vulnerability during public health crises due to their reliance on maritime livelihoods, limited healthcare access, and historical marginalization – challenges exacerbated by the COVID-19 pandemic. However, there is a significant research gap in understanding their unique needs and vulnerabilities, especially its specific impacts on their health and well-being due to the pandemic.

Purpose: This study explores the psychological and social health of the Badjao and the factors affecting them during the COVID-19 pandemic.

Methods: This study used an exploratory qualitative design. Guided semi-structured interviews were conducted with 10 purposively selected Badjao respondents from Barangay Bus-Bus, Jolo-Sulu, Philippines. The data were analyzed using thematic analysis.

Results: The study identified five key themes related to the psychosocial health of the Badjao community during COVID-19 and the affecting factors. They were: (1) Feelings and apprehension, with anxiety over contracting the virus and financial instability; (2) Responses to the pandemic, marked by fear of death, job loss, and hospitalization concerns; (3) Coping mechanisms, where the community relied on traditional remedies, social support, and quarantine adherence; (4) Social status, highlighting food insecurity and disrupted social interactions; and (5) Factors influencing psychosocial health, focusing on the importance of support systems and access to accurate information and resources.

Conclusion: The COVID-19 pandemic has significantly disrupted the social and economic stability of the Badjao community, exacerbating their existing vulnerabilities. The community needed culturally sensitive interventions that addressed both their immediate and long-term needs. Collaborations with local government units and stakeholders are crucial in supporting the resilience and well-being of the Badjao in future crises.

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1. Introduction

Psychological health, encompassing mental and emotional well-being, is essential for maintaining resilience, managing stress, and fostering healthy relationships. It forms the foundation of an individual's overall balance and ability to navigate life's challenges. The significance of psychological health is especially pronounced during crises where the strain on mental well-being intensifies (Abu Khait & Lazenby, 2021; Eiroa-Orosa, 2020; Van Denend et al., 2022). The COVID-19 pandemic, a global public health emergency, has profoundly disrupted these aspects of health, particularly among marginalized communities (Caron & Adegboye, 2021; Virella & Cobb, 2021). The resulting widespread anxiety, distress, and uncertainty have underscored the essential role of healthcare professionals, especially nurses, in addressing these challenges (Inayat et al., 2022; Ness et al., 2021).

The Badjao people, an indigenous and traditionally nomadic maritime group in the Philippines, present a unique case for study (Moreno, 2023). Their reliance on maritime livelihoods, limited access to healthcare, and historical marginalization have made them

particularly vulnerable during public health crises like the COVID-19 pandemic (Fitzpatrick et al., 2023; Moreno, 2023). This situation has placed an unprecedented strain on their psychosocial health, as the pandemic has disrupted their income sources, deepened their social isolation, and exacerbated existing health disparities (Eiroa-Orosa, 2020).

Nurses, as the frontlines of healthcare delivery, play a critical role in managing the psychosocial impacts of the pandemic, especially in vulnerable populations (Fitzpatrick et al., 2023; Inayat et al., 2022; Pratt et al., 2023). Understanding the specific challenges faced by the Badjao community is essential for nurses to provide culturally sensitive and effective care. However, despite extensive research on the psychosocial effects of COVID-19, there is a significant gap in the literature regarding its impact on indigenous and marginalized groups like the Badjao.

This study seeks to address this gap by focusing on the psychosocial health of the Badjao community in Bus-bus, Jolo Sulu, during the COVID-19 pandemic. By exploring how the pandemic has affected the mental, emotional, and social well-being of the Badjao, this research aims to explore the psychosocial health and its affecting factors of the Badjao during the COVID-19 pandemic. The result of this study will provide nurses and other healthcare professionals with the insights needed to develop targeted interventions that address the unique needs of this community. The study also contributed to the broader understanding of COVID-19's impact on marginalized populations and highlighted the critical role of nursing in promoting psychosocial health in diverse cultural contexts.

2. Methods

2.1 Research design

This study employed a descriptive-exploratory qualitative research design to investigate the impact of the COVID-19 pandemic on the Badjao community's mental, emotional, social, and spiritual health. The descriptive aspect systematically captured and articulated the specific effects of the pandemic on these health dimensions, providing a detailed account of the challenges faced by the Badjao. Descriptive research, by definition, gathers data to describe a phenomenon, focusing on the "what," "when," "where," and "how" rather than the "why" (Doyle et al., 2020). This approach was essential for understanding the Badjao community's condition during the pandemic.

The exploratory component aimed to uncover the broader impacts of the pandemic on the Badjao's daily activities, livelihoods, social interactions, and spiritual practices, areas that had been largely unexamined in prior research. Exploratory research is typically undertaken when there is little or no existing research to draw upon, allowing for an initial, theoretical understanding of the study problem. This approach, often informal and unstructured, provided valuable insights into the Badjao community's unique experiences during the pandemic (Nilsen et al., 2019).

2.2 Setting and participants

This study was conducted in Barangay Bus-Bus, Jolo, Province of Sulu, Philippines, a densely populated area with a significant Badjao community, which was identified as highly vulnerable and thus qualified for this study. Barangay Bus-Bus, home to 38,650 people as of the 2020 Census, accounts for 28.16% of Jolo's population (Basaluddin, 2021).

A total of 10 participants as conversational partners were purposively selected to provide insights into the psychosocial impacts of COVID-19 on the Badjao community. The inclusion criteria focused on literate members of nuclear families, particularly heads of families and mothers, who could effectively articulate their experiences. The decision to recruit 10 participants was based on the qualitative nature of the study, where depth of insight was prioritized over sample size, and data saturation was achieved when no new themes emerged (Guest et al., 2020). A community liaison, a trusted common-law friend within the Badjao community, facilitated the recruitment process, helping to identify and engage participants, thereby ensuring their active involvement in the study.

2.3 Data collection

The data for this study were gathered through a scheduled in-depth interview with qualified participants, guided by a semi-structured interview questionnaire. The researchers developed the semi-structured interview guide specifically designed for qualitative exploration of the

psychosocial impacts of the COVID-19 pandemic on the Badjao community. This interview guide was carefully crafted to ensure that it elicited in-depth, relevant insights. The guide was divided into three sections: psychological and mental health (4 questions), social status (4 questions), and factors influencing psychosocial health (4 questions). Each section contained open-ended questions designed to explore the participants' experiences and perceptions in detail. For instance, the psychological section included questions like, "How has the pandemic affected your mental and emotional well-being?" and "What are your biggest concerns related to your family's mental health during this time?" Probing questions were used throughout the interviews to delve deeper into participants' responses, ensuring a comprehensive understanding of their experiences.

The interview guide was translated into the Badjao language to ensure that participants could fully understand and accurately respond to the questions, given that many were not fluent in Filipino or English. The interviews were conducted in the Badjao language to facilitate comfortable and open communication. The guide was developed in consultation with five local experts and validated through a pilot test with a thirty sample of Badjao individuals to ensure cultural relevance and clarity. The pilot test yielded a Cronbach's alpha of 0.81.

Data collection took place over 40 days, from 15 December 2021 to 2 February 2022. Interviews were conducted by the researchers in the participants' houses within Barangay Bus-Bus, Jolo, to create a familiar and comfortable environment. Each interview lasted between 30 and 40 minutes, depending on the depth of the participants' responses. The interviews were audio-recorded with participants' consent, and the recordings were later transcribed into text using Word document software for analysis. After the interviews, the data were coded, analyzed, and interpreted systematically. The first ten days were dedicated to conducting the interviews, while the following 15 days were spent to organizing and coding the data. The entire process, including thematic analysis, was completed within the remaining days to ensure a thorough interpretation of the findings.

2.4 Data analysis

The collected data were analyzed using thematic analysis, a widely used method for identifying, analyzing, and interpreting patterns of meaning within qualitative data. The thematic analysis was conducted in six steps to ensure a rigorous and systematic approach (Naeem et al., 2023). First, familiarization with the data was begun by thoroughly reading and re-reading the transcripts to immerse in the data, noting initial ideas. This step was carried out by ZTM and HKP. Second, initial codes were systematically generated by ZTM to identify significant features across the entire dataset. These codes highlighted important aspects related to the psychosocial impacts of COVID-19 on the Badjao community. Third, searching for themes was done by organizing the codes into potential themes. The authors (ZTM and HKP) collaboratively examined the codes to identify patterns and grouped them into broader themes that captured the essence of the data. Fourth, all authors reviewed and refined the identified themes to ensure that the themes accurately represented the data. This step involved checking the themes against the coded data and the entire dataset to confirm their relevance and coherence. Fifth, the themes were defined and named once they were finalized. Both authors worked together to ensure that each theme captured a distinct and meaningful aspect of the data. Finally, the themes were woven into a cohesive narrative during the writing-up phase, illustrating the key findings of the study.

Throughout the analysis process, discrepancies among the authors were resolved through discussion and consensus. If disagreements arose, the authors re-examined the data collaboratively until an unanimous agreement was reached, ensuring the analysis was robust and reflective of the participants' experiences. This thorough and systematic approach to thematic analysis allowed the researchers to uncover deep insights into the psychosocial impacts of COVID-19 on the Badjao community.

2.5 Trustworthiness/rigor

Several strategies were employed to achieve credibility, transferability, dependability, and confirmability to ensure the rigor of this study. Credibility was achieved through prolonged engagement with the participants and the use of triangulation. The researchers spent considerable time building rapport with the Badjao community, which helped to gather rich, in-depth data. Triangulation was employed by comparing data from multiple sources, such as

individual interviews and focus group discussions, to validate the findings. Member checking was also used as participants were invited to review and verify the accuracy of the transcriptions and interpretations of their responses, ensuring that the data accurately reflected their experiences. Transferability was addressed by providing detailed descriptions of the research context, the participants, and the research process. By thoroughly documenting the setting and the characteristics of the Badjao community, other researchers can determine the applicability of the findings to similar contexts or populations. The study's findings were presented with sufficient detail to allow readers to evaluate the extent to which the findings could be transferred to other settings.

Furthermore, dependability was ensured by maintaining an audit trail, which documented all the decisions made during the research process, including changes to the study design, data collection methods, and data analysis strategies. The research team also engaged in peer debriefing, where they discussed the study's progress and challenges with external experts who provided critical feedback. This helped to ensure that the study's procedures were consistent and could be replicated in future research. Confirmability was established by maintaining objectivity throughout the research process. The researchers kept reflexive journals to record their thoughts, biases, and decisions, which helped to minimize personal biases that could influence the study's outcomes. The audit trail also contributed to confirmability by providing transparency about how the data were analyzed and how conclusions were drawn.

2.6 Ethical considerations

This study was conducted in strict adherence to ethical guidelines to ensure the safety and well-being of all participants. Ethical approval was obtained from the college based ethics review committee of the College of Nursing of Mindanao State University-Sulu (CON-MSU-Sulu: 2021-1125), ensuring that the research met all necessary ethical standards. The study posed no harm to the participants, and all efforts were made to protect their rights and privacy.

Before participating in the study, all participants were provided with an informed consent form based on the World Health Organization's guidelines for qualitative research. This form detailed the purpose of the study, the procedures involved, potential risks and benefits, and the voluntary nature of participation. Participants were given ample time to review the information and ask questions before providing their written consent. This process ensured that participants were fully informed and agreed to participate freely, without any coercion. Moreover, confidentiality was strictly maintained throughout the research process. Personal identifiers were removed from the data, and all recordings, transcriptions, and documents were securely stored to protect participants' privacy. To further ensure anonymity, participants were assigned pseudonyms such as P1 and P2, where "P" stands for participant (e.g., P1 as Participant 1). These identifiers were used consistently throughout the study to reference individual responses without revealing their identities. The ethical considerations undertaken in this study ensured that the research was conducted with the highest respect for the participants' rights and well-being.

3. Results

3.1 Characteristics of the study participants

As illustrated in Table 1, from the selected 10 participants from the Badjao community in Barangay Bus-Bus, Jolo, Province of Sulu, Philippines, six of them were heads of families (60%) and four mothers (40%). All participants were between the ages of 30 and 55, ensuring a diverse representation of perspectives within nuclear families. All participants were literate and had basic proficiency in reading and writing, which was crucial for ensuring that they could effectively articulate their experiences and understand the interview questions. The participants were actively involved in traditional occupations such as fishing (40%), vending (30%), and other small-scale trades (30%), reflecting the primary livelihoods of the Badjao community. Their educational backgrounds were limited, with most having received only informal education, typical within their community. However, their relative literacy enabled them to engage more deeply in the interview process, providing rich insights into their experience during the COVID-19 pandemic.

Table 1. Characteristics of study participants

Participant ID	Role in Family	Age	Literacy Level	Occupation	Education Level
P1	Head of Family	45	Literate	Fishing	Informal
P2	Head of Family	50	Literate	Vending	Informal
P3	Head of Family	38	Literate	Fishing	Informal
P4	Head of Family	30	Literate	Small-scale trade	Informal
P5	Head of Family	55	Literate	Fishing	Informal
P6	Head of Family	42	Literate	Vending	Informal
P7	Mother	40	Literate	Small-scale trade	Informal
P8	Mother	35	Literate	Vending	Informal
P9	Mother	32	Literate	Fishing	Informal
P10	Mother	48	Literate	Small-scale trade	Informal

As presented in Figure 1, the study revealed that the COVID-19 pandemic had significant psychosocial impacts on the health of the Badjao community, as reflected and expressed in five main themes. Theme 1: Feelings and Apprehension highlighted the anxiety related to contracting the disease and the destabilization of daily financial earnings due to disrupted livelihoods. Theme 2: Responses to the Pandemic detailed the community’s fear of death, loss of jobs, and concerns about hospitalization, all of which intensified their stress levels. Theme 3: Coping Responses to the Pandemic explored how the Badjao relied on traditional remedies, community support, adherence to quarantine protocols, and activities like staying at home and sleeping to cope with the crisis. Theme 4: Social Status focused on the pandemic-induced social problems, particularly food insecurity and disrupted social interactions, which led to increased isolation and hardship. Finally, Theme 5: Factors Influencing Psychosocial Health, examined the role of support systems and activities, as well as access to information and resources, in shaping the community’s overall well-being during the pandemic.

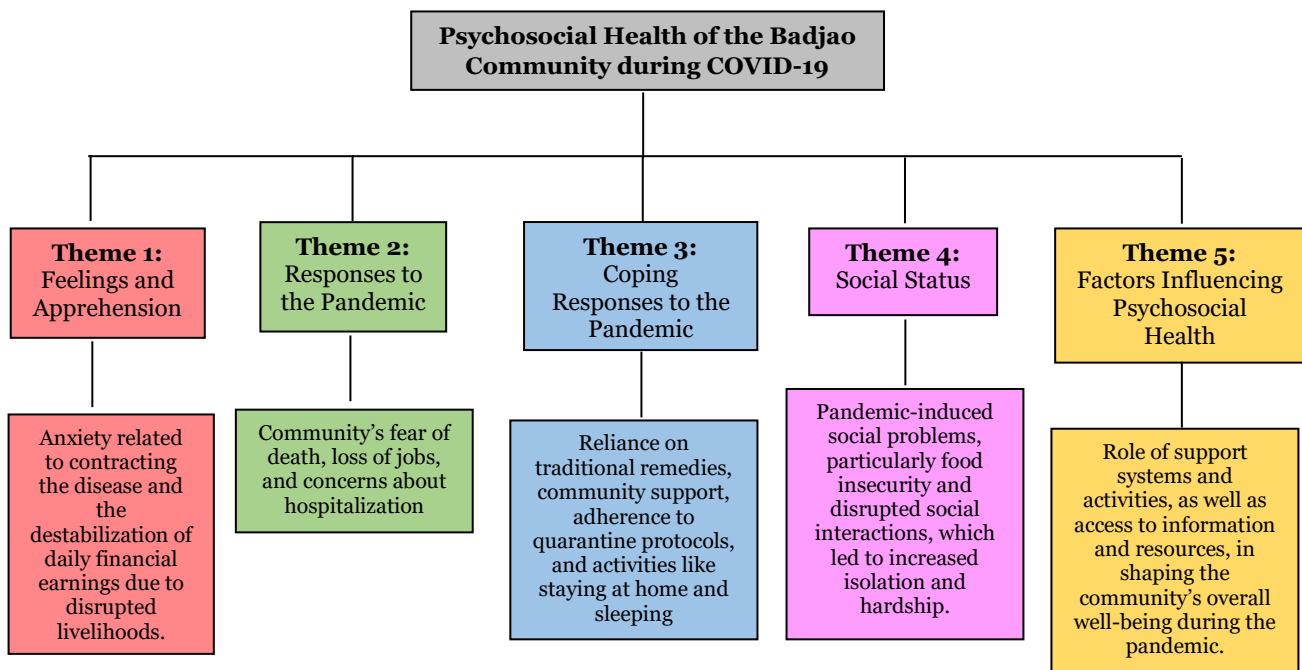


Figure 1. Brief description of the themes

3.2 Theme 1: Feelings and apprehension

The COVID-19 pandemic significantly destabilized the Badjao community’s pre-pandemic sense of security, impacting their mental health and overall well-being. This theme captured the overwhelming anxiety and financial uncertainty that permeated their lives during the crisis.

3.2.1 Anxiety about acquiring the disease

Participants expressed deep fears about contracting COVID-19, particularly due to the risk of exposure from asymptomatic or unidentified infected individuals within the community. This anxiety was heightened by concerns over hospitalization and treatment costs, as one participant stated, “I was afraid to go outside. I was afraid I could get sick with COVID-19 ...” (P3). Another participant echoed this sentiment, saying, “I was afraid to get sick ...” (P4).

3.2.2 Destabilization of daily financial earnings

The pandemic caused severe disruptions in the participants’ daily livelihoods, leading to significant financial instability. Many were worried about how the pandemic would affect their ability to provide for their families, as their income from vending, selling goods, and other forms of daily labor was suddenly halted. One participant shared: “The community leaders instruct us to stay at home. We cannot go out to raise some money due to the lockdown. We only wait for food supplies given by the respective authority” (P1).

Another participant reflected, “I was so worried every day since the time of the pandemic and lockdown because we cannot have everyday income ... I cannot go to my bosses to do laundry ...” (P5). The sentiment of financial strain was further emphasized by P6, who stated, “The pandemic halted us from going fishing, which is our source of food and income as well.”

3.3 Theme 2: Responses to the pandemic

The pandemic elicited strong responses from the Badjao community, characterized by heightened fear of death, job loss, and the potential financial and social implications of hospitalization. These responses reflect the deep psychological impact of the crisis on their lives.

3.3.1 Fear of death

Participants experienced an increased fear of death due to the high mortality rates associated with COVID-19. This fear was fueled by the severity of the disease and the widespread perception of its inevitability and fatality. As P1 noted, “I felt that COVID-19 is a big disease that can cause death.” Similarly, P2 expressed, “I felt that COVID-19 is a serious disease that made people want not to come out for a walk or go outside of the house.”

3.3.2 Loss of jobs

The pandemic led to widespread job loss and reduced work hours among the participants, severely affecting their financial stability and exacerbating their stress and anxiety. P3 commented, “I felt that COVID-19 disrupts our occupation or job, such as ... the inability to do laundry for my boss.” Meanwhile, P5 simply stated, “The COVID-19 made me feel that I lost my job.”

3.3.3 Fear of hospitalization

Participants were deeply concerned about the possibility of being hospitalized, fearing both the stigma of a COVID-19 diagnosis and the high costs associated with the medical care. P6 shared, “... COVID-19 made me feel afraid of being sick of any kind. I do not want to get hospitalized when I get sick because I will be accused of having the disease already.” This fear was echoed by P8, who said, “All sick persons are always diagnosed with COVID-19 ... I do not want to get sick and hospitalized.” P10 also expressed concerns, stating, “I felt that COVID-19 can be easily transmitted, and no known medication ... I am afraid of getting the disease.”

3.4 Theme 3: Coping responses to the pandemic

In response to the overwhelming challenges posed by the pandemic, the Badjao community demonstrated resilience by adopting various coping mechanisms. These included reliance on traditional remedies, adherence to quarantine protocols, and leveraging community support systems to manage stress and uncertainty.

3.4.1 Medication and cure

Participants turned to traditional remedies and community support as primary coping strategies. They relied on herbal medications, prayer, and other rituals, while also adhering to recommended safety protocols to prevent the spread of the disease. One participant explained,

“When my child gets sick, I make sure that I can buy the right medication for them and other (Haggut) herbal meds ...” (P3). P1 added, “I pray and ask the Umbu (deity) to cure me of any disease.” P10 expressed gratitude, stating, “I was very thankful that I was not infected with the COVID-19 ... or my family, because we followed the protocol.”

3.4.2 Staying at home and sleeping

To manage the stress of lockdown and the constant fear of illness, many participants chose to stay at home and engage in activities like sleeping, resting, and household chores. These actions helped them cope with the boredom and anxiety brought on by the pandemic. P6 mentioned, “We spent a lot of time sleeping.” P8 noted, “I stayed safe as I could ...,” while P9 added, “We just eat, then sleep.”

3.5 Theme 4: Social status

The pandemic caused significant disruptions to the social fabric of the Badjao community, leading to widespread issues such as food insecurity and social isolation. These changes strained the community’s ability to maintain its traditional social structures and interactions.

3.5.1 Food insecurity

The economic impact of the pandemic led to severe food shortages for many families, as lockdowns prevented them from earning an income. Participants frequently mentioned the difficulty of securing basic necessities like food and rice during this period. P5 shared, “... It left us bare food to eat on the table because we cannot go out to sell our product to the public.” P9 added, “It left us no rice to cook, we cannot go out to do our jobs and have an income ...,” while P8 expressed, “It left us no food to eat, we are stuck in the house.”

3.5.2 Disrupted social interaction

Social distancing measures and lockdowns severely limited the community’s ability to interact and maintain social bonds. This disruption led to increased feelings of loneliness and isolation, as participants were unable to engage in their usual social activities. P2 reflected, “... We are so worried about being infected, but we are thankful that we were not infected.” P3 also noted, “The pandemic did not allow us to go outside. We had limited time to talk with and mingle with our friends ... Our children did not go to school.”

3.6 Theme 5: Factors influencing psychosocial health

The psychosocial health of the Badjao community during the pandemic was shaped by various factors, including the availability of support systems, social activities, and access to accurate information and resources. These factors played a crucial role in how well individuals coped with the challenges brought by COVID-19.

3.6.1 Support systems and activities

Family and community support were vital in helping participants manage the stresses of the pandemic. Social interactions, even in limited forms, along with engaging in leisure activities, contributed significantly to their overall well-being. P1 acknowledged, “The support from family, barangay captain, mayor, friends ...,” while P5 highlighted the importance of “... mingling and chit-chatting with friends.” P7 also noted that doing sport was a key activity that helped cope with stress, as stated in “... playing basketball games helps keep away from stress and depression.”

3.6.2 Access to information and resources

Access to accurate information and essential resources was a critical factor in how participants navigated the pandemic. Reliance on local leaders for updates and the struggle to obtain medical supplies were commonly mentioned concerns. P4 stated, “We relied on the barangay captain for updates on the pandemic ...,” while P3 mentioned the challenge of “... limited medical supplies ...”

4. Discussion

The core of the study was to explore the psychological and social health of the Badjao and the factors affecting them during the COVID-19 pandemic. Based on the identified themes from the

responses of the participants, various subthemes had emerged, providing details and significance on the contributing ideas on how to comprehend better the changes, effects, emotional changes, and mental baggage that the participants had endured in order to survive, given that they were members of a minority and a marginalized sector of the community.

The findings highlighted significant anxiety and apprehension among the Badjao community during the COVID-19 pandemic. The fear of contracting the virus and the destabilization of their financial earnings were central to their experiences. This anxiety mirrors findings from other studies on marginalized communities during the pandemic, where fear of infection and economic instability were prevalent (Gupta et al., 2021; Petrișor et al., 2021). However, the Badjao's reliance on daily labor for sustenance, combined with limited access to healthcare, exacerbated their vulnerability, making their situation particularly severe compared to more economically stable populations. This aligns with findings from similar studies on indigenous populations, who often face compounded challenges during health crises due to pre-existing socio-economic disadvantages (Fitzpatrick et al., 2023; Huyser et al., 2021).

The Badjao community's responses to the pandemic were marked by heightened fear of death, job loss, and hospitalization. The fear of death, amplified by the global mortality rates, reflects a broader psychological impact seen worldwide during the pandemic, particularly in communities with limited access to reliable health information and resources (Fairlamb, 2022; Menzies & Menzies, 2020). The loss of jobs further intensified financial insecurity, a trend also observed in other studies where low-income communities suffered disproportionate economic impacts due to the pandemic (Han & Hart, 2021; Khetan et al., 2022). The fear of hospitalization, driven by concerns over stigma and costs, adds a layer of complexity that is not always captured in other populations, highlighting the unique intersection of health and economic fears in the Badjao community.

The Badjao community exhibited resilience through traditional coping mechanisms, including the use of herbal medicines and community support systems. This reliance on traditional remedies and communal support is consistent with findings from other studies on indigenous communities, where cultural practices play a crucial role in health and well-being, particularly during crises (Crocetti et al., 2022; Fitzpatrick et al., 2023). The adherence to quarantine protocols, despite the challenges, demonstrates a strong community commitment to collective safety, similar to findings in other communal societies where collective action is emphasized over individual behavior (Leong et al., 2022; Sundiam et al., 2023). However, the focus on staying home and engaging in minimal activities like sleeping also reflects a coping strategy rooted in necessity, driven by limited alternatives.

The pandemic's disruption of the social fabric of the Badjao community, leading to food insecurity and social isolation, is a significant concern. The inability to secure food due to halted incomes is a direct consequence of the economic shutdowns and mirrors similar challenges faced by low-income groups globally during the pandemic (Huyser et al., 2021; Pangandaman, 2023). The social isolation, compounded by the necessity of social distancing, exacerbated feelings of loneliness, a phenomenon widely reported in pandemic literature (Cudjoe & Kotwal, 2020; Hwang et al., 2020; Lewis, 2020). However, the Badjao community's traditional reliance on close social networks made these disruptions particularly painful, contrasting with more urbanized communities where social networks may be less central to daily life.

The psychosocial health of the Badjao community was influenced by the availability of support systems, access to information, and essential resources. The critical role of family and community support in managing pandemic-related stress is well-documented in the literature, where strong social ties are linked to better mental health outcomes (Aragasi & Pangandaman, 2021; Fitzpatrick et al., 2023; Tei & Fujino, 2022). However, the Badjao's dependence on local leaders for pandemic updates and their struggle to access medical supplies underscore the gaps in healthcare infrastructure and information dissemination in marginalized communities. This aligns with studies highlighting the disparities in resource access and information flow in low-income and indigenous populations during health crises (Crocetti et al., 2022; Huyser et al., 2021). The findings emphasize the need for targeted interventions that address these disparities to improve resilience and health outcomes in such communities.

5. Implication and limitation

The findings of this exploratory qualitative research on the psychosocial health status of Badjao people amidst the COVID-19 pandemic at Bus-Bus, Jolo, Sulu, can provide valuable insights into the unique challenges and needs of this specific community. The study's results may inform the development of culturally sensitive interventions and support programs tailored to address the psychosocial well-being of the Badjao people in similar contexts. The implications extend to policymakers, healthcare professionals, and community leaders who can utilize these findings to enhance their understanding and improve the mental health support available to the Badjao community during and beyond the pandemic.

The primary limitation of this study is its contextual specificity, focusing solely on the psychosocial health status of Badjao people at Bus-Bus, Jolo, Sulu, during the COVID-19 pandemic. As a result, caution should be exercised when generalizing the findings to other communities or ethnic groups, as the experiences and circumstances of the Badjao people in this specific location may not reflect those of Badjao individuals living in different regions. The limited sample size and qualitative nature of the study also restrict the generalizability of the findings. Further research involving larger and more diverse samples, quantitative methods, and multiple locations would be necessary to validate and expand upon the current study's findings.

6. Conclusion

One of the most remarkable consequences of the COVID-19 outbreak was the impact on the psychological status of Badjao people and families, which mainly included the fear of contracting and spreading the infection to family members and confusion brought by mass hysteria. It also included significant socioeconomic distress. The pandemic had disrupted not only just their social lives but also their economic status. However, despite the circumstances brought by lockdowns, they diverted their energy towards focusing on childrearing, cleaning the house, doing laundry, and beautifying their homes. They counteracted the social effect of the COVID-19 and the present situation by focusing on the house and the family. The factors that contributed to their psychosocial well-being include a combination of physical, social, and financial factors. It was analyzed that if any of these factors were absent, it disrupted their psychosocial status, which might lead to symptoms such as fear, irritability, and boredom. Therefore, this study recommends that clinical practice should prioritize culturally sensitive mental health interventions tailored to the unique experiences of the Badjao community, with an emphasis on alleviating fear and stress through family-centered approaches. Healthcare providers should integrate community-based psychosocial support programs that address the interplay of physical, social, and financial factors affecting their well-being. Also, collaborations with local government units and stakeholders are crucial in supporting the resilience and well-being of the Badjao in future crises.

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Author contribution

ZTM had made a substantial contribution to the concept and design of the article, including shaping the research objectives and guiding the overall methodology. She actively participated in the data acquisition process, conducting interviews and gathering relevant information from the study participants. HKP substantially contributed in the acquisition, analysis, and interpretation of data and in writing revisions.

Conflict of interest

There is no conflict of interest to declare among authors.

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ORIGINAL RESEARCH

The Effect of Family Caregiver Empowerment Model Intervention on Fear of Hypoglycemia in People with Type 2 Diabetes Mellitus



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Abstract

Background: The family plays a vital role in T2DM self-management, but many families need to understand their role and function as caregivers. This lack of understanding can increase the burden of disease management, contributing to the emergence of psychological problems in people with T2DM, such as fear of hypoglycemia, which in turn worsens blood glucose control. The Family Caregiver Empowerment Model (FCEM) intervention is one model that can be used to empower families as caregivers in T2DM self-management.

Purpose: This study aimed to analyze the effect of the FCEM intervention on the fear of hypoglycemia in people with T2DM.

Methods: The study design was quasi-experimental with a randomized control pretest-posttest design. The sample size consisted of 85 respondents (a pair of family caregivers and people with T2DM), who were randomly divided into two groups: the treatment group (41 respondents) and the control group (44 respondents). The FCEM intervention was conducted once per week for ten weeks for family caregivers, and fear of hypoglycemia was measured using the Indonesian version of the Fear of Hypoglycemia Scale questionnaire. The data were analyzed using the Wilcoxon signed rank test and independent t-test.

Results: The results showed significant differences in fear of hypoglycemia between the pre-test and post-test in the treatment group ($p=0.001$) and the control group ($p=0.001$). However, there was a significant difference in the decrease of fear of hypoglycemia between the treatment and control groups ($t=-7.087$; $p=0.001$). This finding suggests that FCEM intervention can significantly reduce the fear of hypoglycemia in people with T2DM.

Conclusions: The FCEM intervention can reduce the fear of hypoglycemia in people with T2DM by increasing the family caregiver's ability and support in managing T2DM. Nurses can use the FCEM intervention in T2DM management to improve diabetes management outcomes.

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1. Introduction

Type 2 diabetes mellitus (T2DM) is a disease that requires ongoing medical care because it is a complex chronic disease. As much as 10.5% of the world population in the age range of 20-79 years have diabetes. Indonesia is one of the ten countries with the highest number of T2DM cases globally, with 19.5 million (International Diabetes Federation, 2021). T2DM not only interferes with a person's metabolic system but, in some cases, also causes several mental disorders, such as distress, anxiety, depression, and fear of hypoglycemia. Fear of hypoglycemia is a specific and extreme fear of the risk or occurrence of hypoglycemia. A previous study showed that fear of hypoglycemia affects one in seven people with T2DM worldwide (Hendrieckx et al., 2021). Research in Central and Eastern European countries showed that 5.9% of people with T2DM experienced severe fear of hypoglycemia (Haluzik et al., 2018). A study in China also showed that 17.4% of people with T2DM experienced a fear of hypoglycemia (Huang et al., 2022). Another study at Dr. Soebandi Hospital Jember, Indonesia, showed that 21.4% of people with T2DM experienced fear of hypoglycemia (Roessanti et al., 2022). The fear of hypoglycemia in people with T2DM is related to their inability to manage their diabetes independently. The failure to manage

the disease properly, including diet, physical activity, and taking medication, can cause worry and fear about whether the actions taken are correct (American Diabetes Association, 2023). In addition, the inability to self-monitor blood glucose also adds to the problem of further fear because they do not know what their blood glucose level is when needed (Wang et al., 2019). The fear of hypoglycemia can change patient habits, such as increasing inappropriate compensatory behavior, such as improving food portions, reducing insulin use, and others. This fear is often associated with impaired quality of life and emotional well-being, reduced involvement with diabetes management, and poor diabetes outcomes (Hendriekx et al., 2021).

Effective management of diabetes mellitus for individuals with T2DM requires consideration of their characteristics and the support of their families. Therefore, healthcare providers should give the family and patient education and training in specific skills required for self-management at home (American Diabetes Association, 2023; International Diabetes Federation, 2021). Previous studies showed that families play a vital role in the self-management of diabetes (Pesantes et al., 2018; Rondhianto et al., 2023). However, a previous study showed that 48.18% of family caregivers only had self-management skills (diet, physical activity, self-monitoring of blood glucose with medication, and foot care management) in the moderate category, which was still not optimal, thus having an impact on diabetes self-management (Rondhianto et al., 2019). Therefore, it is necessary to make a series of efforts to improve their abilities.

The inability of families to self-manage T2DM can result in failure of self-management, leading to low family support for managing T2DM, which increases the fear of complications such as hypoglycemia or other issues (American Diabetes Association, 2023). Nurses can use behavioral strategies to support diabetes self-management and engagement in health behaviors, such as medication management, physical activity management, and diabetes diet, to promote optimal diabetes health outcomes (American Diabetes Association, 2023). Studies show that family empowerment can improve the self-management of people with T2DM and their health status (International Diabetes Federation, 2021; Luthfa & Ardian, 2019). The application of the empowerment model commonly intervened at this time is focused on empowering people with T2DM. The family's vital role in managing diabetes often receives less attention from healthcare workers, making families unable to carry out diabetes self-management (Rondhianto et al., 2020). Effective management of DM needs to be supported by family and consistent education for families and patients (Luthfa & Ardian, 2019). Education and self-management support for diabetes patients is also carried out to support ongoing medical care (Andriyanto et al., 2019), with the goal of preventing both short and long-term complications (American Diabetes Association, 2022).

The Family Caregiver Empowerment Model (FCEM) is an intervention developed by nurses for family caregivers to increase positive control of the mind and body, create positive and proactive behavior in exploring the role of a family caregiver, support the independence of those receiving care, foster a positive reciprocal relationship, and promote a positive relationship between family caregivers and others around them. FCEM interventions can also improve the ability of family caregivers to carry out diabetes self-management, which includes diet, physical activity, medication, and monitoring blood glucose levels independently, as well as foot care (Rondhianto et al., 2022). Several previous studies have been conducted in Indonesia on family empowerment in diabetes management. However, the most widely practiced empowerment is the empowerment of T2DM patients, not family caregivers of people with T2DM (Andriyanto et al., 2019; Damhudi et al., 2021; Deswita et al., 2020; Pamungkas & Chamroonsawasdi, 2020; Rusdiana et al., 2020; Sari et al., 2022). The absence of optimal support from families who understand the disease and its management can lead to increased non-compliance and decreased self-care, thereby increasing the risk of complications (International Diabetes Federation, 2021). In addition, some interventions in other models are carried out unstructured and prioritize the educational context that only focuses on improving cognitive aspects and skills of family, without supporting and mentoring process (Al Mahdi et al., 2020; Appil et al., 2022; Subrata, 2021). FCEM interventions are structured education, focusing on enhancing cognitive aspects through education, skills aspects through training, and affective aspects through mentoring, monitoring, and evaluation (Rondhianto et al., 2020). In addition, previous studies did not examine the effect of family caregiver empowerment on psychological disorders. Therefore, this study aimed to analyze the effect of the FCEM intervention on the fear of hypoglycemia in people with T2DM.

2. Methods

2.1. Research design

This study used a quasi-experimental design with a randomized controlled group and a pre-test and post-test design. Randomization was performed to assign respondents to either the treatment or control groups using single-blind randomization.

2.2. Setting and samples

This study was conducted from 26 March to 2 July 2023 at a public health center in Jember, Indonesia. The study population consisted of 300 people across five villages: Village 1 (39 people), Village 2 (83 people), Village 3 (75 people), Village 4 (18 people), and Village 5 (85 people). The samples consisted of pairs, namely family caregivers and people with T2DM. The inclusion criteria for family caregivers were: 1) age > 20 years; 2) acting as family caregivers for people with T2DM; 3) having only one person with T2DM in the family; and 4) willingness to participate as a respondent. The inclusion criteria for people with T2DM were: 1) diagnosed with T2DM; 2) not currently hospitalized or receiving treatment in other healthcare facilities; and 3) not having severe complications that require hospitalization. The exclusion criteria were: 1) family caregivers with physical disabilities such as blindness and deafness; and 2) illiteracy.

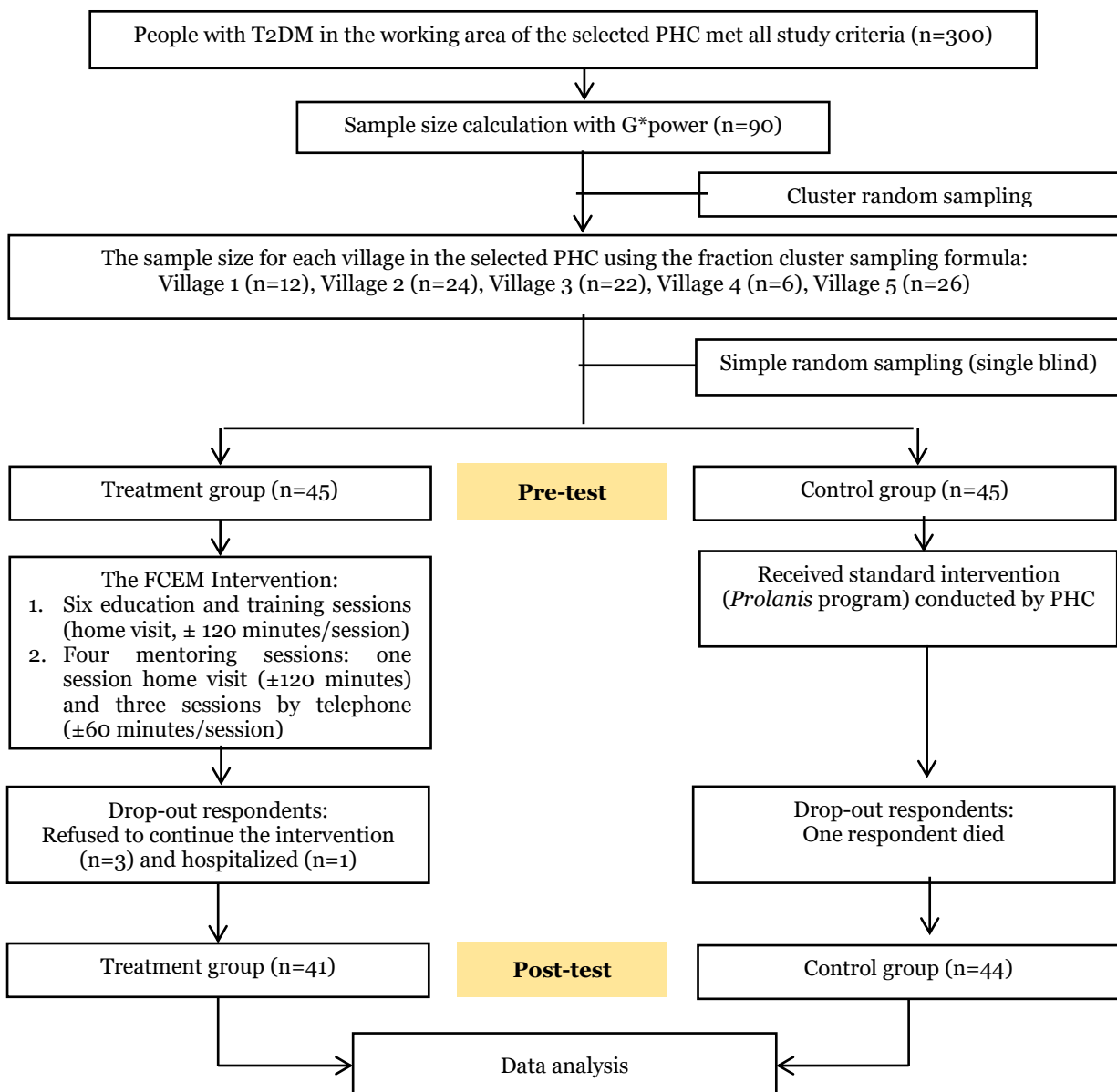


Figure 1. Flowchart of study stages

The sample size was calculated using G*Power software ($\alpha=0.05$; $\beta=0.8$; $f^2=0.64$), resulting in a minimum requirement of 80 respondents. To account for potential drop-outs or loss to follow-up, the researcher added approximately 10%, yielding a total sample size of 90. The sample consisted of 45 respondents in the treatment group and 45 respondents in the control group, selected through cluster random sampling. The researcher determined the sample size for each village with the fraction cluster sampling formula. With a population (N) of 300, the sample size for each village was as follows: (1) Village 1 = $39/300 \times 90 = 12$ respondents, (2) Village 2 = $83/300 \times 90 = 24$ respondents, (3) Village 3 = $75/300 \times 90 = 22$ respondents, (4) Village = $18/300 \times 90 = 6$ respondents, and (5) Village 5 = $85/300 \times 90 = 26$ respondents. Furthermore, the researcher randomly divided (single-blind) respondents in each village into two groups, namely the treatment group and the control group proportionally. During the study, five respondents dropped out for various reasons: four from the treatment group (one was hospitalized, and three chose to withdraw) and one from the control group (due to death). The final sample size at the post-test was 85 respondents, which exceeds the minimum required sample size of 80. Therefore, the sample size remained appropriate for this study. The study stages are detailed in Figure 1.

2.3. Intervention

The researcher conducted the FCEM intervention for the treatment group. In contrast, the control group only received standard intervention, namely health education, through the *Prolanis (Program Pengelolaan Penyakit Kronis)*, or Chronic Disease Management Program, provided by the PHC. The FCEM intervention was based on the results of previous research. In general, the FCEM intervention consists of two main stages, namely education and training (sessions 1-6) and mentoring (sessions 7-10), which are aimed at increasing the capacity of family caregivers in self-managing T2DM so that they can provide the assistance needed by people with T2DM (Rondhianto et al., 2020, 2022). The treatment group was given intervention during 10 sessions within 10 weeks, namely six education and training sessions followed by four mentoring sessions (Table 1).

To ensure that the families implemented T2DM self-management correctly, the researchers provided action record sheets for monitoring, which each family caregiver had to fill in when carrying out self-management actions according to their components (diet management, physical exercise management, medication management, self-monitoring of blood glucose, and foot care). Additionally, the researchers clarified directly with the family caregivers during home visits in week 7 to check whether they had carried out the actions as planned. The researchers also clarified directly with people with T2DM regarding the actions taken by their family caregivers. Family caregivers began carrying out T2DM self-management actions for people with T2DM starting in week 7 (with home visits by the researchers to ensure correct implementation), and continued from week 8 to week 10, with monitoring and evaluation conducted via telephone. Monitoring, evaluation, and corrective actions for the implementation of T2DM self-management by family caregivers were carried out in stages, beginning with home visits in week 7 and continuing with telephone follow-ups from week 8 to week 10.

2.4. Measurement and data collection

Fear of hypoglycemia, as the dependent variable in this study, was measured using the Indonesian version of the Fear of Hypoglycemia Scale (FH-15), which assesses fear of hypoglycemia in people with T2DM in Indonesia (Roessanti et al., 2022). This questionnaire was initially developed by Ortiz et al. (2011) and consisted of 15 unfavorable question items categorized under three indicators: fear, avoidance, and interference. The FH-15 uses a Likert scale ranging from 1 to 5 (1=never, 2=rarely, 3=sometimes, 4=almost always, 5=every day). The minimum score for the questionnaire is 15, and the maximum score is 75, with a cut-off point of 28. If the score is ≥ 28 , it means people with T2DM experience a fear of hypoglycemia. A score < 28 indicates that people with T2DM do not experience a fear of hypoglycemia (Ortiz et al., 2011). The questionnaire was translated into Indonesian by Roessanti et al. (2022) and had its sentence structure reviewed by a professional language institute. The researcher re-tested the validity and reliability of the questionnaire using 30 respondents with T2DM from a public health center in another region that shares similar characteristics with the study site. The validity and reliability test results showed that this questionnaire is valid and reliable with a value of $r = 0.479 - 0.898 > r_{table} = 0.374$ and Cronbach alpha = 0.883. Data collection was conducted through direct

interviews, where respondents answered questions based on the questionnaire. The researchers recorded each response in the questionnaire. Before collecting data, the researchers provided an overview of the study, including its objectives, benefits, procedures, and potential risks. Respondents who agreed to participate signed a consent form. Data were collected to measure fear of hypoglycemia both before the intervention (pre-test) and two weeks after the intervention (post-test).

Table 1. Summary of family caregiver empowerment model intervention

Session/ Time	Learning Outcomes	Material	Method	Strategy
Session 1 (±120 minutes)	Explain basic concepts of T2DM, self-management, illness management in the family, and situational factors in T2DM self-management	The basic concepts and self-management of T2DM, management of illness in the family, and situational factors within self-management of diabetes	Lectures, discussions, and counseling	Build relationship Provide complete and accurate information Guide the assessment of support and resources Help determine needs Provide support in setting goals in the T2DM self-management
Session 2 (±120 minutes)	Explain the role of nurses, filial values, and empowerment in T2DM self-management	Filial values, the role of nurses, and empowering family caregivers in self-management of T2DM		
Session 3 (±120 minutes)	Demonstrate diet management	DM diet management concept and strategy	Lectures, discussions, demonstrations, and counseling	Assess ability Provide information
Session 4 (±120 minutes)	Demonstrate physical activity management	Physical activity management concept and strategy		Strengthen the capability Encourage active participation
Session 5 (±120 minutes)	Demonstrate medication, SMBG, and foot care management	T2DM Medication and Self-monitoring blood glucose concept and strategy		Designing a strategy for implementing self-management
Session 6 (±120 minutes)	Design T2DM self-management plan	Concepts and strategies for foot care, prevention of complications, and preparation of T2DM self-management plans		
Session 7 (±120 minutes)	Face challenges in T2DM	Follow-up and support for resource access (This activity is carried out so that family caregivers can carry out diabetes self-management according to the target)	Mentoring, discussion, and counseling	Encourage action Help solve problems Strengthen the ability Provide information and choice of sources
Session 8-10 (±60 minutes)	Demonstrate T2DM self-management independently	Monitoring and evaluation that includes support and assistance for the continuity of quality care		Evaluate capability Monitoring and support Recognition of the role and competence

Source: Rondhianto et al. (2022)

2.5. Data analysis

The researchers conducted a descriptive analysis to describe the respondents' characteristics and the variable of fear of hypoglycemia. Inferential analysis was performed to determine the effect of the FCEM intervention. The Wilcoxon signed-rank test was used to analyze the pre-test and post-test results for each group, as the data for each group were not normally distributed (p -value $< \alpha = 0.05$). However, the score change (Δ) in each group was normally distributed ($p > \alpha = 0.05$). Therefore, the difference between the treatment and control groups was analyzed using the independent t-test to compare the pre-test and post-test results for each group.

2.6. Ethical considerations

An ethical review was conducted for this study and approved by the ethics committee of the Faculty of Nursing, Universitas Jember, with reference number 124/UN25.1.14/KEPK/2023. Before conducting the research, the researcher provided prospective respondent with information about the general description of the study. Additionally, the researchers explained the objectives, benefits, procedures, potential risks, and rewards for participation. There was no coercion for participation, and respondents were free to withdraw at any time during the study. Prospective respondents who agreed to participate were asked to sign the consent form prepared by the researchers.

3. Results

3.1 Characteristics of respondents

The results showed that the number of respondents in this study was 85 (Table 2). Most of the respondents were early elderly (43.53%), female (80%), elementary school graduates (55.29%), unemployed or housewives (56.47%), and married (83.53%). They had T2DM for less than five years (90.59%), never had hypoglycemia (77.65%), and were hospitalized less than equal to one time (89.41%).

Table 2. Characteristics of respondents (n=85)

Characteristics	Treatment Group (n=41)		Control Group (n =44)		Total (n=85)	
	f	%	f	%	f	%
Age (years)						
< 25 (late adolescent)	0	0	0	0	0	0
26 – 35 (early adulthood)	1	2.44	1	2.27	2	2.35
36 – 45 (late adulthood)	4	9.76	6	13.64	10	11.76
46 – 55 (early elderly)	16	39.02	21	47.73	37	43.53
56 – 65 (late elderly)	13	31.71	9	20.45	22	25.88
> 65 (old)	7	17.07	7	15.91	14	16.48
Gender						
Male	6	14.63	11	25	17	20
Female	35	85.37	33	75	68	80
Education level						
No education	6	14.63	10	22.73	16	18.82
Elementary school	20	48.78	27	61.36	47	55.29
Junior high school	7	17.07	3	6.82	10	11.76
Senior high school	7	17.07	4	9.09	11	12.94
College	1	2.44	0	0	1	1.18
Employment status						
Unemployed/housewives	24	58.54	24	54.55	48	56.47
Civil servant	1	2.44	1	2.27	2	2.35
Indonesian National Army/ Police	0	0	0	0	0	0
Fisherman	0	0	0	0	0	0
Laborer	0	0	1	2.27	1	1.18
Teacher	0	0	0	0	0	0
Farmer	4	9.76	4	9.09	8	9.41
Self-employed	12	29.26	14	31.82	26	30.58
Marital status						
Unmarried	0	0	0	0	0	0
Married	31	75.61	40	90.91	71	83.53
Widow/widower	10	24.39	4	9.09	14	16.47
Duration since diagnosis						
< 5 years	37	90.24	40	90.91	77	90.59
> 5 years	4	9.76	4	9.09	8	9.42
Hypoglycemia history						
No	30	73.17	36	81.82	66	77.65
Yes	11	26.83	8	18.18	19	22.35
Hospitalization history						
≤ 1 time	38	92.68	38	86.36	76	89.41
> 1 time	3	7.32	6	13.64	9	10.59

3.2 The effect of the FCEM intervention on fear of hypoglycemia

The effect of the FCEM intervention on fear of hypoglycemia is illustrated by the results of the difference tests shown in Table 3, which include tests for within-group differences (Wilcoxon signed rank test) for both the treatment and control groups, as well as between-group differences (independent t-test) comparing the treatment and control groups.

Table 3. Differences in fear of hypoglycemia between the treatment and control groups before and after the FCEM intervention

Group	Test	Normality test (<i>p</i>)	Mean(SD)	Wilcoxon signed rank-test		Independent t-test	
				Z	<i>p</i>	t	<i>p</i>
Treatment	Pre-test	0.149	35.59(6.892)	-5.581	0.001		
	Post-test	0.027	20.85(3.712)				
Control	Pre-test	0.914	51.36(10.041)	-3.297	0.001		
	Post-test	0.025	66.27(7.711)				
Difference (Δ) of each group	Δ treatment group	0.143	-14.73(6.454)			-7.087	0.001
	Δ control group	0.172	-3.95(7.483)				

Table 3 shows a significant difference in fear of hypoglycemia among people with T2DM in the treatment group before and after family empowerment with the FCEM. A significant difference in fear of hypoglycemia was also found in the control group, which did not receive the FCEM intervention. Negative Z scores in both the treatment and control groups indicate that the pre-test scores were higher than the post-test scores. The researchers applied the non-parametric Wilcoxon signed-rank test because one of the data sets was not normally distributed. However, the normality test results for the difference data, which showed the change in scores from the pre-test to the post-test, indicated normal distribution ($p > \alpha = 0.05$). Therefore, a parametric statistical test, the independent t-test, was conducted. The independent t-test results showed a significant difference in fear of hypoglycemia between the treatment and control groups ($t = -7.087$, $p = 0.001 < \alpha = 0.05$). The negative t-value indicates that the decrease in fear of hypoglycemia scores was greater in the treatment group than in the control group. Based on the results and interpretation above, it can be concluded that the FCEM intervention has an effect on reducing fear of hypoglycemia in people with T2DM.

4. Discussion

This study examined the effect of the FCEM intervention on the fear of hypoglycemia in people with T2DM. The results showed that the FCEM intervention significantly reduced the fear of hypoglycemia in people with T2DM. The results of this study align with a previous study showing that family-based interventions significantly affected knowledge about the risk of T2DM, self-control, blood sugar measurements, and concerns about T2DM (Feng et al., 2023). In this study, there were differences in intervention between the treatment and the control groups. The treatment group received the FCEM intervention, while the control group did not receive any intervention and was only involved in the pre-test and post-test process. The FCEM intervention consisted of education and training in six sessions, followed by four mentoring sessions (Rondhianto et al., 2022, 2020). Family caregiver empowerment is an intervention that involves family empowerment in its implementation (Abedini et al., 2020; Jafari et al., 2020), which can increase self-efficacy and self-control in people with T2DM (Al Mahdi et al., 2020). The study results for the control group showed a significant decrease in fear of hypoglycemia, but not as much as in the intervention group. Respondents in the control group did not receive the FCEM intervention. They carried out their usual activities according to directions from health workers, such as visiting hospitals, attending the *Prolanis* program, and following their daily routines.

This study also showed that some respondents in the control group had a history of hypoglycemia. Patients who experience hypoglycemia often have good knowledge about it due to interactions with healthcare providers and information obtained from other sources (Fisher et al., 2018). Family caregiver empowerment interventions can increase an individual's self-efficacy, self-esteem, and self-control, allowing them to manage diabetes more effectively (Jafari et al., 2020). Self-efficacy is also essential for managing hypoglycemia events (Grammes et al., 2018).

Understanding the mechanisms underlying the fear of hypoglycemia is crucial. Tailoring diabetes education to address themes relevant to people with T2DM can help foster self-efficacy and prevent negative impacts on self-management and quality of life (Grammes et al., 2017). A previous study showed a positive correlation between self-efficacy and self-care behavior in T2DM patients, leading to improved self-care behavior and glycemic control (Tharek et al., 2018). If family self-efficacy increases, families can regain self-confidence and become more independent, relying less on health workers and engaging more in disease management discussions (Abedini et al., 2020; Jafari et al., 2020).

According to previous research, family empowerment interventions can improve family caregivers' capabilities in managing T2DM, including components like diet management, physical activity, drug management, independent blood glucose monitoring, and foot care (Rondhianto et al., 2022). Other studies also state that family-based interventions can increase families' ability to detect hypoglycemia. After the intervention, there was an increase in the motivation and awareness of respondents and their families regarding the importance of managing DM, especially the ability to detect hypoglycemia events (Damayantie et al., 2021). Additionally, family empowerment, conducted for four weeks with 120-minute home visits, positively impacted family support for people with T2DM (Luthfa & Ardian, 2019). Increasing caregiver support and supervision can assist patients, particularly those who need help preparing food, taking medication, and managing hypoglycemia before it becomes severe (Silbert et al., 2018). There is a positive relationship between family coherence and diabetes self-management ability. The greater the family support received, the better the independence of diabetes management by family caregivers will be (Rondhianto et al., 2019). Educating about hypoglycemia and fear of hypoglycemia can help reduce fear, increase medication adherence, and provide optimal glycemic control (Yuksel & Bektas, 2021). Furthermore, appropriate health education can improve patients' understanding of hypoglycemia (Huang et al., 2022).

The fear of hypoglycemia score in the intervention group was lower than in the control group, likely due to the provision of the FCEM intervention. The FCEM intervention is structured education that empowers family members as caregivers by increasing knowledge and skills in managing T2DM through three stages: education, training, and mentoring. Each family caregiver receives education and training on T2DM self-management skills gradually over six weeks, followed by mentoring (discussion and consultation) through home visits and telephone calls during weeks 7 to 10 (Rondhianto et al., 2022). In addition to receiving materials related to self-management, family caregivers also receive materials about filial values (care, respect, and responsibility), the role of nurses, and empowering family caregivers in self-managing T2DM. This helps improve their understanding of the family's roles in managing the disease and strengthens collaboration with health workers, particularly nurses (Rondhianto et al., 2020). This finding is in line with previous studies that suggest family empowerment can increase family support for diabetes management (Luthfa & Ardian, 2019), self-efficacy (Abedini et al., 2020; Jafari et al., 2020), and self-care capabilities of family caregivers (Pesantes et al., 2018; Rondhianto et al., 2022). The FCEM involves families in the intervention process to enhance caregivers' ability to manage diabetes and improve both family and patient knowledge of hypoglycemia, with one session dedicated to explaining hypoglycemia and how to manage it. Family involvement in diabetes management can facilitate health behavior improvements in people with T2DM (American Diabetes Association, 2022; Onyango et al., 2022). Providing continuous education and support from nurses to patients and families regarding hypoglycemia and fear of hypoglycemia can improve self-efficacy, self-care behavior, and glycemic control in people with T2DM (Hendrieckx et al., 2021; Tharek et al., 2018; Yuksel & Bektas, 2021). Lack of family support can lead to increased distress (Li et al., 2021), which in turn increases the risk of fear of hypoglycemia (Huang et al., 2022; Y. Wang et al., 2021). Improving family understanding and skills in T2DM management can enhance family involvement and support to help people with T2DM control blood glucose levels within the normal range and reduce fear of hypoglycemia.

5. Implication and limitations

The Family Caregiver Empowerment Model (FCEM) intervention can be used as a guideline in nursing management to address the incidence of hypoglycemia and fear of hypoglycemia in T2DM patients. Healthcare providers, especially nurses, can improve self-care management skills for people with T2DM by increasing family caregivers' health literacy and capability in T2DM self-

management to reduce patients' fear of hypoglycemia. Nurses do not only provide education and help patients make decisions but they also educate and empower family caregivers. Family caregivers are essential in assisting patients with independent care related to T2DM. One effort that can be made is to provide family empowerment interventions. Family empowerment is expected to increase family knowledge about diabetes care, which can help patients manage self-care, remind patients to control their fears, and assist in recognizing the signs and symptoms of hypoglycemia, thus reducing the fear of hypoglycemia in patients. The limitations of this study include the intervention being postponed for one week due to a significant event that required the researcher to delay the scheduled interventions. Furthermore, while the study included 85 respondents, this may not be large enough to generalize the findings to a broader population of people with T2DM and their caregivers.

6. Conclusion

This study concludes that the FCEM intervention effectively reduces the fear of hypoglycemia in people with T2DM. It enhances family caregivers' ability to manage T2DM, including regulating eating patterns, physical activity, medication, blood glucose monitoring, and foot care. Family caregivers with adequate skills in T2DM self-management can be directly involved in the care of people with T2DM. Family involvement can provide maximum support in diabetes care, increasing awareness, self-confidence, and self-control among people with T2DM. This, in turn, can improve the self-management abilities of people with T2DM, which is necessary for controlling blood sugar and reducing fear of hypoglycemia. Further research can re-examine the effectiveness of the FCEM intervention in different locations/settings with a diverse and larger sample size.

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Author contribution

RR, the primary author, selected the theme, developed the concept and intervention protocol, collected and analyzed data, and compiled the manuscript. KK, as a member author, played a role in preparing references, analyzing data, and refining the discussion. MNR, as a member author, compiled the manuscript, collected research data, and compiled the results and discussion.

Conflict of interest

The authors declare no conflict of interest.

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