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Research Article

Effect of Honey-based Oral Care on Oral Health of Patients With Stroke Undergoing Rehabilitation: A Randomized Controlled Trial

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SUMMARY

Purpose: To investigate the effects of honey-based oral care on the oral health of patients with stroke undergoing rehabilitation.
Methods: In this randomized controlled trial, 44 stroke patients from a tertiary hospital's rehabilitation ward were assigned to receive either honey-based oral care or normal saline, with treatments administered twice daily for 2 weeks. The study, conducted from November 2021 to August 2022, employed a double-blind method, blinding both participants and evaluators to treatment allocations. The key outcomes measured included oral status, dental plaque index (DPI), and xerostomia. The final analysis included 13 patients in the experimental group and 16 in the control group.
Results: The intervention significantly changed the oral status, DPI, and xerostomia between the groups. The experimental group showed significantly improved oral status ($Z = -4.63$, $p < .001$), DPI ($Z = -4.58$, $p < .001$), and xerostomia ($t = -6.33$, $p < .001$) compared with the control group. The experimental group showed significant improvements in oral status ($Z = -3.27$, $p = .001$), DPI ($Z = -3.19$, $p = .001$), and xerostomia ($t = 7.37$, $p < .001$) after the intervention, confirming the efficacy of honey-based oral care.
Conclusions: Honey-based oral care effectively improves oral status and xerostomia, and reduces DPI in patients with stroke.
Clinical trial registration number: Clinical Research Information Service, KCT0008201. Registered on 04 February 2023. The first patient was enrolled on November 16, 2021, at https://cris.nih.go.kr/cris/search/listDetail.do?searchWord=KCT0008201&search_yn=Y.

Introduction

Patients with stroke often experience a range of functional limitations in their daily lives owing to brain damage. Among these limitations, orofacial functional impairments can reduce salivary flow, impair the ability to remove food debris, reduce the effectiveness of tooth brushing, and diminish oral hygiene management [1]. Additionally, reduced saliva production, oral breathing, dysphagia, and pharmacotherapy can contribute to increased xerostomia and other oral problems, potentially causing oral pain, taste disorders, and difficulty swallowing [2]. Such oral problems can have adverse consequences, including challenges in food intake, increased risk of malnutrition, oral infections, periodontal diseases, and respiratory disorders that significantly affect the recovery and prognosis of patients with stroke [3].

Oral care improves the health outcomes and well-being of stroke patients; however, stroke treatment is generally prioritized over oral care for life and functional rehabilitation [4,5]. Recovery from neurological damage in stroke patients and functional rehabilitation are multifactorial and often require long-term rehabilitation therapy for ≥6 months [6]. Consequently, oral healthcare remains an ongoing nursing practice. Despite its significance, a systematic literature review of older adult patients in long-term care facilities who required continuous oral care reported discomfort, pain, and fear as major barriers to oral care [7]. Therefore, antimicrobial treatments to reduce harmful bacteria and methods to minimize discomfort in patients requiring prolonged oral care (e.g., stroke patients) are essential to prevent treatment rejection and noncompliance.

Various chemical agents are used in clinical practice for oral care for stroke patients, including chlorhexidine, sodium bicarbonate,

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hydrogen peroxide, benzydamine, and povidone-iodine [8]. However, there is no conclusive evidence on the formulation which is best suited for oral care. Furthermore, prolonged use of chemical disinfectants can lead to issues such as inhibition of oral epithelial cell regeneration, tissue degeneration, taste aversion, xerostomia, tooth discoloration, and medication costs [9,10]. Similarly, normal saline is safe, inexpensive, does not destroy granulation tissue, and maintains a normal pH. Hence, NS is commonly recommended for preventing stomatitis and improving the oral care of stroke patients [11]. However, it may cause discomfort because of its salty taste, induces xerostomia [12], and has been reported to have inferior cleansing effects compared with other formulations [13,14].

While various natural extracts such as aloe vera, yogurt, aroma oil, and kimchi probiotics have been studied for their potential to enhance oral care [15–17], honey stands out for its multifaceted benefits in the oral health realm. Recognized for its wound-healing properties [18], honey not only combats a broad spectrum of bacteria—including 60 species of gram-positive, gram-negative, anaerobic, and aerobic strains—but it is also particularly effective against Streptococcus mutans, a bacterium known to induce dental caries [19]. Beyond its antimicrobial prowess, honey is instrumental in preventing and soothing xerostomia [20], improving overall oral health in stroke patients. Furthermore, its agreeable taste and odor offer a comforting alternative to other agents, minimizing discomfort during oral care routines. Honey has shown effectiveness in medical treatments such as post-surgical recovery and chronic wound management [21–23]. It has outperformed chlorhexidine in preventing infections in pediatric care settings and has been effective against oral mucositis in cancer patients [24–26]. However, these applications, largely focused on cancer care, have limited relevance for stroke patients who may not be able to use standard oral care methods due to reduced self-care capabilities. There is a lack of studies investigating the effect of honey-based oral care on improvements in xerostomia of stroke patients. Traditionally used honey in its original form or as a diluted solution for gargling is not suitable for stroke patients at risk of aspiration. This gap underscores the need to validate the effectiveness of oral care methods involving the application of honey-soaked gauze to clean the oral cavity, specifically tailored to improve oral health and manage xerostomia in stroke patients with limited self-care abilities.

Aim

The present study examined how honey-based oral care impacts oral status, dental plaque index (DPI), and xerostomia in stroke patients.

Research hypotheses

H1: The experimental group that received honey-based oral care will have better oral status than the control group that received NS-based oral care.

H2: The experimental group that received honey-based oral care will have more reduction of DPI than the control group that received NS-based oral care.

H3: The experimental group that received honey-based oral care will have more reduction of xerostomia than the control group that received NS-based oral care.

Methods

Design and participants

The study was a randomized controlled trial. The results are reported in accordance with the CONSORT statement. Participants were recruited from the rehabilitation ward of a tertiary care hospital. Participants were randomly assigned to either the experimental group (honey-based oral care) or the control group (NS-based oral care) between November 15, 2021, and August 6, 2022. The inclusion criteria were as follows: patients who had a stroke, were aged ≥19 years, and were classified as patients “unable to perform task” and “requiring minimal assistance or supervision” for personal hygiene on the Korean version of the Modified Barthel Index (K-MBI). Individuals with complete dentures, honey allergies, or diabetes mellitus were excluded.

Sample size

We recruited participants from the rehabilitation ward of a tertiary hospital between November 2021 and August 2022. The sample size was calculated using G*Power software (version 3.1.9.7) based on a two-tailed *t*-test with an effect size (d) of 1.51, informed by similar age demographics and primary variables in study [27]. With a significance level of .05 and power of .95, the required minimum sample size was 26 participants, 13 in each group. Anticipating a potential 40% dropout rate [28] as observed in comparable studies of stroke patients undergoing oral care, we enrolled 22 participants per group, totaling 44 participants. Figure 1 shows that nine participants in the experimental group dropped out due to discharge ($n = 5$), transfer ($n = 3$), and withdrawal of consent due to a concern about allergy ($n = 1$), resulting in 13 participants. In the control group, six participants dropped out due to discharge ($n = 5$) and transfer ($n = 1$), resulting in 16 participants. Thus, 29 participants were included in the final analysis (Figure 1).

Randomization and allocation concealment

To mitigate selection bias, execution bias, and detection bias, we employed a rigorous randomization process. Participants were assigned to two groups in a 1:1 ratio using a random sequence generated by Excel software, as depicted in Figure 1. A third-party research assistant not involved in providing or measuring the intervention maintained blinding by assigning coded symbols for both groups. These codes were concealed in sequentially numbered, opaque, sealed envelopes which corresponded to participant IDs from the random sequence. The envelopes were placed in participant rooms without revealing group assignments. During the intervention phase, 13 research assistants, unaware of the group allocations, administered oral care to ensure impartial treatment administration. The principal researcher, responsible for organizing the study but not involved in direct oral care, along with the outcome evaluators, remained blinded to the group assignments throughout the study. This double-blinding included both the participants and the evaluators to ensure unbiased execution and outcome assessment.

Interventions

The intervention was administered to the participants in their hospital rooms following the oral care protocol. For the experimental group, 30 ml of acacia honey was used per session, adjusted from the initial 20 ml due to honey’s high viscosity. This adjustment was made to ensure full coverage of the oral surfaces, as acacia honey’s higher viscosity required a larger volume to achieve the same application as less viscous agents. Acacia honey was selected for its single-component nature which minimizes the risk of side effects. Its composition has been shown to be similar to widely-researched Manuka honey but is more readily available in Korea, making it easily accessible to participants. Meanwhile, the control group received 20 ml of 0.9% normal saline, a widely used solution that is

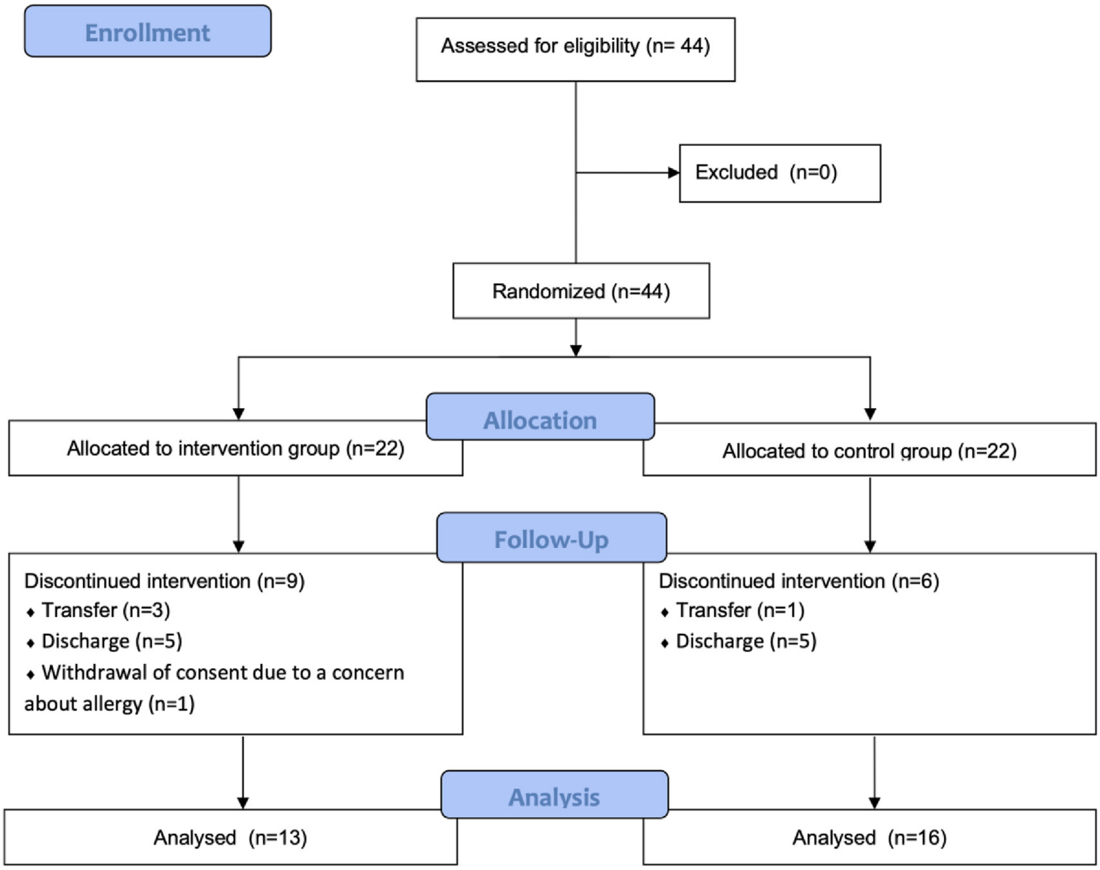

Figure 1. Study flowchart.

cost-effective and considered safe due to its compatibility with oral pH and non-interference with epithelialization processes [11]. Based on prior studies and guidelines, oral care was performed twice daily, approximately 30 minutes after breakfast and dinner, for a duration of 2 weeks [29,30]. Each session lasted about 5 minutes, encompassing 8–10 strokes per oral area as recommended in clinical guidelines [30,31]. Thirteen trained research assistants and nurses working in a rehabilitation ward executed the oral care protocol.

This training ensured that all assistants applied the treatments uniformly. Each session involved a standardized 5-minute oral care protocol, which was consistently reinforced through repeated training to maintain consistent application across sessions.

a. Prepare the sanitized oral care kit with an oral care solution and five pieces of 4 × 4 gauze.
b. Explanation of the purpose and process of oral care for patients and their families. The head of the bed was raised 45° or higher.
c. Observation of the mouth using a tongue depressor and penlight prior to oral care.
d. Hand washing using hand sanitizers, wearing disposable gloves, and cleaning each area (upper teeth, lower teeth, gums, oral mucosa, and tongue) with gauze and honey using forceps. Cleaning the teeth and gums from top to bottom, similar to toothbrushing, ensuring that all surfaces were thoroughly cleaned, with approximately 8–10 strokes for each area. The oral mucosa, the palate, the inside of the cheeks, the inner side of the lips, and leaning the tongue from the inside to the outside were all cleaned.
e. Use of a towel to clean the chin and mouth and apply a lanolin-containing moisturizer to the patient's lips using a cotton swab.
f. Recheck the mouth for injuries or residues using a tongue depressor and penlight.
g. Comfortably assist the patient, remove loves, tidy up the used materials, and handwashing.

Outcome measures

Measurements of oral health variables prior to and after oral care were consistently conducted by the same evaluator to ensure consistency in data assessment and to avoid inter-rater variability. Oral status was assessed using the Oral Assessment Guide developed by Eilers et al. [32], which consisted of eight domains: voice, swallowing, lips, tongue, saliva, oral mucosa, gums, and teeth. However, given the limitations of assessing the voice and swallowing in stroke patients due to issues such as intubation and dysphagia, and because the primary focus of our study was to assess changes in oral health status following the intervention, we measured only four items: the tongue, gums, oral mucosa, and teeth. Each area was scored on a scale of 1–3, with higher scores indicating poorer oral health. The Cronbach α value for this tool was .85 at the time of development, .83 in a study by Jo et al. [33], who measured the same four items with .82 Cronbach α value in the present study.

DPI was measured using the Modified Patient Hygiene Performance Index developed by Podshaley and Haley [34] to assess oral hygiene. The index measures the degree of tooth staining after applying stains on the lingual surfaces of the three upper teeth (buccal surface of the right first molar, labial surface of the right central incisor, and buccal surface of the left first molar) and three lower teeth (lingual surface of the left first molar, labial surface of the left central incisor, and right first molar). The staining intensity of each tooth was scored from 0 to 5; the scores were summed and

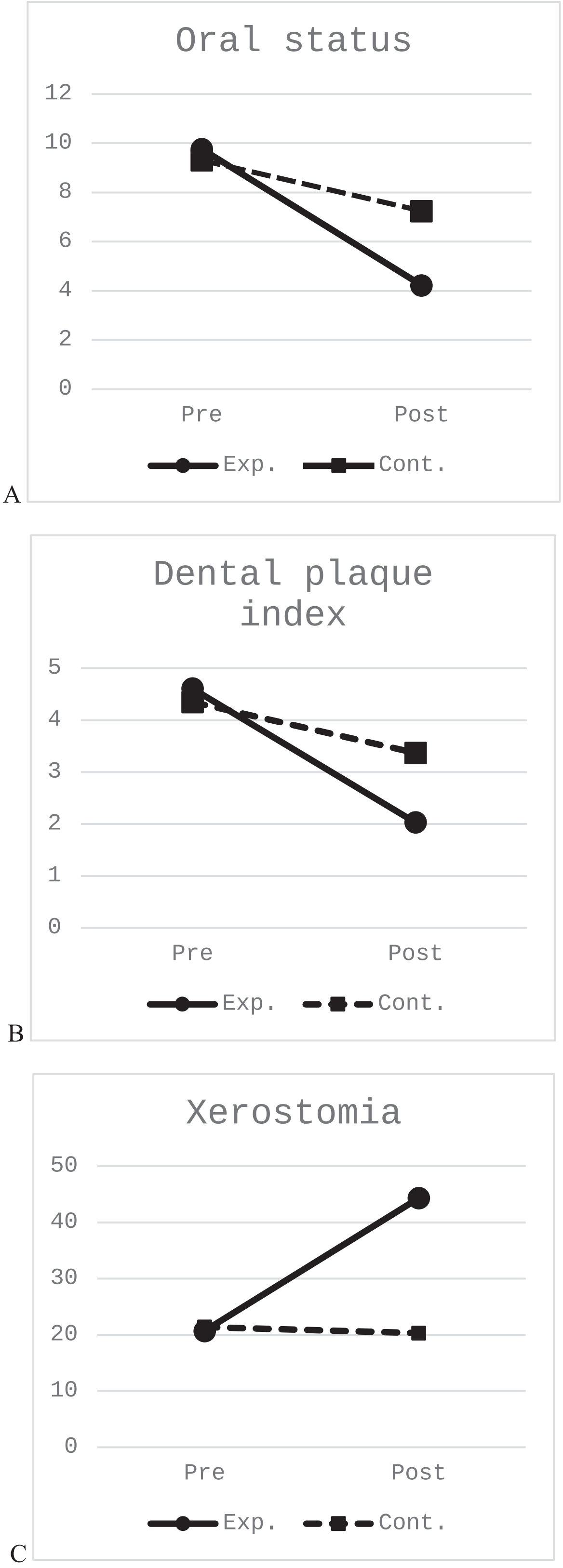

Figure 2. Change of oral status (A), dental plaque index (B), and xerostomia (C) by time.

divided by the number of teeth examined to calculate the DPI. Higher DPI scores indicated greater accumulation of dental plaque and poorer oral hygiene.

The severity of xerostomia was assessed by measuring salivary secretions using absorbent paper strips. Salivary secretion measurement strips (WF41-1850, WHATMAN) were cut to 1 × 17 cm and placed on the floor of the mouth, and the patients were asked to close their mouths. Care was taken to position the end of the absorbent paper strip against the folds of the tongue and avoid contact with the tongue as much as possible. The strips were removed after 1 minute, and the extent of saturation of the strip was recorded using a ruler in mm (EAGLE®). Lower values indicated a lower salivary volume and greater severity of xerostomia.

Data collection

We enrolled stroke patients admitted to the rehabilitation ward of a tertiary hospital between November 15, 2021, and August 6, 2022. The researchers collected data from the participants. Baseline general disease, treatment characteristics, oral status, DPI, and xerostomia were assessed. Oral care was provided for 2 weeks (twice daily, 30 minutes after breakfast and dinner). Oral status, DPI, and xerostomia were assessed again 2 hours after completion of the final intervention.

Ethical considerations

The present study was approved by the institutional review board of the study hospital (IRB No. 2107-016-104). The researcher explained the purpose, methods, and duration of the study to eligible participants. Participants or their legal representatives provided written informed consent for participation.

Statistical analysis

Data were analyzed using SPSS version 27.0. Participant characteristics, oral status, DPI, and xerostomia were analyzed using parentage, mean, and standard deviation (SD). Upon verifying normality, appropriate parametric or non-parametric analyses were employed. Comparison of pre- and post-intervention measures of oral status, DPI, and xerostomia within groups were analyzed using the Wilcoxon signed-rank test and paired *t*-test. The differences in outcomes between the two groups were analyzed using the Mann–Whitney U test and an independent *t*-test.

Results

Participants' characteristic and homogeneity

The most common age group was 50–69 years, and both groups were predominantly males. None of the participants in either group used dentures. The mean number of natural teeth was 26.77 ± 2.45 in the experimental group and 25.31 ± 2.75 in the control group (Table 1). The mean length of hospital stay was 48.46 ± 36.57 days in the experimental group and 44.75 ± 14.87 days in the control group. Regarding the type of stroke, the percentages of ischemic and hemorrhagic strokes were 23.1% and 76.9%, respectively, in the experimental group, and 6.3% and 93.8%, respectively, in the control group. Hemorrhagic strokes were more common in both the experimental and control groups. Hypertension was the most common comorbidity in both groups (61.5% and 31.3% in the experimental and control groups, respectively). None of the patients had liver disease or heart failure. The most commonly administered medications were anticonvulsants (76.9% in the experimental group and 87.5% in the control group). None of the participants received anticholinergics, anticancer agents, autonomic stimulants, or antidepressants. There were no statistically significant

Table 1 *Homogeneity Test of General Characteristics Between Two Groups (N = 29).*

Characteristics	Categories	Exp. ($n = 13$)	Cont. ($n = 16$)	χ^2 or t	p
		n (%) or Mean ± SD	n (%) or Mean ± SD		
Age (year)	≤49	3 (23.1)	5 (31.3)	−0.73	.470
	50~69	6 (46.2)	8 (50.0)		
	≥70	4 (30.8)	3 (18.8)		
Sex	Male	10 (76.9)	13 (81.3)	0.08	>.999[a]
	Female	3 (23.1)	3 (18.8)		
Dentures	Yes	0 (0.0)	0 (0.0)	–	–
	No	13 (100)	16 (100)		
Number of teeth		26.77 ± 2.45	25.31 ± 2.75	−1.48	.148
Dental treatment in the last 2 years	Yes	0 (0.0)	1 (6.3)	0.84	1.000[a]
	No	13 (100)	15 (93.8)		
Smoking history	Yes	0 (0.0)	0 (0.0)	0.90	.340
	No	5 (38.5)	9 (56.3)		
	Cessation	8 (61.5)	7 (43.8)		
	Amount per day	17.50 ± 4.62	16.00 ± 12.32	0.32	.754
Period of hospitalization (day)		48.46 ± 36.57	44.75 ± 14.87	−0.34	.736
Type of stroke	Infarction	3 (23.1)	1 (6.3)	1.23	.234
	Hemorrhage	10 (76.9)	15 (93.8)		
Functional independence	Total dependence	11 (68.8)	7 (53.8)	1.56	.552[a]
	Severe dependence	5 (31.3)	5 (38.5)		
	Moderate dependence	0 (0.0)	1 (7.7)		
Comorbidity[b]	Hypertension	8 (61.5)	5 (31.3)	2.66	.103
	COPD	1 (7.7)	1 (6.3)	0.02	1.000[a]
	Kidney disease	1 (7.7)	0 (0.0)	1.27	.448[a]
	None	5 (38.5)	11 (68.8)	2.66	.144
Respiratory support	Tracheostomy tube	9 (69.2)	15 (93.8)	3.02	.144[a]
Nutritional support	Tube feeding	10 (76.9)	12 (75.0)	0.01	1.000[a]
Drug[b]	Antihypertensives	9 (69.2)	5 (31.3)	4.14	.042
	Antihistamines	1 (7.7)	0 (0.0)	1.27	.448[a]
	Antipsychotics	7 (53.8)	7 (43.8)	0.29	.588
	Anticonvulsant	10 (76.9)	14 (87.5)	0.56	.632[a]
	Diuretics	3 (23.1)	2 (12.5)	0.56	.632[a]
	Antibiotics	2 (15.4)	7 (43.8)	2.69	.129

Note. Cont. = control group; COPD = chronic obstructive pulmonary disease; Exp. = experimental group; SD = standard deviation.

[a] Fisher's exact test.

[b] Multiple response.

differences between the experimental group and the control group across all characteristics, with the exception of antihypertensive use ($p = .042$).

Hypothesis testing

In this study, Hypotheses 1, 2, and 3 were all supported. The results confirm that the experimental group receiving honey-based oral care showed significantly better improvements in oral status, greater reduction in Dental Plaque Index (DPI), and more pronounced reduction in xerostomia compared to the control group receiving NS-based oral care (Table 2 & Figure 2).

In the experimental group, oral status scores improved notably, decreasing from an average of 9.77 ± 0.43 prior to the intervention to 4.23 ± 0.43 after, indicating a significant improvement ($Z = -3.27$, $p = .001$). Similarly, in the control group, scores also decreased from 9.31 ± 1.01 to 7.25 ± 1.18, albeit to a lesser extent, showing some improvement ($Z = -3.55$, $p < .001$). Notably, the experimental group exhibited a more substantial mean reduction in scores (−5.54 ± 0.66) compared with the control group (−2.06 ± 0.92), which was statistically significant ($Z = -4.63$, $p < .001$), indicating a greater improvement in oral status in the experimental group.

In the case of the DPI, the experimental group exhibited a significant improvement, with the mean score declining from 4.61 ± 0.37 prior to the intervention to 2.03 ± 0.44 afterward ($Z = -3.19$, $p = .001$). The control group also saw a decrease in DPI, though less marked, from 4.35 ± 0.65 to 3.37 ± 0.41 ($Z = -3.53$, $p < .001$). The difference in the mean score change was notably significant between the groups, with the experimental group showing a larger reduction (−2.57 ± 0.40) than the control group (−0.97 ± 0.38) ($Z = -4.58$, $p < .001$), indicating a more pronounced improvement in DPI in the experimental group. For xerostomia, saliva production significantly increased from 20.69 ± 8.59 mm to

Table 2 *Outcomes Between Two Groups and Pre-post Comparison (N = 29).*

Variables	Group	Pre-test	Post-test	Z/t (p)	Mean difference	Z/t (p)
		Mean ± SD	Mean ± SD		Mean ± SD	
Oral status	Exp. ($n = 13$)	9.77 ± 0.43	4.23 ± 0.43	−3.27 (.001)[a]	−5.54 ± 0.66	−4.63 (<.001)[b]
	Cont. ($n = 16$)	9.31 ± 1.01	7.25 ± 1.18	−3.55 (<.001)[a]	−2.06 ± 0.92	
Dental plaque index	Exp. ($n = 13$)	4.61 ± 0.37	2.03 ± 0.44	−3.19 (.001)[a]	−2.57 ± 0.40	−4.58 (<.001)[b]
	Cont. ($n = 16$)	4.35 ± 0.65	3.37 ± 0.41	−3.53 (<.001)[a]	−0.97 ± 0.38	
Xerostomia	Exp. ($n = 13$)	20.69 ± 8.59	44.30 ± 11.49	7.37 (<.001)	23.61 ± 11.54	−6.33 (<.001)
	Cont. ($n = 16$)	21.38 ± 10.85	20.31 ± 8.56	−0.45 (.659)	−1.06 ± 9.44	

Note. Cont. = control group; Exp. = experimental group; SD = standard deviation.

[a] Wilcoxon signed-rank test.

[b] Mann–Whitney U test.

44.30 ± 11.49 mm after intervention in the experimental group ($t = 7.37$, $p < .001$) while it did not differ significantly in the control group (21.38 ± 10.85 mm to 20.31 ± 8.56 mm) ($t = -0.45$, $p = .659$). The mean change in the score significantly differed between the experimental group (23.61 ± 11.54 mm) and the control group (−1.06 ± 9.44 mm) ($t = -6.33$, $p < .001$).

In the present study, no significant adverse effects or unintended harm were observed in any of the groups.

Discussion

The present study investigated the effectiveness of honey-based oral care in stroke patients admitted to a rehabilitation ward. No severe, harmful, or unexpected adverse effects were observed in this study.

The participants in this study showed poor oral health prior to the intervention, with 9.77 ± 0.43 in the experimental group and 9.31 ± 1.01 in the control group. This is consistent with the findings of a study on oral hygiene in patients with stroke admitted to a rehabilitation ward [35], highlighting the importance of oral care during rehabilitation. This situation emphasizes the necessity of frequent oral health assessments and targeted care for those with diminished oral care abilities. Despite the low baseline oral health status, our investigation into honey-based oral care yielded substantial improvements in the experimental group compared with the control group. These results highlight the effectiveness of honey-based interventions in enhancing oral health even in patients who are at a heightened risk of oral health decline due to poor oral care capabilities including those with stroke. Given the importance of oral health for the recovery and well-being of stroke patients [36], and considering our findings, employing honey-based oral care emerges as a particularly beneficial approach for this vulnerable group, aiding in improving their oral status and overall health outcomes.

In previous studies, patients swallowed or gargled raw honey or diluted honey solutions [26,27], but these methods may not be suitable for patients with stroke because of their impaired cognitive and oral muscle functions. In the present study, we introduced a method for applying honey to gauze and using it to clean the oral cavity. The results indicated that this method significantly improved the patients' oral health. These results are consistent with those of a meta-analysis that investigated improvements in mucositis after honey-based oral care in patients with cancer undergoing radiation therapy and confirmed that gargling with honey and topical application of honey helps diminish mucositis [26]. Specifically, cleaning the inside of the mouth using honey-soaked gauze without holding honey in the mouth for some time improved overall oral health, including that of the oral mucosa, tongue, gums, and teeth, which has significant implications. Thus, this method of cleaning the oral cavity with honey could be applied to patients who cannot gargle due to altered consciousness, cognitive impairment, diminished oral care capability due to nerve or muscle problems, or risk of airway aspiration.

We examined the effects of honey-based oral care on DPI and found that DPI was significantly reduced in the experimental group compared with the control group. The same gauze was used for tooth and gum care in both groups. However, the results indicate that the antimicrobial and microbial growth-suppression effects of honey have additional benefits to the simple mechanical effect of wiping teeth [18,37,38]. NS is not recommended for oral infections due to limited data [14]. Thus, honey can be used as a substitute for NS, which is generally used for patients with stroke in clinical practice. By inhibiting microbial growth in the oral cavity, honey may help prevent dental caries in stroke patients who cannot brush their teeth properly owing to their impaired abilities.

Honey-based oral care alleviated xerostomia, as evidenced by a more than two-fold increase in saliva production in the experimental group. Xerostomia is a major discomfort caused by chemical agents used in conventional oral care [7,20]. Specifically, in clinical practice, NS used for prophylaxis, rather than the treatment of stomatitis, induces xerostomia in patients with stroke, necessitating practice modifications [10,12]. This study observed a significant change in oral status and DPI after the intervention in the experimental and control groups. However, xerostomia significantly alleviated in the experimental group. Patients with an increased risk of xerostomia due to oxygen therapy and antihypertensive medications, such as those with stroke, should choose oral care agents accordingly.

Oral intake is contraindicated in stroke patients who are undergoing rehabilitation because of the risk of aspiration. However, a lack of oral intake reduces the stimulation of the salivary glands and induces xerostomia. Honey-based oral care appears to alleviate xerostomia because the sweet taste of honey stimulates salivary glands and increases saliva production [39]. Furthermore, the sweet taste of honey may help address patient discomfort and pain associated with the unique taste and odor of oral care products in cases where long-term oral care is necessary, as is often observed in stroke patients [7].

Our study has several limitations. First, the COVID-19 pandemic that occurred after this study was initiated posed difficulties for the trial. During the pandemic, tertiary hospitals transferred stroke patients undergoing rehabilitation to smaller hospitals or rehabilitation hospitals more quickly than usual to reduce patients' lengths of stay in tertiary hospitals. Therefore, at 35%, the dropout rate was high. Future studies should establish study plans in considering these factors. Furthermore, we acknowledge the possibility of partial unblinding among participants due to the distinctive scent of honey used in the experimental group. This could not be completely avoided and is a recognized limitation of our study. Another limitation is that DPI and xerostomia can be influenced by oral food intake, food intake methods, and fluid intake volume. However, 75.9% of our patients received parenteral nutrition, and we could not consider all the factors related to food intake. Future studies should therefore include a broader range of factors such as pH and other variables that impact oral health to provide a more comprehensive understanding of interventions.

Conclusions

The present study demonstrated that honey-based oral care improves oral status, reduces DPI, and alleviates xerostomia in patients with stroke. These findings highlight the substantial antimicrobial properties of honey, advocating for its incorporation into oral care routines, particularly for those with compromised oral hygiene due to functional or cognitive impairments. The use of honey-soaked gauze for cleaning the mouth presents a practical, gentle, and effective approach to oral care in patients vulnerable to aspiration or unable to perform conventional oral hygiene practices. Significantly, the study underscores the importance of honey in reducing dental plaque and mitigating dry mouth symptoms, offering valuable insights into its role as an evidence-based solution for stroke patients who face heightened risks of oral health deterioration, especially from prolonged use of chemical-based oral care products.

Author contributions

A.R.C. & H.S.: made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data; A.R.C., H.S. & G.H.: involved in drafting the manuscript or revising it critically for important intellectual content; A.R.C., H.S. & G.H.:

given final approval of the version to be published. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content; A.R.C., H.S. & G.H.: agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Conflict of interest

The authors declare no conflict of interest.

Acknowledgments

During the challenging times of the COVID-19 pandemic, our research faced significant hurdles due to the temporary closure of the rehabilitation ward. Despite these difficulties, our study could reach its completion thanks to the unwavering support and dedication of the medical staff. We extend our heartfelt gratitude to all the healthcare professionals who, amidst managing patient care under these unprecedented circumstances, provided invaluable assistance and cooperation for our research. Their commitment to both patient care and academic advancement during such a critical period is deeply appreciated. Additionally, we would like to express our sincere thanks to all the participants who generously contributed their time and experiences to this study.

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Research Article

Exploring the Care Experiences Among Clinical Staffing During Emerging Infectious Disease: From the COVID-19 Pandemic Approach

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SUMMARY

Purpose: The coronavirus disease 2019 (COVID-19), one of the most significant recent emerging infectious diseases, has evolved into a global pandemic, resulting in an unprecedented public health crisis with substantial morbidity. The aim of this study was to investigate the care experiences of nursing staff during the COVID-19 pandemic.
Methods: A qualitative, exploratory interview study. This study was conducted from August 2022 to January 2023. Participants were recruited from a medical center in northern Taiwan. A purposive sampling approach was employed to select the participants, and in-depth interviews were conducted with a total of 30 individuals. The collected data were analyzed using content analysis.
Results: The findings of this study revealed five themes that summarized the care experiences of participants during the COVID-19 pandemic, enhanced nursing competence in pandemic mitigation, adherence to clear safety measures, effective adaptation to the stress of the “unknown,” and recognition of the meaning of the pandemic mitigation experience.
Conclusion: This study informs pandemic readiness for nurses and policy enhancement. Medical institutions and governments must prioritize policies ensuring staffing, PPE access, and mental health support. Educators and administrators should elevate on-the-job crisis management training. Future planning should cater to Taiwanese nurses' needs during unforeseen crises such as COVID-19.

Introduction

Emerging infectious diseases are defined as infectious diseases that are newly recognized in a population and cause public health problems either locally or internationally [1,2]. The coronavirus disease 2019 (COVID-19), the major recent emerging infectious diseases, was declared a pandemic approximately 40 days after it was declared a global public health crisis [3,4]. The rapid spread and severity of these diseases have instilled negative emotions of fear, anxiety, and depression among the general public. During the early stages and throughout the pandemic, there was a significant shortage of healthcare personnel, medications, vaccines, medical equipment, and essential care supplies [5]. Consequently, medical professionals across the entire healthcare system have experienced significant psychological pressure [6]. Given these circumstances, it is crucial to explore the resilience experiences of nurses dealing with work-related stress during the pandemic. Nurses directly involved in caring for COVID-19 patients face a high risk of exposure to the novel coronavirus while providing essential nursing care to patients. Therefore, it is imperative to pay close attention to their mental well-being [7].

Since the outbreak of the COVID-19 pandemic, academia and policymakers have intensified their efforts to enhance the resilience of frontline healthcare workers [6]. However, despite advancements in vaccines and treatments for COVID-19, healthcare

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workers attending to COVID-19 patients continue to grapple with unprecedented challenges [8]. Despite improvements in personal protective measures and a decline in confirmed cases, fear and uncertainty persist regarding workplace infections, impacting the mental well-being of healthcare workers [8,9]. The experiences of nurses in providing care for COVID-19 patients markedly diverged from their previous practices in patient care. [10]. Nurses faced numerous obstacles when providing care to COVID-19 patients, including heavy workloads, inadequate protective equipment, psychological distress, fear, personal and familial isolation, and a lack of workplace support [11]. A qualitative investigation of 14 nurses who cared for COVID-19 patients revealed that they experienced heightened awareness of the necessity for self-care due to the amplified requirement for personal protection during caregiving. [10].

Previous research has indicated that bolstering the resilience of frontline nurses during the COVID-19 pandemic can enhance job satisfaction and retention and support the effectiveness and efficiency of nursing services [12]. Research has established that frequent interaction between clinical nursing staff and patients with infectious diseases can result in severe manifestations of depression, anxiety, insomnia, and pain [7]. In contrast, during the initial COVID-19 outbreak, Conti et al. [13] investigated the mental well-being and psychological support needs of healthcare workers. Their findings diverged from previous research, suggesting that direct exposure to COVID-19-infected patients did not result in a significant increase in psychological symptoms. Furthermore, the study by Peng et al. [14] also revealed no difference in depressive symptoms between nurses who had direct contact with confirmed COVID-19-infected patients and those who did not.

Several studies suggest that nurses' diverse backgrounds can influence their resilience and individual experiences during the COVID-19 pandemic. A cross-sectional study involving 163 nurses found that years of working experience were independently linked to their willingness to provide care [15]. Experienced healthcare workers exhibit better adaptation in high-risk settings, showing improved control and resilience due to prior experience with preventive measures [15–17]. Also, senior healthcare workers likely possess extensive clinical experience, particularly in managing infectious diseases, potentially leading to greater skill competency compared to younger colleagues [18]. Moreover, healthcare workers with post-graduate degrees tend to have higher knowledge scores than those with lower degrees [19]. Additionally, during the pandemic, single, divorced, or widowed individuals who perceive greater social support from friends and significant others experience higher environmental quality of life [18].

COVID-19, being a novel disease, has emerged as a worldwide public health crisis, posing considerable hurdles to healthcare and social services systems. It has not only disrupted normal work routines but also impacted the social environment as a whole. Healthcare providers are expected to face ongoing challenges, and individuals may need to discover new ways to adapt to their daily lives and maintain their work [20]. Amidst the most challenging period of the pandemic, the role of nursing staff has become more important than ever [21]. Furthermore, describing how nurses view the experience of caring for patients with COVID-19 could be beneficial in enhancing and advocating for the well-being of patients [22]. Therefore, this study aimed to investigate the caring experiences of nursing staff who encountered work-related stress during the COVID-19 pandemic. Our findings are of value for improving institutional and governmental health policies and may help health workers prepare for future pandemics.

Methods

Study design

The objective of a qualitative descriptive study design is to provide a comprehensive summary of an event by capturing its essence from the perspective of the event and using accessible language and straightforward sentences [23]. It is evident that the experiences of frontline healthcare workers during this pandemic were diverse, multidirectional, and multidimensional. While surveys and questionnaires can capture information from a large number of individuals to inform our understanding of outcomes, the process of obtaining such outcomes through these methods is not as straightforward as it may seem [24].

Participants and setting

This study utilized purposive sampling to recruit participants from a medical center in northern Taiwan. The inclusion criteria for participants were as follows: (1) clinical nurses engaged in full-time nursing work, (2) with nursing work experience of at least six months or more, and (3) who willingly agreed to participate and provided informed consent to complete questionnaires. Exclusion criteria encompassed: (1) currently undergoing treatment for mental health conditions, (2) taking mood-regulating medications, and (3) having previously participated in mindfulness training.

Ethical considerations

The study was approved by the Institutional Review Board of MacKay Memorial Hospital (Approval no. 21 MMHIS458e). All procedures in this study involving human participants were performed in accordance with the Declaration of Helsinki. All participants were fully informed about the aims of the study and research method. Before the interview, the lead researcher provided the participants with information about anonymity and the confidentiality of the information. Then, written informed consent was obtained from the participants who could withdraw from the study at any time.

Data collection

Once written consent was obtained from the participants, face-to-face interviews were conducted in a one-on-one setting, utilizing recording equipment to capture the data. On average, the interviews lasted approximately 55 minutes. The interview location was chosen to provide a comfortable and open environment for participants to express their experiences freely. In-depth interviews were employed as the data collection method. Following the interviews, the complete audio recordings were transcribed verbatim into written scripts, and data analysis was subsequently carried out. When analyzing up to the 26th interview data, it was found that no new thematic units emerged in the data. After collecting an additional 4 interviews and confirming the absence of new themes, data saturation was reached, and data collection was consequently halted.

Prior to formal data collection, literature review and researcher experience were used to form interview guidelines. These guidelines underwent two rounds of pilot studies and were modified into low-structured interview guidelines. The interview questions were presented as follows::

- What was your reaction when you were informed to care for a confirmed/suspected COVID-19 patient?
- What emotions did you experience during your work (both negative and positive aspects)?

- How did your emotions impact your assigned tasks? Specifically, what psychological changes did you experience at work?

Data analysis and rigor

After data collection, a preliminary analysis was conducted to guide subsequent data collection. The qualitative content analysis method [25] was employed to extract the contextual meaning from the interview text and identify emerging themes. The data analysis process involved the following steps: (1) thoroughly reading each set of text data to grasp the context and overall concept; (2) focusing on the research question and identifying meaningful narratives; (3) assigning names to key content and organizing them into categories; (4) inductively combining related categories to form themes; and (5) reviewing and refining categories and themes.

Based on the criteria proposed by Lincoln and Guba [26] for assessing the rigor of evaluation data, the following are explained in terms of credibility, transferability, dependability, and confirmability. In terms of credibility, the research team members possessed backgrounds in qualitative research training or experience and involved an expert with qualitative research expertise who regularly reviewed the analysis for peer debriefing. The research team engaged in multiple discussions and revisions. During interviews, researchers not only listen carefully to participants' narratives but also pay attention to their non-verbal cues. When they encounter uncertainties or misunderstandings about a participant's meaning, they will timely seek clarification to ensure the accuracy of the data, for example, “You just mentioned about … What kind of feelings are involved? Could you elaborate more on that?”. In terms of transferability, during the interviews in this study, the entire process was recorded, and the researcher transcribed all the recordings into text. Throughout this process, the researcher repeatedly read and listened to the audio files to minimize data omission and enhance its richness, aiming to reflect the real-life contexts of the cases and achieve the study's transferability. In terms of dependability, that refers to the degree of consistency in the data. During the data analysis process, the researcher repeatedly read the text to examine their own context and enhance the reliability of the data sources. Apart from the researchers themselves, another qualitative researcher was also involved in the data analysis process to assist in verifying the appropriateness of categorization. Finally, regarding confirmability, researchers conducted an impartial analysis and documented key interview content summaries directly after each interview. These summaries were then compiled into a reference volume to serve as an evaluative resource for subsequent data analysis. Also, throughout the data collection and analysis process, the investigators continued to write in their reflection journals, which further aided in achieving the four indicators outlined above.

Results

For this study, 30 nurses with prior experience working in COVID-19 specialized units were interviewed. The participants' ages ranged from 23 to 51 years, with an average age of 35.77 years. Their nursing experience varied from 1 to 33 years, with an average of 14.07 years. The mean tenure in COVID-19 units was 11.35 months, with a standard deviation of 10.45. Table 1 provides an overview of the characteristics of the nurses who were interviewed.

Based on the findings from in-depth interviews and subsequent data analysis, the essence of the nursing staff's resilience experience during the COVID-19 pandemic was captured, resulting in the identification of five key themes: an environment of acceptance and

Table 1 *Characteristics of the Participants.*

Participants	Age (years)	Marital status	Educational level	Years of nursing experience	Duration of care for suspected/confirmed patients (months)	Nursing competency level
A	39	Married	University	18	12	N3
B	24	Single	University	4	2	N1
C	40	Married	University	19.5	1	N3
D	29	Married	College	9	1	N1
E	49	Married	Master	28	2	N3
F	30	Single	University	10	3.5	N1
G	35	Married	University	14	2	N4
H	26	Single	University	5	5	N1
I	46	Married	University	26	30	N3
J	32	Single	Master	6.5	18	N1
K	47	Single	Master	27	12	N3
L	37	Single	University	17	24	N3
M	28	Single	University	8	16	N1
N	45	Married	University	23	27	N4
O	51	Single	Master	33	27	N4
P	45	Married	College	17	8	N3
Q	29	Single	University	7	12	N2
R	25	Single	University	1.5	5	N1
S	32	Married	Master	10	4	N3
T	29	Married	University	7	18	N3
U	48	Married	University	28	30	N3
V	42	Married	University	19	3	N3
W	23	Single	University	1	4	N1
X	34	Married	University	11	5	N4
Y	37	Single	University	15	1	N3
Z	43	Single	Master	23	2	N3
AA	28	Single	University	4.6	6	N2
AB	33	Single	University	11	24	N3
AC	38	Single	Master	13	32	N2
AD	29	Single	University	6	4	N2
mean	35.77			14.07	11.35	
SD	8.25			8.79	10.45	
Max.	51			33	32	
Min.	23			1	1	

positive support, enhanced nursing competence in pandemic mitigation, adherence to clear safety measures, effective adaptation to the stress of the "unknown," and recognition of the meaning of the pandemic mitigation experience (Table 2). In summary, the key to nursing staff's "resilience" from the high-stress challenges of providing care during the pandemic was both "internal and external restoration." This involved self-relief and internal reconciliation, as well as receiving external encouragement and support from others.

Theme one: An environment of acceptance and positive support

An environment characterized by acceptance and positive support played a crucial role in enabling nursing staff assigned to dedicated units to care for patients in critical situations to persevere in their roles in the fight against the pandemic.

Subtheme one: The atmosphere of family support and peer collaboration in the collective fight against the pandemic

Nursing staff expressed significant concerns about the potential transmission of the virus to their family members, particularly older adults and children, as well as the impact on nursing operations if they became infected. During these challenging times, support and care from both family members and colleagues played a crucial role in alleviating anxiety and stress.

> Nurse J stated, *"The assistance and care provided by colleagues were crucial because the supportive energy helped us face challenges … Family support was also crucial. Despite being aware of the risks involved in my job, my family did not reject me. Instead, they reminded me to be cautious, which enabled me to regain quickly a relatively normal work mentality."*

The collaborative process and supportive environment in which healthcare workers established a consensus on nursing care served as an essential source of inspiration, making nurses feel that they were not alone in their fight.

> Nurse T shared an example, saying, *"For the nursing care of infectious diseases, the ward engaged in discussions with the infection control unit, and we followed a unified process of practices … This created a strong sense of cohesion within the ward … If I forgot something while working in the negative pressure ward, there was always someone available outside the ward to provide assistance, which made me feel supported … I believed that I was on the front line of pandemic mitigation and that we were all in this fight together … "*

Subtheme two: Securing adequate and comprehensive pandemic prevention equipment

Personal protective equipment and supplies served as vital tools for nursing staff during the pandemic, acting as life-saving weapons. Sufficient and fully functional equipment played a crucial role in alleviating the pressure of nursing care.

> Nurse M stated, *" … the hospital provided us with certified N95 masks and protective clothing. We underwent weekly infection screenings, which gave me a feeling of ease, knowing that I had comprehensive protective measures in place."*

> Nurse Y further shared, *"Our supervisor presented evidence to demonstrate the effectiveness of negative pressure in the ward. With this protection, we could confidently admit and provide care to confirmed patients."*

Subtheme three: Provision and delivery of essential supplies by the public

The general public took the initiative to donate supplies as a gesture of support. For nursing staff who were overwhelmed with their responsibilities to the point of skipping meals and restroom breaks, these actions felt like an instant replenishment for their exhausted souls.

> Nurse U shared a personal experience, saying, *"One day, I was so occupied that I didn't even have time to order lunch. After caring for patients in the negative pressure ward, I was both tired and hungry … I decided to 'forget about my hunger and delay eating until after work.' Then, unexpectedly, I spotted bento boxes sent by the public, and it felt like a ray of light had appeared in my life … I was deeply touched and found myself in tears while eating."*

Theme two: Enhanced nursing competence in pandemic mitigation

According to a saying, "One who knows their own strength and that of the enemy is invincible in battle." Similarly, nurses could alleviate the pressure of pandemic mitigation by enhancing their nursing knowledge and skills.

Subtheme one: Accumulating nursing care experience in pandemic mitigation

Taiwan experienced SARS in the past, and the individuals with prior SARS experience found it easier to adjust due to their familiarity with the situation.

Table 2 *Main Themes and Sub-themes of The Study.*

Main themes	Sub-themes
An environment of acceptance and positive support	• The atmosphere of family support and peer collaboration in the collective fight against the pandemic • Securing adequate and comprehensive pandemic prevention equipment • Provision and delivery of essential supplies by the public
Enhanced nursing competence in pandemic mitigation	• Accumulating nursing care experience in pandemic mitigation • Enriching new knowledge in infection control
Adherence to clear safety measures	• Strict adherence to pandemic prevention standard operation procedures (SOPs) • Voluntary self-isolation to minimize social contact • Peer monitoring and reminders for optimal self-protection
Effective adaptation to the stress of the "unknown"	• Sharing negative experiences with peers and engaging in stress-relieving activities • Receiving care and guidance from counselors • Embracing the professional mission to confront challenges • Shifting mindset and staying informed about emerging trends
Recognition of the meaning of the pandemic mitigation experience	• The sense of honor in participating in the pandemic battle and recognizing the value of nursing care • Recognizing the enhancement of professional competency

> For instance, Nurse Z shared, *"Having experienced SARS, when I was informed of the need to care for patients with COVID-19, I accepted it relatively well. I had no issues facing the COVID-19 pandemic." Nurses who had not previously participated in or lacked experience in caring for infected patients could alleviate stress by accumulating nursing experience.*

> Nurse M shared, *"As I began caring for patients with COVID-19, I gradually familiarized myself with the disease and learned how to provide appropriate care. I felt like a well-protected healthcare worker and experienced no fear or reluctance to go to work the following day." Additionally, exchanging experiences or discussing cases with peers could help clarify or share knowledge, providing a boost of energy to nursing staff.*

> Nurse Y shared, *"Our nursing team would discuss the care model and methods for treating the disease when we changed shifts. This process helped us gain insights into potential treatment approaches and identify any specific isolation methods that required special attention. Everyone was being extra cautious and vigilant."*

Subtheme two: Enriching new knowledge in infection control

Actively seeking out and consulting new knowledge and participating in training courses or seminars can enhance nursing-related knowledge and alleviate anxiety among nursing staff involved in pandemic mitigation.

> Nurse S expressed, *"As I had never encountered a pandemic before, I took it upon myself to enhance my protection and knowledge. For example, through attending educational sessions, I made sure to understand the proper procedures for donning and doffing protective equipment. This proactive approach helped alleviate my anxiety associated with the pandemic."*

Moreover, the transparency of pandemic mitigation information enabled the medical team to stay informed about the latest care guidelines and essential considerations, fostering trust and reassurance in the central government agency leading the effort in pandemic mitigation.

> Nurse A shared her initial uncertainties, stating, *"In the beginning, I was unsure and worried about the possibility of getting infected. However, with the increasing transparency of medical information about COVID-19, I gained knowledge on how to protect myself and determine the durations of my contact. By consistently wearing appropriate protective equipment, I felt confident that I could avoid infection. This shift in understanding significantly improved my mindset."*

Theme three: Adherence to clear safety measures

Nurses demonstrated a professional response to the pandemic, safeguarding not only themselves but also their families and peers.

Subtheme one: Strict adherence to pandemic prevention standard operation procedures (SOPs)

Various agencies were continuously adapting and updating the standard processes and norms for pandemic prevention, informed by evidence and experience. Having well-defined SOPs to adhere to was of utmost importance in alleviating the pressure of pandemic mitigation.

> Nurse C expressed this sentiment, stating, " … *with a properly established pandemic mitigation setting and care model, as long as I adhered to the correct usage of protective clothing and followed the prescribed care principles, there were generally no issues when providing patient care."*

In addition to official SOPs, nursing staff also established their own protocols. One commonly mentioned practice among the study participants was the ritual of repeated bathing before leaving the hospital and upon returning home. Some nurses even opted to cut their hair to a length below their ears to minimize the potential of virus retention.

> Nurse D exemplified this by sharing, *"I paid attention to small details … I would shower once at the hospital after my shift and immediately take another shower upon arriving home. Additionally, I separated my laundry from my family members' clothes. Thankfully, my family members have not been infected."*

Furthermore, certain nurses adopted health-promoting behaviors to reduce the risk of infection. They took vitamins, maintained regular sleep patterns by going to bed early and getting up early, and engaged in other wellness-enhancing practices.

> Nurse I explained, *"If I knew that I would be working in the area with infected patients the following day, I would ensure that I went to bed early. I took Vitamin C and B supplements daily, hydrated myself adequately, ate sufficiently, and got enough rest … all in an effort to minimize the likelihood of contracting the virus."*

Subtheme two: Voluntary self-isolation to minimize social contact

Nursing staff, driven by the desire to safeguard their families and friends, willingly adopted measures to reduce contact with others, such as dining alone or residing in separate accommodations like rented houses or dormitories provided by the government.

> Nurse J shared her experience, stating, *"When it came to outings and leisure activities, there was a notable difference compared to the past, as taking care of infected patients was a full-time commitment … Consequently, my recreational activities after work significantly decreased … Upon returning home, I would make a conscious effort to maintain distance and limit contact with my family members, ensuring that we remained separated … This precautionary measure was particularly crucial because there were children at home … Therefore, I requested them to stay away from me and maintain distance."*

Subtheme three: Peer monitoring and reminders for optimal self-protection

Nursing staff reminded and monitored one another, maintaining a high level of alertness to prevent any temporary lapses in attention from compromising their safety.

> Nurse V stated, " … *We made every effort to protect ourselves … We assisted each other by conducting checks, for instance, when entering the infected area to care for patients. Sometimes, due to a momentary lapse in focus, I might forget to bring something, and my colleagues would notice this … They would kindly remind me, saying, 'Did you forget something?' We helped one another stay attentive. Even from the beginning, we worked in pairs, assisting*

> *each other when donning and doffing protective clothing, helping each other to stay alert."*

Theme four: Effective adaptation to the stress of the "unknown"

Did nursing staff worry about potentially spreading the virus to their family and friends? Could wearing personal protective equipment prevent infection? Were the patients' conditions constantly changing? When would the pandemic come to an end? In the face of these profound unknowns, nurses found solace in confiding their anxieties to their peers and engaged in activities that helped alleviate stress. The presence of counselors provided crucial support and guidance, while the nurses' unwavering dedication to their professional mission empowered them to confront challenges head-on. They adjusted their mindset, remained vigilant of emerging trends, and found effective ways to alleviate stress.

Subtheme one: Sharing negative experiences with peers and engaging in stress-relieving activities

Most nurses found solace in confiding in their fellow healthcare workers, as it was easier to find resonance from one another's experiences and effectively release pressure. Concerned about worrying their family members, most participants chose to share positive news rather than the challenges that they faced.

> Nurse F expressed, *"When I feel stressed, I often need to vent. After sharing the initial part of my thoughts with my colleagues, they often understood the rest, so chatting with colleagues in the same profession provides a sense of encouragement …"*

Some individuals turned to religious practices, such as prayer, to alleviate the stress of pandemic mitigation. Additionally, nursing staff organized various activities including meals, flower planting, baking cakes, and watching drama series to relieve work-related pressure.

> Nurse X noted, *"I believe resilience is linked to spending time alone, shielding oneself from external distractions. Taking time for oneself, perhaps reading a book or engaging in household chores, provided a sense of solitude …"*

> Nurse K also shared, *"Engaging in post-work exercise, even a walk, allowed me to clear my mind and relax."*

Subtheme two: Receiving care and guidance from counselors

Numerous institutions offered consultation and counseling services specifically tailored to healthcare professionals involved in pandemic mitigation.

> Nurse W mentioned, *"… our hospital has a spiritual caregiver who provides a platform for expression and support."*

> Nurse Y shared her involvement in a support group, stating, *"… following the COVID-19 outbreak, psychologists and spiritual caregivers joined forces. I participated in group activities facilitated by a spiritual caregiver, social worker, and psychological counselor. We shared our thoughts in the process, received feedback from others, and worked on enhancing our personal resilience. It was a heartwarming and touching experience that helped alleviate the immediate pressure that I felt at the time."*

Subtheme three: Embracing the professional mission to confront challenges

> Nurse E expressed, *"As nursing professionals, it is our responsibility to fulfill our job duties. With adequate protective equipment and proper self-protection, we can ensure our safety."*

> Similarly, Nurse I shared, *"From the moment that I chose to become a nurse, I understood that I would encounter unknown diseases in the future. It is my solemn duty! I cannot shy away because this is the essence of the nursing profession that I deeply cherish. With a shift to the right mindset, I believe I will be fine."*

Subtheme four: Shifting mindset and staying informed about emerging trends

In the midst of the pandemic mitigation battlefield, where there was no escape or surrender, nurses embraced a positive perspective that enabled them to shift their mindset.

> Nurse H shared her experience, stating, *"… I eventually adopted a mentality of accepting the circumstances. There was no way to resign or escape from the situation, so I chose to change my mindset instead. I began to view COVID-19 as just another disease and approached patient care with a different perspective. This shift had a positive impact on my psychological well-being … I believed that maintaining a positive mindset and avoiding dwelling on negative thoughts were crucial."*

Theme five: Recognition of the meaning of the pandemic mitigation experience

If nursing staff in the pandemic mitigation could realize the positive meaning from the experience of epidemic prevention, it would help enhance their resilience.

Subtheme one: The sense of honor in participating in the pandemic battle and recognizing the value of nursing care

> *Nurse T stated, "The news reports highlighting the involvement of government officials, disinfection companies, and the police in joint pandemic mitigation made me feel proud. Standing on the front line instilled in me a profound sense of honor."*

This deep sense of honor served as a source of motivation, helping to alleviate the pressure associated with the nurses' pandemic mitigation work and continuing to replenish their spiritual energy.

> *Nurse O shared her experience, saying, "During the nursing care process, I checked the patients in the ward, interacted with patients, chatted with them, and sometimes encountered adorable patients who expressed their gratitude towards the nurses."*

> *Similarly, Nurse X described, "It was gratifying to witness patients recover under our care and be able to come off the respirator and transfer to another ward. I felt a sense of accomplishment when patients expressed gratitude, which motivated me to continue doing my job."*

Subtheme two: Recognizing the enhancement of professional competency

> *Nurse L shared her perspective, stating, "In reality, I have experienced significant personal growth! Throughout the process, I have felt a tremendous sense of accomplishment … Attending training courses alongside fellow nursing staff has been transformative, as they provided us with clear SOPs and important guidelines to follow, helping us navigate through the uncertainties. I find this aspect of our work very rewarding."*

This practical component added meaningful depth to the experiences of pandemic mitigation.

Discussion

This study aimed to explore the subjective experiences of nursing staff who faced work-related stress during the COVID-19 pandemic. The findings revealed that "An environment of acceptance and positive support" played a crucial role in enabling nursing staff to "recover" from the high-stress challenges of providing care during the pandemic. As frontline healthcare workers, nurses were tasked with caring for COVID-19 patients in dedicated wards. Previous research has highlighted the detrimental psychological impact of working on the front lines during health crises [27,28]. However, the presence of an accepting and supportive environment can help nurses remain resilient in the face of the ongoing battle against the pandemic. Studies by De Kock et al. [20] and O'Donnell et al. [6] identified inadequate personal protective equipment as a significant occupational and environmental risk factor contributing to poor mental health among healthcare workers during the early stages of the COVID-19 pandemic. By contrast, the participants in this study reported that they were "Securing adequate and comprehensive pandemic prevention equipment" during the pandemic, highlighting the association between having adequate and functional equipment and alleviating the pressure related to nursing care.

The participants in this study reported the emotional and mental health impact of the virus on themselves, their family members, and patients. These findings align with those of previous research demonstrating negative effects on mental health, well-being, burnout, reduced resilience, and post-traumatic stress among frontline healthcare workers during the COVID-19 pandemic [29,30]. The psychological response of healthcare workers to infectious diseases during a pandemic is multifaceted, and sources of distress include a sense of loss of control, concerns about viral transmission, the health of family members and others, job-related changes, and worries about isolation [31]. However, as the pandemic progressed, the participants in this study emphasized the importance of "the atmosphere of family support and peer collaboration in the collective fight against the pandemic" in sustaining their clinical care efforts. This finding aligns with an online survey by Dye et al. [32], which revealed that healthcare workers were significantly more likely than the general population to face discrimination, stigma, and bullying related to COVID-19. Despite these challenges, the participants in this study also mentioned that media reports on the pandemic prevention work of nursing staff gave them a sense of honor toward their participation in the fight against the pandemic and highlighted the value of nursing work. Additionally, the "provision and delivery of essential supplies by the public" to dedicated COVID-19 wards emerged as a significant act of support from the community.

Studies conducted after the SARS outbreak have emphasized the importance of strengthening effective training that encompasses skill development and psychological stress relief [33]. Similarly, this study found that "enhanced nursing competence in pandemic mitigation" was associated with the behaviors of nurses who had experienced COVID-19 and actively sought to improve their knowledge and skills in relevant areas to alleviate the pressures of pandemic mitigation. This process was supported by several studies that highlighted the significance of acquiring more knowledge about the virus and adopting strategies to reduce the risk of transmission, which not only acted as a stress buffer but also empowered individuals to play a more proactive role in exerting resilience [34,35].

Although the participants in this study had deep worries and pressures about the process of caring for COVID-19 patients, they voluntarily reduced contact to protect their relatives and friends. This included activities such as dining alone or living in rented houses away from their families. In their efforts to fight against the pandemic and ensure safety for themselves, their families, and their colleagues, they applied their professional skills while "strictly adhering to the established epidemic prevention SOPs." Many participants reported that the sense of solidarity and peer monitoring was positive and helpful while working on the front lines. These findings align with the results of the study by Kinsella et al. [24], which explored the personal experiences of frontline workers during outbreaks.

This study identified a common behavior among the interviewees in dealing with pandemic-related stress, which involved talking to friends who were also healthcare workers and engaging in stress-relieving activities. These series of adaptive coping strategies align with the findings of previous research, which emphasized the importance of social relationships as a coping mechanism [36]. Furthermore, despite the immensely challenging environment that nurses faced, most participants in this study exhibited a proactive approach by "Embracing the professional mission to confront challenges." This "Shifting mindset and staying informed about emerging trends" allowed them to cultivate gratitude, strengthen relationships with others, and draw strength from adversity. These findings highlight the remarkable resilience displayed by clinical care nurses, even during the most challenging times [24]. Resilient nurses, as reported by several studies, tend to view adversity as a natural part of life rather than as a threat, which positively influences their ability to manage chronic illnesses and maintain good mental health. Developing resilience helps nurses to remain committed to their profession instead of choosing to leave their jobs [37,38].

The recognition of the meaning of the pandemic mitigation experience emerged as the fifth theme in this study. Among Taiwanese nurses, this experience encompassed two significant aspects. First, it entailed a sense of honor toward actively participating in pandemic mitigation efforts and acknowledging the value of nursing work. Second, it involved recognizing the positive impact of enhancing professional competence, which contributed to building resilience and added practical importance to the experience of pandemic mitigation. Li et al. [39] also found similar results, highlighting that nurses with prior experience in pandemic mitigation are better equipped to handle the psychological impact of COVID-19 due to their training and practical experience in dealing with disaster situations. Finally, the experiences of participants in this study in caring for COVID-19 patients have similarities and differences with the general experiences of nurses in different situations in Taiwanese medical and cultural contexts. A similarity was the enhanced nursing competence in pandemic mitigation among nurses [40]. COVID-19 poses a significant threat to life, with its widespread prevalence raising international concern [10]. As our comprehension of COVID-19 progressed, nurses had to consistently adapt and modify their practices accordingly. The findings from this study, in conjunction with prior research, indicate disparities in the experiences of caregivers during the COVID-19 pandemic compared to other caregiving contexts. A key distinction highlighted was the emergence of unfamiliar stress reported by participants. This mirrors observations from nurses across different countries and cultures, who have reported experiencing similar stress when caring for patients with infectious diseases [33]. Hence, considering the unprecedented and uncertain nature of COVID-19, it is understandable for caregivers to harbor concerns about contracting or transmitting the virus. However, this particular worry does not arise when providing care for non-communicable diseases.

Conclusion

This study highlights the importance of supporting Taiwanese nurses during crises like the COVID-19 pandemic. To this end, medical institutions and governments should prioritize policies ensuring adequate staffing, access to PPE, and mental health resources for nurses. Nursing educators and administrators should focus on tailored training programs to equip nurses with skills for future crises, including infectious disease management and crisis response protocols. Moving forward, clear protocols and collaboration between healthcare institutions, government agencies, and communities are essential to prepare Taiwanese nurses for unforeseen situations like pandemics. Additionally, there is a crucial need for proactive planning to address the specific needs and challenges that Taiwanese nurses may face in unexpected situations akin to the COVID-19 pandemic, ensuring their readiness and well-being.

Limitations

This study utilized an interview research design, and it is acknowledged that participants may have been influenced by social expectations, potentially affecting the expression of their true thoughts. To address this concern, the investigator emphasized during the interviews that the focus of the study was on understanding nurses' genuine attitudes rather than making moral judgments. It is important to note that the participants in this study had diverse backgrounds in terms of nursing seniority, practical work experience, and tele-counseling experience. In addition, this study employed purposive sampling to select research subjects, only collecting cases that signed the consent form. Although the refusal rate was low, the cases were collected from medical centers in metropolitan areas, and the data collection occurred in the later stages of the COVID-19 pandemic, infectious diseases continue to exist after all. These factors may potentially limit the generalizability of the inference of the results of this study. Therefore, the views obtained in this study were not limited to nurses with specific experiences or from a particular ethnic group. Finally, although this study explores the experiences of nursing staff during COVID-19, it does not directly assess the participants' psychological health status or the changes in their resilience over time. However, these data are crucial for evaluating the impact of the pandemic on the well-being of nursing staff and the effectiveness of coping strategies. Future research should focus on investigating this aspect to provide a clearer understanding and make more meaningful contributions to portraying the resilience of nursing staff during the pandemic.

Ethical statement

This study was approved by the institutional review board of MacKay Memorial Hospital, Taiwan (ethical code: 21MMHIS458e). All participants provided written informed consent prior to participation in the study.

Permission of instruments used in the study

N/A.

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Author contributions

YL, FC, and ML were responsible for the study concept and design, acquisition of data, analysis and interpretation of data, and drafting the manuscript. YL and FC contributed to the data collection and date analysis, and the drafting of the manuscript. PL and PW were responsible for the study concept and design. Supervision was done by ML. All authors read and approved the final manuscript.

Conflict of interest

There is no conflict of interest.

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Research Article

A Structural Equation Model of the Relationship Between Symptom Burden, Psychological Resilience, Coping Styles, Social Support, and Psychological Distress in Elderly Patients With Acute Exacerbation Chronic Obstructive Pulmonary Disease in China

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SUMMARY

Purpose: The prevalence of psychological distress is frequently observed among old adults with acute exacerbation of chronic obstructive pulmonary disease (AECOPD). However, current researches are insufficient to clarify the correlation among these relevant factors. This study examined the effects of symptom burden, psychological resilience, coping styles, and social support on psychological distress.
Methods: Two hundred fifty five elderly patients with AECOPD were conveniently selected in Taian, Shandong Province. The General Information Questionnaire, Distress Thermometer, The Revised Memorial Symptom Assessment Scale, Connor-Davidson Resilience Scale, Simplified Coping Style Questionnaire, Perceived Social Support Scale were used to investigate. The relationship among factors was estimated by using a structural equation model.
Results: Psychological distress score of elderly patients with AECOPD was (5.25 ± 1.01); coping styles, psychological resilience, symptom burden, and social support directly affected psychological distress (the direct effects were −.93, .17, .17, and −.09); coping styles had the largest total effect on psychological distress (the total effect was −.93); psychological resilience indirectly affected psychological distress through coping styles (the indirect effect was −.74); symptom burden indirectly affected psychological distress through psychological resilience (the indirect effect was .25); social support indirectly affected psychological distress through symptom burden, psychological resilience, and coping styles (the indirect effect was −.80).
Conclusion: The psychological distress of elderly patients with AECOPD is at a moderate level; coping styles, psychological resilience, and social support have positive effects on alleviating the psychological distress of elderly patients with AECOPD; symptom burden is negatively correlated with psychological distress. Healthcare professionals should pay more attention to elderly patients with AECOPD who are particularly prone to experience higher levels of psychological distress, especially in the presence of low coping style, limited psychological resilience, inadequate levels of social support, and high symptom burden.

Introduction

According to the data from World Health Organization, there are three million deaths worldwide from chronic obstructive pulmonary disease (COPD) annually, and COPD is projected to be the world's third leading cause of death by 2030 [1]. Studies have shown that the mortality rate of COPD increases with age. The number of reported COPD patients over the age of 70 years accounts for 83.10%, and the mortality rate reaches a peak in patients over 85 years old [2]. Currently, acute exacerbation of chronic obstructive pulmonary disease (AECOPD) is a major cause of death in elderly patients with COPD [3]. A meta-analyses showed that COPD patients with psychological distress had a greater risk of AECOPD, hospitalization, and death [4]. So the psychological distress of COPD patients has attracted intensive attention on a global scale.

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Psychological distress is a state of mind suffering from persistent distress, usually in association with severe physical or mental illness, a sense of hopelessness or helplessness, inability to control their own emotions, and a feeling that life is meaningless [5]. In China, Wang used “Kessler Psychological Distress Scale (K10)” to measure the psychological distress of COPD patients. Results showed that the incidence of psychological distress in COPD patients reached up to 87.5% [6], In Poland, Makuch used “The Distress Thermometer (DT)” to measure psychological distress. The results showed that COPD patients in Poland had moderate level of psychological distress [7].

Peggy A proposed “The classical buffering hypothesis of social support” [8]. It is believed that social support can effectively buffer the adverse effects of external pressure and stimulation on the body and mind of individuals, reduce the burden of symptoms, maintain physical and mental health. At the same time, social support as a protective factor of psychological resilience and coping styles can enhance individuals’ sense of belonging and self-efficacy through emotional sustenance and active coping assistance. It was established that symptom burden, psychological resilience, coping styles, and social support were associated with psychological distress, but the relationship of each variable in elderly patients with AECOPD remains undetermined [9].

Symptom burden is a key factor leading to AECOPD patients’ psychological distress. Elderly patients with AECOPD were usually confronted with higher chance of lung infection. They may experience worse clinical symptoms during the acute exacerbation period, as well as a higher frequency of hospitalization for targeted treatment and care [10]. With the expansion of hospital admissions and medication costs, the economic burden for patients and families also rises. In addition, Nkhoma’s study showed that decreasing levels of social support can further exacerbate a patient’s symptom burden, which affects the psychological state of elderly patients with AECOPD [11].

Psychological resilience is an ability to adjust one’s mindset and seek for hope or meaning in life when facing adversity, stress, threats and mentally distressing issues [12]. There has been a moderate negative relationship between psychological resilience and psychological distress [13], and greater resilience was associated with a lower level of anxiety and depression [14]. However, further research is needed to confirm this conjecture as no previous studies have demonstrated the effect of psychological resilience on psychological distress in elderly AECOPD patients.

Coping styles are the ways in which individuals behave in meaningful and purposeful ways when they experience adversity, trauma, and other stressful events, including positive coping and negative coping [15]. According to previous research results [16,17] , coping styles in patients with COPD affect the intensity of associated depressive and anxiety symptoms, there was a significant positive correlation between psychological distress and “negative coping”, also a significant negative correlation between “positive coping”. In addition, coping styles were found to mediate the relationship with psychological distress and played a crucial role in moderating psychological distress [18].

Social support is defined as the social resources available or actually provided to people in the context of formal support groups and informal helping relationships [19]. Some studies have shown a strong association between higher social support and lower depressive symptoms, social support had been shown to be negatively correlated with the level of psychological distress. In other words, lower levels of social support received by COPD patients were associated with higher levels of psychological distress [20]. However, there is still a lack of research on the relationship between social support and psychological distress within elderly patients with AECOPD.

The purpose of this study was to analyze the influencing factors and the relationship among the variables of psychological distress in elderly patients with AECOPD by a structural equation model. The first aim was to investigate the level of psychological distress in elderly patients with AECOPD as well as the status of symptom burden, psychological resilience, coping styles, and social support. The second aim was to examine the effects of symptom burden, psychological resilience, coping styles, and social support on psychological distress.

Methods

Design and participants

This study followed Strengthening the Reporting of Observational Studies in Epidemiology (STROBE). Patients hospitalized with COPD eligible for inclusion or exclusion were selected from the respiratory departments of three general hospitals (2022-12-1 to 2023-3-31) . Inclusion criteria: ① Age$\geq$65; ② The diagnostic criteria for AECOPD were consistent with GOLD2023 [21]. ③ Without communication and intellectual disabilities; ④ The patient or his family agreed to cooperate and sign the informed consent. Exclusion criteria: ① Patients who died in hospital or during the study; ② Patients with cancer or other diseases and life expectancy was not more than 1 year; ③ Patients who were difficult in communication or reluctant to cooperate with participants due to mental illness, disturbance of consciousness, tracheal intubation, tracheotomy, and other reasons.

Data collection and measurement

The related factors influencing psychological distress of elderly patients with AECOPD were analyzed, including symptom burden, psychological resilience, coping styles, and social support. On the basis of data, the questionnaire and the investigation were designed. According to the contents of the research, researchers designed the general data variables by means of literature review and preliminary investigation including gender, age, education, marital status, place of residence, the total duration of COPD, medical expenses, and duration of illness.

The level of psychological distress was measured by using a Distress Thermometer (DT). DT is a self-assessment of the average degree of psychological distress in last 1 week, from 0 to 10 points, and a value $\geq$4 points indicates that the psychological distress is serious [22].

The Revised Memorial Symptom Assessment Scale (RMSAS) is a good indicator to measure the multi-dimensional physical and mental symptom experience of patients with severe COPD. Nineteen symptom assessment items are retained [23], and the respondents were asked to recall whether they had these symptoms one week before; if they had these symptoms, they were rated according to the three dimensions of symptom frequency (1–4 points), symptom severity (1–4 points), and symptom distress (0–4 points) [24]. The higher total score indicates that symptoms occur more frequently, more severely, and bring more distress to themselves. In this study, the Cronbach α was .82.

The Connor-Davidson Resilience Scale (CD-RISC) is divided into three dimensions of self-reliance, resilience, and optimism, 25 items in total. The Likert-5 scores are scored from 0 to 4 points, and the total score is 0–100 points [25]. The higher total score indicates a higher level of psychological resilience. In this study, the Cronbach α was .94.

The Simplified Coping Style Questionnaire (SCSQ) is divided into two dimensions: positive coping and negative coping, with a total of 20 items, including 1 to 12 positive coping dimensions, and 13 to 20 negative coping dimensions. The Likert-4 scores are scored from 0 to 3 points, with the total score of positive coping 0-36 points, the total score of negative coping 0-24 points, and the total score of coping style = standard score of positive coping - standard score of negative coping [26]. The higher the total score of the two dimensions, the more inclined the respondents are to adopt the corresponding way of this dimension. In this study, the Cronbach α was .938.

The Perceived Social Support Scale (PSSS) is divided into three dimensions, including family support, friend support, and other support, with a total of 12 items. The Likert-7 scores from 1–7 points and the total score is 12–84 points [27]. The higher score indicates a higher level of perceived social support. In this study, the Cronbach α was .846.

Ethical statement

This study was approved by the Institutional Review Board of The Second Affiliated Hospital of Shandong First Medical University (Approval no.2023-008). Before the data were collected, consent and cooperation agreements were obtained from hospital managers and departments, and all participants signed a written informed consent form prior to participation.

Data collection

Elderly patients with AECOPD received a questionnaire within 3 days after admission. The researcher informed them of the study and conducted a one-to-one survey after obtaining informed consent. The questionnaire was filled in by the patients and collected on the spot. For patients who cannot read or fill out by themselves, help from the researchers and family members was provided. Altogether 260 questionnaires were given out, 255 valid questionnaires were returned, and the recovery rate was 98%.

Quality control

Researchers were trained to ensure data consistency, including research goal, questionnaire completion requirements, and assessment methods for scales. Data were recorded by two researchers, excluding errors or omissions of more than 20%, as well as complete similarity of the questionnaire.

Data analysis

The data were checked by two researchers and then recorded into SPSS 25.0. The frequency and composition ratio was used for the statistical description; Pearson linear correlation analysis was used for each variable; structural equation model was constructed by AMOS; maximum likelihood estimation method was used for parameter estimation; and the model was optimized according to the modified index. A test level $\alpha = .05$, $p < .05$ was considered to be of statistical significance.

Results

General information survey status

In this study, 255 patients were investigated, including 186 males (72.9%) and 69 females (27.1%); of these, 61 (23.9%), 77 (30.2%), 59 (23.2%), and 58 (22.7%) were patients aged 65–69, 70–74, 75–79, ≥80. In terms of educational level, primary and below accounted for the largest proportion (67.5%, $n = 172$). In addition, 197 (77.3%) patients were married. The proportion of residence is approximately equal, city (40%, $n = 102$), county (23.1%, $n = 59$), rural (36.9%, $n = 94$). More than half of the patients had a household monthly income of 139–415 USD (56.5%, $n = 144$). And 97.3% of patients are covered by medical insurance. Patients with the total duration of COPD > 5 years were the largest (68.6%, $n = 175$). Details of other chronic diseases were shown in Table 1.

Table 1 *Basic Situation of Elderly AECOPD Patients (N = 255).*

Variant	Items	*N*	Proportion (%)
Sex	Male	186	72.9
	Female	69	27.1
Age (years)	65–69	61	23.9
	70–74	77	30.2
	75–79	59	23.2
	≥80	58	22.7
Educational level	Illiteracy	25	9.8
	Primary and below	172	67.5
	Junior high school	47	18.4
	High school/junior college and above	11	4.3
Marital status	Married	197	77.3
	Widowed	52	20.4
	Divorced	4	1.6
	Unmarried	2	0.7
Place of residence	City	102	40
	County	59	23.1
	Rural	94	36.9
Household monthly income (USD)	≤138	42	16.5
	139–415	144	56.5
	416–692	55	21.5
	≥693	14	5.5
Medical expenses	Medical insurance	248	97.3
	Self-payment	7	2.7
The total duration of COPD (Years)	<3	16	6.3
	3–5	64	25.1
	>5	175	68.6
Coronary atherosclerotic heart disease	Yes	115	45.1
	No	140	54.9
Hypertension	Yes	188	73.7
	No	67	26.3
Diabetes	Yes	93	36.5
	No	162	63.5
Bronchiectasis	Yes	128	50.2
	No	127	49.8
Osteoporosis	Yes	50	19.6
	No	205	80.4
Chronic pulmonary heart disease	Yes	82	32.2
	No	173	67.8

Note. USD = United States dollar(s).

Psychological distress, symptom burden, psychological resilience, coping styles, and social support score of elderly patients with AECOPD

The results showed that the psychological distress score of the elderly patients with AECOPD was (5.25 ± 1.01); the mean score of symptom burden was (1.24 ± 0.39); psychological resilience was (1.90 ± 0.83); social support was (3.10 ± 0.58); and coping styles was (−0.54 ± 0.37). The scores of variables were shown in Table 2.

Correlation of symptom burden, psychological resilience, coping styles, social support, and psychological distress in elderly patients with AECOPD

Psychological distress was negatively correlated with psychological resilience, coping styles, and social support ($p < .01$) but positively correlated with symptom burden ($p < .01$). The correlation of variables were shown in Table 3.

Structural equation model analysis of the effects among symptom burden, psychological resilience, coping styles, and social support on psychological distress in elderly patients with AECOPD

Initial model assumptions

Symptom burden, psychological resilience and coping style as endogenous variables, social support as exogenous variables, and

Table 2 *Psychological Distress, Symptom Burden, Psychological Resilience, Coping Styles, and Social Support Score of Elderly Patients With AECOPD (N = 255).*

Variable	Range	Mean ± SD	Min	Max
Psychological distress	1–10	5.25 ± 1.01	3	8
Social support	1–7	3.10 ± 0.58	1.5	4.25
Family support	1–7	3.37 ± 0.60	1.25	5.52
Friend support	1–7	3.11 ± 0.55	1	4
Other support	1–7	2.83 ± 0.58	1	4
Symptom burden	0–5	1.24 ± 0.39	0.77	4.49
Symptom frequency	1–4	1.51 ± 0.79	1.05	4.32
Symptom severity	1–4	1.31 ± 0.25	1	2.15
Symptom distress	0–4	0.91 ± 0.42	0.26	2.21
Psychological resilience	0–4	1.90 ± 0.83	0.56	2.86
Toughness	0–4	2.14 ± 0.60	0.8	3.12
Self-improvement	0–4	1.88 ± 0.55	0.54	2.69
Optimism	0–4	1.69 ± 0.55	0.33	2.87
Coping styles	–	−0.54 ± 0.37	−1.67	0.38
Negative coping	0–3	1.24 ± 0.67	0.51	2.75
Positive coping	0–3	1.20 ± 0.54	0.34	2.42

Table 3 *Correlation of Symptom Burden, Psychological Resilience, Coping Styles, Social Support and Psychological Distress (N = 255).*

Variable	Psychological distress	Social support	Symptom burden	Psychological resilience	Coping styles
Psychological distress	1				
Social support	−.80**	1			
Symptom burden	.60**	−.43**	1		
Psychological resilience	−.90**	.74**	−.53**	1	
Coping styles	−.95**	.77**	−.59**	.89**	1

Note. ** The correlation was significant at $p < .01$ level.

psychological distress as explicit variables, a theoretical model of the relationship between symptom burden, psychological resilience, coping styles, social support, and psychological distress is constructed.

Model modification

The modified structural equation model was obtained by fitting with the maximum likelihood method. χ^2/df = 1.51, IFI = 0.87, TLI = .87, CFI = .87, RMSEA = .05, and R^2 = .568, all fitting indexes of the model met the standard.

Model verification and results

The influence of symptom burden on psychological distress: Symptom burden has a positive effect on psychological distress, the total effect is .42, the direct effect is .17, and it has an indirect effect on psychological distress through two paths: The first path is that symptom burden affects psychological distress through psychological resilience. The second path is that symptom burden affects coping styles through psychological resilience, which in turn affects psychological distress (Figure 1).

The influence of psychological resilience on psychological distress: Psychological resilience has a negative effect on psychological distress, the total effect is −.57, the direct effect is .17, and it has an indirect effect on psychological distress through one path: The second path is that symptom burden affects coping styles through psychological resilience, which in turn affects psychological distress.

The influence of coping styles on psychological distress: Coping styles have a negative effect on psychological distress, and the total effect is −.93.

The influence of social support on psychological distress: Social support has a negative effect on psychological distress, the total effect is −.89, the direct effect is −.09, and it has an indirect effect on psychological distress through six paths: The first path is that social support affects psychological distress through symptom burden. The second path is that social support affects psychological resilience through symptom burden, which in turn affects psychological distress. The third pathway is that social support affects psychological distress through symptom burden, psychological resilience, and coping styles. The fourth path is that social support affects psychological distress through psychological resilience. The fifth path is that social support affects psychological distress

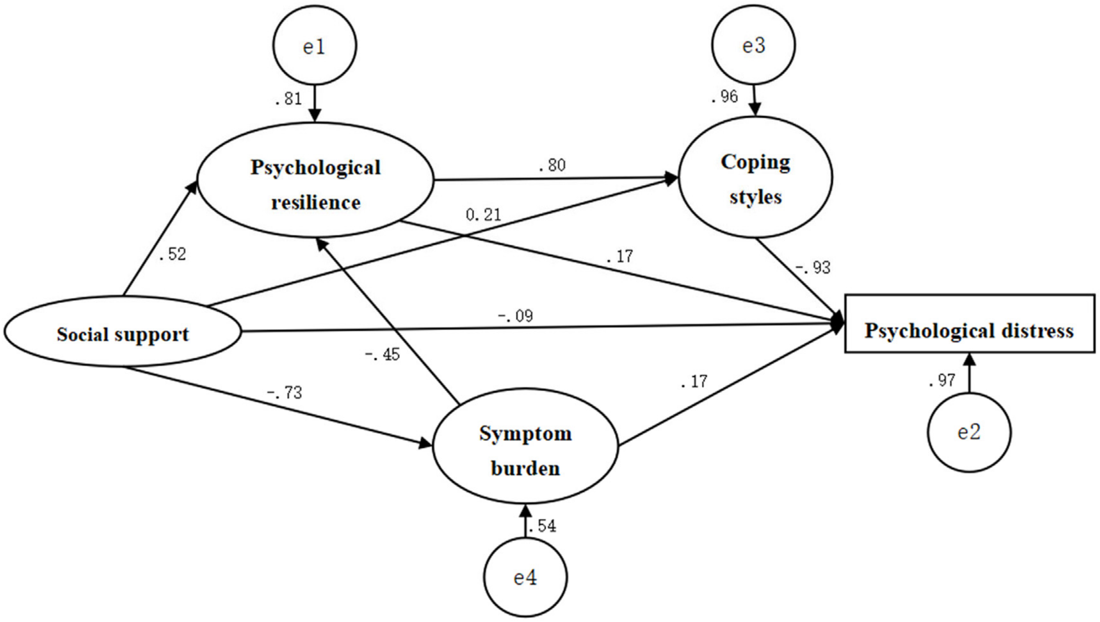

Figure 1. Structural equation modeling of symptom burden, psychological resilience, coping style, social support on psychological distress.
Note. The variables in the ellipse are latent variables, and the variables in the rectangle are explicit variables. The beginning of the arrow represents the influencing factor, and the direction of the arrow represents the affected factor. The value represents the standardized estimates. e1~e4 are error variable.

through coping styles. The sixth path is that social support affects coping styles through psychological resilience, which in turn affects psychological distress. The model normalized regression weight and significance test results were shown in Table 4.

Symptom burden can positively influence psychological distress ($\beta = -.17$, $p < .001$), psychological resilience ($\beta = .17$, $p < .001$), coping styles ($\beta = -.93$, $p < .001$), social support ($\beta = -.09$, $p < .001$), and can negatively affect psychological distress. The standardized effect values of the indicators were shown in Table 5.

Discussion

The purpose of this study was to analyze the influencing factors and the relationship among the variables of psychological distress in elderly patients with AECOPD by a structural equation model. The results showed that the coping styles, psychological resilience, symptom burden, and social support can directly affect psychological distress. The total effect of coping styles on psychological distress is the largest; psychological resilience can indirectly affect psychological distress through coping styles. Symptom burden can indirectly affect psychological distress through psychological resilience. Social support can indirectly affect psychological distress through symptom burden, psychological resilience, and coping styles.

The psychological distress score of elderly patients with AECOPD was (5.25 ± 1.01), which was higher than that of elderly patients with COPD in the community (4.85 ± 1.99) [28], but below the general COPD patients (6.00 ± 1.59) [29], in the middle level. According to the survey, the incidence of acute exacerbation in elderly patients with COPD was 61.7% within 1 year and 63.9% within 2 years [30]. Frequent acute exacerbation results in a sharp drop in pulmonary function, with a higher risk of respiratory failure in severe cases. Acute exacerbation of the disease can also lead to numerous psychological problems, the level of psychological distress of patients is higher.

The results indicated that the coping styles score of elderly patients with AECOPD was at a moderate level, and the mean score of negative coping items (1.24 ± 0.67) was slightly higher than that of positive coping items (1.20 ± 0.54), which was consistent with the research results of Du [31]. This suggests that older people with AECOPD often cope with the disease in a negative way. In this study, coping styles were negatively correlated with psychological distress, and had a direct effect on psychological distress (the total effect was −0.934), which was higher than the influence of social support, psychological resilience, and symptom burden, and it had the greatest effect on psychological distress. This was in line with the findings of Wang [6], who divided the coping styles into yielding and facing, which indirectly influenced psychological distress of stable COPD patients through a chain mediation effect. In this study, middle-aged and elderly patients with AECOPD tend to deal with the disease in a negative way because of their age, the increasing number of acute exacerbations of COPD, and the human, material, financial resources consumed by repeated hospitalization. As a result, they experienced negative emotions such as despair, sadness and anxiety [32], which was not conducive to disease rehabilitation. Research has shown that maintaining positive coping is conducive to mental health and to improve the quality of life [17]. Thus, healthcare professionals should be aware of the dynamic changes of patients' emotions and implement targeted behavioral intervention programs according to different emotional states [33]. In addition, communication with patients should be strengthened, then guide them to establish a correct disease outlook, so as to deal with the development of future disease in a positive way.

Table 4 *The model normalized regression weight and significance test results.*

Paths	B	SE	CR	p
Symptom burden[1] → Psychological resilience[1]	−.45	.14	−5.95	<.001
Symptom burden[1] → Psychological distress[3]	.17	.36	4.56	<.001
Psychological resilience[1] → Coping styles[1]	.80	.08	8.96	<.001
Psychological resilience[1] → Psychological distress[3]	.17	.87	1.04	.038
Coping styles[1] → Psychological distress[3]	−.93	.15	−4.64	<.001
Social support[2] → Symptom burden[1]	−.73	.06	−7.58	<.001
Social support[2] → Psychological resilience[1]	.51	.10	6.38	<.001
Social support[2] → Coping styles[1]	.20	.08	2.97	.003
Social support[2] → Psychological distress[3]	−.09	.39	−1.40	.006

Note. [1]as endogenous variables, [2]as exogenous variables, [3]as explicit variables.

Table 5 *Indicators of Standardized Effect Value of Symptom Burden, Psychological Resilience, Coping Styles, and Social Support on Psychological Distress.*

Paths	Direct effect	Indirect effect	Total effect	p
Symptom burden[1] → Psychological distress[3]	.17	.25	.42	<.001
Psychological resilience[1] → Psychological distress[3]	.18	−.74	−.57	<.001
Coping styles[1] → Psychological distress[3]	−.93	–	−0.934	<.001
Social support[2] → Psychological distress[3]	−.09	−.80	−0.885	<.001

Note.[1]as endogenous variables, [2]as exogenous variables, [3]as explicit variables.

The results indicated that the psychological resilience score of elderly patients with AECOPD was low, and the mean score of toughness dimension item (2.14 ± 0.60) was higher than that of self-improvement dimension item (1.88 ± 0.55) and optimism dimension item (1.69 ± 0.55). In this study, psychological resilience was negatively correlated with psychological distress, and psychological resilience can directly affect psychological distress (the direct effect was .17), also had an indirect effect by affecting coping styles (the indirect effect was −.74). Patients with high psychological resilience still have the ability to self-regulate in the face of frustration and pressure, then quickly adapt to the occurrence of acute exacerbations of COPD. Thus, they can face the changes of the disease with an optimistic attitude and cope with the disease in a positive way. On the contrary, patients with low psychological resilience will have a pessimistic view of the prognosis of the disease, which may lead to treating the disease in a negative way, deepening the degree of psychological suffering and affecting the recovery process of the disease. Therefore, how to effectively regulate psychological resilience is crucial to alleviate psychological distress [34]. Healthcare professionals in the implementation of routine treatment and nursing at the same time must also pay attention to implement psychological intervention strategies to improve psychological resilience [35]. In addition, family members should encourage patients to actively participate in disease management and treatment, learn about the disease together, and improve their psychological ability to cope with the disease.

The results indicated that the symptom burden of elderly patients with AECOPD was high, the frequency and severity of psychological symptoms is high, which was consistent with the research results of Yang [36]. In the study, symptom burden was positively correlated with psychological distress, and can directly affect psychological distress (the direct effect was .17), which also had an indirect effect by affecting psychological resilience (the indirect effect was .25). On the one hand, elderly patients with COPD usually face rapid deterioration of many symptoms in the acute exacerbation period, and the heavy burden of symptoms in a short period of time makes patients lose confidence in overcoming the disease, with the level of psychological resilience decreases. On the other hand, the higher the burden of symptoms, the lower the level of psychological resilience, and by adopting negative coping styles, it can also lead to psychological distress. Therefore, healthcare professionals can start from the improvement of psychological state. Fully affirm positive ideas of patients and encourage them to firm confidence in rehabilitation. Patients can also be inspired to share their own successful experiences in coping with AECOPD by holding “Patient Exchange Meetings” and “Example Lectures”, so as to improve their overall cognition of the disease and view the disease in a dialectical way [37].

The study showed that the social support of elderly patients with AECOPD was at a low level, and the mean score of family support dimension (3.37 ± 0.60) was higher than friend support dimension (3.11 ± 0.55) and other support dimensions (2.83 ± 0.58). In this study, social support was negatively correlated with psychological distress, and had a direct effect on psychological distress (the direct effect was −.09), also had an indirect effect on psychological distress by affecting psychological resilience, coping styles, and symptom burden (the indirect effect was −.80). This was consistent with the views of Zhou [38]. Considering the complexity of traditional family concepts and family network, family support is the main source of social support for elderly patients with COPD, and strong family support is a solid backing for patients, It is the key to improve their adaptability and psychological ability to resist pressure. How social support affects psychological distress for several reasons. First of all, the therapeutic and medication measures provided by healthcare professionals can offer necessary material support and effectively alleviate the symptomatic burden of patients. Afterward, family caregivers also support the patient with adequate emotional and spiritual support, reducing the occurrence of various types of negative emotions and increasing the level of psychological resilience. In the end, healthcare professionals and family caregivers play a supervisory and management role in the patient’s behavior, helping patients to maintain a healthy approach to their illness and health, and to achieve the final goal of reducing psychological distress in elderly patients with AECOPD. Besides, studies have shown that elderly patients with AECOPD who live alone, are disabled, have poor family economic conditions, and no pension insurance lack social support [39]. As healthcare professionals, we should support the care work to relieve the pressure on family caregivers, patiently carry out disease health education and other work. In the context of the rapid development of aging, service models such as standardized long-term care and continuous care can be applied to elderly COPD patients in the future.

Limitations

Firstly, data were collected in only one city in China and used the convenience sampling method, which may have biased the sample selection, constrained the dissemination of the research results. It is recommended to expand the sample size and conduct a multicenter study. Secondly, because both psychological resilience and coping styles have psychological characteristics, there is multicollinearity between the independent variables, the correlation between them is high, above 0.8, which may affect the stability of the model to some extent. Thirdly, this study only investigated the influencing factors of psychological distress in elderly AECOPD patients and the relationship between the variables, and did not provide effective interventions and dynamic tracking, suggesting further intervention studies in the future and the development of appropriate interventions to guide nursing care. Finally, psychological distress as a psychological experience, it is suggested that follow-up can be done from the perspectives of patients and healthcare professionals dissecting the specific connotations of psychological distress in elderly AECOPD patients through qualitative research methods.

Conclusion

This study found that the psychological distress of elderly patients with AECOPD was at a moderate level. The structural equation model proved that the coping styles, psychological resilience, symptom burden and social support can directly affect psychological distress. The total effect of coping styles on psychological distress is the largest; psychological resilience can indirectly affect psychological distress through coping styles. Symptom burden can indirectly affect psychological distress through psychological resilience. Social support can indirectly affect psychological distress through symptom burden, psychological resilience, and coping styles. This suggests that healthcare professionals should focus on the coping styles of elderly patients with AECOPD in clinical work, mobilize multiple support forces and improve the level of psychological resilience, ultimately reduce the symptom burden and psychological distress of patients.

Ethical approval

This study was approved by the ethics review institution of the second affiliated hospital of Shandong First Medical University (2023-008), complying with the declaration of Helsinki. Prior to data collection, consent and cooperation agreements were obtained from hospital administrators and departments, and prior to participation, all patients taking part in the study signed written informed consent forms.

Conflict of interest

The authors have no conflicts of interest to report.

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Research Article

Psychometric Testing of the Korean Version of the Self-Care of Coronary Heart Disease Inventory Version 3

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SUMMARY

Purpose: This methodological study evaluated the psychometric properties of the Self-Care of Coronary Heart Disease Inventory version 3 (SC-CHDI v3) in a Korean context.
Methods: The SC-CHDI v3 was translated into Korean following a rigorous translation process. Participants were 452 patients who had experienced coronary heart disease (CHD), all recruited from a tertiary hospital in Korea. Exploratory and confirmatory factor analyses were performed to test construct validity. Concurrent validity was examined by correlating scores from the Korean version of the SC-CHDI v3 with those from the Cardiac Self-Efficacy Scale. Internal consistency was analyzed using Cronbach's alpha and McDonald's omega.
Results: The Korean version of the SC-CHDI v3 consists of 21 items, excluding two from the original instrument. The self-care maintenance subscale identified a two-factor structure: “treatment adherence” and “health-promoting behaviors.” The goodness-of-fit indices were satisfied: $\chi^2 = 18.19$, $p = .110$, comparative fit index (CFI) = .97, Tucker-Lewis Index (TLI) = .95, and standardized root mean square residual (SRMR) = .04. The self-care monitoring subscale consisted of a one-dimensional structure (“monitoring behaviors”) and the goodness-of-fit indices were satisfied: $\chi^2 = 19.19$, $p = .059$, CFI = .99, TLI = .99, and SRMR = .04. The self-care management subscales had a two-factor structure of “consulting behaviors” and “problem-solving behaviors.” The goodness-of-fit indices were satisfied: $\chi^2 = 16.44$, $p = .037$, CFI = .99, TLI = .98, and SRMR = .03. Scores from the Cardiac Self-Efficacy Scale showed a positive correlation with the Korean version of SC-CHDI v3 subscales. Reliability estimates were $\geq .80$ for all subscales except for the self-care maintenance subscale.
Conclusions: The Korean version of the SC-CHDI v3 consists of 21 items in 3 subscales and is a valid and reliable instrument. Therefore, healthcare providers can effectively utilize it to assess the self-care levels of patients with CHD.

Introduction

Coronary heart disease (CHD) is an ischemic heart disease characterized by insufficient oxygen supply to the myocardium, often resulting from the narrowing or occlusion of the coronary arteries [1,2]. Recently, the World Health Organization announced that CHD ranks as the number one cause of death worldwide [2]. In South Korea, heart disease is the top cause of death among single diseases, with the mortality rate from heart disease per 100,000 people increasing from 55.6 in 2015 to 65.8 in 2022, indicating a continuous annual rise [3]. Despite advancements in pharmaceutical development, coronary artery bypass surgery, and percuta-

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Abbreviations: CFA, Confirmatory Factor Analysis; CFI, Comparative Fit Index; CHD, Coronary Heart Disease; EFA, Exploratory Factor Analysis; KMO, Kaiser-Meyer-Olkin; MI, Modification Index; RMSEA, Root Mean Square Error of Approximation; SC-CHDI, Self-Care of Coronary Heart Disease Inventory; SRMR, Standardized Root-Mean-square Residual; TLI, Tucker-Lewis Index.

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neous coronary intervention, CHD is at high risk for recurrence, other cardiovascular events, or death [4,5]. Thus, self-care of patients with CHD is necessary to decrease mortality and morbidity and is an essential factor that is associated with interventions such as optimal drug treatment, healthy lifestyle changes, and cardiovascular risk factor control [4,5].

Based on the Middle Range Theory of Self-Care of Chronic Illness, self-care is “a process of decision-making in natural settings that involves the maintenance of health via practices that promote health and the management of chronic illness” [6,7]. It encompasses the actions taken by individuals with chronic conditions, such as CHD, to maintain their health and manage their illness effectively. Through self-care, patients can navigate their daily lives, enhance their health management skills, and address challenges arising from their condition [7,8]. Furthermore, as self-care proficiency increases, individuals experience improvements in daily functioning, perceive their health status more positively, and ultimately strive to improve their overall quality of life [4,9].

To devise intervention strategies to enhance the self-management capabilities of patients with CHD, a reliable tool is essential to sensitively and accurately assess their self-management abilities. The Self-Care of Coronary Heart Disease Inventory (SC-CHDI), developed by Vaughan Dickson et al. [10], is grounded in a theoretical framework specifically designed to measure the self-care practices of CHD patients [6]. The SC-CHDI is predicated on the Middle Range Theory of Self-Care of Chronic Illness, which differentiates self-care monitoring from the processes of self-care maintenance and management [6]. The second version of SC-CHDI (SC-CHDI v2) encompassed three subscales—self-care maintenance, management, and confidence—to offer a thorough assessment of self-care in patients with CHD, incorporating a confidence measure in self-management [10,11]. However, self-care confidence was recognized as going beyond a simple component of self-care and emerging as an essential determinant of self-care. Accordingly, in the third version of SC-CHDI (SC-CHDI v3), the self-care confidence scale was removed and reconfigured to reflect self-efficacy more accurately [10,11].

Unlike SC-CHDI v2, which integrated self-care monitoring within the self-care maintenance and management subscales, SC-CHDI v3 introduces self-care monitoring as an independent scale, thus reorganizing the inventory into three distinct subscales [10–12]. Additionally, the three items assessing self-care maintenance behaviors were revised to be more precise, and the “self-care monitoring” scale has been introduced in place of the “self-care confidence” subscale that was part of the SC-CHDI v2. Furthermore, the response format has been updated to a 5-point Likert scale from its previous 4-point version [10–12]. This adjustment highlights the importance of self-care monitoring and allows for a more nuanced evaluation.

The SC-CHDI v3 has been translated into several languages and utilized to evaluate self-care maintenance, management, and monitoring across diverse populations in Italy, Thailand, and China [12–14] (www.self-care-measures.com). However, the reliability and validity of a Korean version are yet to be established. This study aimed to provide a Korean translation of the SC-CHDI v3 and evaluate the reliability and validity of its components.

Methods

Study design

A methodological study evaluated the validity and reliability of the Korean version of SC-CHDI v3 by recruiting patients attending the outpatient cardiovascular clinic at tertiary healthcare in Korea.

Study participants

Participants were selected from among individuals diagnosed with CHD using a convenience sampling method. The inclusion criteria were: (a) aged 19 years or older; (b) having been diagnosed with CHD (including angina pectoris, myocardial infarction, stent placement, or coronary artery bypass grafting) by a cardiologist for more than a month (c) proficient in understanding and speaking Korean. Patients with cognitive impairments, dementia, psychiatric disorders, those currently on central nervous system medications, those suffering from other serious illnesses, or those who were considered very frail were excluded. Additionally, individuals recently hospitalized or underwent surgery, potentially affecting their self-care capacities, were excluded. Patients who had difficulty communicating were excluded.

Sample size

The SC-CHDI v3 is a 23-item instrument divided into three subscales measuring self-care maintenance, self-care monitoring, and self-care management [11]. Recommendations for minimum sample sizes generally suggest having at least 10 observations per item [15], and a sample size of at least 200 is required for adequate inference in exploratory or confirmatory analysis. Therefore, we enrolled 480 participants to account for potential attrition. Of these, 28 were excluded due to missing or incomplete responses. A total of 452 participants completed the questionnaires, achieving a 94.2% response rate.

Instrument

The self-care of coronary heart disease inventory

The 23 items are distributed across the three subscales as follows: self-care maintenance (nine items), self-care monitoring (seven items), and self-care management (seven items) [11]; the self-care maintenance subscale inquiries about the frequency with which patients adhere to general health practices, such as attending appointments, taking medications, and eating healthily. The self-care monitoring subscale assesses how often patients check aspects of their health, including blood pressure, side effects of medication, and weight. The self-care management subscale explores whether patients are likely to act in response to symptoms, such as by modifying their level of activity, taking additional medication, or contacting their healthcare provider. All questions within the three subscales are assessed on a 5-point Likert scale, where the scores vary between 1 and 5 [11].

For the SC-CHDI v3, the scoring process includes determining a standardized score for every scale. The scale's score is missing if respondents complete 50% of the items or fewer. Initially, a raw score for the scale is calculated, which is subsequently transformed into a standardized score ranging from 0 to 100, in line with the instructions provided at www.selfcare-measures.com.

The cardiac self-efficacy scale

The Cardiac Self-Efficacy Scale, developed by Sullivan et al. [16] and translated into Korean by Kang et al. [17], was utilized to assess concurrent validity within our study. This tool is designed to gauge the perceived self-efficacy of patients with CHD about managing their disease. It comprises 16 items, categorized into symptom control (10 items), functioning maintenance (four items), and two items focused on obesity and dietary habits. Each item is scored on a 5-point Likert scale (0 = not confident to 4 = completely confident). A higher aggregate score reflects greater self-efficacy. The validity of this instrument has been previously established in

Korean populations [17]. While Cronbach's alpha was .87–.90 in a previous study [16], Cronbach's α was .71–.81 in this study.

Instrument translation

The Korean translation of the SC-CHDI v3 followed the methodology recommended by the World Health Organization [18]. Authorization for the psychometric evaluation of the SC-CHDI v3 was acquired from its developer, Barbara Riegel. Initially, the translation was carried out by two bilingual nursing professors fluent in both Korean and English, who are knowledgeable about the cultural nuances between Korea and the United States two bilingual nursing professors, proficient in both Korean and English and knowledgeable about the cultural nuances between Korea and the United States, independently translated the instrument into Korean. Subsequently, another pair of independent nursing professors synthesized these translations. During this phase, they scrutinized the translation for accuracy and cultural appropriateness, making necessary adjustments to ensure the Korean version was coherent and culturally relevant.

Then, two separate bilingual translators independently conducted a back-translation of the Korean version into English. The back-translated versions were merged into one unified English document and scrutinized alongside the original instrument to detect and correct any language discrepancies or interpretation errors. This revised version was submitted to the instrument's developer, Barbara Riegel, for a final review, ensuring the translated SC-CHDI v3 accurately reflected the original's intent and meaning. The final version underwent a pilot test to assess the clarity and applicability of the instructions and items of the Korean version of the SC-CHDI v3 within the Korean cultural context. Ten patients with CHD who had not previously been exposed to the instrument were recruited through a convenience sampling procedure. Participants were instructed to complete the Korean version of the SC-CHDI v3 and were requested to identify any ambiguous or unacceptable terms or expressions and suggest possible alternatives. Following the pilot test, two patients responded that it was unnatural to use “my” in Korean in items 10 to 16 and corrected it. Given that all participants in this pilot test confirmed that the instrument was easy to understand and straightforward, the Korean version of the SC-CHDI v3 was finalized.

Data collection

Data were collected in the cardiology outpatient clinic from May 3 to August 22, 2022. Patients visiting the outpatient cardiovascular clinic were enrolled in the study. Research assistants screened and identified potential participants who met the inclusion criteria based on their medical records. They approached eligible patients individually and provided pertinent information, including the study's purpose, procedure, benefits, risks, and the required participation time. They also informed participants of their rights, including confidentiality and withdrawal rights. Written consent was obtained from those who voluntarily agreed to participate. Participants then completed the self-report questionnaires and answered questions about sociodemographic and clinical characteristics. The survey took approximately 15 to 30 minutes.

Data analysis

The collected data were analyzed using IBM SPSS Statistics version 26, AMOS version 25 (IBM Corp., Armonk, NY, USA), and the R program. Descriptive statistics conducted with SPSS were used to analyze the sociodemographic and clinical characteristics of the participants and the Korean version of the SC-CHDI v3.

Construct validity

The sample was divided into two subsamples using the random assignment function in SPSS to validate construct validity. This ensured that each subsample met the necessary sample size criteria: at least 10 times the number of items for exploratory factor analysis (EFA), with 237 cases, and a minimum of 200 cases for confirmatory factor analysis (CFA), with 215 cases [19].

Subsample 1 ($n = 237$) underwent EFA to explore the Korean version of the SC-CHDI v3 structure. Given that the instrument was initially developed for CHD patients in the United States, it was crucial to consider how Korean patients' sociodemographic characteristics and cultural context might affect the instrument's construct. Therefore, we employed an EFA to ascertain whether the construct aligns with that of the original instrument or if novel factors emerge. The Kaiser–Meyer–Olkin (KMO) measure and Bartlett's test of sphericity were utilized to determine the data's appropriateness for factor analysis, demonstrating suitability with a KMO value of .50 or higher and a significant Bartlett's test outcome ($p < .05$) [20]. Factor analysis with Promax rotation was applied for factor extraction and items with factor loadings < .30 were considered for deletion to refine the instrument [21].

Subsample 2 ($n = 215$) was used in CFA to test the suitability of the measurement model identified through EFA. Given that the CFA test data did not meet the criteria for multivariate normality, the bootstrap method was employed as an alternative approach [22]. In evaluating the fit of the model, an array of goodness-of-fit measures and benchmarks were applied: a chi-square test (χ^2) showing a value that was not statistically significant ($p > .05$), a comparative fit index (CFI) exceeding .95, a root mean square error of approximation (RMSEA) below .06, a Tucker-Lewis index (TLI) greater than .90, and a standardized root mean square residual (SRMR) at or below .06 [23,24]. To improve the model's fit, covariance was adjusted for items with a modification index (MI) of 10 or higher [25]. A previous study [12] found that factor loadings were deemed adequate if greater than | .30 | [26]. EFA and CFA were conducted using the AMOS program.

Concurrent validity

To assess concurrent validity, correlations were evaluated between the self-care maintenance, monitoring, and management domains of the Korean versions of the SC-CHDI v3 and Cardiac Self-Efficacy Scale based on previous research [12,27,28]. The hypothesis was raised based on prior studies that reported self-efficacy influencing promoting self-care [12,27,28]. Pearson correlation coefficient was used to test the concurrent validity, where values from .1 to .3 indicated low correlations, .3 to .5 indicated medium correlations, and values above .5 indicated high correlations. Pearson correlation coefficients were calculated using the SPSS program.

Internal consistency

Internal consistency was calculated using Cronbach's alpha for unidimensional scale and McDonald's omega coefficients for multidimensional scales (i.e., when more than one latent factor explains the correlations among the items) [29]. McDonald's omega coefficients offer a more comprehensive reliability estimate as they do not assume essential tau-equivalence [30]. Values exceeding .7 are deemed to represent a satisfactory degree of internal consistency [29,30]. Calculations of reliability coefficients were performed utilizing the R program.

Ethical considerations

The institutional review board at the hospital where the data of this study were collected ethical approval for this study (*Approval no.* AJOUIRB-SUR-2022-100). This study was conducted according to the principles of the Declaration of Helsinki; before initiating data gathering, participants were briefed on the study's objectives, the processes, the anticipated advantages, and possible hazards, and their freedom to exit the study whenever they chose. Anonymity and confidentiality were assured. The questionnaire was administered only to those who provided written consent, and completed questionnaires were immediately collected in sealed envelopes by an experienced research assistant.

Results

Participants' sociodemographic and clinical characteristics

The mean age of participants was 64.59 years (SD = 9.63). They were predominantly men (n = 372, 82.3%), married (n = 363, 80.3%), and employed (n = 281, 62.2%). The participants' mean number of comorbid conditions was 2.96 (SD = 2.06). The mean duration of illness was approximately 4.00 years (SD = 5.40) (Table 1).

Table 1 *Sociodemographic and Clinical Characteristics of Participants (N = 452).*

Characteristics	Total (N = 452)	Subsample 1 (n = 237)	Subsample 2 (n = 215)
	n (%) or Mean ± SD	n (%) or Mean ± SD	n (%) or Mean ± SD
Age, year (range: 40–79)	64.59 ± 9.63	64.41 ± 9.74	64.78 ± 9.51
≤54	67 (14.8)	33 (13.9)	34 (15.8)
55–64	163 (36.1)	86 (36.3)	77 (35.8)
≥65	222 (49.1)	118 (49.8)	104 (48.4)
Gender			
Men	372 (82.3)	195 (82.3)	177 (82.3)
Women	80 (17.7)	42 (17.7)	38 (17.7)
Marital status			
Unmarried	89 (19.7)	43 (18.1)	46 (21.4)
Married	363 (80.3)	194 (81.9)	169 (78.6)
Employment status			
No	171 (37.8)	86 (36.3)	85 (39.5)
Yes	281 (62.2)	151 (63.7)	130 (60.5)
Educational level			
≤Middle school	112 (24.8)	57 (24.1)	55 (25.6)
High school	155 (34.3)	73 (30.8)	82 (38.1)
≥University	185 (40.9)	107 (45.1)	78 (36.3)
Body mass index, kg/m^2 (range: 17.69–40.43)	25.10 ± 3.11	25.10 ± 3.23	25.11 ± 2.98
<23.0	98 (21.7)	48 (20.2)	50 (23.2)
23.0~25.0	136 (30.1)	80 (33.8)	56 (26.1)
≥25.0	218 (48.2)	109 (46.0)	109 (50.7)
Currently smoking			
Yes	71 (15.7)	43 (18.1)	28 (13.0)
No	381 (84.3)	194 (81.9)	187 (87.0)
Number of comorbid conditions (range: 0–7)	2.96 ± 2.06	2.78 ± 2.06	3.16 ± 2.05
Illness duration, year (range: 0.25–17.42)	4.00 ± 5.40	3.73 ± 5.27	4.29 ± 5.54
<5	308 (68.1)	168 (70.9)	140 (65.1)
5~10	75 (16.6)	37 (15.6)	38 (17.7)
≥10	69 (15.3)	32 (13.5)	37 (17.2)

Construct validity

Self-care maintenance subscale

The results demonstrated a KMO value of .67 and Bartlett's test of sphericity value of χ^2 = 345.85 (p < .001), meeting the prerequisites for factor analysis. In EFA, two factors were identified with two out of nine items (items 6 and 9) demonstrating factor loadings of < .30. Therefore, EFA was rerun excluding these items, and two factors were identified (Factor 1 "treatment adherence" and Factor 2 "health-promoting behaviors"). All seven items exhibited factor loadings ≥ .30. In the CFA, the indices for model fit were deemed adequate after corrections were made for covariance errors, except the χ^2 statistic: χ^2 = 18.19 (df = 12, p = .110), CFI = .97, RMSEA = .05, TLI = .95, and SRMR = .04 (Table 2). All factor loadings were significant and adequate, and the two factors showed a positive and significant correlation of .65 (p < .001), as indicated in Figure 1.

Self-care monitoring subscale

The KMO measure was .80, and Bartlett's test of sphericity was 1240.05 (p <.001), confirming the suitability of the data for factor analysis. EFA identified one factor ("monitoring behaviors"). All seven items displayed factor loadings of ≥ .30. In the CFA, the indices for model fit were deemed adequate after corrections were made for covariance errors, except the χ^2 statistic: χ^2 = 19.19 (df = 11, p = .059), CFI = .99, RMSEA = .06, TLI = .99, and SRMR = .04 (Table 2). All factor loadings in the modified model were significant and adequate (Figure 2).

Self-care management subscale

The KMO measure was .78, and Bartlett's test of sphericity was 716.38 (p < .001), confirming the suitability of the data for factor analysis. EFA identified two factors (Factor 1, "consulting behaviors," and Factor 2, "problem-solving behaviors"). All six items showed factor loadings of ≥ .60. In CFA, the model-fit indices were sufficient except for RMSEA: χ^2 = 16.44 (df = 8, p = .037), CFI = .99, RMSEA = .07, TLI = .98, and SRMR = .03 (Table 2). All factor loadings were found to be significant and adequate, and the two factors indicated a positive and significant correlation of .61 (p < .001) (Figure 3).

Concurrent validity

The Pearson correlation coefficients were analyzed to examine the relationship between the Cardiac Self-Efficacy Scale scores and the Korean version of the SC-CHDI v3 self-care maintenance, monitoring, and management scores. The total self-efficacy scores demonstrated a positive correlation with self-care maintenance (r = .18, p < .001), monitoring (r = .33, p < .001), and management (r = .04, p = .413) scores, respectively.

Internal consistency reliability

The internal consistency reliability analysis revealed that McDonald's omega for the self-care maintenance and management subscales, which have two dimensions, was .53 and .86, respectively. Cronbach's alpha for the self-care monitoring subscale, which has one dimension, was .85.

Discussion

We performed EFA and CFA to test the construct validity of the Korean version of the SC-CHDI v3. In the EFA of the self-care maintenance subscale, we observed low factor loading values for item 6 ("ask for low-fat items when eating out or visiting others") and item 9 ("avoid cigarettes and smokers"). Consequently, we excluded these two items due to their limited contribution to the self-care maintenance subscale. We attributed the low factor loading of item 6 to the relatively sparse availability of special diet menus, such as low-fat options, in Korean restaurants despite the increasing prevalence of Western-style Korean eating-out culture [31]. Additionally, requesting a special diet when visiting someone else's home is often considered impolite in Korean culture, which may have influenced the factor loading of item 6. Moreover, with the changed perception about cigarettes and smoking being allowed only in restricted areas, an increasing number of people are avoiding these in Korea. In this study, almost half of the

Table 2 *Fit Index Values for the Korean Version of the Self-Care of Coronary Heart Disease Inventory Version 3 (N = 215).*

Korean version of the SC-CHDI v3	Model	χ^2 test goodness of fit			CFI	RMSEA	TLI	SRMR
		χ^2	df	*p*				
Self-care maintenance	Before adjust model	36.13	13	<.001	.90	.09	.83	.08
	After adjust model	18.19	12	.110	.97	.05	.95	.04
Self-care monitoring	Before adjust model	187.34	14	<.001	.85	.24	.77	.08
	After adjust model	19.19	11	.059	.99	.06	.99	.04
Self-care management	Before adjust model	16.44	8	.037	.99	.07	.98	.03

Abbreviations: CFI, comparative fit index; RMSEA, root mean square error of approximation; SC-CHDI, Self-Care of Coronary Heart Disease Inventory; SRMR, standardized root mean square residual; TLI, Tucker–Lewis index.

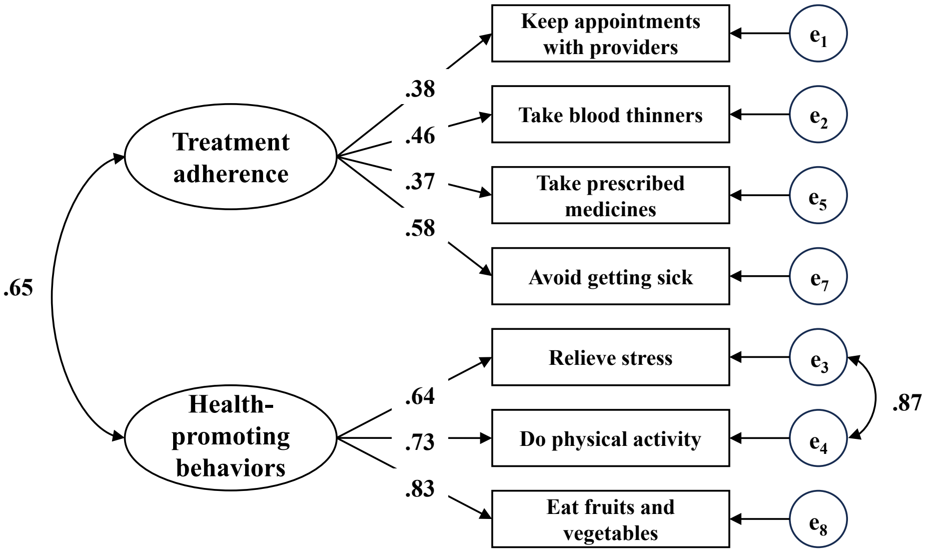

Figure 1. Confirmatory factor analysis of the self-care maintenance subscale.

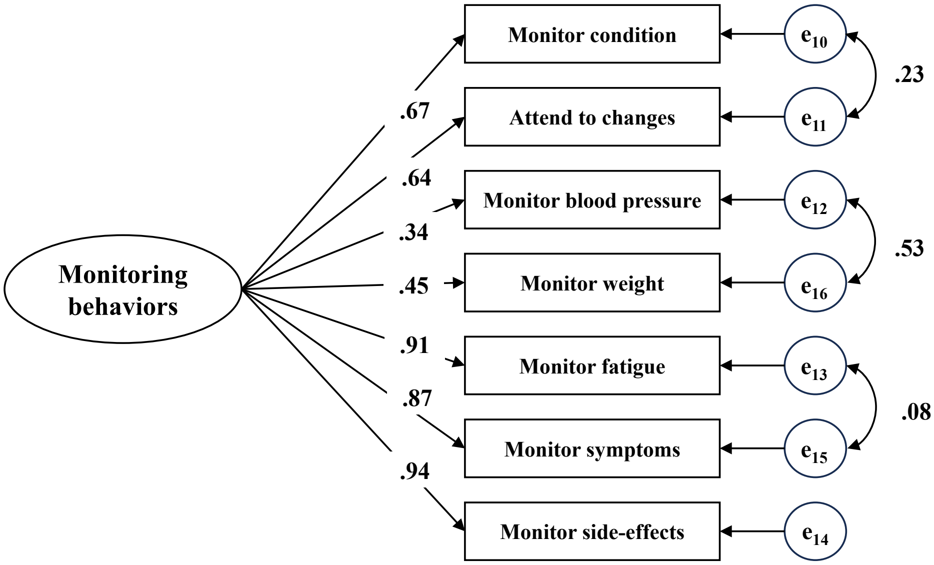

Figure 2. Confirmatory factor analysis of the self-care monitoring subscale.

participants consistently responded “always or daily” to item 9. In contrast, the other half responded “never or rarely,” demonstrating a trend of skewed responses to one extreme or the other. This may be related to the low factor loading value of item 9 for the corresponding scale. Overall, our study underscores the importance of cultural considerations in the evaluation and refinement of self-care assessment tools for specific populations like Korean patients with CHD.

After excluding items 6 and 9 and adjusting for the error of covariance, the two-factor structure of the seven-item self-care

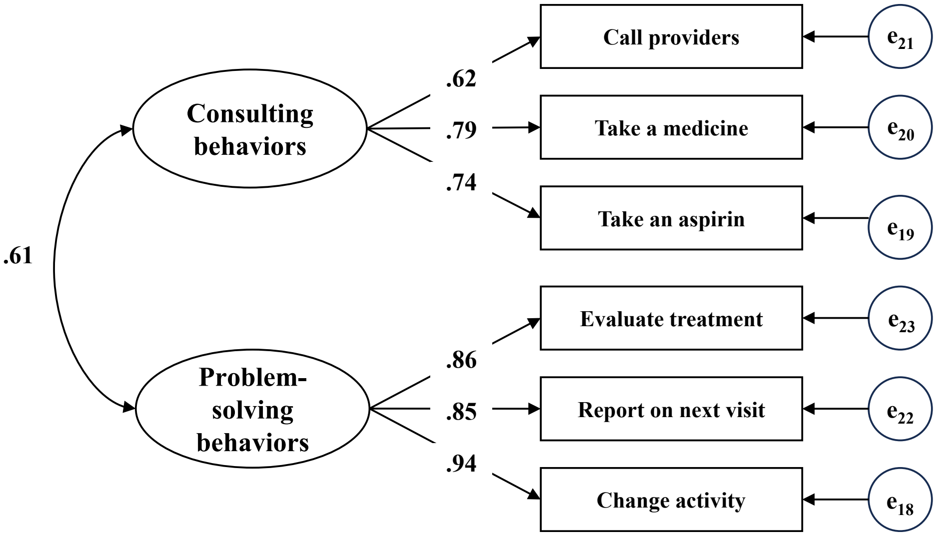

Figure 3. Confirmatory factor analysis of the self-care management subscale.

maintenance subscale showed satisfactory fit statistics: “treatment adherence” and “health-promoting behaviors.” However, the two-factor model differed somewhat from those reported in previous studies [12,13]. In previous studies [12,13], item 7 (“avoiding getting sick”) was allocated to the factor “health-promoting behaviors.” However, in this study, it was included in the factor “treatment adherence.” These differences could be ascribed to the study being undertaken during the period of the COVID-19 pandemic. During this period, patients with chronic diseases such as CHD and heart failure received recommendations to minimize the risk of virus transmission and disease exposure, including vaccination and mask-wearing. Additionally, considering that the Middle Range Theory of Self-Care of Chronic Illness encompasses adherence to medical service provider recommendations (e.g., healthy diet and regular exercise) and medical prescriptions (e.g., drug therapy and regular outpatient visits) under self-care maintenance, the item “avoiding getting sick” might be more appropriately categorized under “treatment adherence” [10,14].

EFA conducted on the self-care monitoring subscale revealed that seven items were loaded onto a single factor: monitoring behaviors. The CFA demonstrated that all values met the cutoff criteria after corrections were made for covariance errors, affirming that all seven self-care monitoring items are classified under a single factor. These findings align with the results observed in SC-CHDI v3 validation studies conducted in Italy [12] and Thailand [13] regarding patients with CHD. The factor “monitoring behaviors” encompassed seven items related to objective self-care monitoring behaviors (e.g., checking blood pressure, monitoring drug adverse effects) and subjective self-care monitoring behaviors (e.g., paying attention to mood swings, checking for fatigue). Therefore, the self-care monitoring subscale aids patients with CHD in attentively monitoring their regular health status and sensitively identifying changes [4,13], ultimately facilitating the improvement of self-care maintenance practices.

Finally, the EFA of the self-care management subscale revealed that six items were loaded into two factors: “consulting behaviors” and “problem-solving behaviors.” In CFA, all goodness-of-fit indices met the cutoff criteria. In this study, “consulting behaviors” encompassed items requiring the active involvement of medical service providers, such as items 19 (“taking an aspirin”), 21 (“calling providers”), and 20 (“taking medication”). Conversely, “problem-solving behaviors” comprised items related to longer-term self-care. Including items about medication or guidance from medical service providers in the “consulting behaviors” factor diverged from the results of a previous study, where items 21 and 22 were loaded differently [12]. However, these findings align with those observed in SC-CHDI v3 validation studies conducted in Thailand [13] or China [14] regarding patients with CHD. This consistency could be attributed to the increasing recognition of the significance of self-medication as an initial response to symptoms such as chest pain, burning, and shortness of breath among patients with CHD [32]. Meanwhile, all six items exhibited adequate factor loading with values $\geq .60$.

Its correlation coefficient with the Cardiac Self-Efficacy Scale was analyzed to evaluate the concurrent validity of the Korean version of SC-CHDI v3. The study revealed that the self-care maintenance and monitoring scores had weak correlations with Cardiac Self-Efficacy Scale scores. These are consistent with previous studies that indicate weak correlations between these measures [12]. Moreover, in contrast to prior research suggesting a moderate correlation between self-care management score and Cardiac Self-Efficacy Scale score [12], this study failed to demonstrate a statistical relationship between these measures. This may be linked to the culture of Eastern healthcare systems, which tends to limit patients' autonomy in self-care decisions or the efficacy of self-care, such as managing prescribed medications or activities when symptoms appear [14]. However, considering that patients with high self-efficacy in coping with their chronic diseases reflect a perceived ability to manage challenges related to their diseases [33]. Efforts to increase self-efficacy for self-care will be essential.

The internal consistency reliability of the SC-CHDI v3 subscales was analyzed using Cronbach's alpha (α) and McDonald's omega (ω) coefficients. Cronbach's alpha, a widely utilized measure for determining internal consistency, relies on stringent prerequisites such as one-dimensionality, the independence of error terms, and essential tau-equivalence across test items. Violating these conditions could lead α coefficients to inaccurately gauge the absolute reliability, either by overestimating or underestimating it [30]. Meanwhile, ω coefficients offer a more comprehensive reliability estimate as they do not assume essential tau-equivalence [30]. Therefore, α was deployed to gauge the unidimensional construct of self-care monitoring. In contrast, Ω was applied to assess this study's multidimensional self-care maintenance and management constructs. The results revealed that self-care maintenance exhibited low reliability with a ω of .53. Simultaneously, other subscales maintained internal reliability with a α or ω ≥ .70. The low reliability of the self-care maintenance subscale could potentially be related to the reduction in the number of items compared to the original instrument by removing two items that showed minimal contribution during construct validity testing. However, since this study is the first to use the Korean version of SC-CHDI v3, it is necessary to secure evidence to verify the instrument's reliability through repeated studies.

The strengths of this study are as follows: First, it is significant as the first study to employ a systematic approach to test the validity and reliability of the Korean version of the SC-CHDI v3 among CHD patients. Second, this study's findings contribute to examining the impact of a self-management intervention for patients with CHD by developing a validated and reliable instrument [8]. Third, its utility extends to facilitating research on personalized interventions for improving self-care and assessing the effectiveness of self-care programs.

However, this study has some limitations, and future research directions are recommended. Caution is warranted when interpreting the findings, given that the survey solely included CHD patients from a single institution. Remarkably, replicating studies with more diverse demographics is essential, considering the sample's predominance of male and married individuals. Additionally, while this study investigated the three subscales in the structure of the SC-CHDI v3 and utilized Cronbach's alpha and McDonald's omega values for internal consistency reliability analysis, the inability to conduct test-retest reliability assessments due to study period limitations is acknowledged. Hence, follow-up research assessing the stability of the instrument is recommended. Furthermore, as the participants were exclusively patients with CHD receiving outpatient care at a tertiary hospital within a specific region, it is advised to conduct replication studies involving patients from various healthcare institution levels and expanded geographical areas to enhance the clinical applicability of the Korean version of the SC-CHDI v3.

Conclusions

In the present study, the SC-CHDI v3, three subscales devised based on the Middle Range Theory of Self-Care of Chronic Illness and extensively used globally to assess self-care, was systematically translated into Korean, and its applicability for Korean patients with CHD was scrutinized. The results revealed that the Korean version of SC-CHDI v3 comprises 21 items across three subscales: self-care maintenance, self-care monitoring, and self-care management. Each item on the three subscales is scored on a 5-point Likert scale, with higher scores indicating better self-care.

Furthermore, the outcomes substantiated the construct and criterion validity of the Korean version, while its reliability was also affirmed. Hence, with the Korean version of the SC-CHDI v3 being validated as an effective tool for gauging self-care levels in individuals with CHD, this study's results hold significant implications for clinical practice. They could guide the creation and assessment of intervention strategies to enhance self-care behaviors among Korean CHD patients.

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Ethics approval and consent to participate

The present study was approved by the institutional review board of the authors' affiliated university hospital (IRB no. AJOUIRB-SUR-2022-100). Informed consent was obtained from all participants before their participation in this study.

Consent for publication

As part of the informed consent process, permission was sought from the participants to be able to use the data collection in publication, with the participants remaining anonymous.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflict of interest

All authors declare that they have no conflict of interests related to submitted manuscript.

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Research Article

Subjective Study on Pediatric Emergency Department Nurses′ Perceptions of Urgency Using Q Methodology

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SUMMARY

Purpose: In the emergency department (ED), triage significantly impacts patient safety. Therefore, triage nurses must make decisions accurately and timeously. This study aims to investigate how South Korean pediatric emergency nurses perceive urgency and classify severity using the Q methodology, which examines individuals' subjectivity.
Methods: We collected 84 statements from a Q population based on a literature review and interviews and selected 33 Q samples. The P samples included 30 pediatric emergency nurses at a Seoul tertiary care hospital. The principal component factor analysis method was used to analyze data using the PC-QUANL program.
Results: Four urgency perception types were identified among pediatric ED nurses—Type 1: “Experiential coping”; Type 2: “Careful reasoning”; Type 3: “Patient-centered thinking”; and Type 4: “Intuitive prediction.” These types appear to be an integrated process of knowledge and clinical experience that considers children's characteristics and developmental stages.
Conclusion: This study may serve as a basis for future education to improve pediatric ED nurses′ urgency judgment and severity classification skills.

Introduction

The emergency department (ED) is one of the most critical parts of the healthcare system. Patient visits to the ED are challenging because of the unpredictable and variable severity of illnesses. Although the annual number of patients visiting EDs is steadily increasing, only 25–60% of patients treated in EDs are true emergencies. Overcrowding can occur when EDs are filled with non-urgent patients, and overcrowded EDs can affect patient safety in terms of providing timely and appropriate care [1].

To address overcrowding in EDs, which is extremely crucial [2], the severity triage was first introduced in the United States to enhance efficiency and ensure patient safety in overcrowded EDs and is currently practiced in EDs worldwide [3]. Triage is essential for patient safety; therefore, accurate decision-making by triage providers in EDs is of paramount importance [4].

Focus on severity classification among pediatric patients is necessary as their physiological characteristics differ from those of adults and their growth and developmental stages must also be considered [5]. Furthermore, pediatric patients require higher accuracy in severity classification than do adults because the symptoms and signs of disease and damage in children are not as evident as in adults, and the course of disease varies with age [6].

Meanwhile, prior studies have shown the role of intuition, particularly in emergency situations, where decisions often rely on reasoning and direct experiential knowledge. Furthermore, as nursing expertise develops, nurses tend to rely more on intuition, incorporating implicit guideline information into their clinical assessments [7]. Intuition refers to a “direct” experience of reality, rather than a view acquired via experience or scientific thinking. In nursing, clinical intuition refers to a decision-making process in which a nurse has knowledge about a patient that cannot be explained and expressed verbally and whose source cannot be determined [8]. Intuition plays a key role in all phases of the nursing process as a basis for decision-making that supports safe patient

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care and is a validated component of nursing clinical care expertise [9]. Intuition is not considered magical, superstitious, or irrational but rather a way of life acquired after years of experience and learning. Therefore, it is necessary to develop and systematize systems in which intuition can be practiced as a form of nursing art [10].

However, although previous studies [11,12] have analyzed the intuition of clinical nurses or ED nurses, there are few studies that have systematically analyzed and understood the intuition of pediatric triage ED nurses′ perception of urgency. Therefore, there is a great need for research on this topic.

Q methodology, a method that starts from the actor's perspective, not the researcher's assumptions, and focuses on the abduction of hypotheses, i.e., simply discovering what is, not from a predetermined, manipulative concept [13]. It is appropriate for this study, which aims to discover the value and structure of pediatric ED nurses′ subjective judgments, including their experiences with intuition in recognizing the urgency of a patient's condition, the process of arriving at intuition, and the types of intuitions that are subjective to each individual. Thus, this study aims to examine how pediatric ED nurses perceive urgency and classify severity and determine the specific types of urgency through the Q methodology, which shows individual subjectivity.

Methods

We used Q methodology to explore pediatric ED nurses′ subjectivity of urgency. Table 1 summarizes the study's process.

Organization of Q populations

Literature reviews and interviews were conducted to establish the Q population. Domestic search engine (RISS) and foreign search engines (PubMed, Embase, CINAHL) were used to review the elements, meanings, definitions, and characteristics of pediatric ED nurses′ subjectivity. The literature reviews were conducted using keyword searches related to “pediatric ED nurses” or “pediatric emergency” or “pediatric acute deterioration,” and an unstructured questionnaire was created.

Personal in-depth interviews were conducted from May 3 to May 8, 2023, based on the questionnaire created from the literature review. Ten pediatric ED nurses from a Seoul tertiary care hospital comprising 2700 beds were selected for the Q population to identify the factors affecting their subjective perception of patient urgency. Interviews were conducted at the convenience of the participants, usually in a quiet café before or after work, or in a conference room at the hospital. Data collection from the Q population continued until saturation. The time spent with each participant was a minimum of 25 minutes and a maximum of 50 minutes. The interviews were recorded with the consent of the interviewees and transcribed.

We created a transcript based on the in-depth interviews and read the transcripts repeatedly, underlining the statements that we thought were related to the pediatric ED nurses′ perception of urgency construct, trying to understand the subjective meanings, thoughts, and feelings implied by the participants, and extracted the Q population based on the transcripts. The statements were organized so that each statement contained the subjectivity of the participant's statement and were modified and supplemented by referring to relevant prior research. The extracted statements were read several times, reviewed for content, and categorized and organized by grouping statements that were deemed to belong to the same topic. During this categorization process, statements with similar meanings were selected as the most representative among them, and statements with more than one meaning were separated into two to reorganize the statements.

Table 1 *Flowchart Descriptions in the Manuscript.*

No.	Stage	Content
1	Organization of Q populations ($N = 84$)	Literature reviews and in-depth interviews
2	Selection of Q samples ($N = 33$)	Q-statement sorting and supplementation
3	Composition of P samples ($N = 30$)	Pediatric ED nurses′ group
4	Q sorting and data analysis	Compulsory sorting by P samples and analyses by type

Note. ED = emergency department.

The process of extracting and categorizing Q statements was conducted under the guidance of professors who have extensive experience in researching and teaching Q methodology in the relevant field. This was done to minimize subjectivity, and any parts that did not effectively convey meaning or had errors in sentence structure were corrected and supplemented. Additionally, advice from pediatric emergency specialists was also taken into consideration. This process was repeatedly reviewed and revised several times. Finally, we reached a total Q population of 84, obtained from both in-depth interviews and a literature review on pediatric ED nurses′ subjectivity in ascertaining patient urgency.

Selection of Q samples

The Q sample was constructed by randomly selecting statements that best represent each thematic category [14]. It is crucial to select a sample that can illustrate the key aspects of the dimension to be studied. The study questions were divided into the following categories: patient's symptoms, care giver's opinion, nurse's experience and knowledge, nurse's ability, and colleagues' and other people's opinions to reflect pediatric ED nurses′ perception of urgency. Afterward, with the help of a professor with research and teachings on the Q methodology, 33 final Q samples were selected. These included the following: patient's symptoms ($n = 8$), care giver's opinion ($n = 5$), nurse's experience and knowledge ($n = 8$), nurse's ability ($n = 7$), and colleagues' and other people's opinions ($n = 5$).

Composition of P samples

The P samples refer to the individuals who are the focus of the research. The research conducted by the Q methodology follows the small sample principle, and the number of P samples is typically around 50 [13]. Referring to the previous study [12], this study selected 30 nurses working in the pediatric ED of a 2700-bed tertiary hospital in Seoul as the P sample because it is believed that it can best reveal the subjectivity of pediatric ED nurses who judge the urgency of patients. The age range of the P sample was 15 in their 20s, 7 in their 30s, 7 in their 40s, and 1 in their 50s, with 9 with less than 3 years of clinical experience, 4 with 3–5 years of experience, 6 with 5–10 years of experience, 6 with 10–20 years of experience, and 5 with >20 years of experience (Table 2). The P samples who understood the purpose of the study and provided written consent to participate after an explanation of the study through the recruitment announcement were selected as participants.

Q sorting and data analysis

From August 13 to December 3, 2023, the P samples categorized 33 statement cards selected as Q samples by focusing on their thoughts while reading them. The Q statement is a three-level categorization of statements (Q samples) into positive, neutral, and negative, according to the degree of agreement. The forced distribution method is applied to achieve a normal distribution. This Q sorting activity serves as an effective tool for promoting participant reflexivity and self-awareness. Data were scored by verifying the number of the statements recorded in the Q sample distribution chart, giving a sequential score starting with 1 point for the most disagreeable statement and 9 points for the most agreeable one.

After Q sorting, we asked the P samples additional questions about their reasons or feelings about the statements that fell on the dichotomous spectrum of agreement and disagreement to obtain useful information for interpreting the Q factor. Prior to the Q sorting process, P samples were asked to fill out the General Characteristics Questionnaire, and the categorization process was explained to them while they watched the card categorization instructions. The time spent on the General Characteristics questionnaire, Q sorting, and additional interview ranged from 25 minutes to 50 minutes and was conducted at the convenience of the participant, usually in a quiet café before or after work or in a conference room in the hospital.

These were then coded and entered into the PC-QUANL program (ver. 0.74; DOSBox). The principal component factor analysis was used for data analysis. To determine the ideal number of factors, the number of factors was varied based on the eigenvalue of 1.0 or more, and reasonable factors were selected from the calculated results. Based on these criteria, we varied the number of factors in each category and finally selected four types. The standard score (Z-score) of each item was then used to select the appropriate items, and the reasons for selecting the most agreeable and most disagreeable items were used to interpret the characteristics of each type, centered on the participants with the highest weight in each type.

Table 2 *Demographic Characteristics and Factor Weights for P Samples (N = 30).*

Type	No.	Age (yrs)	Gender	Clinical experience	Factor loading
Type 1 (*N* = 12)	P1	25	Female	2 yrs 6 months	1.18
	P4	29	Female	6 yrs 5 months	1.05
	P8	33	Female	10 yrs 8 months	1.07
	P14	24	Female	1 yr 3 months	0.96
	P16	24	Female	10 months	0.68
	P18	40	Female	17 yrs 5 months	0.79
	P20	33	Female	9 yrs 1 month	1.33
	P21	36	Female	13 yrs	1.12
	P22	25	Female	2 yrs 1 month	1.01
	P24	27	Female	3 yrs 2 months	1.86
	P25	25	Female	1 yr 8 months	1.32
	P28	31	Female	9 yrs 6 months	0.66
Type 2 (*N* = 8)	P2	24	Female	1 yr 5 months	1.31
	P6	29	Female	5 yrs 10 months	1.31
	P10	52	Female	29 yrs 1 month	0.77
	P11	45	Female	22 yrs 4 months	1.27
	P13	36	Female	9 yrs 3 months	1.97
	P19	41	Female	20 yrs 6 months	0.67
	P23	43	Female	22 yrs	2.00
	P27	29	Female	3 yrs 6 months	1.92
Type 3 (*N* = 6)	P5	33	Female	9 yrs 5 months	1.07
	P9	26	Female	2 yrs 1 months	1.13
	P15	27	Female	3 yrs	1.60
	P17	40	Female	16 yrs 8 months	0.93
	P26	32	Female	10 yrs 6 months	0.85
	P30	41	Female	18 yrs 9 months	0.62
Type 4 (*N* = 4)	P3	26	Female	2 yrs 3 months	1.29
	P7	26	Female	2 yrs 9 months	0.99
	P12	28	Female	4 yrs 1 month	1.32
	P29	44	Female	20 yrs 5 months	0.75

Note. yrs = years.

Ethical considerations

This study was approved by the institutional review board of the Asan medical center on June 13, 2023 (Approval no. 2023-0709). To guarantee the rights and freedom of the study participants, the study objectives, methods, time required for sorting the statement cards, and recording of interview contents were explained to the participants, and their written consent was obtained. In addition, it was explained to the participants that they could withdraw P sample at any time during the card sorting or interview, if they wished to, that their anonymity would be guaranteed, that the interview data would not be used for other purposes, and that the stored records and prints would be disposed of after data analysis.

Results

Result analysis

Four types were derived. The eigenvalues by type were the following: 15.48 (Type 1); 2.21 (Type 2); 1.48 (Type 3); and 1.24 (Type 4). The cumulative variance was 0.68 (Table 3).

Table 4 presents the correlation coefficients showing similarity between individual types, as follows: 0.70 (types 1 and 2); 0.76 (types 1 and 3); 0.71 (types 1 and 4); 0.69 (types 2 and 3); 0.60 (types 2 and 4); and 0.68 (types 3 and 4).

We classified the factor weights and obtained the results. In Type 1, P24 showed the highest value at 1.86; Type 2, P23 at 2.00; Type 3, P15 at 1.60; and Type 4, P12 at 1.32 (Table 2).

Perception-type characteristics

Type 1: Experiential coping

Type 1 was named “Experiential coping,” reflecting nurses′ tendency to prioritize through categorizing severity based on direct clinical experience, rather than theoretical knowledge. This type was most likely to agree with Q8, “I think it is important for nurses to prioritize because they perform multiple tasks in a short amount of time during an emergency ($z = 1.81$),” and disagree with Q20, “I have seen caregivers react with alarm to a patient's out-of-character behavior and assign a higher level of severity to a situation than what was required ($z = -1.98$)” (Table 5). In Type 1, the positive statement with the largest difference from the average of other types was Q23: “I believe that nurses have different perspectives on a similar situation depending on their skill level in determining urgency ($d = 1.34$),” and the negative statement with the largest difference was Q5: “I believe I can predict a patient's level of severity by looking at their color ($d = -1.03$)”.

P24, who had the highest factor weight of Type 1, wrote, “When I worked as a nurse in the pediatric ED, I felt that I could not do clinical work with only the knowledge I learned in school. My knowledge and experiences as a nurse played a crucial role, as there are various diseases not within the contents of a book, and symptoms vary among patients with the same disease.” Type 1 nurses value their own experience in classifying severity based on the patient's symptoms and vital signs and prioritize and work efficiently in emergency situations.

Table 3 *Eigenvalues and Explanatory Variances in the Classification of Four Types.*

Contents	Type 1	Type 2	Type 3	Type 4
Chosen eigenvalues	15.48	2.21	1.48	1.24
Total variance	0.52	0.07	0.05	0.04
Cumulative	0.52	0.59	0.64	0.68
Solution variance	0.76	0.11	0.07	0.06
Cumulative	0.76	0.87	0.94	1.00

Table 4 *Correlation Coefficients Between Types.*

Contents	Type 1	Type 2	Type 3	Type 4
Type 1	1.00			
Type 2	0.70	1.00		
Type 3	0.76	0.69	1.00	
Type 4	0.76	0.60	0.68	1.00

Type 2: Careful reasoning

Type 2, the “Careful reasoning,” demonstrated the characteristics of nurses who predict the patient's condition based on accurate and detailed objective data collection. This type showed the strongest agreement with Q19, “I consider the patient's consciousness to be the most important factor in determining urgency. Therefore, I check for consciousness first ($z = 2.22$),” and the strongest disagreement with Q20, “I have seen caregivers react with alarm to a patient's out-of-character behavior and assign a higher level of severity to a situation than what was required ($z = -1.99$)” (Table 5). In Type 2, the positive statement with the largest difference from the average of the other types was Q33: “Since one anomaly can make things worse, I tend to err on the side of conservative severity, just in case ($d = 1.75$),” and the negative statement with the largest difference was Q4: “There is a specific kind of nurse's touch when judging urgency that cannot be explained by nursing knowledge alone ($d = -1.62$).”

P23, who had the highest factor weight of Type 2, stated, “Assessing the patient through objective data is very important. Since a nurse's touch or a care giver's reaction is not an objective indicator, it should not be completely trusted.” Type 2 nurses prioritize objective data over subjective data and predict emergencies and prepare for them early, based on their inferences from objective data.

Type 3: Patient-centered thinking

Type 3, the “Patient-centered thinking,” represents nurses who put aside the caregiver's subjective opinion and focus on the patient's condition when judging them. This type showed the strongest agreement with Q19, “I consider the patient's consciousness to be the most important factor in determining urgency, so I check for consciousness first ($z = 1.94$),” and the strongest disagreement with Q20, “I have seen caregivers react with alarm to a patient's out-of-character behavior and assign a higher level of severity to a situation than what was required ($z = -2.02$)” (Table 5). In Type 3, the positive statement with the largest difference from the other type's averages was Q25: “I think it is important to assess the patient's condition objectively. Therefore, the caregiver's opinions must not interfere with your judgment ($d = 1.04$),” and the negative statement with the largest difference was Q13: “I believe that listening to the caregiver's statement is important when categorizing a patient's severity because children naturally cannot speak or express their symptoms directly ($d = -1.02$).”

P15, who had the highest perceived weight of Type 3, said, “There are cases where the patient is still energetic, playing well, and has pinkish skin, even if she is unable to eat and has had a fever for five days. Meanwhile, sometimes the patient feels cold and damp and has pale, mottled skin but has had a fever for only a day. I think it is important to examine children's condition, as caregivers sometimes require a mobile bed or call 911 for a stretcher, even for simple fevers or mild complaints.” Type 3 nurses value the directness of a patient's assessment over a care giver or a paramedic's statements.

Type 4: Intuitive prediction

Type 4, “Intuitive prediction,” depicted nurses' ability to predict an emergency based on intuition. This type showed the strongest agreement with Q5, “I believe I can predict a patient's level of severity by looking at their color ($z = 1.96$),” and the strongest disagreement with Q20, “I have seen caregivers react with alarm to a patient's out-of-character behavior and assign a higher level of severity to a situation than what was required ($z = -2.16$)” (Table 5). In Type 4, the positive statement with the largest difference from the other type's averages was Q4: “There is a specific kind of nurse's touch when judging urgency that cannot be explained by nursing knowledge alone ($d = 1.48$),” and the negative statement with the largest difference was Q11: “The first thing I look for is how the patient is breathing, as we see a lot of respiratory arrests in pediatric patients ($d = -1.59$).”

P12, who had the highest factor weight of Type 4, wrote, “A patient's breathing, which is the most important factor when judging the severity of a pediatric patient, clearly reflects their condition. I think it triggers a nurse's instinct, which is difficult to explain, when meeting an emergency patient.” It seems that although nurses' knowledge is important, their intuition is also a crucial factor in predicting an emergency.

Consensus items

The consensus items refer to those items for which each factor agreed. There were 13 consensus items of each type. Rather than interpreting factor-specific characteristics, consensus items allow for understanding of cross-factor characteristics by finding commonalities among factors [15].

In the consensus items, the statements that responded in the positive direction were Q27: “I think it is important for nurses to predict potential risks in an emergency situation by recording a patient's history, doing a physical exam, and looking at all the clues such as vital signs”, Q30: “I believe this temperament is helpful in the initial assessment of a patient, as it is important for a nurse to be able to quickly assess the situation in the moment during a crisis”, Q10: “I believe that a nurse's clinical reasoning skills affect their ability to categorize a patient's severity because they must differentiate between critical conditions based on various symptoms”, Q14: “I believe that referring to the ellipse test results is necessary when categorizing a patient's severity if they came from an ellipse”, Q3: “I find it very helpful to share the experiences of more experienced colleagues in the department when judging urgency”, Q26: “I believe that history taking is important and requires the communication skills of a nurse who can elicit important information from the caregiver”, and Q9: “I believe that the caregiver knows the patient's condition best, so for triage, I check to see if the child is eating, sleeping, and playing as usual.”

On the other hand, the statements that responded in the negative direction were Q6: “I believe that nurses are not given enough time to determine urgency, so they rely on their clinical experience”, Q22: “I do not think you should judge urgency based solely on the numbers you see on the machine as machines can often indicate errors”, Q28: “I predict an emergency when a patient arrives in a stretcher car with a paramedic rather than on foot”, Q21: “I do not think the care giver's statement should influence the urgency judgment because there may be social emergencies (e.g., child abuse, domestic violence, etc.)”, Q31: “I believe that if information was shared from the paramedics prior to arrival at the emergency room, it can be considered a critical situation and therefore affect the triage of the patient”, and Q20: “I have seen caregivers react with alarm to a patient's out-of-character behavior and assign a higher level of severity to a situation than what was required.”

Discussion and conclusions

Four types of urgency perception of pediatric ED nurses were identified: Type 1, “Experiential coping”; Type 2, “Careful reasoning”;

Table 5 *Q Statements and Z-scores.*

No.	Q Statement	Z-score			
		Type 1 ($N = 12$)	Type 2 ($N = 8$)	Type 3 ($N = 6$)	Type 4 ($N = 6$)
Q1	Since I trust the judgment of the people I work with, their judgment influences how I categorize a patient's severity.	−0.28	−0.40	−0.90	0.11
Q2	I believe that the nature of children makes it possible to categorize, through experience, whether an increased heart rate is simply an abnormality due to crying or indicative of something pathologically significant.	−0.28	−1.18	0.22	−0.78
Q3	I find it very helpful to share the experiences of more experienced colleagues in the department when judging urgency.	0.50	−0.03	0.46	0.38
Q4	There is a specific kind of nurse's touch when judging urgency that cannot be explained by nursing knowledge alone.	−0.28	−1.10	0.62	1.23
Q5	I believe I can predict a patient's level of severity by looking at their color.	0.35	0.73	1.45	1.96
Q6	I believe that nurses are not given enough time to determine urgency, so they rely on their clinical experience.	0.11	−0.51	0.45	−0.49
Q7	I believe that if there is consensus among physicians—nurses in categorizing a patient's severity; the results are reliable in determining urgency.	0.98	0.67	0.26	1.42
Q8	I think it is important for nurses to prioritize because they perform multiple tasks in a short amount of time during an emergency.	1.81	1.09	1.46	0.73
Q9	I believe that the caregiver knows the patient's condition best, so for triage, I check to see if the child is eating, sleeping, and playing as usual.	0.08	0.68	−0.08	0.28
Q10	I believe that a nurse's clinical reasoning skills affect their ability to categorize a patient's severity because they must differentiate between critical conditions based on various symptoms.	1.20	0.45	0.26	0.35
Q11	The first thing I look for is how the patient is breathing, as we see a lot of respiratory arrests in pediatric patients.	1.01	1.83	1.19	−0.25
Q12	I believe that there is a significant difference in the accuracy of severity classification based on the nurse's clinical experience as experience is essential in determining and classifying a patient's severity.	0.87	−0.39	−0.05	0.72
Q13	I believe that listening to the caregiver's statement is important when categorizing a patient's severity because children naturally cannot speak or express their symptoms directly.	−0.19	0.32	−0.70	0.82
Q14	I believe that referring to the ellipse test results is necessary when categorizing a patient's severity if they came from an ellipse.	0.04	0.78	0.37	0.60
Q15	I believe that vital signs are the most objective reflection of a patient's condition, so I consider an emergency when vital signs are out of the normal range.	−0.74	0.14	0.24	−0.99
Q16	I believe that every response and outcome from a patient is important and must be considered.	−0.87	−1.30	−0.38	0.37
Q17	I believe that pediatric severity classification should have flexibility in judgment because its inter-rater agreement is lower than that in adults.	−0.29	−0.45	−1.34	−1.24
Q18	I believe that a physical examination provides an accurate picture of a patient's condition. Therefore, seeing and touching the patient is crucial when assessing urgency.	0.05	1.14	0.91	0.42
Q19	I consider the patient's consciousness to be the most important factor in determining urgency, so I check for consciousness first.	0.67	2.22	1.94	0.95
Q20	I have seen caregivers react with alarm to a patient's out-of-character behavior and assign a higher level of severity to a situation than what was required.	−1.98	−1.99	−2.02	−2.16
Q21	I do not think the care giver's statement should influence the urgency judgment because there may be social emergencies (e.g., child abuse, domestic violence, etc.).	−1.36	−1.59	−1.10	−1.45
Q22	I do not think you should judge urgency based solely on the numbers you see on the machine, as machines can often indicate errors.	−0.47	−0.91	−0.24	−0.61
Q23	I believe that nurses have different perspectives on a similar situation depending on their skill level in determining urgency.	1.24	0.42	−0.35	−0.38
Q24	I believe that nurses′ abilities depend on their knowledge, affecting their judgment of the patient's severity.	1.46	0.51	0.73	1.55
Q25	I think it is important to assess the patient's condition objectively. Therefore, the caregiver's opinions must not interfere with your judgment.	−1.95	−1.83	−0.80	−1.74
Q26	I believe that history taking is important and requires the communication skills of a nurse who can elicit important information from the caregiver.	0.01	0.59	−0.09	0.64
Q27	I think it is important for nurses to predict potential risks in an emergency situation by recording a patient's history, doing a physical exam, and looking at all the clues such as vital signs.	1.15	0.58	0.63	0.84
Q28	I predict an emergency when a patient arrives in a stretcher car with a paramedic rather than on foot.	−1.24	−0.89	−1.46	−1.80
Q29	I observe the changes in the patient's facial expressions when determining the urgency of the situation, as children are not able to communicate clearly.	−0.52	−0.30	−1.27	−0.10
Q30	I believe this temperament is helpful in the initial assessment of a patient, as it is important for a nurse to be able to quickly assess the situation in the moment during a crisis.	1.20	0.35	1.18	0.33
Q31	I believe that if information was shared from the paramedics prior to arrival at the emergency room, it can be considered a critical situation and therefore affect the triage of the patient.	−1.73	−1.01	−1.85	−1.01
Q32	I think it is important to jointly examine the findings to make a judgment call because the same fever can have different levels of urgency depending on other accompanying symptoms.	0.67	0.58	1.29	−0.09
Q33	Since one anomaly can make things worse, I tend to err on the side of conservative severity, just in case.	−1.24	0.80	−1.02	−0.60

Type 3, “Patient-centered thinking”; and Type 4, “Intuitive prediction.”

The correlations between the four types of pediatric ED nurses were relatively high, ranging from 0.60 to 0.76. In R methodology, a lower correlation coefficient between factors is more desirable. However, in Q methodology, a high correlation coefficient does not necessarily imply that there is no difference between two factors; it provides a basis for a hypothesis generation based on the linkage and separation between theoretical concepts [13]. Therefore, even if there are high correlations between types, it does not mean that a study does not need to categorize types. In this study, this relatively high interfactor correlation indicates a few common attributes among pediatric nurses on how they manage their perception of urgency. Unlike general wards, pediatric nurses undergo systematic training to improve their accuracy on classifying severity and reduce errors on the Korean Triage and Acuity Scale. Thus, it can be considered an effect of training, which was implemented to train nurses to make a single and valid severity classification during emergency situations rather than making individual and independent judgments [12]. However, despite these high correlations and shared characteristics, there were four distinct attributes of urgency perception reported by the pediatric ED nurses in this study, suggesting the need for different approaches to urgency perception for each typology.

We identified that among the 33 Q items, 13 items were consistent across factors, as the P samples from each factor revealed similar scores. Furthermore, following were the most common consensus items: “Nurse's ability to anticipate potential risks,” “Ability to quickly assess the current situation,” “Nurse's clinical reasoning skills,” “Sharing the experiences of more experienced colleagues,” and “Nurse's communication skills are needed.” This suggests that pediatric ED nurses value these attributes as part of a nurse's abilities to ascertain patient urgency in a hectic ED environment. This aligns with the findings of Thompson et al. [6], who argued that pediatric triage requires a higher level of proficiency.

Conversely, the common disagreement items among the concordance items include “intense reaction of the caregiver” and “prior information sharing from 911 paramedics.” This suggests that information or emotional reactions from third parties other than the patient are not key attributes of pediatric ED nurses′ perceptions of patient urgency.

Twelve nurses in our sample fit the Type 1 category, “Experiential coping.” They rely exclusively on personal clinical experience rather than on theoretical knowledge to categorize and prioritize cases based on severity. They also complete their tasks rapidly. The emphasis on the significance of nurses′ work experience aligns with studies by Moon [16] and Kim et al. [17], who suggested that ED nurses with greater total clinical experience and ED experience possess better expertise in triage. However, not everyone with a lot of personal clinical experience will be categorized as this type, so caution should be used in categorizing and interpreting the types, and further research is needed to determine what attributes they possess. Those who do fall into this type may benefit from training methods such as simulations that provide indirect access to clinical experience.

Eight nurses in our sample were included in the Type 2 category, “Careful reasoning.” They use accurate, detailed, and objective data to predict a patient's condition. Clinical reasoning is a cognitive process that precedes clinical decision-making. Hwang and Shin [18] reported that clinical reasoning ability was the paramount predictor when analyzing factors affecting ED nurses′ triage ability. Nurses can improve their accuracy in severity classification by collecting information about the patient's condition based on basic knowledge and analyzing the significance of collected information. Individuals who fall into this category are likely to benefit from a training approach that introduces basic knowledge and methods training to strengthen clinical reasoning skills.

Six nurses in our sample belong in the Type 3 category, “Patient-centered thinking.” They ignore the subjective opinions of caregivers and objectively assess the patient's condition. Type 3 nurses believe it is necessary to assess the patient directly. However, they must be highly skilled in pediatric-specific communication and symptom assessment as communication barriers due to children's linguistic and cognitive development can hinder information gathering and symptom assessment. For those who fall into this category, it would be effective to train them in communication methods specific to the unique patient population of pediatrics.

Four nurses in our sample fit the Type 4 category, “Intuitive prediction.” They rely on intuition, which is a feeling difficult to express, to anticipate emergencies. This aligns with Kim [12]'s findings, which stated that emergency room nurses′ intuition enables them to immediately sense unexpected changes in emergency patients. However, the study did not determine whether people with this type also have high levels of expert-level intuition, so interpretations should be made with caution, and further research is needed to determine what attributes they possess.

Urgency identification and severity classification are crucial for pediatric ED nurses as they enhance their work efficiency and ensure pediatric patients' safety. The types of urgency perceptions of pediatric ED nurses′ identified in this study incorporate a process of knowledge and clinical experience that considers children's characteristics and developmental stages. This can serve as the basis for future education to improve pediatric ED nurses′ urgency judgment and severity classification skills. The results also suggest that further development of educational programs that acknowledge the diversity of nurses′ urgency perceptions and incorporate the four dimensions should be actively explored. Furthermore, it is necessary to establish policies based on the characteristics and dimensions of each type to rectify and supplement the deficiencies of the pediatric emergency triage system.

However, this study has a few limitations. First, it is unclear whether the types derived using the Q methodology clearly reflect the opinions of individuals on urgency. Therefore, individually analyzing internal experience and awareness on urgency based on in-depth qualitative research is necessary. Second, the types derived using the Q methodology may not be classified similarly in other countries owing to differences in experiences, culture, and customs, which affects urgency perceptions. Therefore, further research is required to expand the understanding and scope of urgency.

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Conflict of interest

The authors have no personal, financial, or institutional interest in any of the drugs, materials, or devices described in this article.

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Research Article

Relationship Between Emotional Intelligence, Occupational Well-Being, and Work Engagement Among Chinese Clinical Nurses

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SUMMARY

Purpose: To identify the relationship between emotional intelligence, occupational well-being, and work engagement among Chinese clinical nurses.
Methods: This cross-sectional study is based on survey responses provided by 1744 registered nurses from a Chinese hospital. The survey utilized emotional intelligence, occupational well-being, and work engagement scales.
Results: A questionnaire was distributed to nurses, and among them, 1744 filled it in. Work engagement was related to demographic characteristics. The nurses' work engagement score was 28.99±5.46. Work engagement was positively correlated with emotional intelligence ($r=.94$, $p < .01$) and occupational well-being ($r=.96$, $p < .01$).
Conclusions: The current work engagement of nurses in China is at a medium level. It is influenced by emotional intelligence and occupational well-being.

Introduction

The shortage of nurses is a global issue. It is a more serious problem in China where the ratio of employed registered nurses, compared to the global ratio, is lower (the nurse-to-patient ratio is approximately 1:16 in China and 1:9 globally) [1]. Moreover, considering the aging population worldwide and the dwindling younger population, the shortage of clinical nurses is bound to intensify as an issue [2]. Clinical nurses face various stressors, such as higher workload, hostile workplace culture, and disrespectful climate; these may be associated with improper nursing-patient communication [3]. The inability to address to negative emotions might make them consider quitting. The average annual turnover rate of nurses in China is 28% [4]. Even if nurses choose to keep working, their work engagement is bound to decline. Therefore, methods to retain clinical nurses and increase their work engagement are important issues for healthcare organizations.

Like a positive mental state, work engagement results from the best interaction between work demands and work resources, and its characteristics include vigor, dedication, and absorption [5]. The concept of work engagement was proposed by Kahn in 1990; it implies the positive physical, emotional, and cognitive state in workers [6]. It has drawn a lot of attention because of its good effects on workplace performance and adverse effects on turnover and burnout. Nurses with higher work engagement are energetic and enthusiastic about work and are likely to devote themselves fully to their jobs, achieve a better work-life balance, and perform better emotionally, cognitively, and physically [7]. Work and personal factors are correlated to work engagement. Meanwhile, studies indicated that emotions play an important role in work engagement [8]. A high level of work engagement means happiness and satisfaction [6], which are the prerequisites of work engagement.

Emotional intelligence, according to Bar-On [9], includes several non-cognitive talents, competencies, and abilities that affect one's ability to succeed in the face of everyday demands and stresses. It implies the ability to control one's own and others' emotions as well as recognize and use this information to guide one's thoughts and actions [10]. Research shows that individuals with high

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emotional intelligence can take some measures to achieve their goals, which then contributes toward increasing their work engagement [11]. Some authors [12] suggested that people who are not emotionally intelligent cannot deal with their job demands and are more likely to succumb to burnout and lower commitment, thus affecting their well-being at work. The nursing industry is associated with emotional labor, and hence, research on emotional intelligence in this field has become critical. According to one study, emotional intelligence in nurses is currently at a medium level, and emotional intelligence is associated with less stress and greater job satisfaction worldwide [13].

Diener first presented the idea of occupational well-being in 1993. It has five components: how one is treated for welfare, how people interact with one another, how valuable is one's work, how one is managed, and how the nature one's work itself [14]. Occupational well-being denotes experiencing a pleasant psychological state at work, which is closely related to emotional intelligence and work engagement [15]. Emotional intelligence contributes to minimizing the negative outcomes of emotional labor and enhancing occupational well-being. Moreover, occupational well-being boosts nurses' productivity and quality of work while also assisting in the regulation of their negative emotions [16]. However, the relationship between emotional intelligence, occupational well-being, and work engagement among Chinese clinical nurses remains under-explored.

Nurses are susceptible to job burnout because of their heavy workload and irregular working hours. Therefore, it is worth considering ways to improve their work engagement. This study explored the effect of emotional intelligence and occupational well-being on nurses' work engagement and investigated the work engagement predictors.

Methods

Study design

We adopted a cross-sectional descriptive study design, adhering to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.

Participants

Questionnaires were administered to registered clinical nurses (In China, minimum age requirement for registered clinical nurses is 18.) working in a tertiary general hospital in Henan Province from January to March 2023. This study involved 1744 nurses (130 male nurses and 1614 female nurses), who were from several different departments. A convenience sampling method was used to choose the participants from each of the 15 health center departments, including internal medicine, surgery, obstetrics and gynecology, pediatrics, ENT (ear-nose-throat) and ophthalmology, psychiatry, emergency, operating room, and so on. The inclusion criteria were as follows: (1) The participant had to be a registered clinical nurse in China, and (2) the participant had to volunteer to participate and provide accurate and reliable answers. All non-hospital registered on-the-job nurses as well as those who were on vacation, retired, not working in the hospital during the survey, or with psychiatric illnesses were excluded. All the eligible nurses were recruited as participants. The hospitals' relevant management department approved the study and encouraged nurses' participation. All participants received a letter explaining the nature of the study, their rights, and the corresponding precautions. After agreeing to participate, they were asked to fill in the questionnaires by themselves to ensure authenticity. The participation was voluntary and anonymous, and we wanted to ensure that no participant faced stigma.

Data collection

Questionnaires were randomly distributed department-wise through *Wenjuanxing* (a survey platform in China) to ensure honest answers and avoid stigmatizing participants as much as possible. All responses with missing data values or entry errors were excluded. Meanwhile, a minimum of five nurses from the same department were included in the analysis to consider the influence of workplace group Units [17].

Measurements

Demographic characteristics

A self-compiled general demographic questionnaire was once used, and the items enquired about covered age, gender, education level, average monthly income, work department, period of service, marital status, the number of children.

Emotional intelligence

To evaluate the nurses' emotional intelligence, a Chinese version of the self-report Wong and Law Emotional Intelligence Scale (WLEIS) [18] was adopted in this study. The scale contains four dimensions, namely “self-emotional appraisal,” “other's emotions appraisal,” “use of emotions,” and “regulation of emotions.” Each sub-scale has four items. All items are rated on a five-point Likert scale (1- “strongly disagree” to 5- “strongly agree”). The higher the score, the higher the emotional intelligence. The total scale had a Cronbach's α of .93, the CR (composite reliability) was .85, AVE (average variance extracted) was .59 (Supplement Table 1), and this scale was valid and reliable.

Occupational well-being

The occupational well-being scale used in this study was a Chinese version compiled by Chen and Liu [19], which was adopted to evaluate the well-being of Chinese' nurses and has good reliability and validity. It includes five dimensions, namely “welfare treatment,” “interpersonal relationships,” “work values,” “manager,” and “working characteristics.” Each sub-scale has three to five items. All items are evaluated using a five-point Likert scale (1- “strongly disagree” to 5- “strongly agree”), with high scores indicating better occupational well-being. The Cronbach's α score of the total scale was .93, the CR (composite reliability) was .85, AVE (average variance extracted) was .53 (Supplement Table 1), and this scale was valid and reliable.

Work engagement

The shortened Chinese version of the Utrecht Work Engagement Scale (UWES) was used in the current study to calculate the nurses' work engagement [20]. The three dimensions of the scale are “vigor,” “dedication,” and “absorption,” and each sub-scale has three items. All items are evaluated using a five-point Likert scale (1- “strongly disagree” to 5- “strongly agree”). The higher the score, the higher the engagement. The total scale had a Cronbach's α of .87, the CR (composite reliability) was .77, AVE (average variance extracted) was .53 (Supplement Table 1), and this scale was valid and reliable.

Ethical considerations

The Ethical Board of XinXiang Medical University approved this study (number XYLL-20230276). Data confidentiality and anonymity as well as the voluntary participation of all the participants were guaranteed.

Data analysis

The data were first collected and then screened. Subsequently, the SPSS 23.0 version was used for data analysis. Data were expressed as the mean ± SD. The means between two independent groups were compared using the independent sample t-test; multiple groups were compared using one-way analysis of variance (ANOVA), and Pearson's correlations were used to calculate the correlation variables. After testing normality, linearity, and homoscedasticity, hierarchical multiple regression analyses helped identify the contribution of the independent variables to work engagement; ANOVA was used to assess the full regression models. SPSS Amos 26.0 was used to confirmatory factor analysis, and the specific values, significance, reliability, validity, and convergence of each parameter are shown in Supplement Table 1. A difference was considered significant at $p < .05$.

Table 1 *General Characteristics of Respondents by Gender.*

Variable		$N = 1744$	
		Number	percentage
Demographic characteristic	**Gender**		
	Men	130	7.5%
	Women	1614	92.5%
	Age (years)		
	18–30	709	40.7%
	31–50	958	54.9%
	51–60	77	4.4%
	Educational level		
	≤College	354	20.3%
	University	1258	72.1%
	≥Masters	132	7.6%
	Monthly income		
	Less than 3000 Yuan	278	15.9%
	3000–5000 Yuan	825	47.3%
	5000–10000 Yuan	558	32.0%
	Over 10000 Yuan	83	4.8%
Work situation	**Department**		
	Internal medicine department	578	33.1%
	Surgical department	283	16.2%
	Obstetrics and gynecology department	138	7.9%
	Pediatrics department	39	2.2%
	ENT and ophthalmology department	175	10.0%
	Psychiatry department	130	7.5%
	Emergency department	115	6.6%
	Operating room	121	6.9%
	Other departments	165	9.5%
	Length of service		
	Under 5 years	412	23.7%
	5–10 years	489	28.0%
	Over 10 years	843	48.3%
	Job title		
	Nurse practitioner	24	1.4%
	Nurse-in-charge	761	43.6%
	Associate professor of nursing	959	55.0%
	Position		
	General staff	1529	87.7%
	Management	215	12.3%
Household and couple characteristics	**Marriage**		
	Unmarried	451	25.8%
	Married	1274	73.1%
	Divorce	19	1.1%
	Dual-earner couples (excluded unmarried)		
	Yes	704	54%
	No	589	46%
	Number of children (excluded unmarried)		
	0	124	9.6%
	1	697	53.9%
	≥2	472	36.5%

Results

Participants' demographic characteristics

A total of 1744 registered clinical nurses completed the questionnaire. Out of them, 1614 were women (92.5%) and 130 were men (7.5%). They were 18–60 years old; most (48.3%) served in their hospital for over 10 years; 72.1% of them had a bachelor's degree; the average monthly income was RMB 3000-5000 (47.3%). The participants were from many different departments; most (33.1%) were from the internal medicine department; 73.1% of them were married, and 53.9% had 1 child. Table 1 summarizes the information.

Nurses' emotional intelligence, occupational well-being, and work engagement scores

The total score of nurses' emotional intelligence was 50.30 ± 10.15, and the average score was 3.14 ± 0.63. The dimensions ranked in ascending order of their average score are as follows: use of emotions, regulation of emotions, others' emotional appraisal, and self-emotional appraisal (Table 2). The total score of nurses' occupational well-being was 61.07 ± 11.24 and the average score was 3.21 ± 0.59. The dimensions ranked in ascending order of their average score are as follows: working characteristics, managers, interpersonal, welfare treatment, and work value (Table 2). The total score of nurses' work engagement was 28.99 ± 5.46, and the average score was 3.22 ± 0.61. The dimensions ranked in ascending order of their average score are as follows: vigor, dedication, and absorption (Table 2).

Influencing factors of nurses' work engagement

As shown in Table 3, age, monthly income, length of service, job title, position, marriage, dual-earner couples, and the number of children affect nurses' work engagement. Hence, these personal and work factors may be considered as predictors of nurses' work engagement.

Table 2 *Scores of Emotional Intelligence, Occupational Well- Being and Work Engagement ($n = 1744$).*

Variables	The total score Mean ± SD	The average score Mean ± SD
Emotional intelligence	50.30 ± 10.15	3.14 ± 0.63
self-emotion appraisal	12.98 ± 3.24	3.24 ± 0.82
Others' emotion appraisal	12.59 ± 2.85	3.15 ± 0.71
Use of emotion	12.18 ± 2.82	3.04 ± 0.70
Regulation of emotion	12.56 ± 2.70	3.14 ± 0.68
Occupational well-being	61.07 ± 11.24	3.21 ± 0.59
Welfare treatment	13.29 ± 3.35	3.32 ± 0.84
Interpersonal	12.91 ± 2.62	3.23 ± 0.66
Work value	15.76 ± 3.08	3.15 ± 0.62
Managers	9.70 ± 2.20	3.23 ± 0.73
Working characteristics	9.41 ± 1.82	3.14 ± 0.61
Work engagement	28.99 ± 5.46	3.22 ± 0.61
Vigor	9.13 ± 2.05	3.04 ± 0.68
Dedication	9.68 ± 2.09	3.23 ± 0.70
Absorption	10.18 ± 2.07	3.39 ± 0.69

SD = standard deviation.

Correlation analysis of nurses' emotional intelligence, occupational well-being, and work engagement

The correlations between the variables are shown in Table 4. Emotional intelligence, occupational well-being were significantly associated with work engagement. There was a significant positive correlation between work engagement and emotional intelligence ($r = .94$. $p < .01$), a significant positive correlation between work engagement and occupational well-being ($r = .96$. $p < .01$), and a positive correlation between emotional intelligence and occupational well-being ($r = .93$. $p < .01$). The strongly positive relationship between these variables was in line with our hypothesis.

Predictors of work engagement

Table 3 shows that work engagement is notably influenced by most demographic characteristics. Table 4 shows meaningful correlations between work engagement, emotional intelligence, and occupational well-being.

Table 4 *Relationship Between Emotional Intelligence, Work Engagement and Occupational Well-Being (n = 1744).*

Variable	1	2	3
Emotional intelligence	1		
Occupational well-being	.93**	1	
Work engagement	.94**	.96**	1

**$p < .01$.

In a hierarchical multiple regression analysis, age, income, length of service, job title, position, marriage, dual-earner couples, and the number of children were included in Model 1; emotional intelligence was added to Model 2, and occupational well-being was added to Model 3.

Table 5 shows that these demographic variables are dramatically connected with work engagement. The variables of length of service, dual-earner couples and number of children were positively related ($\beta = .24–.34$, $p < .01$, VIF = 1.38–6.01). These factors had the option to represent 29.8% of the change in work engagement (R_2 change = .30, F = 50.33, $p < .001$). Meanwhile, some demographic variables are not dramatically connected with work engagement, such as age, income, considering the reasons may be, in logistic analysis, the model takes confounders into account. In Model 2, the adjust R2-value was expanded to .89, implying that emotional intelligence explained an extra 58.2 % of

Table 3 *Work Engagement Among Nurses with Different Characteristics (n = 1744).*

Variable		The total score Mean (SD)	F/t	*P*
Demographic characteristics	**Age (years)**			
	18–30	28.24 ± 5.58	61.02	<.001 *
	31–50	29.42 ± 5.36		
	51–60	30.62 ± 4.58		
	Educational level			
	≤College	30.00 ± 5.02	1.21	.297
	University	28.74 ± 5.54		
	≥Masters	28.50 ± 0.50		
	Income			
	Less than 3000 Yuan	28.18 ± 5.88	16.87	<.001 *
	≥3000, <5000 Yuan	29.46 ± 5.32		
	≥5000, <10000 Yuan	28.65 ± 5.63		
	Over 10000 Yuan	29.34 ± 4.48		
Work situation	**Department**			
	Internal medicine department	28.56 ± 5.94	1.31	.118
	Surgical department	29.75 ± 4.64		
	Obstetrics and gynecology department	29.04 ± 5.70		
	Pediatrics department	25.92 ± 8.31		
	ENT and ophthalmology department	29.69 ± 4.57		
	Psychiatry department	29.21 ± 4.40		
	Emergency department	29.43 ± 5.19		
	Other departments	28.83 ± 5.39		
	Length of service			
	Less than 5 years	27.56 ± 5.90	183.78	<.001 *
	≥5, <10 years	29.31 ± 5.02		
	Over 10 years	29.51 ± 5.36		
	Job title			
	Nurse practitioner	28.49 ± 5.68	7.35	<.001 *
	Nurse-in-charge	29.30 ± 5.34		
	Associate professor of nursing	30.77 ± 3.18		
	Position			
	General staff	28.91 ± 5.59	35.80	<.001 *
	Management	29.74 ± 4.09		
Household and couple characteristics	**Marriage**			
	Unmarried	28.55 ± 5.83	164.37	<.001 *
	Married	29.13 ± 5.35		
	Divorce	30.79 ± 3.35		
	Dual-earner couples (excluded unmarried)			
	Yes	29.53 ± 5.35	2.63	.009*
	No	28.73 ± 5.26		
	Number of children (excluded unmarried)			
	0	26.64 ± 6.17	18.31	<.001 *
	1	29.86 ± 4.61		
	≥2	28.78 ± 5.81		

Note: SD: standard deviation.

the variance connected to work engagement (R_2 change = .59, F = 842.08, $p < .001$, VIF = 1.46). In Model 3, the R_2-value was expanded to .94, implying that occupational well-being explained an extra 4.9% of the variance connected to work engagement (R_2 change = .05, F = 1478.92, $p < .001$, VIF = 7.99). The results further indicated that emotional intelligence and occupational well-being had notably positive associations with work engagement.

Discussion

Since the most current fitness reform, the Chinese Ministry of Health has been struggling to boost techniques to decrease the nursing turnover rate and provide improved care. Work engagement has been empirically proven to affect nursing performance, with a consequent effect on healthcare outcomes [21].

In this study, the overall score of nurses' work engagement was 28.99 ± 5.46. Compared to nurses' engagement reported in some other countries [22,23], the suggested rating we observed was once notably low, which may be associated with the heavy workload on registered scientific nurses in China. As to the three components of work engagement, absorption had the absolute best score, accompanied by dedication and vigor. The lowest score of vigor indicated emotional exhaustion, and this may increase the nurses' turnover rate [24], which might be of interest to healthcare organizations.

This study also showed that nurses younger than 30 years old, with monthly income less than RMB 3000, service less than 5 years, and who were junior professionals had lower work engagement scores. These findings are in line with some preceding reports, whereas they contradict others [23,25]. The results may be related to the shorter duration of service, lack of work experience, and lower emotional intelligence to handle high-pressure work. Additionally, nurses who were married, had a child, and had earning partners (dual-earner couples) scored higher in work engagement, which is consistent with previous research reports [26]. A possible explanation is that these nurses have a relatively stable family environment and a high level of emotional intelligence.

Through further study, following what we expected, work engagement was positively correlated with emotional intelligence. Nursing is an emotionally labor-intensive industry [27]. Continuous and excessive emotional labor is more demanding physically and mentally, and if this is not timely dealt with, it will decrease occupational well-being, thus affecting work engagement and even causing burnout [28,29]. Correcting the nurses' emotional regulation is key to improving their occupational well-being and increasing their work engagement, which is an important determinant of nursing quality and patient safety outcomes [13].

Similar to previous studies [30], there used to be a strong high-quality correlation between occupational well-being and emotional intelligence among Chinese registered clinical nurses. The higher the emotional intelligence, the better the control and perception of others' emotions. When they face stress and complex situations, they may be good at adjusting their emotions and avoiding

Table 5 *Predictors of Work Engagement of Chinese Registered Nurses (n = 1744).*

Predictors	Model 1				Model 2				Model 3			
	B	SE	β	p	B	SE	β	p	B	SE	β	p
Age												
18–30 = 1												
30–50 = 2	−1.29	.41	−.12	.002**	−3.25	.16	−.30	.048*	−0.25	.12	−.22	.047*
50–60 = 3	1.62	.69	.06	.018*	−0.45	.28	−.17	.106	−0.22	.21	−.01	.300
Income												
Less than 3000 Yuan = 1												
3000–5000 Yuan = 2	0.70	.33	.06	.032*	−0.15	.13	−.14	.245	−0.06	.10	−.00	.563
5000–10000Yuan = 3	0.42	.38	.04	.264	−0.42	.15	−.36	.006**	−0.20	.16	−.02	.083
Over 10000 Yuan = 4	0.94	.62	.04	.126	−0.53	.25	−.02	.033*	−0.22	.19	−.01	.241
Length of service												
Under 5 years = 1												
5–10 years = 2	2.68	.40	.22	<.001**	−0.54	.16	−.44	.001**	−0.34	.12	−.03	.005**
Over 10 years = 3	3.29	.54	.30	<.001**	−0.26	.22	−.24	.230	−0.31	.17	−.03	.062
Job title												
Nurse practitioner = 1												
Nurse-in-charge = 2	0.53	.34	.05	.124	0.59	.14	.05	<.001**	0.38	.10	.04	<.001**
Associate professor of nursing = 3	0.43	.78	.02	.582	0.09	.32	.00	0.767	0.29	.24	.01	.231
Position												
General staff = 1												
Management = 2	−0.49	.04	−.03	.263	0.00	.18	.00	.997	0.09	.13	.01	.522
Marriage												
Unmarried = 1												
Married = 2	1.41	.44	.11	.002**	−0.35	.18	−.03	.052	−0.27	.14	−.02	.049*
Divorce = 3	2.02	1.17	.04	.082	−0.51	.47	−.10	.274	0.31	.35	.01	.375
Dual-earner couples												
No = 1												
Yes = 2	2.62	.27	.24	<.001**	0.12	.11	.01	<.290	−0.20	.08	.00	.806
Number of children												
0 = 1												
1 = 2	1.85	.50	.09	<.001**	0.14	.20	.01	.493	0.17	.15	.001	.256
≥2 = 3	3.74	.29	.34	<.001**	0.16	.12	.02	.182	0.09	.09	.001	.331
Emotional intelligence					0.50	.01	.93	<.001**	0.18	.01	.34	<.001**
Occupational well-being									0.31	.01	.63	<.001**
R^2 (change in R^2)	.30				.89				.94			
Adjust R^2	.30				.59				.05			
F (*p*)	50.33 (<.001)				842.08 (<.001)				1478.92 (<.001)			
F change (*p*)	50.33 (<.001)				8851.70 (<.001)				1326.60 (<.001)			

Note: SE = standard error.
*$p < .05$.
**$p < .01$.

negative behaviors. Therefore, this may reduce conflicts at work, enhancing occupational well-being and then increasing work engagement. Our results indicated that emotional intelligence can, directly and indirectly, affect nurses' work engagement.

Work engagement is closely related to the quality of nursing services and patient safety outcomes, which is of great concern to healthcare organizations. Hence, we further investigated the predictors of work engagement in the context of Chinese registered clinical nurses. Out of all the demographic variables, age, monthly income, duration of service, job title, position, marriage, dual-earner couples, and the number of children are predictors of work engagement, which is partly consistent with others' research [25]. We noticed that emotional intelligence was a significant positive predictor of work engagement, which increased the variance related to work engagement to 67.2%; this is in line with previous studies [31]. Our results indicated that the emotional intelligence score of Chinese registered clinical nurses was lower than in some other countries; emotional intelligence can subsequently be viewed as a potential intervention for expanding nurses' work engagement by rectifying emotional regulation. Further, we added occupational well-being, which increased the variance connected to work engagement by an additional 4.9%. Previous studies showed that there is also room for further improvement in nurses' occupational well-being [32], which would then increase nurses' work engagement.

In summary, healthcare organizations must increase nurses' work engagement, and emotional intelligence is a dramatically positive predictor of work engagement. Nurses' emotional intelligence may be developed through immersive scenario simulation training methods to implement a sequence of psychological or emotional experiences, which was close to the real scene, and could continue to improve the effective communication skills of nurses [33]. Another suggestion would be to strengthening the training of nurses' non-verbal communication skills [34]. This would help them become more proficient at using body language to convey emotions and improve their communication skills. Enhancing nurses' clinical communication and emotional management abilities can lessen job stress and enhance the standard of nursing care [33,34].

China's healthcare system is undergoing reform, and the shortage of nurses and their high turnover rate lead to the poor quality of nursing. Therefore, improving the work engagement of nurses and then improving the quality of care needs attention. To solve this problem, it is suggested that healthcare organizations should train nurses in communication skills, improve their ability to control and perceive emotions, and increase their occupational well-being.

Limitations

This study has some limitations. First, similar to all survey-based research, limitations are intrinsic because of choice and reaction inclination. Second, the members were from a specific locale in China, and the results may not mirror what is happening in the entire country. Third, the study was cross-sectional. Hence, future research ought to hire a longitudinal graph to verify the findings and investigate the causality of relationships.

Conclusion

The findings of this study revealed that the score of nurses' work engagement is lower than in some other countries, especially in terms of vigor, which may be related to the high turnover of nurses in China. Emotional intelligence and occupational well-being are positive predictors of work engagement in China. Thus, healthcare organizations need to train nurses to improve their emotional skills and then further increase their work engagement. Finally, a decreased rate of nurse turnover would improve nursing quality and patient safety outcomes.

Ethical approval

This study was approved by the local ethics committee (number XYLL-20230276). Obtained permission from the hospital to issue research questionnaires and conducted anonymous surveys. All participants in the study are voluntary participation. Meanwhile, all methods were performed in accordance with the STROBE guidelines and XinXiang Medical University Ethics Committee regulations.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Author contributions

Z.Z.H designed the content of this study, Z.Z.H, G.X.L and Z.T. wrote the main manuscript text, Z.T., G.X.L., D.M.X., and H.R. drew the tables. W.L.N. participated in data collection and made adjustments to the format of the manuscript. The manuscript was examined by all the authors, and all authors are responsible for the content and have approved this final version of the manuscript.

Declaration of competing interest

The authors declared that they have no conflicts of interest to this work. We declare that we do not have any commercial or associative interest that represents a conflict of interest in connection with the work submitted.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.anr.2024.07.003.

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Research Article

Latent Class Analysis on Suicide-related Behavior and Associated Factors in Korean Adolescents

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SUMMARY

Purpose: This study aimed to analyze the latent class of suicide-related behaviors among Korean adolescents and identify related factors.
Methods: This study used 2021 Korean Youth Risk Behavior Web-Based Survey data and analyzed 7300 participants using latent class analysis.
Results: Suicide-related behaviors were categorized into four classes: suicide ideation only (Class 1), suicide plan without ideation or attempt (Class 2), suicide attempt with ideation and plan (Class 3), and suicide attempt without ideation or plan (Class 4). Sexual intercourse experience, habitual drug use experience, and hospital treatment experience due to violence, which were set as risky behavior-related variables, were found to be factors influencing Class 3. However, these variables were not statistically significant factors affecting those belonging to Class 2 and Class 4.
Conclusion: The findings emphasize the necessity of understanding the variances in suicide-related behaviors among adolescents to tailor interventions effectively. Adolescents who plan and attempt suicide despite having low levels of suicidal ideation exhibited high levels of stress and a tendency for sadness and despair compared to the suicide attempt with the ideation and plan group. These insights underscore the importance of addressing psycho-emotional factors and developing intervention strategies that cater specifically to the nuanced needs of each group to prevent potential suicide attempts.

Introduction

According to the United Nations International Children's Emergency Fund (UNICEF)'s “The State of the World's Children 2021” report, approximately 46,000 adolescents take their own lives worldwide annually. According to this report, suicide is one of the top five causes of youth death worldwide, and more than one youth takes their own life every 11 min, raising global concerns about youth suicide [1].

In Korea, the number one cause of death among adolescents for 10 consecutive years is suicide, and the number of adolescent suicides has been steadily increasing since 2017, and the suicide rate among adolescents is higher than that of adults [2,3]. In addition, in recent years, psychological anxiety and emotional isolation have deepened due to COVID-19, and depression and risk factors are increasing throughout society as loss of hope and despair for the future among young people in Korean society have become problems. Domestic and foreign experts predict the possibility of an increase in suicide in 2–3 years [4]. In this situation, adolescents are less able to cope with stress than adults and may be more negatively affected [5]. The number of suicide and self-harm counseling cases reported to national youth counseling and welfare centers and youth cyber counseling centers is continuously increasing [6], so it can be said that it is a time when more attention and intervention on youth suicide is needed. Korea's government carries out various policy support and service projects to protect adolescents' mental health. In order to understand the mental health status of adolescents and establish policies for adolescents' mental health prevention and intervention, the government regularly conducts the Korean Youth Risk Behavior Web-Based Survey (KYRBS), Adolescent Mental-health Problem-behavior Questionnaire, and Youth Statistics, and each ministry carries out child and youth mental health projects. Various policies and support projects

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are being implemented, such as student health management projects, at-risk youth projects, and infrastructure expansion, to improve the quality of youth mental health services and strengthen accessibility [5].

In addition, many studies have been conducted to provide evidence-based interventions for adolescent suicide. Previous research has attempted to identify variables that can predict suicide in adolescents, and research results have shown that the predictors include psychological factors such as depression and anxiety [7], most of which are consistent with developmental and environmental factors such as the family's economic status, abuse, or neglect [8,9].

Previous studies have mostly used regression analysis with a single group to identify predictors. The regression analysis results are interpreted as common predictive factors applied to the youths under study; however, this does not reflect individual characteristics. To overcome this problem, latent class analysis (LCA) has recently been attempted to identify detailed types of suicidal behaviors among adolescents analyzed as a single group. The classification of detailed types of suicidal behavior can be useful as a basis for developing systematic and professional services for each type or for establishing customized policies [10].

LCA is a method of discovering heterogeneous characteristics in an individual's response pattern and classifying it by determining the probability that the response belongs to each class of the behavior pattern of similar individuals [11]. Cluster analysis is similar to LCA in that it classifies classes, but has the problem that the researcher must specify the existence of subgroups in advance and the number of these cannot be statistically verified. However, LCA has the advantage that the number of extracted classes is determined through data, the standards for latent classes are statistically verified, and model fit statistics are provided [12].

The LCA applies the minimum ratio of the number of cases per group to the sample to evaluate the practical usefulness of the latent class. Jung and Wickrama considered all classes at least 5% of the sample number [13]. Berlin et al [14] found that if the proportion of the latent class was less than 5% or less than 25 people, it was considered a latent class that occurred by chance with a high probability.

However, Hill believed that comparison by class is possible if it is more than 1% of the sample number [15]. In counseling and clinical fields that study special aspects of human behavior, there is interest in whether even a minority group of approximately 1% appears as a qualitatively distinct group [16]. The KYRBS, conducted in Korea, surveys by selecting 50,000 people every year through a sampling design, with the target population being teenagers in the first year of middle school to the third year of high school. In these data, 1% is the sample size of approximately 500 people, and groups of less than 500 people can be classified as non-significant classes in the LCA. However, when it comes to adolescent suicide-related behavior, those that account for less than 1% of the total are samples that cannot be overlooked and provide very useful information. Therefore, using the KYRBS to categorize suicidal behavior among Korean adolescents and identify related factors, this study aimed to analyze only adolescents who had experienced suicidal thoughts, suicide plans, or suicide attempts. Through this, we intend to identify a small number of meaningful potential types of suicide-related behaviors, further subdivide the types of youth suicide-related behaviors, and use it as basic data for customized interventions by type through the confirmation of related factors. The specific objectives of this study were as follows:

First, the participants' general, risky behavior-related, psycho-emotional characteristics were examined. Second, identify the latent class of youth suicide-related behavior. Third, identify predictive factors according to latent class.

Methods

Study design and participants

This study is a secondary data analysis using data from the 2021 KYRBS. The KYRBS has collected data annually from the Korea Centers for Disease Control and Prevention (KDCA) and the Ministry of Education since 2005 to identify adolescents' health behaviors and calculate health indicators. Adolescents from their first year of middle school to their third year of high school across the country were used as the population, and samples were extracted by stratifying and distributing them. Region and school levels were used as stratification variables, and the sample was distributed among 400 middle schools and 400 high schools, totaling 800 schools. Stratified cluster sampling was used with schools as the primary and classes as the secondary sampling units. In 2021, COVID-19 was prevalent, and a self-reported online survey was conducted. The teacher of the selected school moved the students to the school's computer room with internet access, assigned one computer to each student, and randomly assigned them to seats. The person in charge of the survey explained the need for the survey and how to participate, and students who agreed to participate accessed the KDCA online site and participated in the survey anonymously. The survey was conducted from August 1 to November 30, 2021, and 54,848 participants responded. In this study, of the 7335 participants who responded “yes” to one or more questions about suicidal ideation, suicide plans, and suicide attempts, 35 participants with missing values were excluded, and the final 7300 participants were analyzed.

Measures

Sociodemographic characteristics

The participants' sociodemographic characteristics included age, grade, sex, family economic status, and academic performance. The family's economic status was classified on a 5-point scale, with 1 point being “low,” 2 points being “low middle,” 3 points being “medium,” 4 points being “medium high,” and 5 points being “high.” Academic performance over the past 12 months was categorized into 1 point as “low,” 2 points as “low intermediate,” 3 points as “intermediate,” 4 points as “high intermediate,” and 5 points as “high.”

Risky behavior-related characteristics

Participants’ risky behavior-related characteristics included smoking experience, alcohol consumption experience in the past month, sexual intercourse experience, habitual drug use experience, and hospital treatment experience due to violence.

Smoking experience was categorized into “yes” and “no” to the question, “Have you ever used regular cigarettes, liquid-type electronic cigarettes, or cigarette-type electronic cigarettes?” Alcohol consumption experience in the past month was categorized into “yes” and “no” in response to the question, “Have you ever drank alcohol in the last 30 days?” Regarding sexual experience, the question “Have you ever had sexual intercourse?” was categorized as “yes” or “no.” Habitual drug use experience was categorized as “yes” or “no” in response to the question, “Except for treatment purposes, have you used any drugs or substances habitually?” Experience of hospital treatment due to violence was answered as “yes” or “no” to “In the last 12 months, have you ever received treatment at a hospital because you were a victim of violence (physical assault, threats, bullying, etc.) by a friend, senior, or adult?” Changes in smoking and alcohol consumption after COVID-19 were classified on a 5-point scale, with 1 point indicating “very decreased” and 5 points indicating “very increased” compared with before the COVID-19 pandemic.

Psycho-emotional characteristics

Psycho-emotional characteristics of the participants included changes in perceived stress, experience of loneliness, experience of sadness or despair, and depression due to COVID-19.

Stress perception was assessed on a 5-point scale from 1 (“I do not feel stress at all”) to 5 (“I feel very much stress”) in response to “How much stress do you feel daily?” The experience of loneliness was assessed on a 5-point scale ranging from 1 (“I never felt lonely”) to 5 (“I always felt lonely”) in response to the question, “How often have you felt lonely in the last 12 months?” The experience of sadness or despair was categorized into “none” and “yes” in response to the question, “During the last 12 months, have you ever felt so sad or hopeless that you stopped your daily life for two whole weeks?” Changes in depression after COVID-19 were classified on a 5-point scale, with 1 point indicating “very decreased” and 5 points indicating “very increased” compared with before the COVID-19 pandemic.

Suicide ideation, plan, and attempt

If respondents answered “yes” to the question, “During the last 12 months, have you ever seriously thought about suicide?” suicide ideation was assessed as “yes.” If respondents answered “yes” to the question, “During the last 12 months, have you ever made a specific plan to commit suicide?” Suicidal plan was assessed as “yes.” If the respondents answered “yes” to the question “Have you attempted suicide in the last 12 months?”, suicide attempt was assessed as “yes.”

Data analysis

This study was analyzed in the following order according to the research purpose using Mplus 8.5 and SPSS 26.0. First, the frequency, percentage, mean, and standard deviation of the participants' sociodemographic characteristics, risky behaviors, and psycho-emotional characteristics were calculated. Second, latent classes were identified according to participants' suicide-related behavior types. This method classifies the population by probability; that is, the individual belongs to a cluster with a certain probability, and is ultimately assigned to that with the highest posterior probability [17]. To determine the latent classes, the Akaike information criterion (AIC), Bayesian information criterion (BIC), sample size-adjusted BIC (saBIC), Entropy, Lo-Mendell Likelihood Ratio Test (LMR), and bootstrap likelihood ratio test (BLRT) were used. For AIC and BIC, smaller values indicate better fit [18] and entropy is an index that confirms the quality of classification, and the closer it is to 1, the better the classification [19]. To compare the derived latent class models, LMR and BLRT provide *p*-values to verify the difference between the k (alternative hypotheses) and k-1 (null hypotheses) latent group models; when statistically significant, k (alternative hypotheses), the model is supported [20].

Third, a difference test was conducted using the chi-square test and ANOVA on each latent class's sociodemographic, risky behavior-related, and psycho-emotional characteristics. Fourth, a multinomial logistic regression analysis was conducted to identify the associated factors for each latent class by inputting sociodemographic, risky behavior-related, and psycho-emotional characteristics.

Ethical consideration

This study was confirmed as an Exempt Research Project by the Institutional Review Board of the X University (Approval no.: Not Applicable).

Results

Participants' sociodemographic, risky behavior-related, and psycho-emotional characteristics and suicide-related behavior

The participants' sociodemographic, risky behavior-related, and psycho-emotional characteristics are presented in (Table 1). The average age of the subjects was 15.00 ± 1.73 years, and 20.0% were second-year middle school students, 18.8% were first-year middle school students, and 18.7% were third-year middle school students. Sex was female at 61.4%, and economic status was “Medium” at 45.8%, followed by “Medium high” at 25.8%. Academic grades were “intermediate” at 28.0% and “low intermediate” at 24.8%.

Regarding risky behavior-related characteristics, 18.3% had smoking experience, and 17.3% had alcohol consumption experience in the past month. Of those who had experienced sexual intercourse, 9.5%, those who had habitual drug use and 2.1%, and those who had experienced hospital treatment due to violence were 4.7%. The change in smoking due to COVID-19 was 2.68 ± 0.81 points out of 5, and the change in alcohol consumption was 2.74 ± 0.83 points.

Regarding psycho-emotional characteristics, the average score for perceived stress was 1.93 ± 0.85 out of 5, and the average score for experience of loneliness was 3.43 ± 1.00 out of 5. A total of 70.2% of the participants experienced sadness or despair. The change in depression owing to COVID-19 was 3.85 ± 0.93 points.

A total of 94.9% of the participants had suicidal ideation, 29.9% had suicide plans, and 16.9% had attempted suicide.

Latent classes of adolescent suicide-related behaviors

Latent classes of adolescent suicide-related behaviors were identified (Table 2). When the groups were divided into five groups (Group 5), LMR and BLRT were not significant. LMR and BLRT were significant when groups were divided into three (Group 3) and four (Group 4), while the final grouping (4 groups) had the lowest AIC, BIC, and saBIC values. The entropy was close to 1; therefore, the quality of the classification was considered good. One group accounts for 2.5% of the group; however, based on previous research, we evaluated that it has practical usefulness for the potential class. Therefore, class counts (for the latent classes based on the estimated model) were estimated to be 185.85 and considered appropriate, and Group 4 was selected as the final model. The estimated probability distribution in Group 4 was 81.8%, 4.2%, 11.5%, and 2.5% for Class 1, 2, 3, and 4, respectively.

The characteristics of each latent class are shown in Figure 1. Class 1 was named the “Suicidal Ideation Only Group” because suicidal ideations were high, suicide plans were low, and the probability of a suicide attempt was low. Class 2 was named the “Suicide Plan without Ideation or Attempt Group” because the conditional probability values for suicidal ideation and attempts were low, and suicide plans were high. Class 3 was named the “Suicide Attempt with Ideation and Plan Group” because the conditional probability values for suicidal ideation, plans, and attempts were high. Class 4 had a medium conditional probability of suicidal ideation, the suicide plan was low, and the probability of suicide attempt was high; therefore, it was named the “Suicide Attempt without Ideation or Plan Group.”

Differences in variables and associated factors by latent class

The actual proportion by group was 84.3%, 3.8%, 10.6%, and 1.4% for Class 1, 2, 3, and 4, respectively. According to latent class, there were statistically significant differences in grade, sex, economic status, academic performance, smoking experience, alcohol

Table 1 *The Socio demographic, Risky Behavior-Related, Psycho-Emotional Characteristics, and Suicide-Related Behavior of Participants (N = 7300).*

Characteristics		Categories	*N*(%) or M ± SD
Socio demographic	Age		15.00 ± 1.73
	Grade	Middle school 1	1374 (18.8)
		Middle school 2	1457 (20.0)
		Middle school 3	1367 (18.7)
		High school 1	1030 (14.1)
		High school 2	1122 (15.4)
		High school 3	950 (13.0)
	Gender	Men	2819 (38.6)
		Women	4481 (61.4)
	Economic status	Low	323 (4.4)
		Low middle	1066 (14.6)
		Medium	3344 (45.8)
		Medium high	1882 (25.8)
		High	685 (9.4)
	Academic performance	Low	1010 (13.8)
		Low intermediate	1813 (24.8)
		Intermediate	2045 (28.0)
		High intermediate	1589 (21.8)
		High	843 (11.6)
Risky behavior-related	Smoking	Yes	1333 (18.3)
		No	5967 (81.7)
	Alcohol consumption in the past month	Yes	1264 (17.3)
		No	6036 (82.7)
	Sexual intercourse experience	Yes	696 (9.5)
		No	6604 (90.5)
	Habitual drug use experience	Yes	154 (2.1)
		No	7146 (97.9)
	Hospital treatment due to violence	Yes	346 (4.7)
		No	6954 (95.3)
	Changes in smoking after COVID-19		2.68 ± 0.81
	Changes in alcohol consumption after COVID-19		2.74 ± 0.83
Psycho-emotional	Perceived stress		1.93 ± 0.85
	Loneliness		3.43 ± 1.00
	Sadness or despair	Yes	5124 (70.2)
		No	2176 (29.8)
	Changes in depression due to COVID-19		3.85 ± 0.93
Suicide-related behavior	Ideation	Yes	6929 (94.9)
		No	371 (5.1)
	Plan	Yes	2182 (29.9)
		No	5118 (70.1)
	Attempt	Yes	1232 (16.9)
		No	6068 (83.1)

M = mean; SD = standard deviation.

Table 2 *Potential Class Fit for Participants.*

Number of groups	AIC	BIC	aBIC	Entropy	LMR	BLRT	Latent class distribution rate(%)[a]				
							1	2	3	4	5
1	18642.27	18662.98	18653.44	-	N/A	N/A	100.0				
2	17229.33	17277.63	17255.39	0.68	<0.001	<0.001	58.2	41.8			
3	17036.12	17112.03	17077.07	0.92	<0.001	<0.001	75.6	17.0	7.4		
4	16907.54	17011.05	16963.38	0.90	<0.001	<0.001	81.8	4.2	11.5	2.5	
5	16915.54	17046.65	16986.27	0.51	0.49	0.49	35.9	35.7	19.1	6.5	2.8

AIC = Akaike information criterion; aBIC = sample-size adjusted Bayesian information criterion; BIC = Bayesian information criterion; BLRT = bootstrap likelihood ratio test; LMR = Lo-Mendell Likelihood Ratio Test.

[a] Proportions for the latent classes based on the estimated model.

consumption experience in the past month, sexual intercourse experience, habitual drug experience, hospital treatment experience due to violence, change in alcohol consumption after COVID-19, perceived stress, experience of loneliness, experience of sadness or despair, and changes in depression after COVID-19 (Table 3).

Regarding sociodemographic characteristics, the proportion of women was high in Classes 1 and 3, whereas the proportion of men was high in Classes 2 and 4. The economic statuses of Classes 2 and 4 were higher than those of Classes 1 and 2, respectively. Among the variables related to risky behavior, smoking, alcohol consumption experience in the past month, sexual intercourse experience, and hospital treatment experience due to violence had the highest proportion in Class 3 and the lowest in Class 4. Habitual drug use was highest in Class 3 and lowest in Class 2. Changes in alcohol consumption after COVID-19 were significantly higher in Classes 1 and 3 than in Class 4. Regarding psycho-emotional variables, perceived stress was highest in Classes 2 and 4, followed by Classes 3 and 1. The experience of loneliness was highest in Class 3, followed by Classes 1, 2, and 4. The rate of experiencing sadness or despair was high in Classes 2 and 4. The change in depression after COVID-19 was the highest in Class 3, followed by Class 1, and lowest in Classes 2 and 4 (Table 3).

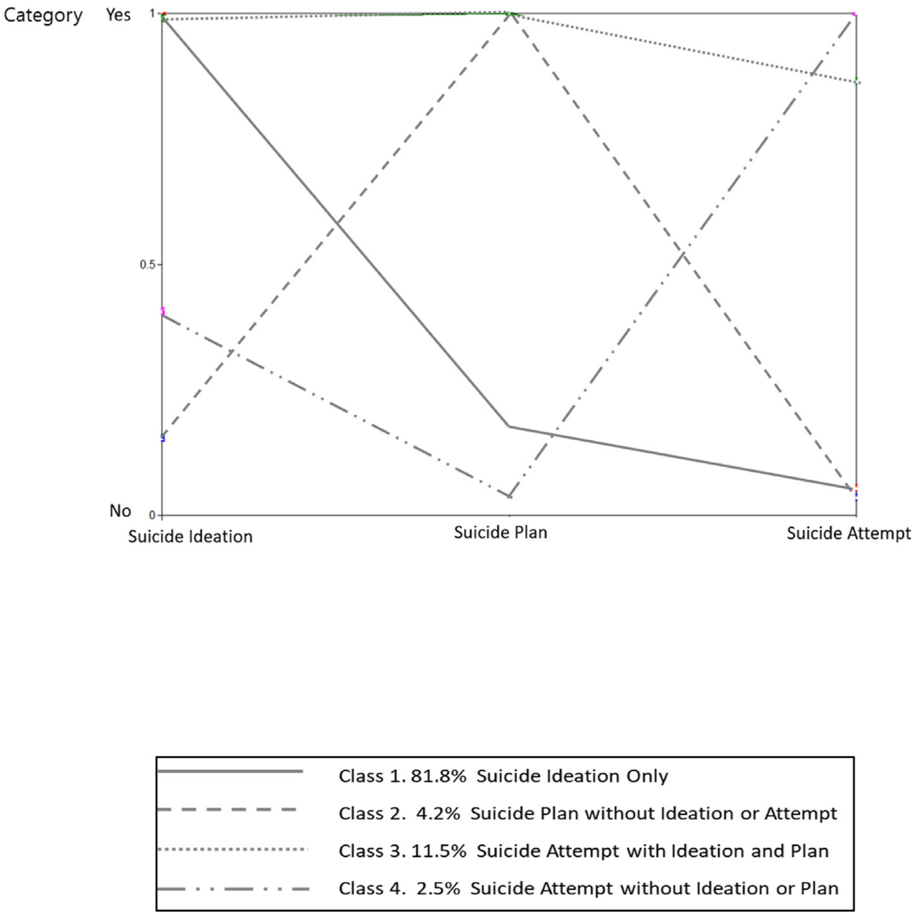

Figure 1. Latent class analysis on suicide-related behavior.

To confirm the associated factors for each latent class, a multinomial logistic regression analysis was conducted by inputting all factors, and the regression model was significant ($\chi^2 = 800.20$, df = 45, $p < .001$) (Table 3).

When comparing Class 2 with Class 1 as the reference group, alcohol consumption in the past month (OR = 1.66, $p = .008$), perceived stress (OR = 1.59, $p < .001$), experience of loneliness (OR = 0.75, $p < .001$), experience of sadness or despair (OR = 2.59, $p < .001$), and changes in depression after COVID-19 (OR = 0.84, $p = .017$) were significant.

When comparing Class 3 with Class 1 as the reference group, grade (OR = 0.92, $p = .001$), economic status (OR = 0.91, $p = .020$), and smoking experience (OR = 1.35, $p = .005$), alcohol consumption experience in the last month (OR = 1.40, $p = .002$), sexual intercourse experience (OR = 1.85, $p < .001$), habitual drug use experience (OR = 1.92, $p = .001$), hospital treatment experience due to violence (OR = 2.89, $p < .001$), perceived stress (OR = 0.88, $p = .019$), experience of loneliness (OR = 1.40, $p < .001$), and experience of sadness or despair (OR = 0.46, $p < .001$) were significant.

When comparing Class 4 with Class 1 as the reference group, sex (OR = 0.64, $p = .031$), smoking experience (OR = 0.38, $p = .020$), and change in smoking after COVID-19 (OR = 1.89, $p = .018$), changes in alcohol consumption after COVID-19 (OR = 0.49, $p = .006$), perceived stress (OR = 1.52, $p < .001$), experience of loneliness (OR = 0.76, $p = .010$), and experience of sadness or despair (OR = 2.52, $p < .001$) was significant.

Discussion

This study identified four latent classes of suicide-related behaviors among Korean adolescents using data from the KYRBS conducted in 2021 and explored associated factors for each class. Studies on LCA of suicide among Korean adolescents have identified characteristics of subtypes of suicidal thoughts or behavior [18,21–23] research on dividing the increase and decrease in suicidal impulses over time into subgroups [24–26], and research on the trajectory of suicidal thoughts [21,23,27,28].

Previous research on Korean adolescent suicide has only focused on individual suicidal thoughts or behaviors, only a few studies have been conducted after 2020. However, this study is significant because it considers the complexity of suicide and identifies different types of suicide. We only classified latent classes for samples with at least one suicidal ideation, suicide attempt, or suicide plan. This resulted in 268 and 104 participants in the suicide plan without ideation or attempt and suicide attempt without ideation or plan groups, respectively, which is less than 1% of the total sample size. However, the importance of suicide plans and attempts cannot be overlooked.

Suicidal ideation do not always lead to suicide attempts, according to research. While it is common for suicidal ideation to precede attempts, there is evidence that not all attempts are accompanied by suicidal ideation [29]. A representative example is non-suicidal self-injury (NSSI), which is generally defined in comparison with suicidal behavior. The criteria for distinguishing

Table 3 *Latent Class on Suicide-related Behavior and Associated Factors (N = 7300).*

Characteristics	Class 1 (*n* = 6157, 84.3%)	Class 2 (*n* = 268, 3.8%)	Class 3 (*n* = 771, 10.6%)	Class 4 (*n* = 104, 1.4%)	F or χ^2	Comparison group (Ref = class 1)		
						Class 2	Class 3	Class 4
						OR (95% CI)	OR (95% CI)	OR (95% CI)
Grade	3.28 (1.67)	2.99 (1.70)	3.26 (1.69)	3.05 (1.67)	3.14*	0.93 (0.86–1.01)	0.92 (0.87–0.97)**	0.99 (0.88–1.13)
Sex (ref = male)	61.7%	48.9%	65.4%	44.2%	36.04***	0.84 (0.65–1.09)	1.18 (1.00–1.39)	0.64 (0.43–0.96)*
Economic status	3.22 (0.93)^{a}	3.35 (0.99)^{b}	3.08 (1.12)^{c}	3.32 (0.93)^{d}	7.75*** (b,d > a,c)	1.11 (0.96–1.28)	0.91 (0.84–0.99)**	1.07 (0.86–1.35)
Academic performance	2.94 (1.21)	2.97 (1.18)	2.80 (1.27)	2.95 (0.09)	3.11*	0.97 (0.86–1.08)	0.99 (0.92–1.06)	0.95 (0.80–1.14)
Smoking (ref = no)	17.0%	17.9%	30.0%	7.7%	85.19***	1.09 (0.75–1.60)	1.35 (1.10–1.66)**	0.38 (0.17–0.86)**
Alcohol consumption (ref = no)	15.9%	18.7%	28.7%	14.4%	79.11***	1.66 (1.14–2.40)**	1.40 (1.14–1.73)**	1.73 (0.95–3.16)
Sexual intercourse experience (ref = no)	8.3%	8.2%	20.6%	3.8%	125.24***	1.02 (0.62–1.68)	1.85 (1.47–2.34)***	0.60 (0.21–1.74)
Habitual drug use experi ence (ref = no)	1.8%	0.7%	5.6%	1.0%	51.74***	0.53 (0.13–2.25)	1.92 (1.30–2.84)**	0.95 (0.13–7.11)
Hospital treatment due to violence (ref = no)	3.6%	5.6%	13.5%	2.9%	148.49***	1.30 (0.73–2.32)	2.89 (2.21–3.78)***	0.88 (0.27–2.86)
Changes in smoking after COVID-19	2.70 (0.77)	2.63 (0.93)	2.77 (1.01)	2.58 (0.93)	1.52	1.07 (0.78–1.47)	0.94 (0.81–1.09)	1.89 (1.12–3.20)*
Changes in alcohol consumption after COVID-19	2.75 (0.80)^{a}	2.63 (0.93)^{b}	2.77 (1.01)^{c}	2.58 (0.93)^{d}	3.39* (a,c > d)	0.84 (0.61–1.15)	0.97 (0.84–1.12)	0.49 (0.29–0.81)**
Perceived stress	1.92 (0.82)^{a}	2.51 (0.99)^{b}	1.72 (0.88)^{c}	2.48 (0.90)^{d}	76.16*** (b,d > c > a)	1.59 (1.37–1.84)***	0.88 (0.79–0.98)**	1.52 (1.21–1.91)***
Loneliness	3.41 (0.97)^{a}	2.81 (1.13)^{b}	3.87 (0.99)^{c}	2.79 (1.08)^{d}	102.30*** (c > a > b,d)	0.75 (0.65–0.85)***	1.40 (1.28–1.54)***	0.76 (0.61–0.94)*
Sadness or despair (ref = no)	30.0%	61.9%	12.3%	62.5%	298.22***	2.59 (1.98–3.38)***	0.46 (0.37–0.58)***	2.52 (1.65–3.85)***
Changes in depression due to COVID-19	3.85 (0.90)^{a}	3.35 (1.03)^{b}	4.04 (1.05)^{c}	3.34 (1.08)^{d}	48.23*** (c > a > b,d)	0.84 (0.73–0.97)**	1.02 (0.83–1.12)	0.82 (0.66–1.03)

CI = confidence interval; OR = odds ratio.

For bivariate analyses, values with superscript letters a,b,c and d are significantly different across rows ($p < 0.05$). ***$p < .001$; **$p < .01$; *$p < .05$.

between the two were “whether there was an intention (thought) to commit suicide” and “the lethality of the behavior.” NSSI is often considered less serious than suicidal behavior, as it involves less lethal methods. However, recent studies have shown that it can still be fatal, particularly in adolescents. Although it cannot be concluded that Classes 2 and 4 shown in this study are NSSI, they were shown to be types of suicide-related behaviors without suicidal thoughts. Suicide is not only limited to attempts resulting from persistent suicidal ideation. These results indicate that screening protocols for suicide attempts mainly set suicidal ideation as a potential risk indicator [30], and as our results document, adolescents who make suicide plans and attempt with low levels of suicidal ideation. This is even more important in that there is a possibility of such adolescents being excluded from intervention. Therefore, there is a need to develop methods to identify additional factors that may alert service providers to the need for intervention even if suicidal ideation is low.

In this study, Class 2 had low suicidal ideation but suicide plans, Class 4 had low suicidal ideation but suicide attempts, and Class 3 had high conditional probability values for suicidal ideation, suicide plans, and suicide attempts. The discussion will compare the factors associated with Classes 2, 4, and 3.

Psycho-emotional factors that had a common influence on belonging to Classes 2 and 4 were that they perceived high stress and experienced sadness and despair but experienced less loneliness. Class 3's influencing factors showed an opposite trend to these variables, indicating low stress and no sadness, but high levels of loneliness. Adolescent suicide is often an escape from current pain. Stress and despair from this pain are factors in impulsive suicide plans and attempts [9]. Adolescents are characterized by being psychologically unstable, being greatly influenced by surrounding stimuli, and impulsively responding to stress or stimulation [31]. As a result, suicide attempts are more impulsive than those in adults [32], and adolescent suicides may occur suddenly without expressing the various expected signs of suicide. For adolescents, a single suicide attempt can have fatal consequences, so it is important to prevent and respond in advance [33]. In that sense, there is a need to further understand the characteristics of the types of suicide plans without ideation or attempt and suicide attempts without ideation or plan.

The suicide plan without ideation or attempt group (Class 2) and suicide attempt without ideation or plan group (Class 4) felt less lonely than the suicide ideation only group (Class 1) and suicide attempt with ideation and plan group (Class 3). The higher the perception of loneliness, the higher the probability of belonging to Class 1 compared to Classes 2 and 4, and the higher the probability of belonging to Class 3 compared to Class 1. Loneliness is an unpleasant state of self-awareness that occurs when an individual's social network falls short of their desired quantity or quality [34]. Loneliness in adolescents can indicate the absence of support systems like family or friends. This means that loneliness due to the absence of a support system was higher in the group with the characteristics of the suicidal attempt with ideation and plan group (Class 3) formed over a longer period than in the suicide plan without ideation or attempt and suicide attempt without ideation or plan groups formed over a relatively short period. Previous research has established that loneliness can lead to physical and psychological vulnerability and is associated with suicidal ideation and behaviors between 10 weeks and five years after reporting [35]. Having a positive relationship with parents, knowing someone who has had similar experiences, or being part of a group of friends can help reduce suicidal intent through reducing loneliness; therefore, the development and application of interventions that utilize these findings are needed. Further research is needed to investigate how each variable impacts suicide-related behavior in adolescents, with a focus on distinguishing the different emotions they experience.

In this study, sexual intercourse experience, habitual drug use experience, and hospital treatment experience due to violence, which were set as variables related to adolescents' risky behaviors, were found to be factors influencing belonging to Class 3. However, these variables were not statistically significant factors influencing Classes 2 and 4. This can be interpreted as adolescents belonging to Classes 2 and 4 may not exhibit risky behaviors usually revealed to parents, teachers, or adults around them, or so-called externalizing problems, compared to Class 3. Previous research has linked externalizing problems to suicidal behavior and risky behavior (such as high-risk sex, binge drinking, drug use, violence, disturbed eating, and smoking). The more problems an individual has, the higher their risk of attempting suicide [36–38]. In other words, the fact that risky behavior-related variables appeared significantly as a factor influencing Class 3, where suicidal thoughts, plans, and attempts were all high, compared to Class 1, which had high suicidal thoughts and low suicide plans and attempts, is in line with existing research results, which showed that variables related to risky behavior did not appear significantly in Classes 2 and 4, where suicidal thoughts were low and only plans and attempts were high, contradictory to existing research results. This result shows that Classes 2 and 4 have different characteristics from Classes 1 and 3, as can be seen in the results that Classes 2 and 4 perceived their economic status and academic performance to be higher than those of Classes 1 and 3 in terms of differences in general characteristics. In other words, unlike juvenile delinquents, adolescents may live without any apparent problems and suddenly plan and/or attempt suicide. Therefore, identifying these groups who have internal emotional problems without outwardly revealing them, and allowing them to confront their emotional problems more adaptively rather than through suicidal plans and attempts is crucial so that suicide plans and attempts are not viewed as the only solution. We need to develop interventions that strengthen emotional capacity to prevent this from happening [39]. Parents, teachers, and school health nurses, which are the primary protective environments for adolescents, must understand the characteristics of adolescents' suicide-related behavior, which is difficult to predict, and education for this will be necessary.

Limitation

First, we used secondary data with a limited number of variables to perform the regression analysis. Further studies are needed to identify the factors affecting suicide-related behaviors by adding variables such as family functioning [40] and affiliation with peers [41], for example. Second, the analyses were based on a cross-sectional design; thus, the results of this study cannot prove causal relationships between the influencing factors and suicide-related behavior.

Conclusions

This study attempted to provide basic data for customized interventions for each type of suicide-related behavior among Korean adolescents by typing their suicide-related behaviors of Korean adolescents and analyzing related factors. Data from the 2021 KYRBS were used in the present study.

As a result of the study, suicide-related behavior was categorized into suicide ideation only group (Class 1), suicide plan without ideation or attempt group (Class 2), suicide attempt with ideation and plan group (Class 3), and suicide attempt without ideation or plan group (Class 4). There were differences in related factors between Classes 2, 4, and 3. Adolescents belonging to Classes 2 and 4 perceived high levels of stress and experienced sadness and despair but experienced less loneliness, which was the opposite of the characteristics of adolescents belonging to Class 3. In addition, sexual intercourse experience, habitual drug use experience, and hospital treatment experience due to violence, which were set as risky behavior-related variables, were found to be factors influencing Class 3. However, these variables were not statistically significant factors affecting belonging to Classes 2 and Class 4.

It is necessary to understand that adolescents have different characteristics depending on their class of suicide-related behavior and to vary the focus of intervention for each class.

Ethical statement

This study was confirmed as an Exempt Research Project by the Institutional Review Board of the E University (Approval no.: Not Applicable, Management no.: EUIRB2023-004).

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Conflict of interest

The authors declared no conflicts of interest.

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Research Article

Investigating the Possibility of Nurse Prescribing Training Development in Nursing Education System in Iran

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SUMMARY

Purpose: Adequate medical knowledge and skills are fundamentals for nurse prescribing authority development. This study will explore the potential for developing nurse prescribing training in Iran, where nurses currently lack prescribing authority despite their strong academic nursing education.
Methods: This is a study with two phases. At first, in a conventional qualitative content analysis method, with purposive and snowball sampling, from June 2021 to March 2023, 20 participants, including 16 nurses in different clinical, managerial, educational, and policy-making settings, three physicians, and one clinical pharmacist were interviewed. Unstructured interviews were conducted face-to-face or virtually as the situation required during the pandemic period due to Coronavirus disease, 2019 (COVID-19). Qualitative content analysis as developed by Elo and Kyngäs in 2008 was used for data analysis. In the second comparative analysis phase, four masters of science and one doctor of nursing curricula analyzed in the existence of the nurse prescribing prerequisite courses and these five curricula and two potential masters of science in community health and critical care nursing curricula were compared with John Hopkins University curricula.
Results: In the qualitative phase, two themes emerged: nursing education challenges and the potential for nurse prescribing training development. These were further broken down into four subthemes: inadequate nurses' knowledge in prerequisite nurse prescribing courses, unprepared educational infrastructure, treatment sector potentials, and educational potentials, with a total of 12 concepts identified. During the comparative phase, it was found that none of the nursing curricula had adequate prerequisite courses for nurse prescribing. However, the Community Health and Critical Care nursing curricula showed potential for developing nurse prescribing training.
Conclusions: In the nursing education system, there are some challenges and potentials for prescribing training, and the community health and critical care nursing curricula have the potential capacity to prepare the graduated nurses to prescribe. It needs educational and managerial policies. More developmental research and pilot studies are recommended.

Introduction

As the largest group of healthcare providers, nurses play an effective role in various settings such as critical care, public health, and chronic disease management [1]. Infectious diseases (such as Coronavirus disease, 2019 [COVID-19]), chronic diseases, and decreasing medical budgets have affected global public health, and it is necessary to have competent health workforces to respond to the increasing public needs through educational curricula [2]. The nursing education system must train nursing students with high competency for providing safe and quality health care to meet the community needs [3]. This globally aging population and the chronic disease burden have caused many countries such as America, England, Australia, etc. to use nurse practitioners (NPs) with a high level of education in nurse prescribing roles, especially in community settings to meet the health needs in the context of shortage of the doctors in remote areas [4].

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NPs initially began prescribing in the United States in the 1960s and later expanded this practice to other countries [5]. According to the definition of the International Council of Nurses (ICN), NP is a nurse who has specialized knowledge at the postgraduate level and has acquired more advanced practice, decision-making skills, and complex clinical skills based on the context of their country [6]. In the United States, they currently receive additional training programs in the Master of Science in Nursing (M.Sc.) or Doctor of Nursing Practice (DNP) to prescribe, treat, and follow up the patients autonomously [7,8]. They have professional skills such as clinical reasoning, critical thinking, clinical decision-making, and counseling during nurse prescribing [9]. Prescribing is a process that includes gathering accurate, complete, and comprehensive patient information, making appropriate decisions, managing drug supply, and collecting adequate information to keep patients safe and provide quality care [6].

Different countries have different plans for nurse prescribing training (NPT). For example, it has been integrated into the undergraduate curriculum of family nurses in Estonia, undergraduate nurses in Spain, and community health nurses in Norway, and some other countries, such as Cyprus, it has been integrated into the master of science curriculum [5]. In the UK, the independent and supplementary NPT is provided as theoretical and practical courses stand-alone or integrated into the graduate nursing curriculum and under the supervision of the Nursing and Midwifery Council (NMC) standards and for at least 3 years of nursing experience nurses in the relevant clinical setting [10]. The nurse prescribing courses in some countries like America, Australia, Canada, and England are anatomy, advanced physiology, pathophysiology, pharmacology including drug side-effects and interactions, physical and mental health assessment, and differential diagnoses, so that these nurses have been trained to manage the patient's health needs independently [11].

Iran, in the context of this study, has a population exceeding 85 million [12]. Over the next 50 years, the elderly population is projected to increase by 20% [13]. The country faces several healthcare challenges, including rising healthcare costs, lifestyle changes, an increasing trend of chronic diseases [14], and a shortage of physicians, with a ratio of 15.14 physicians per 10,000 population. This is in stark contrast to England and the United States, which have ratios of 31.7 and 35.5, respectively [15]. Additionally, nurses in Iran lack prescribing authority [16]. Given these resource constraints and the need for efficient resource utilization, the development of community health nursing care, including home-based nursing care, has become a key priority for the nursing deputy [17]. Nadri has highlighted that nurses in specialized care units in Iran require prescribing authority to save patients' lives in situations where a physician is not readily available [18]. If Iran can train nurses with sufficient knowledge and skills in prescribing, they could address some of these issues. A similar need for policymaking regarding the utilization of nurses to address service delivery gaps has been observed in the United States. In response to the needs of older adults with chronic conditions who lack access to traditional medical care outside their homes (accounting for nearly 93% of Medicare expenditures), U.S. health policymakers have been influenced to utilize the capacity of Advanced NPs with prescribing authority in the provision of care. This includes over 825,000 home-based primary care visits annually by NPs, which has been utilized as a solution [19]. This empowering specialized and qualified nurse has helped alleviate the workload of doctors in more leading countries [20].

Academic nursing education in Iran dates back to 1915 when it was established by religious missionaries. In 1936, a three-year nursing curriculum was approved by the Council of Education, followed by the introduction of a four-year nursing curriculum in 1965 under the supervision of World Health Organization (WHO) consultants. The expansion continued with the introduction of five master's degree majors in nursing in 1976, which have since grown to include 14 curricula such as adult and pediatric critical care nursing, community health nursing, and emergency nursing. The Ph.D. nursing curriculum was approved in 1994 and undergoes periodic revisions by the Supreme Council of Medical Sciences Planning in the Ministry of Health [21]. Despite the four times revisions in the bachelor's curriculum, two times revisions in the master's curricula, and three times revisions in the Ph.D. curriculum until now [22], and the growing trend of academic nursing education at the master of science level, nurse prescribing training (NPT) have not been designed in these nursing curricula [16,23].

In Iran, despite the use of advanced countries' models in the designation of the nursing curricula [24], similar to those in advanced countries, advanced nursing roles such as nurse prescribing have not been developed [25,26]. However, according to small policies in Iran, the registered nurses in specialized intensive care units and emergency wards have been allowed to prescribe epinephrine and atropine timely and urgently in unavailable physician situations for a patient who needs cardiopulmonary resuscitation until the doctor arrives, since 2018 [27]. Naderi has reported that 92.1% of intensive care unit (ICU) nurses considered that it is vital to develop nurse prescribing authority (NPA) in the ICU and 86% assumed that it is possible to implement this role in the ICU [18]. In 2021, Haririyan reported that undergraduate nursing students in five Iranian cities stated that they would be ready to prescribe, if they improve their knowledge of pharmacology and acquire leadership, management, and accountability skills [28]. Due to the necessity of nurse prescribing and the lack of any previous study, in this study, the possibility of nurse prescribing training development in Iran will be investigated.

Methods

To investigate the possibility of nurse prescribing training development (NPTD) and to gain new insight into the nursing education system's capacities for developing NPT in Iran, this study was conducted in two phases. In the first phase, a conventional qualitative content analysis study and in the second phase, a comparative study was conducted. Consolidated criteria for reporting qualitative research checklist (COREQ) were applied for reporting the first phase.

First phase: conventional qualitative content analysis

Conventional qualitative content analysis as a research method, describes phenomena objectively and systematically [29] and by making inferences and interpretations from the text, it creates knowledge, and new insights and shows facts [30]. In this study, the method of qualitative content analysis was used to gain new insight into developing nurse prescribing programs in the nursing education system.

Setting and samples

The participants were selected based on inclusion criteria, which included expert clinical nurses in various settings (adults, pediatrics, and critical care), nurse managers in clinical and educational roles, policymakers, physicians, and clinical pharmacists with more than 3 years of work experience. Using maximum variation sampling and leveraging the researcher's access, participants were recruited from seven public hospitals in different cities, including Yazd, Kerman, Jiroft, Tehran, and Noor Abad in Lorestan province. The inclusion criteria also considered different education levels, both genders, effective communication skills, ability to express rich experiences, willingness to volunteer, at least a bachelor's degree, proficiency in the Persian language, availability, respect for confidentiality, and adherence to ethical considerations.

Due to the primary involvement of nurses as key participants in this study, the majority of participants were selected from among nurses in different fields, settings, and education levels. The main concept of this study was nurse prescribing rather than differences in experiences in the field. However, to enhance data completeness, address any gaps, and maintain professional relationships with other general participants (e.g., physicians and pharmacists), a smaller number of them were also included. This approach was continued until data saturation.

Despite efforts to interview a larger number of clinical pharmacists, invitations to interview clinical pharmacists working in hospitals and multiple pharmacy schools in various cities were sent via email, but we were only successful in interviewing one clinical pharmacist.

In Iran, the NP role has not yet been legally established or introduced. However, it is noteworthy that out of the 20 participants (16 nurses, one clinical pharmacist, and three physicians), 15 were experienced registered nurses with over 10 years of work experience in various nursing fields. Additionally, 6 nurses were at the Master's degree level, and 7 were pursuing Ph.D. education.

Data collection

Data were collected from 2021 (June) to 2023 (March) through unstructured and semi-structured interviews and purposive and snowball sampling. The interviewer was the first author with clinical nursing practice experience in the past who is now working as a nursing faculty member. She was familiar with nurse prescriptions and their circumstances. She interviewed her volunteer colleague with inclusive criteria in the first interview and the subsequent interviewees were recruited through snowball sampling. Interviews were conducted individually in a quiet environment at work face-to-face or virtual (due to the COVID-19 pandemic) by phone call or using Skype software and WhatsApp communication platform based on the interviewees' convenience and previous appointment during the off-work hours. At the beginning of the interview, informed consent was obtained for interviewing and audio recording. The study goals were explained to each interviewee.

The demographic characteristics of the interviewee, including age, education level, and work experience were asked.

Due to in clinical settings, there are instances where nurses observe that they are practically able to meet a patient's needs, alleviate their health issues, and preserve their health status and dignity by prescribing medication. Due to a lack of legal authorization for nurse prescribing, they experience ethical distress. Therefore, two interviews were conducted as a pilot to guide the questions. Two open-ended questions were:

Q1: **questions from nurse:** ‘Please explain your experience of nurse prescribing without a physician's order in a situation where nurses are not authorized to prescribe.’

Q2: **questions from nurse:** ‘Please describe the possibility of nurse prescribing training.’

The primary questions were followed by probing questions such as ‘Please explain further or provide an example in this scenario and …’

Q3: **questions from the Physician**: ‘Please share your experience of nurses prescribing without a physician's order.’

Q4: **questions from Clinical Pharmacist**: ‘Please describe your experience of nurses prescribing without a physician's order.’

The duration of the interviews was 30–90 minutes (44.55 ± 17.07 minutes). Then the interviews were transcribed verbatim immediately. Data collection continued until data saturation which means replication of codes and no emergence of new concepts [31]. It was achieved after 18 interviews. Two more interviews were conducted to ensure data saturation. So, data collection was completed after 20 interviews.

Data analysis

Data collection and analysis were done simultaneously. The procedure enunciated in Inductive qualitative content analysis by Elo and Kyngäs 2008 was used for data analysis [30]. In the inductive qualitative content analysis process, data preparation, reading, coding, categorizing, and theme development are carried out to conceptualize and extract meanings from participants' narratives [32].

This data analysis approach was carried out during three stages preparation, organization, and results reporting stages [33]. In the preparation stage, the written interview (transcript) was considered as the unit of analysis. Then, important and meaningful phrases in each interview were selected as meaning units. Through six steps in the organization stage: (1) each meaning unit was placed in a code sheet; (2) the meaning unit was condensed; (3) a code was extracted from the condensed meaning unit (open coding); (4) concepts were created from the same meaning codes; (5) subthemes were extracted from the same meaning concepts; and (6) the themes were extracted from the same meaning subthemes. So, there was the greatest convergence within themes and the greatest divergence between themes. In the third stage, the results were reported. The first author (AS) read the transcripts and extracted the codes.

Trustworthiness

To ensure the trustworthiness of the qualitative content analysis findings, the most widely used Lincoln and Guba (1985) [29] rigor criteria were used.

Prolonged involvement for a deep understanding of the implicit and explicit meanings of the data was done to ensure the credibility of the findings. To ensure the confirmability of the data, the participants were recruited from various nursing and medical fields/settings in different cities and wards in different public hospitals means maximum variation sampling. Three coded interviews were randomly returned to the relevant interviewee to ensure the correct understanding of the meaning (member check). Also, the concepts, subthemes, and themes were revised by the other research team (peer check) as well as a researcher outside the research team (external check).

To ensure dependability, the details of the research method and analysis process were audited and clarified. Auditing, purposive sampling, and diversity in the selection of participants ensured the transferability of the findings.

Ethical considerations

This study was approved by the Research Council and Ethics Committee of Medical Sciences of Tarbiat Modares University (approval no. IR.MODARES.REC.1400.074). In this research, ethical considerations were confidentiality of the content of the interviews and anonymity of the interviewees, conducting interviews with volunteer participants after obtaining informed consent, and conducting interviews in compliance with the conditions set by the interviewees. To maintain anonymity, we used job title abbreviations and interview order instead of the participant's name like AN8 (Academic Nurse 8), and Dr15 (Doctor 15), in the quotes.

Second phase: comparative analysis

The comparative analysis goal is to search for similarity and variance of conditions among units of analysis [34]. In this comparative analysis phase, first, to examine the condition of nursing curricula in Iran in the existence of the prerequisite nurse prescribing courses such as pharmacology, pathophysiology, and health assessment, the last revised version of four Master of science in nursing curricula including medical-surgical nursing (M.Sc.) 2021, adult critical care nursing (M.Sc.) 2019, pediatric critical care nursing (M.Sc.) 2018, community health nursing (M.Sc.) 2021, and one Ph.D. of nursing curriculum 2016 were analyzed and compared with the same curricula in the John Hopkins University (JHU). Then, in the two predetermined potential treatment sectors based on the results of the first phase results, the adult critical care nursing (M.Sc.) curriculum 2019 and the community health nursing (M.Sc.) curriculum 2021 were compared with the same JHU curricula 2018 to investigate the possibility of nurse prescribing training development (NPTD) in nursing curricula in Iran like JHU.

In Iran, education in medical sciences is integrated within the Ministry of Health. The curricula for all nursing programs, across different degrees, are centrally designed by the Deputy Minister of Education and communicated to nursing schools nationwide for implementation. It's important to note that there is a single curriculum applied uniformly in all nursing schools throughout the country [35–37].

In this study, we required details of nursing curricula for comparison with nursing curricula in Iran. The nursing curriculum at Johns Hopkins University provided detailed course units for various advanced nursing specialties at the master's and doctoral levels, addressing nurse prescribing capability. As we did not have access to nursing curricula with such details in other leading countries, we utilized this nursing curriculum for our study.

Results

First qualitative phase

A total of 20 participants including 16 nurses in different clinical and managerial settings including clinical, education, and policy-making, and three doctors and one clinical pharmacist were included in the study. The age of the participants was 30 -58 (44.12 ± 8.73) years. Six interviews were conducted face-to-face, and the remaining 14 interviews were conducted virtually due to the restraints caused by the COVID-19 pandemic, in eleven cases by phone, two through Skype, and one through WhatsApp. The sociodemographic characteristics of the participants are given in Table 1. Two themes, four subthemes, and 12 concepts were extracted. The qualitative data analysis process is demonstrated in Table 2. Below, the extraction process of the themes from the subthemes and concepts is explained based on the participants' quotes.

Theme 1:

Nursing education challenges for nurse prescribing training development

For nurse prescribing authority, nurses must have sufficient knowledge and skills and educational infrastructures must be sufficient for nurse prescribing training development (NPTD); According to the participants' quotes, they are not sufficient currently and need to be strengthened. The first theme includes two subthemes which will be explained below.

Subtheme 1:

Inadequate nurses' knowledge in the prerequisite nurse prescribing courses

In addition to advanced nursing care knowledge and skills, nurse prescribers should have specialized knowledge for prescribing including anatomy, advanced physiology, pathophysiology, pharmacology, and physical and mental health assessment. This first subtheme includes four concepts which are explained based on the participant's quotes.

Concept 1:

Inadequate English language mastery

Nurses in each situation need to continuously keep their knowledge up-to-date. So, they must be able to use international English scientific sources such as books and articles, …. So, English language mastery is necessary for being up-to-date.

> *"Now, our nurses' English language proficiency is not enough for nurse prescribing development. S/he must be merit in the English language for more study in nurse prescribing competency" (AN8).*

Table 1 *Participant's Sociodemographic Characteristics.*

Field		Setting		Role	N	%
Participant's job characteristics		Nursing	Manager	Education supervisor	1	5.0
				Clinical supervisor	1	5.0
				Head nurse	4	20.0
			Clinical	Nurse	3	15.0
			Education	Nursing school dean	1	5.0
				Faculty member	3	15.0
			Policy making	Top nursing manager	2	10.0
			Policy making & education	Policymaker &faculty member	1	5.0
		Medical	Clinical	Physician	3	15.0
				Clinical pharmacist	1	5.0
	Work experience in the field (years)	3–10			2	10.0
		11–20			7	35.0
		21–30			8	40.0
		31–40			3	15.0
Participant's demographic characteristics	Age (years)	29–39			7	35.0
		40–49			8	40.0
		50–59			5	25.0
	Gender	Male			7	35.0
		Female			13	65.0
	Education level	Bachelor's degree			4	25.0
		Master's Degree			6	30.0
		Ph.D.			7	35.0
		Fellowship			3	15.0

Table 2 *Qualitative Data Analysis Process.*

Concepts	Subthemes	Themes
Inadequate English language mastery	Inadequate nurses' knowledge in the prerequisite nurse prescribing courses	Nursing education challenges for nurse prescribing training development
Inadequate basic science courses (laboratory sciences, pathology, physiology, anatomy, pharmacology)		
Inadequate knowledge of health assessment		
Inadequate advanced nursing care knowledge and skills		
Continuing nursing education	Educational infrastructures readiness	
Motivation of nurses for continuous professional development		
Unprepared academic nursing system for nurse prescribing training		
Possibility of nurse prescribing in the home care	Treatment sector potentials	Nurse prescribing development potential
Possibility of nurse prescribing in the critical care units		
Existence of experienced proficient nurses		
The existence of academic nursing curricula	Educational potentials	
The possibility of interprofessional training		

> *"To prepare nurses for nurse prescribing, they must have up-to-date and comprehensive medical knowledge for patient treatment. Our nurses should be more fluent in English"(MN6).*

Concept 2:
Inadequate basic science courses (laboratory sciences, pathology, physiology, anatomy, pharmacology)

To make nurses prepare for nurse prescribing, they have to be taught basic science courses such as anatomy (structure of the human body), pathology (identification of structural changes in tissues), physiology (cells and body organs and biological systems function), pathophysiology (functional changes that occur due to a disease or pathological condition) and pharmacology (the study of drugs and their effects) to make a correct decision for the patient problem treatment. The participants in this study stated that nurses' basic scientific knowledge is insufficient for nurse prescribing development.

> *"For nurse prescribing authority, s/he must study the pathology, pathogenesis, and pharmacology courses to know the pathogenesis of the patient's problem and prescribe a proper medicine to treat the patient" (Dr17).*

> *"Our nurses' knowledge in anatomy, pathophysiology, and pharmacology is not enough for nurse prescribing authority" (AN8).*

> *"According to my research, the pharmacology knowledge of our nursing students and registered nurses is not enough for prescribing. They have superficial information. So, nurse prescribing is far from being implemented. It is a threat to patient safety" (MN6).*

Concept 3:
Inadequate knowledge of health assessment

Proper treatment needs physical and psychological health assessment knowledge to take a history, physical examination, and interpret diagnostic tests. The participants in this study stated that nurses' health assessment knowledge and skills are insufficient for doing nurse prescribing.

> *"It is very important that the nurse prescriber could be able to make the right decision and prescribe the right medicine. So, it needs sufficient health assessment knowledge. Now, our nurses' health assessment knowledge is not enough" (MN14).*

> *"A nurse prescriber must have enough health assessment knowledge for history taking and doing physical examination. In my opinion, the health assessment courses in bachelor's and master's nursing curricula are not sufficient. How can a nurse who cannot distinguish normal and abnormal lung sounds do nurse prescribing?" (AN8).*

Concept 4:
Inadequate advanced nursing care knowledge and skills

Nurse practitioners (NPs) with nurse prescribing authority (NPA) in the leading countries are highly experienced and professionally qualified nurses with sufficient advanced nursing knowledge and skills. These competencies cause more patient trust in the nurse and create more self-confidence in the nurse to be successful in the patient's treatment. The participants in this study stated that nurses' advanced nursing knowledge and skills are not enough for nurse prescribing.

> *"Our nursing knowledge is weak. With this level of knowledge and skill, nurse prescribing is not possible" (AN2)*

> *"Our nursing students at different educational levels do not have the necessary professional knowledge and skills after graduation. The gap between theory and practice is high. Nurse prescribing needs a qualified and competent nurse" (MN6).*

Subtheme 2:
Educational infrastructures readiness

The second subtheme was extracted from the three concepts below. In this study, the participants stated that the method of continuous education, the motivation of nurses in professional development, and the academic nursing education must be more active and improved for nurse prescribing training development (NPTD).

Concept 1:
Continuing nursing education

The participants stated that the content and methods in nursing continuous education have not been effective in their nursing practice.

> *"Participation in the in-service or continuing education is necessary for being up-to-date. The nursing system should plan, monitor, and provide resources. Unfortunately, its efforts are inadequate. In-service or continuing education training is not very effective in our nursing practice" (MN14).*

> *"Continuing education trainings are not appropriate in terms of content, execution method, and execution time, and they are not very effective in our nursing practice" (CN3).*

Concept 2:
Motivation of nurses for continuous professional development

Full-time work schedules along with a high workload make nurses tired and unmotivated for continuous professional development.

> *"One of the nursing difficulties is extra shifts. Most of the nurses work two shifts a day. How do these nurses have to use continuous training? These nurses are always tired and sleepy. They have no time or motivation for continuous professional development" (MN6).*

> *"Because the nursing system management has not improved the nurses' motivation for professional development, they do have not enough motivation for professional development" (AN8).*

Concept 3:
Unprepared academic nursing system for nurse prescribing training

In this study, the participants stated that the nursing education system needs to be strengthened for nurse prescribing training (NPT).

> *"The shortage of clinical nursing faculties is evident. Asking the head nurses with a high workload to supervise the last year's nursing students at the bachelor's level, will reduce the efficiency of the nursing education" (MN6).*

> *"Our nursing curricula in different levels of nursing education are not ready for nurse prescribing training. The existent bachelor or master of science in nursing curricula have to be modified for nurse prescribing training" (PMN7).*

> *"Another problem for nurse prescribing training is the nursing professors who have not been trained for training the nurse prescribing. We should train our teachers first, and then train our nurses" (AN8).*

Theme 2:
Nurse prescribing development potential

As the second theme, there are some potentials such as the existence of nursing curricula at different levels, the existence of experienced and competent nurses, and the possibility of using interprofessional education with the collaboration of pharmacists and doctors at the beginning of NPT, which have not been used for nurse prescribing development till now. This theme includes two subthemes.

Subtheme 1:
Treatment sector potentials

This subtheme encompasses three concepts: the potential for nurse prescribing in community health nursing within the home care sector, the provision of critical nursing care, and the presence of experienced and proficient nurses.

Concept 1:
Possibility of nurse prescribing in the home care

Community health nursing graduates are one of the health system potentials for nurse prescribing development and patient treatment by nurses in the community.

> *"I think one of the places where we can start nurse prescribing, is the community health nursing care in the field of home care and for chronic disease patients at home. It can be implemented both easier and faster" (PMN7).*

> *"Some of the patients with chronic conditions that are hospitalized in the ICU and are under mechanical ventilation may receive this care at home by competent nurses. This will reduce the cost burden of patients and families too" (Dr 19).*

Concept 2:
Possibility of nurse prescribing in the critical care units

When a patient is in critical condition and the physician is unavailable, the experienced nurses have to save the patient's life and prescribe some drugs. So, nurse prescribing competency and skill are necessary for them to provide safe care.

> *"Our doctors are usually busy with other patients either in the operating room or the emergency room and are not available on time in the ICU. We must start immediate and necessary treatment for the patient" (CN10).*

> *"Nurse prescribing happens a lot in the unavailable doctor situation in critical care units. They need to do this to save the patient's life" (MN9).*

Concept 3:
Existence of experienced proficient nurses

According to the participants' statements, some experienced nurses in some wards are more scientific and have good capacities for nurse prescribing development and some doctors consult with them regarding patient treatment.

> *"When a patient becomes unwell, we discuss with her/his in-charge nurse and ask for their opinions. Sometimes nurses give good treatment and diagnostic opinions" (Dr 15).*

> *"Nurses' knowledge differs in different wards of the hospital. In transplant or ICU wards with few patients, there are many more scientific nurses" (C-Ph 16).*

Subtheme 2:
Educational potentials

There are some educational potentials such as the existence of nursing curricula at different educational levels [22], the possibility of using interprofessional education, and the cooperation of pharmacists and doctors at the beginning of prescribing education, which has not been used so far to develop nurse prescribing. This subtheme includes two concepts.

Concept 1: The existence of academic nursing curricula

> *"We potentially have nursing curricula at different levels, but because the goal was not to train nurse prescribers, this potential was not used. We may improve nursing master's curricula for nurse prescribing training" (PMN20).*
>
> *"We have a non-clinical nursing Ph.D. curriculum which is philosophical and it is possible to design clinical doctorate curricula to train the nurse prescribing" (AN18).*

Concept 2: The possibility of interprofessional training

It is possible to use interprofessional training with the help of physicians and pharmacists at the beginning of nurse prescribing training (NPT) in Iran.

> *"Nurses are in a good interprofessional situation with the possibility of learning from the doctors" (MN14).*
>
> *"Currently, the pharmacists could help us in pharmaceutical education and the doctors could monitor our prescription in nurse prescribing" (AN18).*

In general, some challenges should be overcome and some potentials must be considered for NPT.

Second comparative analysis phase

According to the results of the first qualitative phase, the participants stated that nurses' knowledge is inadequate in the main prerequisite courses for NPT including pharmacology, pathophysiology, and health assessment. In this regard, the last revised version of nursing curricula in four Master of Science (M.Sc.) in nursing including medical-surgical nursing (M.Sc.) 2021, adult critical care nursing (M.Sc.) 2019, pediatric critical care nursing (M.Sc.) 2018, community health nursing (M.Sc.) 2021, and one Ph.D. of nursing 2016 were compared in the mentioned courses with John Hopkins University [38] to examine the curricula for NPTD. A comparison of different nursing curricula between Iran and JHU in the main prerequisite courses in nurse prescribing is shown in Table 3.

In this investigation, the credit numbers in the three main courses in the JHU were more than the related unit numbers in Iran and also there were additional clinical judgment and diagnoses symptom and illness management courses in the JHU rather than Iran.

Following the necessity of nurse prescribing in the critical care units, we compare the last revised master of science in critical care nursing curriculum 2019 in Iran with the master of science in adult-gerontological acute care nurse practitioner curriculum 2018 in JHU to investigate the capacity of this Iranian curriculum for nurse prescribing training development (NPTD). This comparison is demonstrated in Table 4.

The results of the comparison show that in the adult-gerontological acute care nurse practitioner (M.Sc.) curriculum of JHU, each nursing student completes the main courses more than nursing students in Iran.

In the USA, each credit number is equivalent to 14 theoretical hours, 28 practical hours, and 42 apprenticeship hours [39], but, in Iran, each unit is equivalent to 17 theoretical hours, 34 practical hours, and 51 apprenticeship hours [40].

Following the participants' quotes in the first qualitative phase to the necessity of developing nurse prescribing in community home care nursing, we compare the last revised community health nursing (M.Sc.) curriculum in Iran with the adult-gerontological primary care nurse practitioner (M.Sc.) curriculum in John Hopkins University (JHU) to investigate its capacity for NPTD, which is demonstrated in Table 5.

In this comparison, there are additional credits including advanced practice core courses such as physiology, pathophysiology, advanced pharmacology, advanced health assessment, and also specialty courses such as diagnosis symptoms of illness management, and management of symptoms and signs in the adult-gerontological primary care nurse practitioner (M.Sc.) that prepare nurse practitioners to manage acute and chronic diseases in different centers in the society in USA and none of these units exist in the community health nursing (M.Sc.) curriculum in Iran. It seems that modifying the community health nursing curriculum as a suitable structure is necessary for preparing community health nurses for nurse prescribing in Iran.

Discussion

In this study, we investigate the possibility of NPTD in Iran. The results show that there are some challenges such as poor basic knowledge and unprepared infrastructures along with some potential that will remove the challenges.

Nurse prescribing authority (NPA) requires sufficient knowledge in history taking and high-level assessment skills [41].

In this study, nurses stated that nurses' English language needs to be strengthened to be up-to-date and prepared for prescribing. In England, one of the criteria for nurses to enter advanced nurse prescribing training (NPT) is being master in English reading and writing skills with an International English Language Testing System (IELTS) score of at least 6.5 [42,43]. Although English is the main language of the people of England, even in other countries with English as the second language or not English is spoken, because of the English textbooks in higher education, and the need for speaking and writing English fluently to improve the quality of nursing care, the nurses need to be master in English language [44]. In a systematic review study in Iran, one of the challenges of using evidence in evidence-based practice nursing care has been reported as the nurses' insufficient English mastery [45]. Also, in the study of Sajjadi et al., Iranian graduate nursing students do not have the necessary English language skills to meet their academic and professional needs despite receiving general and specialized English language training [46]. English language mastery is necessary for nurses to use international resources, effectively communicate with patients, collaborate with colleagues, understand medical terminology, advance their careers, and ensure patient safety.

In this study, nurses' pharmacology knowledge was weak and it was determined the same should be strengthened. In the same study, in a meta-synthesis study by Darvishpour et al. in 2014, the nurses' weak pharmacology and disease treatment knowledge has been reported as one of the obstacles to nurse prescribing development in Iran [47]. In other countries, doctors have been worried about patients' safety due to nurses' poor pharmacology knowledge, and it has hindered the implementation of prescribing authority [48]. Enough pharmacology knowledge is one of the main requirements of prescribing authority [43,49]. Nurses in the USA, Australia, and Canada are trained in pharmacology, physiology, pathophysiology, critical thinking, ethics, law, leadership, and information technology to prepare for nurse prescribing [50]. These

Table 3 *Comparison of Different Nursing Curricula Between Iran and JHU in the Main Nurse Prescribing Prerequisite Courses.*

Nursing Education levels	Main prerequisite courses in nurse prescribing	Iran				John Hopkins [56]			
		Course of studies (curriculum)	course name	Unit number	Hours	Course of studies (curriculum)	course name	Credit number	**Hours**
Master of Science in Nursing	Pharmacology	Master of Science in Medical- Surgical Nursing 2021	Clinical nursing pharmacology	1.5(Th)	26 h	Advanced practice track: clinical nurse specialist adult-gerontological health (M.Sc.)	Clinical Pharmacology	3cr	42 h
			The role of the nurse in complementary and alternative medicine	1(Th)	17 h				
	Pathophysiology		Pathophysiology	1.5(Th)	26 h		Physiology/ Pathophysiology	3cr	42 h
	Health assessment		Advanced Health Assessment	1(Th) + 1(App)	68 h (17 + 51)		Health Assessment and Measurement – Adult-Gero Variations	1cr	14 h
							Advanced Health Assessment and Measurement	2cr/36CL	64 h (28 + 36)
							Clinical Judgment in Acute & Critical Care I – Adult	1cr	14 h
							Clinical Judgment in Acute & Critical Care II – Adult	1cr	14 h
	Pharmacology	Master of science in critical nursing 2019	Specialized pharmacology	1(Th)	17 h	Clinical nurse specialist, adult-gerontological critical care (M.Sc.)	Clinical Pharmacology	3cr	42 h
	Pathophysiology		Pathophysiology	—			Physiology/ Pathophysiology	3cr	42 h
	Health assessment		Health assessment (Diagnostic evaluations)	1(Th)	17 h		Health Assessment and Measurement – Adult-Gero Variations	1cr	14 h
							Advanced Health Assessment and Measurement	2cr/36CL	28 h/36CL
							Clinical Judgment in Acute & Critical Care I – Adult	1cr	14 h
							Clinical Judgment in Acute & Critical Care II – Adult	1cr	14 h
	Pharmacology	Master of science in pediatric critical nursing 2018	Specialized pharmacology	1.5(Th) + 0.5(App)	52 h (26 + 26)	pediatric critical care Clinical nurse specialist (M.Sc.)	Clinical Pharmacology	3cr	42 h
	Pathophysiology		Pathophysiology	1.5(Th)	26 h		Physiology/ Pathophysiology	3cr	42 h
	Health assessment		Health assessment (pediatric health assessment)	0.5(Th) + 1.5(App)	86 h (9 + 77)		Health Assessment and Measurement – Pediatric Variations	1cr	14 h
							Advanced Health Assessment and Measurement	2cr/36CL	28 h/36CL
							Clinical Judgment in Acute & Critical Care I – Pediatrics	1cr	14 h
							Clinical Judgment in Acute & Critical Care II – Pediatrics	1cr	14 h
	Pharmacology	Master of science in community health nursing 2021	Complementary and alternative medicine (non-core)	0.5(Th) + 0.5(App)	35 h (9 + 26)	Adult- gerontological primary care nurse practitioner (M.Sc.)	Clinical Pharmacology	3cr	42 h
	Pathophysiology		Pathophysiology	—			Physiology/ Pathophysiology	3cr	42 h
	Health assessment		Health assessment	—				1cr	14 h

(*continued on next page*)

Table 3 (*continued*)

Nursing Education levels	Main prerequisite courses in nurse prescribing	Iran				John Hopkins [56]			
		Course of studies (curriculum)	course name	Unit number	Hours	Course of studies (curriculum)	course name	Credit number	**Hours**
							Health Assessment and Measurement Adult-Gero Variation		
							Advanced Health Assessment and Measurement	2cr/36CL	28 h/36CL
							Diagnosis, Symptom and Illness Management I – Adult-Gero	2cr	28 h
							Diagnoses Symptom and Illness Management II – Adult-Gero	2cr	28 h
Doctor of nursing	Pharmacology	Ph.D. of nursing 2016	Pharmacology	–		Doctor of nursing practice (DNP) advanced practice tracks	Clinical Pharmacology	4cr	56 h
	Pathophysiology		Pathophysiology	–			Advanced Physiology/ Pathophysiology	4cr	56 h
	Health assessment		Health assessment	–			Advanced Health Assessment and Measurement	3cr	42 h
							Diagnostic Skills and Procedures for Advanced Practice Nursing	2cr	28 h

Note. App = Apprenticeship; CL = Clinical Hours; Cr = credit; h = Hour; p = Practical; Th = Theoretical.

studies show that implementation of prescribing authority requires rich pharmacology knowledge and keeping it updated.

Nurses also need advanced clinical nursing knowledge and skills for nurse prescribing. In a study conducted by the Department of Health in England, more than 80% of independent nurse prescribers who were able to provide nursing care at the highest level of standards, had enough health assessment knowledge and skill and decided on the patient's problem before receiving NPT [51]. Also, in a scoping review conducted in Sweden, the advanced nurses with prescribing qualifications had managed the patient's problem independently with a deep knowledge of nursing care along with sufficient medical information, while they were not expected to replace the doctor, but reduced the doctor's work [11]. These results show that a nurse prescriber is an advanced nurse practitioner with high nursing care knowledge and skills that have received special NPT to manage the patient's health problem.

This study shows that academic nursing education and continuing nursing education should be strengthened for NPT. The most important challenges that should be solved are the shortage of trained faculty members for NPT and the lack of special nurse prescribing programs. In a 2020 study, Ahmadi Chenari reported that, the shortage of nursing faculty and insufficient educational resources as the challenges of nursing education in Iran [52]. In other countries, such as the United States, there is an educational mechanism of advanced pharmacology training and taking a national certification exam for registered nurses to become registered nurse prescribers, and then, they receive national certification from the American Nurses Credentialing Council (ANCC) then they will be allowed to prescribe in their specialty [53]. In Poland, a special prescribing course is implemented for nurses who graduated before 2019, and for graduates after 2019, this course is included in their post-graduate curriculum. These nurses can work as independent or supplementary nurse prescribers [54]. In England, NPT is taught stand-alone or in the academic curriculum and under the standards of the Nursing and Midwifery Council [5]. These findings show that NPT needs context-based educational structures.

In this study, continuous professional education programs as the other nursing education need strengthening for NPT. According to the results of a cross-sectional study of continuous professional education programs evaluation in Iran, most of the nurses gave an average score to its goal, educational techniques, and educational content [55]. The results of a systematic review of mixed-method studies on barriers to non-medical prescribing in 2017 showed that the lack of a formal and national infrastructure to guide continuing education has hurt non-medical prescribing [56]. Continuous professional education is essential to keep the nurses' professional knowledge and skills up-to-date to provide safe and patient-centered care, and some factors such as personal motivation, the relevance of training to individual performance, willingness to learn at work, strong leadership, and accepting it as a positive culture in the work environment increase its effectiveness [57].

The results of the first phase of this study show that it is necessary and possible to implement NPT in Iran through the Master of Science in Community Health Nursing curriculum in the home care units. Like this, in England, for the first time since 1992, the Department of Health allowed community nurses to prescribe through a specialized formulary at homes [58]. Most of the nurse prescribers, prescribe in primary care [49]. Also, in Poland, after allowing nurses to prescribe, patients with chronic diseases have had better access to medicines through nurse prescribers in primary care centers [8].

It requires to creation of a position for community health nurses within the Iranian primary health care system to improve the accessibility, effectiveness, and quality of health care [59].

Table 4 *Comparison of Adult-gerontological Acute Care Nurse Practitioner (M.Sc.) in Johns Hopkins University 2017-2018 With Critical Care Nursing (M.Sc.) Curriculum 2019 in Iran.*

	Johns Hopkins University [34]	Iran [21]
Course name	Master of Science in adult-gerontological acute care nurse practitioner	Critical Care Nursing (M.Sc.) 2019
Course credits	37 Credits [cr]/706 Clinical Hours [CL]	Total: 32 units (Core: 26 U), (Non-Core: 2 U), (dissertation: 4 U) + (5 U additional deficit unit) + 45 hours mandatory workshops
Course duration	Part Time**:** 10 terms Full Time: 8 terms (4 years)	2-3 years
Course goal	Diagnose and manage health problems of acutely and critically ill individuals across the adult lifespan, work in acute and complex care settings such as critical care units, hospitals or specialty services, and in other settings where patients are physiologically unstable, technologically dependent, require frequent monitoring and intervention, or are highly vulnerable for complications	The goal is to train graduates with the necessary professional abilities, communication skills, creative criticism, and problem solving in critical situations for patients who need special care.
Core Courses	Biostatistics for Evidence-Based Practice [3cr]	Evidence based practice (6 hours workshop)
	Context of Health Care for Advanced Nursing Practice [3cr]	Basics of critical nursing care (1.5 Th. U)
	The Research Process and Its Application to Evidence-Based Practice [3cr]	Advanced research methods (1 Th. U + 0.5 P. U)
	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice [3cr]	Theories, models and concepts of critical care nursing (1.5 Th. U)
	—	Law, nursing ethics and professional relations (1 Th. U)
Advanced Practice Core Courses	Physiology/Pathophysiology [3cr]	—
	Clinical Pharmacology [3cr]	Specialized pharmacology (1 Th. U)
	Health Assessment and Measurement Adult-Gero Variation [1cr]	Diagnostic evaluations (1 Th. U)
	Advanced Health Assessment and Measurement [2cr/36CL]	—
Specialty Courses	Health Promotion and Disease Prevention [1cr]	Patient safety and infection control (12 h workshop)
	Diagnoses, Symptom and Illness Management I – Adult [2cr]	—
	Advanced Practice in Acute Care I [4cr/250CL]	Respiratory critical care (1.5 Th. U + 1 App. U), Cardiac critical care (1.5 Th. U + 1 App. U), Neurological and psychologic critical care (1.5 Th. U + 1 App. U), Gastrointestinal critical care and abdominal surgery (1 Th. U), kidney and urinary tract critical care and dialysis (1 Th. U + 0.5 App. U), Endocrine critical care (0.5 Th. U), critical care for multi-organ disorders and patients with special needs (2 Th. U + 1 App. U)
	Advanced Practice in Acute Care II [3cr/170CL]	
	Advanced Practice in Nursing: Clinical Topics & Professional Issues	—
	Gerontological Acute Care NP [4cr/250CL]	
	Advanced Diagnosis and Therapeutics [2cr]	—

Note. App. U = Apprenticeship unit; CL = Clinical Hours; Cr = credit; M.Sc. = Master of science; P.U = Practicum unit; Th. U = Theoretical unit.

Another potential situation for NPT in Iran is the Master of Science in Critical Nursing Care. Regarding the possibility of implementing NP in the intensive care unit in Iran, Naderi et al showed that 86% of ICU nurses stated that it is possible to implement nurse prescribing in the ICU departments [18]. Also, some NPs are prescribing in acute and critical care units in Australia and efficiently meeting service gaps [60]. In this study, nurses stated that NPA is necessary to develop in intensive care unit (ICU) to save patients' lives in the context of timely non-availability of physician and is possible to implement in community health care and critical nursing care in Iran and the comparisons in the second phase favor the possibility of introduction of nurse prescribing training development (NPTD) in these curricula because of their similarity in structure with that of the (JHU).

Limitation & implication

Due to the pandemic of Coronavirus disease, 2019 (COVID-19), we had to conduct some of the interviews virtually which may hinder the triangulation in data collection. One of the other limitations of the study was the difficulty in interviewing physicians in various fields and clinical pharmacists. Due to their heavy

Table 5 *Comparison of Adult-gerontological Primary Care Nurse Practitioner (M.Sc.) in Johns Hopkins University 2017-2018 With Community Health Nursing (M.Sc.) Curriculum 2021 in Iran.*

	Johns Hopkins University [34]	Iran [21]
Course Characteristics	Master of Science in nursing adult- gerontological primary care nurse practitioner	Community health nursing (M.Sc.) 2021
	40 Credits [cr]/640 Clinical Hours [CL]	Total: 32 units (Core: 26 units), (non -core: 2 units), (dissertation: 4 units), (Additional required units 5.5 units), workshop 28 hours (8 h Mandatory and 20 h Optional)
Course duration	Full time: 4 terms Part times: 7 terms	2-3 years
Course goal	Provide primary care to young adults (including late adolescents and emancipated minors), adults, and older adults on the primary care management of acute episodic and chronic conditions in primary care practices in ambulatory and tertiary care settings, private practices, urgent care centers, continuing care retirement communities, and specialty care clinics.	The goal is to train graduates to provide health services in society and to learn about social factors affecting their health and performance in society in the roles of prevention, care, education, research, support, management, and productivity (entrepreneurs).
Core Courses	Biostatistics for Evidence-Based Practice [3cr]	Statistics and advanced research methods (2 Th. U+ 1 P. U) as additional required units
	Health Care for Advanced Nursing Practice [3cr]	—
	Context of -The Research Process and Its Application to Evidence-Based Practice [3cr]	Evidence-Based Services Workshop: Optional
	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice [3cr]	Community health nursing theories and models and their application (1.5 Th. U + 0.5 App. U) Ethics, law, and professional relations (1 Th. U+ 0.5 P. U)
Advanced Practice Core Courses	Physiology/Pathophysiology [3cr]	—
	Clinical Pharmacology [3cr]	—
	Health Assessment and Measurement Adult-Gero Variation [1cr]	—
	Advanced Health Assessment and Measurement [2cr/36CL]	—
Specialty Courses	Health Promotion and Disease Prevention [2cr]	Promoting health and a healthy lifestyle (1 Th. U + 1 App. U)
	Diagnoses Symptom and Illness Management I – Adult-Gero [2cr]	—
	Advanced Practice in Primary Care I – Adult-Gero [4cr/224CL]	—
	Advanced Practice in Primary Care II – Adult-Gero [3cr/156CL]	—
	Diagnosis, Symptom and Illness Management II – Adult-Gero [2cr]	—
	Advanced Practice Nursing: Clinical Topics & Professional Issues – Adult-Gerontological Primary Care NP [4cr/224CL]	—
	Human and Family Development through the Lifespan [2cr]	Community-family health nursing (2 Th. U + 1 App. U)

Note. App. U = Apprenticeship unit; CL = Clinical Hours; Cr = credit; M.Sc. = Master of science; P.U = Practicum unit; Th. U = Theoretical unit.

workloads and possible lack of interest in developing nurse prescribing capabilities, many of them were not willing to be interviewed, which led to limitations in data collection

Another limitation of this study was the restricted access to detailed information on nurse prescribing curricula across different specialties and at various levels of master's and doctoral programs. The researcher only had access to the curriculum of Johns Hopkins University, rather than curricula from other leading countries in nurse prescribing.

The results of this study help educational policymakers or managers to develop NPT in nursing education. The results of this article can be helpful in countries where nurses' prescribing rights are not legislated. They can draw inspiration from the results of this study for developing a specialized nurse prescribing program within their nursing education system.

Conclusion

The results of this study show that to start NPT, some challenges must be met, and some potential help to remove these challenges in the nursing education system in Iran. Modifying the existent Master of Science curricula, using the prepared structures such as nursing home care and experienced nurses in ICUs, and interprofessional education with the cooperation of the physicians and pharmacologists are the best potentials that help the nurse prescribing training development in Iran. Pilot studies including nurse prescribing training courses in continuing education and formal curricula such as Master of Science in community health nursing or critical care nursing and examining their outcomes in practice are recommended.

Abbreviations

ICN, International Council of Nurses; ICUs, Intensive care units; JHU, Johns Hopkins University; M. Sc, Master of Science; NMC, Nursing and Midwifery Council; NP, Nurse Practitioner; NPA, Nurse prescribing authority; NPT, Nurse prescribing training; NPTD, Nurse prescribing training development

Authors' contributions

Mrs. Aazam Soltaninejad: data Analysis, writing the initial draft, and review & editing manuscript. She is a Ph.D. student whit nursing practice experience and nursing faculty member. **Mrs. Fatemeh Alhani:** project administration (Management and coordination of the research activity planning and execution), supervision (leadership of the research activity planning and execution), and review & editing manuscript. She is a nursing faculty member. **Mrs. Maryam Rassouli:** supervision and review & editing manuscript. She is a nursing faculty member.

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Conflict of interest

The authors declare that they have no conflict of interest.

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Research Article

The Experience of Social Alienation in Elderly Lung Cancer Patients: A Qualitative Study[☆]

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ABSTRACT

Purpose: The aim of this study was to understand the experience of social alienation in elderly lung cancer patients, to explore its causes, and to propose targeted intervention strategies.
Methods: From July to August 2023, 16 elderly lung cancer patients attending the respiratory department of a tertiary hospital in Changsha City, Hunan Province, were selected for semi-structured interviews using a purposive sampling method. The Colaizzi 7-step method was used to analyze the data.
Results: A total of four themes were distilled: the experience of social alienation in elderly lung cancer patients (pessimistic feelings, inferiority complex, and heavy psychological burden), subjective causes (disease-included shame, avoidant social behavior, and stigmatized labels), objective causes (isolated social states, and reduced amount of socialization), and rehabilitation support.
Conclusion: The causes of social alienation in elderly lung cancer patients include multiple aspects of personal, family, and social support, and symptom management and psychological guidance should be strengthened for this population to construct a hospital–society–family triple-linkage care program to help patients recover.

Introduction

In recent years, the incidence of cancer has continued to rise, but with medical advances, the 5-year survival rate of patients has improved, and the number of groups surviving with tumors has gradually increased [1]. Many patients suffer from the disease and generally face problems such as anxiety, depression, and somatic dysfunction, which cause them to become closed in interpersonal communication and make it difficult for them to establish good interactions with others [2,3]. Patients often feel a strong sense of alienation and loneliness, which in turn manifests the problem of alienation from social groups [4]. Studies have shown that social alienation is prominent in cancer patients, with a prevalence as high as 33% [5]. Social alienation refers to the reduction or detachment of patients' relationships with others, which leads to negative emotions such as despondency, helplessness, and loss of support [6,7]. It is manifested in two aspects: first, negative emotional experiences such as loneliness and helplessness at the subjective level; and second, behavioral manifestations such as social avoidance and narrowing of the social circle at the objective level [8]. This state of alienation not only hinders the physical and mental recovery process of patients but also imposes a serious burden on their families and society [9,10].

Lung cancer is the most common malignant tumor in China [11], with an annual incidence of 787,000 new cases and 631,000 deaths, and it has become the “No. 1 killer” [12]. Smoking is one of the main factors leading to lung cancer, coupled with the symptoms of coughing and sputum, which makes the public often hold prejudice and misunderstanding toward lung cancer patients, leading to their intentional or unintentional alienation, and then they feel a strong sense of social alienation [13]. Body-image changes are closely related, such as impaired body integrity after surgery, hair loss due to chemotherapy, and skin pigmentation due to radiotherapy. These changes make patients feel ashamed, and in turn, they actively choose to distance themselves from the outside world, exacerbating their sense of social alienation. A prospective cohort study of 211 patients with lung cancer by Takemura. [10] demonstrated that social alienation was associated with patient survival and home mortality. The high prevalence age of lung cancer is 65–69 years [14]. As the physiological reserve capacity of the elderly declines,

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their stress resistance and ability to maintain the stability of the internal environment are weakened, which leads to increased difficulty in their social contact and makes them more prone to develop detached behaviors [15]. In addition, lung cancer patients are often required to take medications, which brings additional challenges to their already fragile social lives. In this context, elderly lung cancer patients are more prone to social detachment, which seriously affects their somatic, role, emotional, cognitive, and social functioning, which in turn affects their physical and psychological health [16].

However, the existing studies are mainly cross-sectional. Therefore, there is an urgent need for insights from lived experience understanding of the experience of social detachment in elderly lung cancer patients and the main reasons for its emergence to inform the proposal of targeted interventions.

Methods

Study design and the participants

Purposive sampling was used to recruit participants according to the age, education level, occupation, and chemotherapy time of elderly lung cancer patients by the maximum difference method. Elderly lung cancer patients who attended the respiratory department of a tertiary hospital in Changsha City, Hunan Province from July to August 2023 were selected as the studyparticipants. Inclusion criteria were as follows: (1) being diagnosed with lung cancer by pathological examination; (2) being aged ≥60 years (according to the China's Law on the Protection of the Rights and Interests of the elderly stipulates that the age threshold for the elderly is 60 years); (3) undergoing chemotherapy; (4) being conscious, without cognitive dysfunction, and being able to communicate normally in Putonghua; and (5) informed consent and voluntary participation in this study. Exclusion criteria were as follows: (1) metastasis during the treatment of lung cancer; (2) those who were unable to cooperate with the investigation due to the combination of other malignant tumors or serious diseases of other organs; and (3) previous history of mental illness or psychological disease; (4) being involved in other studies. The sample size was standardized by reaching saturation of information [8]. When the collection of interview data reached 16 cases, there was no more new information, so a total of 16 respondents were interviewed in this study, all of whom voluntarily participated in this study.

Data collection

This study was approved by the Institutional Review Board of the Hunan Normal University (Approval no. 2023-635). This study was guided by the phenomenological research methodology, and data were collected from July–August 2023 using semistructured interviews. Firstly, after reviewing the literature, an interview outline was developed in conjunction with subject-group discussions and guidance from the tutor. Secondly, two participants who met the inclusion and exclusion criteria were selected for preinterview. Finally, the final interview outline was developed based on the results of the preinterviews and group discussions (Table 1).

The researcher herself worked in the respiratory internal medicine department of a tertiary hospital in Changsha City, Hunan Province, for up to one year and understood the characteristics of diseases, treatment protocols, and regulations of the department, as well as established a familiar and good relationship with patients and healthcare staff, which laid a foundation of trust for the interviews. The research lead had previously undertaken training in qualitative research methods, including interview techniques that facilitated consistent, high-quality data collection.

The interviews were one-on-one and were chosen to take place in a hospital conference room or in a quiet environment in the participant's home to ensure an undisturbed interview process. Before the formal interview began, the researcher introduced herself first, then introduced the purpose and content of this study, informed the research participants that the interview data were only used for the study, absolutely protected personal privacy to obtain their informed consent, and audio-recorded the content of the interview. During the interview, the interviewer avoided giving any inducing or suggestive words, listened patiently and encouraged the participants to express their inner experience, and recorded the behavioral and emotional changes of the participants in real-time. All participants took part in one interview, which lasted 30–60 minutes. No participant refused or withdrew from this study.

Data analysis

The data were analyzed using the Colaizzi 7-step method [17], which involves the following steps: (1) Read all the information carefully. (2) Analyze statements of significance. (3) Code recurring ideas. (4) Gather the coded ideas together. (5) Write a detailed, unambiguous description. (6) Identify similar ideas. (7) Return to participants for evidence.

Data analysis was carried out by two researchers, one who transcribed the audio recordings into text and compiled field notes within 24 hours of the interviews and the other who checked the transcriptions and returned it to the interviewees for confirmation. All respondents indicated that the transcription was correct without any modifications or additions. Once all interviews and transcriptions were completed, meaningful statements were distilled and coded and then summarized to form themes and subthemes.

Results

General information of the interviewees

There were a total of 16 interviewees, with an average age of (64.19 ± 4.18) years; among them, 5 (31.2%) were male and 11 (68.8%) were female; literacy level: 6 (37.5%) in primary school, 3 (18.8%) in middle school, 3 (18.8%) in high school, 4 (25.0%) in college, and 15 (93.8%) were mostly married (Table 2).

Themes

By analyzing the interview data of 16 elderly lung cancer patients, a total of four themes were distilled (Table 3): experience of social alienation, subjective reasons, objective reasons, and rehabilitation support for elderly lung cancer patients.

Elderly lung cancer patients' experience of social alienation

Overall, the results of this study indicate that older lung cancer patients experience social alienation in pessimistic feelings. After the disease, many patients have difficulty accepting the facts, and at the same time, they do not know enough about the disease. On this basis, any “special look” from the outside world will increase the patients' psychological pressure (heavy psychological burden) and give rise to strong fear and inferiority complex.

1) Pessimistic feelings

Under the influence of traditional thinking, people are scared of talking about “cancer”, and the traditional perception of Chinese

Table 1 *Interview Outlines.*

1. When you learned of your diagnosis, what was your emotional experience at that time, and what were the changes in your psychology and daily life? Can you describe it specifically?
2. Compared with the time before the disease, did your family/relatives/friends/colleagues/classmates change their attitudes/perceptions toward you? What do you think are the reasons for these changes? How have you perceived and responded to these changes? Please give us examples of specific incidents.
3. After the diagnosis, have you thought about staying away from social groups (e.g., family/relatives/friends/colleagues/classmates, etc.) and what do you think are the reasons for this?
4. How did friends, family, and partners help you after diagnosis? What kind of results do you think were achieved?
5. What is the biggest difficulty you currently have in participating in social activities and interpersonal interactions? Why do you have such difficulties? Are there any particular thoughts or feelings you would like to express?

people is that cancer is incurable and that they can only wait for death quietly, resulting in strong pessimism.

> What's in my heart, it would be better to die. It would be that I really wanted to die, so I cried every day, sitting there with nothing to do but shed tears; it was this kind of not wanting to live, a particularly desperate state of mind. (Participant 1)

> Well, cancer, this disease is equivalent to a terminal disease, and then it felt like the sky was gray. The mood is very low, do not want to talk, sits in a daze, eats no appetite, and sleeps is also easy to wake up in the middle of the night. I myself felt more pessimistic when I thought of having this disease. (Participant 7)

> Very despairing, devastated kind of thing. I have no hope for the world at all, and I feel like I just want to be alone, I don't want to go anywhere anyway, I just stay at home; it's like I'm waiting to die, and I have very little communication with other people. (Participant 11)

2) *Inferiority complex*

The second subtheme of the experience of social alienation was to feel inferiority complex. Respondents answered that they experienced major changes in their physical appearance after the disease, such as hair loss, weight loss, and poor mental health, and that these conditions made them feel inferior and afraid to communicate with others.

> “At that time after people were diagnosed in the hospital, I was in a bad mood, just felt like I had no face to meet people, mentally confused, unwilling to meet people, just didn't want to go out.” (Participant 2)

> “My body doesn't allow me to go out now, and now this image is a bit unacceptable to others.” (Participant 3)

> “After two chemotherapy treatments, my hair has turned gray and is almost gone, my teeth have fallen out, and my face has lost a lot of weight. My appearance has changed so much that I can't

Table 2 *General Information on Interviewees.*

No.	Age	Sex	Education	Marital status	Career	Monthly family income (Yuan)	Medical expenses reimbursement rate	Time to diagnosis (months)
1	62	Female	High School	Married	Retirement	16000	90%	19
2	65	Male	High School	Married	Retirement	17000	85%	13
3	60	Female	Middle School	Married	Unemployed	3000	45%	12
4	68	Female	college	Married	Retirement	15000	70%	15
5	76	Male	Primary School	Widowed	Retirement	3000	75%	19
6	62	Female	Primary School	Married	Retirement	6000	45%	21
7	60	Male	Middle School	Married	Retirement	18000	70%	13
8	64	Female	college	Married	Retirement	60000	70%	16
9	66	Female	Primary School	Married	Unemployed	4000	50%	11
10	63	Female	Primary School	Married	Retirement	6000	90%	18
11	66	Male	High School	Married	Retirement	8000	90%	21
12	65	Male	Primary School	Married	Retirement	7000	75%	19
13	60	Female	Middle School	Married	Retirement	10000	75%	10
14	68	Female	Primary School	Married	Retirement	14000	75%	12
15	62	Female	college	Married	Employed	10000	60%	21
16	60	Female	college	Married	Employed	10000	90%	18

Table 3 *Themes, Subthemes, and Concepts from the Interviews.*

Theme	Subthemes	Concepts
Elderly lung cancer patients' experience of social alienation	Pessimistic feelings	When I got sick, I could not accept the unacceptable fact. I did not have any hopeful outlook for the world.
	Inferiority complex	I feel ashamed and embarrassed to see anyone. I do not even want them to know my sickly state.
	Heavy psychological burden	I feel like a mountain of weight inside. I experienced a sleepless night.
Subjective reasons for social alienation of elderly lung cancer patients	Disease-included shame	Treatment-induced hair loss leaves me feeling ugly and self-conscious. If I attend an event, I'm anxious that my coughing will disturb others.
	Avoidant social behavior	Isolate yourself and avoid seeing anyone. I'm reluctant to reach out to people on the outside.
	Stigmatized labels	When visiting me, my friends wear protective masks to fear infection.
Objective reasons for social alienation of elderly lung cancer patients	Isolated social states	I ended my friendship with a friend. My friends are deliberately avoiding me.
	Reduced amount of socialization	I hardly ever venture out of the house, avoiding socializing. I rarely gather with friends.
Rehabilitation support	–	I desire the care and assistance of community workers at my home. My family's caring and concern inspired warmth and confidence in me, leading to a positive treatment approach.

> even see people. I'm just afraid of losing face." "I feel that I have no hope for anything, and I have low self-esteem. It was the most painful and hopeless state I've ever suffered." (Participant 5)

> "I am afraid that I will be known by other people, by more people, and then I feel that people who are sick, compared to healthy people, don't look good in every way, and they must be much worse in comparison, so I don't want to interact more with people who are healthy." (Participant 13)

3) Heavy psychological burden

However, due to symptoms such as coughing, sputum, vomiting, pain, loss of appetite, sleep disorders, fatigue, etc., patients are unable to carry out daily activities as they did before diagnosis, and they feel powerless even though they want to participate. Activities of daily living are affected by the decline in physiological functioning and often require the help of others to complete, leading to a greater psychological burden as patients become fearful of dragging their family members down with them.

> "I am never happy and always feel like a mountain inside. I feel like I'm dragging my partner down and putting them in pain, and I feel sorry for them." (Participant 2)

> "If you say no treatment, your partner doesn't agree, you really don't have any money, your family has no money, and you have to borrow money, the sky is falling. I am also physically hurt, so I thought I would go outside to bear it, not wanting to let my family and my closest people see me in such a difficult situation." (Participant 3)

> "I wasn't particularly surprised, but in my heart, I felt very stressed." (Participant 5)

> "At that time they actually started all right, but I myself had a heavy psychological burden." (Participant 12)

> "When I found out about it, it must have been a long period of time, one or two months of not being able to sleep at night, and then I had to take sleeping pills like Valium." (Participant 13)

Subjective reasons for social alienation of elderly lung cancer patients

Lung cancer patients subconsciously perceive themselves as different from others and even develop a sense of guilt. As a result, they are often self-denying, and the scope of their social network and the frequency of social contacts are significantly reduced compared to that in the presickness period. In addition, many patients reported that they were labeled negatively and suffered prejudice or discrimination in society. These reasons have led to their social alienation.

1) Disease-included shame

Respondents reported constant coughing, as well as drastic changes in their physical appearance; they felt ugly and gradually became self-denying, avoiding interactions with social groups.

> " Coughing and not wanting to go out all day, staying at home all day, and not in good spirits, afraid of being looked down upon when I go out." (Participant 1)

> "At that time, after people were diagnosed in the hospital, I was in a bad mood, I just felt like I didn't have the face to see people, I just felt in a bad mood, I can't tell you; it was hard; I didn't want to see people. Mentally confused, didn't want to see people, just didn't want to go out." (Participant 2)

> "After having two chemotherapy treatments, my hair went gray, it was falling out, I lost a lot of teeth, and my face lost a lot of weight. My appearance has changed so much that I can't even see people. I don't look like a human being. I'm afraid of losing face." (Participant 5)

> "I used to love to go out, but when I was first diagnosed, everyone knew about it, I didn't want everyone to know, but he knew and came to see me, and I think the house was quite messy at that time. Because my hair fell out, it got ugly, I felt so ugly, and then I didn't even want them to know. They always ask me how I feel now or if I look older than others. I wear a hat when I go out and I just feel like there are strange looks." (Participant 10)

> "I'm just afraid that I'll affect them, I just want to be alone, quiet or something. If I go to an event, I'm worried that I'll affect others by coughing and infecting them." (Participant 14)

2) Avoidant Social Behavior

The second subtheme of the subjective reasons for social alienation was avoidant social behavior. The interviews indicated that when they were diagnosed, they felt scared, confused, and psychologically changed; they were reluctant to socialize and leave the house.

> "Not taking the initiative to socialize with friends, it was like closing myself off, not wanting to see anyone. My old colleagues and friends, I don't want to take the initiative to contact them either, and when they ask me, I just pass them off in a few words, so I don't want to continue to talk to them. I intentionally cut off contact with my friends and don't reach out to them. I feel like I'm closing myself off by not wanting to get in touch with my old friends. I just felt like I wanted to get out of this mixed-up world, it felt like I just wanted to be alone and not reach out to anyone." (Participant 1)

> "It just feels like there's nothing to do, there's no interest in doing anything, and I don't like to go out anymore. I think when people are down or suffering, they don't want to be disturbed like I don't want to meet, I just want to bear it by myself, sooner or later I have to go. Kind of like what young people say nowadays about lying flat." (Participant 5)

> "I felt that I had isolated myself during that period of time. I didn't want to go to the parties and outings in the past. Then I usually like to stay by myself, and I didn't even want to go out when I was first diagnosed. I just like to isolate myself, and I don't take the initiative to get in touch with people." (Participant 7)

> "I don't want to contact people outside; I don't want more people to know." (Participant 8)

3) Stigmatized labels

In addition to avoidant social behavior, respondents indicated that they were negatively labeled, which led to prejudice and discrimination in society and prevented them from socializing properly.

> "Worrying about whether the disease will affect them, whether this friend of mine will worry about the contagion aspect, whether there will be a worry about like eating together or

> something, talking without wearing a mask, so try to avoid that. Try to stay away a little bit when they're out and about, try not to pick a time when they're free. In the hospital, some people don't understand, some older people are less qualified, and they're there every day talking about contagion, and there's still a distance to socialize with people now." (Participant 2)

> "If it's true that if your children stay away from you and your old partner stays away from you, then that's the way it should be. Who let themselves get this disease, the child also has a child, and people are also afraid, when the time comes, although there is no clear contagion, that child is too young; he wants to stay away; we can't say anything. We also can't give our son or daughter a mess all the time right." (Participant 3)

> "Some are afraid of catching it, and some are just afraid of catching them again." (Participant 11)

> "If you go to an event you are worried that the cough will affect others and infect them." N16: "Friends they would and do come to visit me but not as enthusiastic as before; it just doesn't feel as enthusiastic as before ah, they all wear masks, they are afraid of spreading the infection." (Participant 14)

Objective reasons for social alienation of elderly lung cancer patients

Objective causes of social detachment in elderly lung cancer patients include isolated social states and reduced amount of socialization.

1) Isolated social states

Respondents indicated that their relatives and friends were reluctant to associate with them for fear of their financial problems, and were cold or deliberately distant from them.

> "The main thing is that the first one is poor, plus this disease, it takes a long time to treat, then there is even less money. I borrowed from all the relatives that I could, and basically, later on, it was the interaction with that friend that basically cut off the interaction." (Participant 3)

> "We used to be together every day, square dancing and stuff, and when they heard I had this disease, they stopped calling me, and I felt like I was isolated. Just intentionally avoiding me. They used to play well together, but when they heard about my disease; they stopped coming, as if they had isolated themselves. Friends all think that if you have the disease, then they must be afraid of you borrowing money and must stay away from you." (Participant 6)

> "My original colleagues, who had an average relationship, are now polite when they see me occasionally and treat me as a seriously ill patient, so I definitely have a sense of distance. I feel that they are intentionally avoiding me and distancing themselves from me." (Participant 8)

> "When I first got sick, I felt that I was being left out because sometimes I would go out for a walk and occasionally I was asked if I wanted to go out, and when I said no, they went their own way, and they didn't take care of me in terms of their diet, so I felt particularly lost, and I felt that they were really leaving me out in the cold." (Participant 12)

> "Sometimes I let my friends come to the house to play with me, sometimes I will call him, and then they always; sometimes it is to take into account me, said that I am afraid of resting poorly ah what is to find some perfunctory reasons for me." (Participant 16)

2) Reduced amount of socialization

Respondents reported that after the illness, they stopped attending friends' meetings and events that they used to participate in before.

> "For example, I am not usually needed for grocery shopping, so I have less contact with friends outside. Then I can only go online, and online contact is not safe nowadays, so I can't contact people indiscriminately, so my circle is a bit narrower. Ordinary friends naturally have less contact." (Participant 1)

> "I used to go out to play mahjong and travel, but now I basically seldom go out and occasionally get together with them, not as frequently as before." (Participant 4)

> "Maybe I don't have the same physical condition as before; I would be very tired just playing for a day. Basically don't go out, don't have much socialization, and now my health is not very good." (Participant 5)

> "In the past, we used to be together every day, square dancing and stuff, they heard that I got this disease, and they don't call me anymore, I feel like I'm isolated, we used to go out together in the evenings, and we used to dance at night and buy food together, they heard about this disease, and they know that I'm not in good health anymore, they don't come to call me anymore." (Participant 6)

> " After all, although it is said to have improved, for example, this physical strength ah what is still worse than before, so that is also still not very willing to participate in these activities ah." (Participant 12)

> "I don't go out much, I just buy groceries." (Participant 13)

> "Sometimes my family calls me to go out to the park, but I am not willing to go unless I have been told many times. Because of this disease, I am under a lot of pressure." (Participant 14)

Recovery support

Participants expressed the hope that more care from family, friends, communities, and hospitals would be of great significance to their active cooperation in treatment and recovery. The understanding and support from family and friends had a certain impact on their confidence in overcoming the disease, and they hoped that "end-of-life care" could be put into practice.

> "Whether it's the community or society, the end-of-life care that is being promoted now, or the care in the community, these aspects can really be put into practice." (Participant 5)

> "We need to create a good living atmosphere at home, and we don't expect a community to take care of so many people, we just hope that the community can provide more medical checkups, health talks, and so on. I hope the doctors can come up with some good programs according to the different stages of illness." (Participant 8)

> "I hope my children can provide more financial help, the community can provide some places to walk and rest, and the hospital can provide some help with treatment costs." (Participant 9)

> "The family is a concern; on the other hand, it is also a motivation because when I can't think about it, I feel they are there, so I feel a little bit reluctant to let go of them, and they are taking care of me and caring for me, and I feel very warm, which

> makes me have the confidence to go for active treatment." (Participant 10)

> "Behind is their behavior more or less also play a certain role because often send me this short video funny paragraph ah." (Participant 12)

> "I hope the family is more lively and the children have to come back to visit often. If the community, I hope that they can care about the care and concern and that they can come to the door to care about the greetings. But I still have to integrate myself into society, and I would be happier if I could have a little more people to care about me." (Participant 13)

> "Family and friends are quite good; my family are all very understanding; they all let me go; I am still very grateful to them, and the same goes for my friends. As long as I say I want to eat something, or there is something I want to go to the place, relatively close to the case, the weather is better, they will buy for me, or take me for a walk, ah, this kind of help makes me more optimistic than before, and then the state of mind better than before can be positively faced with the problem of illness, and then positively deal with it; is not very decadent to allow him to develop." (Participant 15)

Discussion

This qualitative study explored the experiences and causes of social alienation in elderly lung cancer patients. The results revealed four themes: (1) the experience of social detachment in elderly lung cancer patients included pessimism, feelings of inferiority, and psychological burden; (2) subjective causes included feelings of shame, social avoidance, and stigma; (3) objective causes included social isolation and reduced social activities; and (4) rehabilitation support.

In this study, the experience of social detachment in elderly lung cancer patients was similar to that in the findings of other studies. Elderly lung cancer patients face great physical and psychological stress, especially when the disease is diagnosed, and often do not want to believe that it will happen to them. Elderly lung cancer patients exhibit various behaviors such as difficulty in sleeping, loss of appetite, and explaining their afterlife. Yıldız [18] stated that pessimism and low self-esteem developed by lung cancer patients during the treatment process are subjective feelings that lead to social alienation. In rural areas and other areas, suffering from cancer is considered as having done something bad in a previous life, and they will inevitably face the finger-pointing of their neighbors in the village, in turn, elderly patients with lung cancer like to cover up their true inner feelings with silence. The results of the study by Suwankhong [19] indicated that this will affect the social confidence of elderly patients with lung cancer in the long run, and ultimately social dysfunction will occur. Therefore, healthcare professionals should pay attention to the social detachment of elderly lung cancer patients and encourage patients to seek help from professional psychotherapists to provide emotional support and psychotherapy.

Dong [20] conducted semistructured interviews with 20 cancer patients, and the results showed that most of the cancer patients were significantly less socially active due to fatigue, disease stigma, and health concerns, and more often avoided or refused social situations. It is consistent with the results of this study. The sense of disease shame reduces patients' social function by affecting their social confidence. Long-term repeated hospitalization makes elderly lung cancer patients have a pessimistic attitude toward the outside world and a strong sense of disease shame, and then they like to cover themselves with behaviors such as silence or avoidance and are unwilling to reveal their hearts to the outside world [21,22]. Many of the patients in this study mentioned that their friends and relatives thought lung cancer was contagious, and this external prejudice and ignorance made them afraid of social activities. The idea of "patience" in traditional culture implicitly affects lung cancer patients, who are more willing to bear the pain alone in order not to increase the burden of their friends and relatives [23]. Lack of communication reduces the self-adjustment ability of elderly lung cancer patients and makes them more socially withdrawn. Therefore, healthcare professionals should pay attention to the self-disclosure of elderly lung cancer patients, conduct appropriate psychological interventions, and improve the disease cognitive level of patients and their family members by means of knowledge lectures in order to help elderly lung cancer patients face life rationally and maintain their interest in socialization.

After patients are diagnosed with lung cancer, their family members and friends subconsciously alienate themselves from lung cancer patients and even show discrimination inadvertently [24]. Many of the study participants in this study mentioned that they were unable to participate normally in previous social activities due to fatigue and decreased endurance of physical activities, and they mostly stayed at home alone to convalesce, with a significant decrease in their activities. They were even worried about becoming a burden to their friends and relatives and had less contact with them, causing changes in their social networks [25]. Dong [20] said that the caring care of relatives and friends and family support help cancer patients get out of psychological difficulties and adapt to social life. It is consistent with the results of this study. Social support can effectively alleviate negative emotions such as depression in elderly lung cancer patients, reduce the physical and psychological pain caused by chemotherapy, enhance confidence in overcoming the disease, and improve the sense of social identity [26,27]. Therefore, the state should strengthen the medical insurance support for lung cancer to reduce the economic burden on patients, and patients should also strengthen respiratory function training to promote rehabilitation after surgery, which can effectively reduce the level of social alienation of patients.

This study shows that elderly lung cancer patients want to receive rehabilitation support from their families, communities, and hospitals. Zhou's study [28] showed that knowledge education from healthcare professionals can help elderly lung cancer patients correctly cope with rehabilitation problems and improve their anxiety, depression, and other adverse emotions. Zhang [29] used a questionnaire survey of 475 lung cancer patients using the Cancer Patient Nursing Professionalism Support Needs Scale and found that patients had a high level of supportive needs, with information needs scoring the highest. Studies have shown that meeting patients' needs for rehabilitation-related knowledge can help improve their quality of life [30]. Therefore, healthcare professionals can use internet platforms or offline activities to explain disease-related knowledge to lung cancer patients and carry out hospital–society–family triple-linkage hospice programs to help patients recover.

Limitations

The population of this study originated from Hunan Province, and the sample size can be expanded in the future to compare the differences between different countries and regions.

Conclusions

In this study, we conducted in-depth interviews with 16 elderly lung cancer patients and found that the reasons for the social alienation of elderly lung cancer patients included both subjective and objective reasons. Therefore, healthcare professionals should strengthen symptom recognition, management, and psychological guidance for this population and construct a hospital–society–family triple-linkage care program to help patients recover.

Ethics approval

This study was approved by the Institutional Review Board of the Hunan Normal University (Approval no. 2023-635).

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Authors' contributions

Conceptualization and Methodology: CNS, LBY; Data collection: CNS; Fornal Analysis: CNS, LBY; Writing – original draft: CNS; Supervision: LBY; Project administration: LBY; Writing – review and editing: LBY. All authors approved the final version for submission.

Data availability

Datasets are available through the corresponding author upon reasonable request.

Conflict of interest

The authors declare that they have no competing interests.

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Research Article

Lessons for Future Vaccination Policies: COVID-19 Vaccination Intention in People With and Without Chronic Diseases

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SUMMARY

Purpose: This study compared COVID-19 vaccination intentions in those with and without chronic diseases (CDs and non-CDs) in South Korea. We hypothesized that the factors associated with COVID-19 vaccination intentions would differ between CDs and non-CDs in South Korea.
Methods: Using survey data collected through a Korean online panel in June 2021, we conducted a cross-sectional secondary data analysis. Of the 2292 participants, 411 had at least one chronic disease. To construct a comparable dataset, we selected non-CDs via a 1:1 case-control matching for age and gender. We then utilized a multivariable binary logistic regression model to explore the factors contributing to COVID-19 vaccination intentions in CDs and non-CDs.
Results: All told, over 75% of participants in both groups indicated that they intended to vaccinate against COVID-19. In both groups, those who mistrusted general vaccine benefits reported significantly lower COVID-19 vaccination intentions. Regarding factors associated with vaccination intentions, CDs identified anxiety regarding coronavirus and exposure to COVID-19 vaccination promotions at the community level, while non-CDs highlighted hesitancy regarding vaccines and confidence in government/health services.
Conclusion: Improving vaccination acceptance will require the development and implementation of tailored approaches for CDs and non-CDs and efforts to minimize general vaccine mistrust.

Introduction

Since December 2019, over 760 million people have had confirmed cases of COVID-19, and as of March 2023, almost 7 million deaths had been attributed to the disease worldwide [1]. After the major COVID-19 vaccines were approved in December 2020, COVID-19 vaccination accelerated among the general public first in the United States (U.S.) and European countries, followed by Israel in January 2021 and in Korea in July 2021 [2, 3]. Seeking to verify the efficacy and safety of the vaccines, the Korean government initiated COVID-19 vaccinations relatively late compared to its peer countries [3], beginning vaccinations for priority groups (e.g., residents and staff of long-term care facilities, those older than 65 years old, and healthcare workers) at the end of February 2021 [3].

The World Health Organization (WHO) emphasizes the importance of COVID-19 vaccination and herd immunity to control the disease's spread [4]. Accordingly, several studies on the public's intention to vaccinate against COVID-19 have identified factors influencing the intention to vaccinate [5-7]. These include the following [5-7]: general characteristics such as old age, being male, having a higher educational status, having a chronic disease; a history of seasonal influenza vaccine uptake; a positive attitude toward vaccines; a perception of higher vaccine benefits; lower levels of belief in vaccine conspiracies; fewer concerns regarding vaccine safety; and favorable attitudes toward COVID-19 prevention measures.

Applying the socio-ecological model (SEM) to COVID-19 vaccination intentions clarifies the complexity of human behaviors and their interactions within social systems [8, 9]. The SEM proposes that individuals' health behaviors relate to factors on the individual, community, organization, and policy levels [9]. At the time of the

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H1N1 pandemic, factors at the SEM levels were associated with vaccine uptake. In separate models for each level, 53% at the individual level, 47% at the community level, 34% at the organizational level, and 8% each at the policy and community levels explained vaccine uptake decisions, and 65% at all levels together did [9]. Our study considered various factors that may influence COVID-19 vaccination, including gender, age, attitudes toward vaccines in general, hesitancy regarding vaccines, influenza vaccination uptake, anxiety regarding Coronavirus, compliance with COVID-19 prevention guidelines, and belief in coronavirus conspiracy theories at the individual level; exposure to COVID-19 vaccination promotions at an organizational level; exposure to COVID-19 vaccination promotions at the community level; and confidence in the government's and health service authorities' abilities to handle the pandemic at a policy level.

The WHO has identified old age, underlying noncommunicable diseases, and smoking as risk factors for increased mortality from COVID-19 [10]. According to the U.S. Centers for Disease Control and Prevention (CDC), 92% of patients hospitalized with COVID-19 had chronic diseases [11]. The European CDC reported that patients who had chronic diseases were often transferred to intensive care units [12]. Recognizing consistent research findings showing that people with chronic diseases (CDs) are more likely to get very sick or die from COVID-19 than those without chronic diseases (non-CDs), the WHO emphasizes the importance of vaccinating those with CDs [4]. Understanding the vaccination intentions of individuals with CDs is therefore crucial. While studies regarding the COVID-19 vaccination intentions of individuals with CDs are emerging [13–14], studies comparing individuals with and without CDs remain scarce [13–14]. The demographic characteristics of people with CDs tend to differ from those of the general population; e.g., they are often over the age of 40 and are more likely to be male [15]. Since those with CDs and those without tend to have different characteristics, determining whether differences in COVID-19 vaccination intentions are attributable to their general demographic characteristics or modifiable experiences or perceptions of COVID-19 is difficult. To control for differences in demographic characteristics (e.g., age and gender) between groups and increase between-group comparability, researchers have utilized the 1:1 case-control matching method [16]. While this method has commonly been used to compare those with and without specific outcomes or those with similar characteristics [16], researchers have successfully applied it to explore different health outcome-related factors between those with and without certain diseases [17, 18].

Aiming to compare factors associated with COVID-19 vaccination intentions between individuals with and without CDs, we utilized the 1:1 case-control matching method to control for the differences in demographic characteristics. We hypothesized that the factors associated with COVID-19 vaccination intentions differ between those with and those without CDs in South Korea. Our findings could help identify modifiable factors that influence vaccination intentions and lead to policy recommendations tailored to group characteristics.

Methods

Study design and participants

To assess Korean adults' COVID-19 vaccination intentions and associated factors, we conducted a cross-sectional secondary data analysis study [19]. The data collection was conducted in June 2021 in the middle of the third and fourth waves of COVID-19—a time when the number of new cases did not change significantly [1], and just before the COVID-19 vaccines were offered to the general public, the Korean government was promoting the benefits of vaccination, such as lifting gathering restrictions for vaccinated individuals [3].

The sampling and recruitment procedures we used have been described elsewhere [19]. Briefly, we conducted an online survey using a research panel from a company with 1.5 million voluntarily registered members. To construct a representative sample of Korean adults, we implemented an age- and gender-based stratified sampling method. At that time, COVID-19 patients were subjected to social stigma during the quarantine process in South Korea [20]. To eliminate the influence of recent COVID-19 infection or vaccination experiences, the survey excluded people who (1) had been previously diagnosed with COVID-19 or (2) were vaccinated against COVID-19. For the secondary data analysis study, we defined CDs as people who indicated they had been diagnosed with a chronic disease. Out of the 2292 people who completed the survey, 411 had chronic diseases, while 1881 did not. To control for confounding factors and enhance comparability between non-CDs and CDs, we matched the non-CDs with the CDs based on age and gender variables using a 1:1 case-control matching procedure (Supplementary Figure 1) [17]. This method is typically used when the outcome variables are binary or categorical, such as the presence or absence of a disease or event [16, 17, 21]. Cases and controls are matched based on predefined variables, which were age and gender in this study. These two matching variables were selected as they are inherent demographic characteristics between CDs and non-CDs, regardless of the types of CDs [16, 17]. In this matching procedure, an individual with any types of chronic diseases (case) was matched with an individual without the disease (control) who had the same gender and age groups (20s, 30s, 40s, 50s, and 60s). A total of 822 respondents (411 CDs and 411 non-CDs) were included in this study. Compared to the total non-CDs in the original dataset ($n = 1881$), the matched non-CDs ($n = 411$) were characterized by an older age and a higher proportion of males (Supplementary Table 1).

Measures

Perceptions and experiences regarding vaccines in general

We used the Vaccination Attitude Examination scale to measure attitudes toward general vaccines [19, 22]. This scale consists of 12 items in four subdomains: (a) mistrust of vaccine benefits (three items, e.g., I feel safe after being vaccinated); (b) worries about unforeseen future effects (three items, e.g., I worry about the unknown effects of vaccines in the future); (c) concerns about commercial profiteering (three items, e.g., vaccines make a lot of money for pharmaceutical companies but do not do much for regular people); and (d) preference for natural immunity (three items, e.g., being exposed to diseases naturally is safer for the immune system than being exposed through vaccination.). Participants provided responses to items using a 6-point Likert-type scale (1 = strongly agree to 6 = strongly disagree). We calculated the scale scores as the average of each item's value. A higher score indicated a more negative attitude toward the vaccine (Cronbach's $\alpha = .86$).

We assessed general vaccine hesitancy using the Korean version of the Vaccine Hesitancy Scale [19, 23]. The scale consists of seven items (e.g., childhood vaccines are important for my child's health) with 5-point Likert-type responses (1 = strongly agree to 5 = strongly disagree). We calculated the scale score by averaging the item values. A higher score indicated more hesitancy regarding vaccines in general (Cronbach's $\alpha = .93$).

To assess influenza vaccine uptake, we used one item: “Have you been vaccinated against seasonal influenza in the last two years (2019–2020)?” The response options included: 1) yes in 2020, 2) yes in 2019, 3) yes in both years, and 4) neither. We recorded the responses and grouped the subjects as 1) never been vaccinated or 2) previously vaccinated.

Perceptions and experiences regarding COVID-19 and the COVID-19 vaccine

We measured subjects' anxiety levels regarding COVID-19 using the Coronavirus Anxiety Scale [24, 25], which is psychometrically valid in many cultures [26–28]. This scale includes five negative feelings people may experience when exposed to information about the coronavirus (e.g., I felt dizzy, lightheaded, or faint when I read or listened to news about the coronavirus). Possible responses ranged from 0 (not at all) to 4 (nearly every day). We defined participants as anxious if the summed scores were >= nine (Cronbach's $\alpha = .93$) [25, 26].

To assess compliance with COVID-19 guidelines, we used 11 items (e.g., covering your mouth and nose with your bent elbow or tissue when you cough or sneeze) [29, 30]. Participants provided responses on a 4-point Likert-type scale (1 = not at all to 4 = to a great extent). We obtained the scale score by averaging the item scores. Higher scores indicated more rigorous compliance with COVID-19 prevention guidelines (Cronbach's $\alpha = .86$).

Regarding COVID-19 conspiracy theories, we asked participants to rate the extent to which they agreed with 14 conspiracy statements (e.g., Big Pharma created COVID-19 to profit from vaccines) [31]. Participants responded to items on a 5-point scale (1 = do not agree to 5 = agree completely). We calculated the scale score by averaging the item scores. A higher score indicated that the participants strongly believed the conspiracy theories regarding the coronavirus (Cronbach's $\alpha = .95$).

We surveyed two items regarding exposure to COVID-19 vaccination promotions at the organizational level [32]: 1) My family and I have heard about COVID-19 vaccination at a company, organization, or school; and 2) My family and I have provided written consent for COVID-19 vaccination at a company, organization, or school. The response options were 1) frequently, 2) having 1–2 experiences, and 3) never. We calculated the scale score by averaging the items. A higher score indicated participants had more exposure to COVID-19 vaccination promotions at the organizational level.

We measured exposure to COVID-19 vaccination promotion at the community level using two items [32]: 1) I have heard about COVID-19 vaccination in my local community; and 2) I have written a consent form for COVID-19 vaccination in my local community. possible responses were 1) often, 2) sometimes, or 3) never. We calculated the scale score by averaging the item scores. A higher score indicated that a participant had more exposure to COVID-19 vaccination promotion at the community level.

We asked participants about their level of confidence in how 1) the Korean government and 2) the health service authorities handled the pandemic [33, 34]. Participants rated each item on a seven-point Likert scale (1 = not at all confident to 7 = completely confident), and we calculated the scale score by averaging item responses. Higher scores indicated that the participants had higher levels of confidence in the Korean government and the health service authorities.

COVID-19 vaccination intention

To assess COVID-19 vaccination intention, we asked participants, “How likely do you think you are to get a COVID-19 vaccine when one is approved?” [35]. Participants provided responses on a seven-point Likert-type scale (1 = very unlikely to 7 = very likely). The distribution of this item was extremely skewed, and we coded the ordinal options for analytical purposes as 1) low intentions (responses 1–4) and 2) high intentions (responses 5–7) [19]. The midpoint (response 4) indicated that the participant was neutral, indifferent, or undecided [36]. In comparing factors related to COVID-19 vaccination intentions, we categorized neutral participants as having low vaccination intentions [36, 37].

General characteristics

We obtained participants' individual-level characteristics for age, gender, educational attainment, cohabitation status, monthly income, and chronic disease status.

Data analysis

Data were analyzed using SPSS 26.0 (Armonk, NY, USA: IBM Corp.). To describe participants' general characteristics, we calculated the mean and standard deviation (SD) frequencies and percentages. We used t-tests for continuous variables and chi-square tests for categorical variables to examine the homogeneity between CDs and non-CDs. To explore the crude associations between each variable and intentions to receive the COVID-19 vaccine, we preliminarily conducted univariate binary logistic analyses and calculated crude odds ratios (ORs) with 95% confidence intervals (CIs), which provide raw measures of association. To examine the adjusted associations between each variable and the dependent variable after controlling for the effects of the others, we performed multivariate logistic analyses and calculated adjusted ORs and 95% CIs. This analysis controlled for potential confounding variables such as gender, age, cohabitation status, education attainment, and income [6–8]. This adjustment helps to isolate the specific effect of each variable on vaccination intentions. We separately constructed logistic regression models for those with and without CD to compare factors that contribute to COVID-19 vaccination intentions. The study protocol was exempt from review by the Chung-Ang University Institutional Review Board (No. IRB no. 1041078-202201-HR-025).

Results

General characteristics of chronic diseases and nonchronic diseases

Participants' average age was 50–51 years old, and 64.0% were male (Table 1). Both groups showed similar cohabitation status, educational attainment, and monthly income distributions. Over $^4/_5$ lived with someone, and ¾ partook in regular education courses.

Regarding general vaccine perceptions and experiences, general attitudes toward vaccines, and general vaccine hesitancy were similar between those with and without CDs. Those with CDs were more likely to receive the influenza vaccine than those without (CD = ever 51.8%, never 48.2%; non-CD = ever 41.4%, never 58.6%; $\chi^2 = 9.04$, $p = .003$).

Regarding perceptions and experiences of COVID-19 and the COVID-19 vaccine, individuals without CDs were more exposed to COVID-19 vaccination promotions in their communities than those with CDs (CDs = 0.52 ± 0.56, non-CDs = 0.61 ± 0.64; $t = 2.08$, $p = .038$). Most subjects were not anxious about COVID-19 (CDs = 93.4%, non-CDs = 94.9%, $\chi^2 = 0.80$, $p = .372$). Over 75% of individuals in both groups reported having high intentions to receive the COVID-19 vaccination ($\chi^2 = 0.57$, $p = .452$).

Factors associated with intentions to receive the COVID-19 vaccine in chronic diseases and nonchronic diseases

Many explanatory variables showed significant crude associations with COVID-19 vaccination intentions in both groups. Among CDs, those who exhibited positive attitudes toward general vaccines, demonstrated lower hesitancy regarding vaccinations, and had positive perceptions and experiences related to the COVID-19 vaccine

Table 1 *General Characteristics of CDs and Non-CDs (N = 822).*

Variables	CDs (*n* = 411)	Non-CDs (*n* = 411)	Statistics	
	Mean ± SD or *N* (%)		t (p)	χ2 (p)
Gender, male	263 (64.0)	263 (64.0)		
Age	50.79 ± 10.33	50.29 ± 10.58		
20–29	25 (6.1)	25 (6.1)		
30–39	33 (8.0)	33 (8.0)		
40–49	83 (20.2)	83 (20.2)		
50–59	166 (40.4)	166 (40.4)		
60–64	104 (25.3)	104 (25.3)		
Cohabitants, yes	338 (82.2)	344 (83.7)		0.31 (.578)
Education attainment				3.69 (.298)
≤9 years	4 (1.0)	10 (2.4)		
10–12 years	98 (23.8)	99 (24.1)		
≥13 years	309 (75.2)	302 (73.5)		
Monthly income (USD)				7.67 (.175)
<2 K	69 (16.8)	51 (12.4)		
2–3.9 K	118 (28.7)	117 (28.5)		
4–5.9 K	106 (25.8)	118 (28.7)		
6–7.9 K	60 (14.6)	48 (11.7)		
8–9.9 K	33 (8.0)	40 (9.7)		
≥10 K	25 (6.1)	37 (9.0)		
General vaccine perceptions and experiences				
Attitude toward vaccination (range 1–6)				
Mistrust of vaccine benefits	2.44 ± 1.02	2.45 ± 0.97	0.12 (.907)	
Worries about unforeseen future effects	4.44 ± 0.90	4.49 ± 0.91	0.80 (.426)	
Concerns about commercial profiteering	2.85 ± 1.19	2.75 ± 1.16	−1.19 (.234)	
Preference for natural immunity	3.14 ± 1.18	3.15 ± 1.19	0.07 (.945)	
Hesitancy regarding vaccines (range 1–5)	2.19 ± 0.71	2.16 ± 0.67	−0.59 (.559)	
Influenza vaccine uptake				9.04 (.003)
Ever	213 (51.8)	170 (41.4)		
Never	198 (48.2)	241 (58.6)		
COVID-19 and the COVID-19 vaccine perceptions and experiences				
Anxiety regarding Coronavirus (range 0–20)				0.80 (.372)
Not anxious (total < 9)	384 (93.4)	390 (94.9)		
Anxious (9 ≤ total)	27 (6.6)	21 (5.1)		
Compliance with COVID-19 prevention guidelines (range 1–4)	3.25 ± 0.44	3.30 ± 0.40	1.87 (.061)	
Beliefs regarding coronavirus conspiracy theories (range 1–5)	1.33 ± 0.78	1.34 ± 0.78	0.17 (.865)	
Exposure to COVID-19 vaccination promotion at organizational level (range 0–2)	0.64 ± 0.62	0.68 ± 0.65	1.07 (.284)	
Exposure to COVID-19 vaccination promotions at the community level (range 0–2)	0.52 ± 0.56	0.61 ± 0.64	2.08 (.038)	
Confidence in the government's and health service authorities' ability to handle the pandemic (range 1–7)	4.82 ± 1.74	4.94 ± 1.60	1.04 (.297)	
COVID-19 vaccination intention				0.57 (.452)
Low intention	97 (23.6)	88 (21.4)		
High intention	314 (76.4)	323 (78.6)		

CDs = people with chronic diseases; Non-CDs = people without chronic diseases.

were more likely to show higher intentions to receive the COVID-19 vaccination. Among non-CDs, those with more favorable attitudes toward vaccines (excluding worries about unforeseen future effects), lower hesitancy toward general vaccinations, and a higher uptake of influenza vaccinations in the past two years were significantly more likely to have higher intentions to receive the COVID-19 vaccine. Regarding COVID-19-related perceptions and experiences, lower levels of coronavirus conspiracy beliefs, greater exposure to COVID-19 vaccination promotions at the community level, and higher confidence in the government's and health service authorities' ability to manage the pandemic were significantly associated with higher intentions to receive the COVID-19 vaccine among non-CDs.

On the other hand, the adjusted associations differed in the multivariate regression models between the two groups (Table 2). Consistently, CD and non-CD participants who indicated higher mistrust of vaccine benefits reported significantly lower COVID-19 vaccination intentions (OR = 0.35, 95% CI = 0.23–0.52 for CDs; OR = 0.26, 95% CI = 0.16–0.40 for non-CDs) (Table 2). The other factors affecting COVID-19 vaccination intentions were heterogeneous between the two groups. Among CDs, coronavirus-related perceptions and experiences impacted COVID-19 vaccination intentions. For example, those who were not anxious about the coronavirus were significantly more likely to intend to receive the COVID-19 vaccination (OR = 0.23, 95% CI = 0.07–0.80). In particular, CDs who were more exposed to COVID-19 vaccination promotions at the organizational level had significantly higher odds of COVID-19 vaccination intentions (OR = 2.68, 95% CI = 1.31–5.48). Non-CDs who showed higher levels of general vaccine hesitancy (OR = 0.43, 95% CI = 0.22–0.85) and lower confidence in the government's and health service authorities' abilities to handle the COVID-19 pandemic (OR = 0.05, 95% CI = 1.00–1.67) were less likely to intend to receive the COVID-19 vaccination.

Discussion

Chronic disease is a known risk factor for COVID-19 morbidity. Understanding the vaccination willingness among those with CDs could help protect this at-risk population and reduce social losses.

Table 2 *Factors Associated with the Intention of Receiving the COVID-19 Vaccine in CDs and Non-CDs ($N = 822$).*

	CDs ($n = 411$)				Non-CDs ($n = 411$)			
	Crude		Adjusted[a]		Crude		Adjusted[a]	
	OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*
General vaccine perceptions and experiences								
Attitudes toward general vaccines								
Mistrust of vaccine benefits	0.27 (0.20–0.36)	<.001	0.35(0.23–0.52)	<.001	0.19 (0.13–0.28)	<.001	0.26 (0.16–0.40)	<.001
Worries about unforeseen future effects	0.77 (0.59–1.00)	.050	1.03 (0.70–1.51)	.881	0.89 (0.68–1.15)	.367	1.46 (0.94–2.28)	.096
Concerns about commercial profiteering	0.53 (0.43–0.66)	<.001	0.83 (0.57–1.20)	.321	0.59 (0.48–0.73)	<.001	1.33 (0.83–2.16)	.239
Preference for natural immunity	1.41 (1.15–1.73)	.001	0.79 (0.56–1.11)	.168	0.73 (0.59–0.89)	.002	0.79 (0.53–1.17)	.239
Hesitancy regarding vaccines	0.34 (0.24–0.48)	<.001	1.04 (0.62–1.76)	.884	0.20 (0.17–0.31)	<.001	0.43 (0.22–0.85)	.015
Influenza vaccination uptake (ref.: never)	1.33 (0.84–2.10)	.221	0.79 (0.42–1.48)	.456	2.73 (1.60–4.67)	<.001	1.77 (0.85–3.69)	.129
COVID-19 and the COVID-19 vaccine perceptions and experiences								
Anxiety regarding Coronavirus (ref.: Not anxious)	0.26 (0.12–0.57)	.001	0.23 (0.07–0.80)	.020	0.18 (0.21–1.34)	.524	1.08 (0.23–5.06)	.921
Compliance with COVID-19 prevention guidelines	2.68 (1.59–4.52)	<.001	1.69 (0.84–3.41)	.140	1.77 (0.98–3.19)	.059	0.92 (0.38–2.23)	.854
Beliefs regarding coronavirus conspiracy theories	0.73 (0.56–0.96)	.024	1.33 (0.89–1.97)	.160	0.63 (0.48–0.83)	<.001	0.76 (0.49–1.18)	.223
Exposure to COVID-19 vaccination promotions at the organizational level	2.21 (1.44–3.39)	<.001	2.68 (1.31–5.48)	.007	1.30 (0.89–1.89)	.178	0.98 (0.46–2.09)	.954
Exposure to COVID-19 vaccination promotions at the community level	1.53 (0.99–2.38)	.056	0.56 (0.26–1.20)	.139	1.60 (1.07–2.40)	.023	0.99 (0.47–2.09)	.971
Confidence in the government's and health service authorities' ability to handle the pandemic	1.64 (1.42–1.88)	<.001	1.19 (0.97–1.47)	.102	1.59 (1.37–1.85)	<.001	1.29 (1.00–1.67)	.046

CDs = people with chronic diseases; Non-CDs = people without chronic diseases; OR = odds ratio; CI = confidence interval

[a] Age, gender, cohabitation, educational attainment, and monthly income were adjusted in the models.

In this study, we found that while those with and without CDs appeared to have similar levels of intentions to vaccinate against COVID-19, the contributing factors varied based on the presence of chronic diseases.

Among those with CDs, individuals who were anxious about COVID-19 were less willing to be vaccinated against COVID-19 than their counterparts. Coronavirus anxiety causes adverse outcomes, such as functional impairment, alcohol or drug coping, hopelessness, and passive suicidal ideation [25, 26]. Anxiety about the virus could overwhelm some individuals, which in turn may lead them to refuse vaccination [27, 38]. A study in Turkey found an association between higher anxiety levels regarding COVID-19 and lower intentions to be vaccinated against it [39]. Although anxiety levels were similar among those with and without CDs in our study, only individuals with CDs who were anxious about COVID-19 showed significantly lower COVID-19 vaccination intentions. Non-CDs who perceive coronavirus anxiety may not feel the same level of urgency, resulting in potentially lower intentions to get vaccinated. This is likely because those with CDs respond more sensitively to their anxiety than those without CDs. Thus, proactively identifying individuals with CDs who are anxious about COVID-19 and alleviating their anxiety is therefore critical [24]. To alleviate the COVID-19-related anxiety of individuals with CDs, public health centers could integrate relief programs, including psychotherapy, cognitive behavioral therapy, or medication, into routine chronic disease management programs [24]. Organizations could also provide employees who have chronic diseases and are experiencing high levels of anxiety regarding COVID-19 the option of working from home [40].

Individuals with CDs and their families who experienced greater COVID-19 vaccination promotion at their companies, organizations, or schools tended to have higher intentions of receiving the COVID-19 vaccine. However, those with CDs did not experience as much COVID-19 vaccination promotion in their communities as those without CDs. During social distancing in Korea, high-risk individuals (such as those with CDs) often could not participate in social activities, limiting their exposure to community-level vaccine promotions, while non-CDs were more frequently exposed [3]. People often obtain and share information about novel infectious diseases at their organizations, where they spend almost half of their daily lives [9]. CDs often have more frequent interactions with healthcare providers and are more likely to receive targeted vaccination messages during medical visits than non-CDs. Their organizations could provide official COVID-19-related information. Organizational communication channels, including email, intranet, and internal newsletters could be utilized to disseminate accurate information about emerging novel infectious diseases and promote vaccination among individuals with chronic diseases [9]. Additionally, mobile health units could visit underserved communities to provide on-site promotion and education [41].

Mistrust of general vaccine benefits was the only variable that affected COVID-19 vaccination intentions in both those with and without CDs. This indicates that individuals who mistrusted vaccine benefits were less likely to intend to receive the COVID-19 vaccine, regardless of their chronic disease status. Numerous studies have pinpointed the lack of trust in the benefits of vaccination as a pivotal factor in diminishing vaccination intentions [42, 43]. This mistrust is influenced by several key elements, including the proliferation of misinformation, concerns over vaccine safety, and a general lack of confidence in the healthcare system, supporting our findings, which were significant only in crude associations but no longer significant in adjusted models. Misinformation about vaccines, especially on social media, affects individuals across various demographic groups and leads to generalized mistrust of vaccine efficacy and safety [43, 44]. Just before the COVID-19 vaccine was offered to the general public in South Korea, social media was flooded with concerns regarding COVID-19 vaccines and their side effects [28]. Additionally, a general lack of confidence in the healthcare system's ability to manage the pandemic and ensure vaccine safety and efficacy also fosters vaccine mistrust, reflecting broader societal issues rather than specific health conditions [33].

Non-CDs highlighted general vaccine hesitancy and confidence in government/health services as critical factors. People who were hesitant about vaccines in general exhibited significantly lower intentions to vaccinate against COVID-19. This finding aligns with previous studies indicating that general attitudes toward vaccines heavily influence vaccination intentions across different populations [43]. Numerous studies have reported that individuals with positive attitudes toward their current governments and high levels of trust in healthcare authorities tend to hold favorable opinions of COVID-19 vaccination [5, 6, 9]. This trend is consistent with our findings, even among our study groups of older, more male individuals without CDs. Individuals in Asian countries such as Korea, China, and Singapore have relatively high levels of trust in their governments, and such trust is associated with high levels of COVID-19 vaccine acceptance [45]. Trust in government strengthens the general population's sense of civic duty, leading to greater compliance with government policies. Also, individuals with CDs who have more trust in healthcare providers and more personal experience in healthcare settings may be more motivated to get vaccinated [46–48]. The government, health authorities, and healthcare providers need to keep taking efforts to build trust with the public in preparation for future pandemics, including by maintaining consistent and clear communication, providing transparent information about diseases and vaccines, and executing effective management campaigns [44].

The case-control matching method was utilized to control for potential confounders and ensure comparability between CDs and non-CDs [16–18]. By aligning participants by age and gender, we minimized the impact of these confounders, which are known to significantly affect health behaviors and vaccination intentions [49]. This approach enabled a more precise assessment of whether the key concepts in our study—such as vaccine hesitancy, coronavirus anxiety, exposure to COVID-19 vaccination promotion, and confidence in government and health services—were differentially associated with vaccination intentions between individuals with CDs and those without CDs who had similar demographic characteristics.

However, this study had several limitations that should be considered when interpreting its results. First, given the cross-sectional study design, we could not establish a causal relationship among the variables. Although we hypothesized that perceptions and experiences related to vaccines and COVID-19 influence intentions to receive the COVID-19 vaccine, intentions to receive the vaccine could also have reciprocal effects on these perceptions and experiences [50]. Another limitation is that secondary data analysis restricts the ability to collect additional items, such as types or numbers of chronic diseases and the amount or extent of exposure to vaccine-related promotion and information [5-7, 46–48]—factors that were not measured in the original survey. Lastly, those not registered in an online research panel could not access our online survey, potentially undermining the generalizability of our findings. Additionally, the case-control matching process resulted in our non-CD sample being older and more male. Consequently, the factors associated with vaccination intentions among non-CDs may reflect the characteristics of an older and more male-dominated group rather than those of the general non-CD population.

Conclusions

We found that the factors associated with COVID-19 vaccination intentions were distinguishable between CDs and non-CDs. This highlights the need for the development and implementation of customized policies based on the presence of chronic diseases. Novel infectious diseases emerge periodically, and we should strengthen our competencies and abilities to prevent, prepare, and respond to future disease threats.

In addition, to promote vaccination intentions among both CDs and non-CDs, a concerted effort should be made to mitigate general vaccine mistrust, especially by combating the spread of negative information via social media. To reduce vaccine mistrust, it is imperative to launch a national campaign promoting vaccination intentions as early as possible, ideally before the commencement of a vaccination program [51]. Governments should work to bolster public confidence in vaccination programs at multiple levels. Public vaccine campaigns should be conducted at the community level, and the government should provide authoritative information and policies [42, 43]. Meanwhile, health authorities should promote vaccine benefits, transparently disclose information about diseases and vaccines, correct false rumors, and reveal vaccine testing progress [52].

Health authorities should investigate concerns surrounding new vaccines among populations with chronic diseases. Specifically, assessing and alleviating anxiety related to novel diseases among individuals with chronic diseases by integrating anxiety relief interventions into routine chronic disease management programs are critical. Organizational health clinics should assess whether their students/employees and their family members have chronic diseases and provide them precise information about novel diseases. The government should also develop methods, such as deploying mobile health units to engage individuals with chronic diseases who are not parts of organizations or communities, enabling them to access accurate information. Efforts should also be made to support non-CDs by reducing their general vaccine hesitancy. Transparent and consistent communication regarding vaccines and pandemics with the public will help establish trust and resolve vaccine hesitancy and misunderstanding. Future research regarding novel infectious diseases should consider information about the numbers and types of chronic diseases (e.g., cancer, HIV, renal failure, etc.).

Ethical approval

Ethical approval for this study was exempt from the Chung-Ang University Institutional Review Board because this study was a cross-sectional secondary data analysis (IRB no. 1041078-202201-HR-025).

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Conflicts of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.anr.2024.07.008.

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Research Article

Lived Experiences of Pregnant Women With Cancer in South Korea: A Qualitative Study

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SUMMARY

Purpose: The incidence of cancer during pregnancy is increasing, presenting several challenges to the treatment of cancer in pregnant women. However, research focusing on the lived experiences of pregnant women with cancer in South Korea is limited. This study aimed to explore and describe the day-to-day lived experiences of women diagnosed with or treated for cancer during pregnancy and their husbands.

Methods: The study employed a qualitative descriptive design and utilized purposive sampling to recruit participants. The participants comprised six women living in Korea diagnosed with cancer during pregnancy and one husband of a female participant. In-depth semi-structured interviews were conducted, audiotaped, and transcribed. Five of the participants agreed to a second interview, resulting in a total of 12 individual interviews. A thematic analysis was then performed. The participants' ages ranged from 31 to 40 years, and their diagnoses during pregnancy were either breast or thyroid cancer.

Results: Four main themes were identified: (1) Participants faced various heart-breaking difficulties maintaining their pregnancies throughout cancer treatment; (2) Pregnant women with cancer experienced complex but responsible feelings toward their children; (3) Patients with cancer also fulfilled their roles as parents even with their own diseases; and (4) Family support had a significant impact on the pregnant women to overcome the path.

Conclusions: These findings provide a comprehensive understanding of the lived experiences of being diagnosed with cancer during pregnancy. A recommended strategy is to develop a nursing education program for pregnant women with cancer to provide necessary information and support, and to help them cope positively with their situation.

Introduction

The incidence of women diagnosed with cancer during pregnancy is increasing worldwide [1–3]. A cross-national study analyzing data from pregnant women diagnosed with cancer registered in 16 countries from 1996 to 2016 found that the number of women diagnosed with cancer during pregnancy increased from 257 (1996–2004) to 537 (2010–2016) [4]. A study estimated the worldwide cancer incidence to be 80–140 in 100,000 deliveries [5]. In Korea, the incidence of cancer diagnosed during pregnancy at only one university hospital was 31% from 2007 to 2013, compared to 8% from 1995 to 2000, revealing an increasing frequency of occurrence over time [6]. Since cancer diagnosis rates among fertile women are increasing with age [7] and the proportion of pregnancies among women of advanced maternal age is rising in Korea [8], the incidence of cancer during pregnancy is expected to increase, making it a health concern.

The proportion of patients undergoing cancer treatment during pregnancy is increasing [4,9]. The application of surgery and chemotherapy in pregnant patients with cancer is also increasing,

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and their outcomes are similar to those observed among non-pregnant cancer patients [9,10]. Furthermore, the administration of chemotherapy between 14 and 35 weeks of gestation has proven safe for both the mother and fetus [11,12].

In the treatment of cancer during pregnancy, early diagnosis and prompt management are important factors in improving the prognosis of both the mother and fetus [4,13,14]. Recent advances in imaging diagnostics, such as positron emission tomography/computed tomography (PET/CT) scans, have confirmed their safety for the fetus, thereby clarifying the feasibility of cancer screening during pregnancy [15]. However, diagnosing cancer during pregnancy remains challenging due to its increasing but not yet common incidence [9], and because pregnancy-related physiological changes, such as nausea, vomiting, breast changes, abdominal pain, anemia, fatigue, and constipation, are similar to the symptoms of cancer [16,17].

Several qualitative and quantitative studies have explored the experiences of women receiving cancer treatment during pregnancy internationally [18–20], focusing on the degree of distress and the psychological burden they face. However, Korean studies have mainly focused on the current status of and case studies on cancer diagnosis and treatment during pregnancy [6,21], with only one study measuring nurses' perceptions of cancer treatment during pregnancy [22]. Research on pregnant women's simultaneous experiences of pregnancy and cancer is limited in Korea. Therefore, this study aimed to gain a deeper understanding of their lived experiences of cancer diagnosis and treatment through one-on-one interviews.

Methods

Design

This study employed a descriptive qualitative research methodology and thematic analysis to explore the experiences of women (and their husbands) who were diagnosed with or treated for cancer during pregnancy. Qualitative research methods aim to explore and understand phenomena in depth and are suitable for topics that researchers have generally not yet studied [23]. Thematic analysis is a method of describing participants' experiences and their meanings by unraveling reality while reflecting it. In addition, it is an accessible form of analysis for researchers with relatively little qualitative research experience [24]. This study followed the checklist of consolidated criteria for reporting qualitative research (COREQ) [25].

Participants/recruitment

Participants were recruited through open recruitment posts on social networking sites for patients with cancer and mothers from May 17 to October 31, 2022. Since there is no specific social networking site for pregnant women diagnosed with cancer, open recruitment announcements were posted on both sites for cancer patients and sites for mothers (online community sites for cancer patients, thyroid cancer patients, breast cancer patients, and mothers related to pregnancy, birth, parenting). Recruitment announcements and study descriptions were also disseminated directly to potential participants who met the selection criteria (women diagnosed with cancer during pregnancy and/or their husbands).

Where cases of pregnancy were present during cancer treatment, they were excluded from the study. Although pregnancy and childbirth are physiological processes experienced by women, the roles of husbands as parents are crucial. Therefore, husbands were included in the study. We encouraged the female participants to invite their husbands to participate in the study, but only one husband agreed. Ultimately, six women and one man who consented to participate were selected.

Data collection

Data were collected through one-on-one, in-depth interviews. Interviews were scheduled in advance based on each participant's preferred time and location. A comfortable and suitable space for communication and recording was selected. Each participant was interviewed once or twice. The first interview was conducted in person between May 18 and August 31, 2022, and took a minimum of one hour and a maximum of two hours. The second interview was conducted over the phone between May 13 and 17, 2024, and lasted about 25 minutes.

Creating a thematic map from the first interview and defining and naming the themes required repeated discussions and revisions, which took a considerable amount of time. In this process, the need for additional interviews was belatedly confirmed, causing a delay in conducting the second interview. During the second interview, which aimed to confirm the findings of the first interview and gather additional insights, the main points from the first interview were expanded upon to gain a deeper understanding of the participants' experiences.

All participants in the first interview were asked to participate in the second interview, but one participant declined for personal reasons and another for health reasons. Therefore, only five participants participated in the second interview, resulting in a total of 12 interviews. All interviews were conducted by the first author, who continued the interviews until no new information was generated. The fifth of these interviews, with the husband, overlapped with the previous four women's interviews, and no new content was confirmed. These 12 interviews provided a clear understanding of the research themes, marking the end of data collection.

The interviews began with a general greeting and consisted of semi-structured open-ended questions. Participants were asked to detail their experiences over time by supplementing broader questions with more focused ones. The main questions included, “Please tell me in detail about your experience when you were diagnosed with cancer during pregnancy,” “Please tell me how you were medically treating cancer during pregnancy,” “Please share your experiences after childbirth or cancer treatment,” and “How have these experiences affected your life, and what does this mean to you?” Furthermore, the second interview confirmed that the researchers had correctly understood and interpreted the initial interview, and it sought further explanations on aspects discussed prior. Follow-up questions included, “What did you think after reviewing the content of the last interview?” “Is there anything else you would have liked to emphasize or talk about more?” and “After reviewing the content of the last interview, did you find any differences or similarities to your own experience?”

Interviews were recorded and transcribed with participants' consent, removing all personally identifiable information. Nonverbal behaviors were also recorded in field notes. Any missing or ambiguous parts of the interview transcripts were clarified by asking participants over the phone or checking their posts on the website. Participants' posts were written on their personal blogs and included descriptions of their experiences with cancer during pregnancy. Through their shared posts, the time and stage of their cancer diagnoses and their current emotions were cross-verified with the interview contents.

Data analysis

Thematic analysis was conducted with an emphasis on flexibility, allowing for a wide range of data analysis methods [24]. The analysis comprised six stages:

1) Familiarization with the data: Listening to and transcribing recordings, reading transcripts repeatedly, and noting initial thoughts about the data.
2) Initial coding: Extracting meaningful text and creating 298 initial codes during systematic data analysis.
3) Theme identification: Combining codes to identify 27 subthemes and 10 themes as potential themes.
4) Theme review: Checking the relevance of extracted codes to the data and creating a thematic map.
5) Theme definition and naming: Ensuring that the content of each theme is accurately conveyed.
6) Paper writing: Selecting the most relevant cases and ensuring consistency and logic in conveying the paper's message.

Rigor

The quality of this study was evaluated based on criteria for qualitative research [26]. Credibility was ensured by maintaining an objective stance, recording each interview, and discussing results with two nursing professors experienced in qualitative research. Fittingness was ensured by sharing and confirming results with participants. Auditability was established by providing a systematic and detailed description of the study and presenting the results in participants' own words. In the process of translating the Korean interviews into English, we strived to express the participants' statements as they were said, carefully choosing words to convey their meaning, emotions, and nuances. This was further emphasized by requesting a professional to edit the grammatical elements of English. The author then reviewed the edited English sentences, comparing and examining them against the participants' original Korean statements. Confirmability was ensured by meeting the credibility, fittingness, and auditability criteria.

Ethical considerations

This study was approved by the institutional review board before data collection (approval nos. 2204/001-001 and 2405/004-002). Before starting the interview, the purpose and methods of the study, as well as the right to withdraw from the study at any time, were explained to the participants. They were also informed that their data would only be used for research purposes and that their personal information would not be disclosed. We confirmed their understanding and obtained their written consent.

As the participants in this study belonged to a vulnerable group, we selected and provided interview locations that were quiet and sparsely populated. The interview times were adjusted considering the participants' health conditions. Additionally, we obtained extra consent for collecting sensitive information, such as the timing and stage of cancer diagnosis and experiences of cancer diagnosis during pregnancy. After the interviews, a small gratuity was offered for their participation. This study was performed in compliance with the Declaration of Helsinki.

Results

The study participants were six women and one man (the husband of a female participant) aged between 31 and 40 years. Three female participants were diagnosed with breast cancer, and three with thyroid cancer during pregnancy. All participants received treatment while remaining pregnant, except for one. Most participants had completed cancer treatment at the time of the interview, except for one who was scheduled for cancer surgery after childbirth and one undergoing radiation therapy. Table 1 summarizes the participants' general characteristics.

Based on meaningful and interesting statements, the coding contents were further divided into 10 subthemes and derived into four main themes (Table 2). The four main themes that emerged were “heart-breaking difficulties facing both pregnancy maintenance and cancer treatment,” “complex but responsible feelings toward children among pregnant women with cancer,” “self-sacrificing parental attitudes,” and “impact of family support on pregnant women with cancer.”

Theme 1 : Heart-breaking difficulties facing both pregnancy maintenance and cancer treatment

This theme represents the various difficulties participants experienced while considering both their own and fetal health after being diagnosed with cancer during pregnancy. Four subthemes were derived: *“symptoms of cancer not easily detected during pregnancy,” “anxiety in cancer diagnosis and treatment,” “the burden of determining whether to continue the pregnancy,” and “lack of sufficient communication with medical staff.”*

Symptoms of cancer not easily detected during pregnancy

Participants diagnosed with thyroid or breast cancer experienced difficulties in recognizing cancer symptoms during pregnancy. Some participants with thyroid cancer had no related symptoms before diagnosis, given that prenatal tests include checking thyroid levels. However, some participants with breast cancer experienced symptoms such as nipple bleeding and chest pain before diagnosis, which were mistaken for pregnancy-related physiological changes. Participant B visited the obstetrics and emergency departments with her symptoms and was told that she would be fine, given the pregnancy. Nevertheless, she did not believe in these treatments and consulted a breast surgeon so that she could start treatment immediately. Participant G was advised to see a breast surgeon by the obstetrics department but was told by a

Table 1 *Participants' Characteristics (N = 7).*

ID	Gender	Age (years)	Type of cancer	Year of diagnosis	Time from diagnosis to interview (years)	Gestational age at diagnosis (weeks)	Decision to maintain/ terminate pregnancy	Cancer treatment	
								During pregnancy	After delivery
A[a]	Women	40	Breast	2011	11	11	Termination	Surgery, chemotherapy, and hormone therapy after termination of pregnancy	
B[a]	Women	34	Breast	2019	3	29	Maintenance	Surgery	Chemotherapy
C[a]	Women	34	Thyroid	2021	1	9	Maintenance		Planning surgery
D[a]	Women	34	Thyroid	2018	4	5	Maintenance	Surgery	Isotope therapy
E	Men	38	(D's husband)						
F[a]	Women	40	Thyroid	2021	1	20	Maintenance		Surgery
G	Women	31	Breast	2021	1	37	Maintenance		Surgery, chemotherapy, and radiotherapy

[a] 2nd interview participant.

nurse that her symptoms were pregnancy-related, leading to a delayed cancer diagnosis.

> *"On the internet, most people who are pregnant and diagnosed have really advanced diseases. They are told that it can happen when you are pregnant, therefore, it happens. If only the hospital had told them properly and on time, it would not have gone this far. … I think it is very important at one point." (Participant A)*
>
> *"Because I was pregnant, I was so sick that I even went to the emergency room. But all they could give me was painkillers, and they could not do anything because I had a baby. I had a baby, and I could not test anything. We did not have any doubts that it was anything at all. … But I was like, 'Oh, I do not know.' So, I went to see the breast surgeon." (Participant B)*
>
> *"The nurse looked at it and said it was just natural and to come back if it got worse. So, I thought, 'Oh, it is not that big of a deal,' and I went home. I kind of hate that nurse a little bit. … I thought it was just mammary gland development, so I moved past it." (Participant G)*
>
> *"It is not really easy to find. … It could have been found with more advanced cancer, or it could have passed by without finding it at all. Therefore, this is a really difficult part. … In fact, I do not think the public really knows." (Participant B 2nd interview)*

Anxiety in cancer diagnosis and treatment

Some participants had never considered the possibility of being diagnosed with cancer during pregnancy. They struggled to find accurate information online, which added to their anxiety. Additionally, because of pregnancy, they were limited to certain tests and faced situations where immediate cancer treatment was not possible. They reported pain that "dried up their blood" and experienced frequent anxiety, worry, and nervousness while awaiting diagnosis and treatment.

> *"Since I am pregnant, I didn't do a fine needle aspiration biopsy right away; they told me to do it about three months after the stabilization period. … My mind is ready for surgery. Now, there are situations in which surgery is not possible. No matter how late the thyroid cancer progresses, I am worried about what will happen if it progresses again. No one in my family will be able to bear it." (Participant C)*
>
> *"Because it is a surgery that requires general anesthesia, they said it should be done in the mid-trimester. … During those 21 weeks, I kept looking on the Internet. Whenever I went to the gynecologist, I kept asking my obstetrician if this was the right thing to do." (Participant D)*

The burden of determining whether to continue the pregnancy

Participants had to choose whether to continue their pregnancy ahead of cancer treatment, which was a difficult and frightening decision. Although they trusted and followed the medical team's advice on continuing the pregnancy, they emphasized that the decision and responsibility were ultimately theirs. Some participants were hurt and distressed by the medical staff's negative attitudes and criticism during these challenging situations. Participant A stated that the most difficult part of her treatment was finding a clinic to terminate her pregnancy independently.

> *"Because abortion is illegal, obstetricians are very sensitive and blame the patient, saying, Why are you thinking of yourself? I had already made a big decision here, despairing that I could not save*

Table 2 *Themes, Sub-Themes, and Codes From the Interviews.*

Themes	Sub-themes	Codes
1. Heart-breaking difficulties facing both pregnancy maintenance and cancer treatment	1.1 Symptoms of cancer not easily detected during pregnancy[a]	Delayed diagnosis due to similar pregnancy and cancer symptoms Misidentifying breast pain as pregnancy symptoms
	1.2 Anxiety in cancer diagnosis and treatment	Not knowing anything about cancer during pregnancy and feeling anxious about the unknown Difficulty getting screened during pregnancy Waiting for a diagnosis—I could not bear it
	1.3 The burden of determining whether to continue the pregnancy	Medical staff blame patients for terminating pregnancy Worrying about choosing whether to continue the pregnancy
	1.4 Lack of sufficient communication with medical staff[a]	Treatment without consideration for pregnancy and childbirth Trying to trust healthcare staff more due to lack of prior knowledge Lack of explanations and emotional support from medical staff
2. Complex but responsible feelings toward children among pregnant women with cancer	2.1 Feeling sorrowful toward the child for being an unhealthy mother	Concerned about the relationship between cancer and breast milk and feeling sorry for your child for stopping breastfeeding Feeling guilty blaming myself for my child's health problems
	2.2 Feeling grateful toward the child as the pregnancy helped detect cancer	Pregnancy allowed for an early diagnosis Gratitude for my child
3. Self-sacrificing parental attitudes	3.1 Efforts to protect the fetus during the cancer diagnosis process[a]	The happiness of pregnancy and the unhappiness of cancer intersect, but trying to be as comfortable as possible (prenatal education) Sacrificed enough to have a biopsy without anesthetic
	3.2 Prioritizing the child over cancer treatment[a]	Worrying about my child more than my own health Difficulty taking care of myself due to childcare Stopping hormone treatment to get pregnant due to continued depression
4. Impact of family support on pregnant women with cancer	4.1 Complete support from family to overcome the path	Trying to stay positive by talking to my husband The power of family support in overcoming cancer treatment
	4.2 Emotional baggage (unresolved feelings of hurt) due to a lack of understanding among family members	Still unresolved due to lack of emotional communication between family members Not remembering how I spent that time (blackout)

[a] Highlighted again in the 2nd interview.

> *my child, and I had no choice but to go to the gynecologist to get an abortion. I remember it was really difficult and sad. … I did not feel good about the process where I had to find a clinic where I could get one (an abortion).” (Participant A)*

> *“Even if the hospital tells us it is still our choice about this one baby, so I think that was a little bit … I think that was very hard. … After hearing the sound of the child's heart, we now have to do this … and my heart …” (Participant C)*

Lack of sufficient communication with medical staff

As being diagnosed with cancer during pregnancy is uncommon, participants relied on medical staff in situations where there was a lack of information about the disease. However, some healthcare settings lacked detailed explanations of the disease and treatment process, failing to consider the participant's individual situation.

> *“When I listened to the doctor, he told me that the course was good anyway, so I felt comforted and cheered up. … However, professors at large hospitals try to explain the treatment instead of listening to the patient—so they talk for a minute or two, and then it's over.” (Participant B)*

> *“The doctor does not explain things in detail. … I am kind of hoping that they are going to explain some of the things that we do not understand.” (Participant D 2nd interview)*

The lack of collaboration between different departments related to pregnancy and cancer made it difficult for some participants to cope, both physically and mentally. Participant G received no obstetric care and suffered physical pain and infertility as her cancer treatment progressed.

> *“My body had not recovered from giving birth, and then I went straight into (chemotherapy), and it almost destroyed my body. … He (the breast surgeon) did not have any of these 100-day standards for childbirth. I asked him to do it quickly, and he just did it accordingly. … I cannot have children anymore. … So, if you brought up that (the fertility risks of chemotherapy), I would have thought about it, but I did not know anything about fertility from the start.” (Participant G)*

Theme 2 : Complex but responsible feelings toward children among pregnant women with cancer

This theme represents that participants, as both patients with cancer and mothers, had a range of emotions toward their children, yet they were inherently responsible. The following two subthemes were derived: “feeling sorrowful toward the child for being an unhealthy mother” and “feeling grateful toward the child as the pregnancy helped detect cancer.”

Feeling sorrowful toward the child for being an unhealthy mother

Some participants felt regret and sorrow about having to stop breastfeeding due to cancer treatment, feeling as though they had failed as mothers. Even if they did breastfeed, they were worried that their cancer would adversely affect their breast milk.

> *“Is there anything wrong with my baby drinking this breast milk when I am like this? … When my breast milk came out, I could not stop it. Afterward, I tried to quit; wow, I felt guilty and sorry. … Stop breastfeeding. Oh … You know, I told myself something like that when I tried to do it. Ha, I felt like I was not doing a good job as a mom.” (Participant F)*

Moreover, by connecting her child's health to her own, one participant saw herself as the cause if something went wrong with her child's health. She stated that this made her different from other women with healthy pregnancies.

> *“If my child is sick, it is unconditionally my fault because I have it (cancer). … I do not have anything to do with jaundice, but … (laughs) … Is my baby weaker than others because my cancer affects the development of a baby? There are always a lot of things like that. There is a difference in that kind of thinking. … I am so scared that my illness will go to this child, even though I am supposed to be the only one suffering because I am sick. So, I always say, You look like your dad.” (Participant F)*

Feeling grateful toward the child as the pregnancy helped detect cancer

Some participants believed that if they had not become pregnant, their cancer would have gone undetected and progressed. For this reason, they saw their pregnancy as an opportunity to detect their cancer early and were grateful to their child, expressing, “I survived thanks to my child.”

> *“Because I got pregnant, I found out about the cancer anyway; if I had not, I might have found out when it was more advanced. … I rather appreciated it, and it made me feel a little better.” (Participant C)*

> *“The doctor said it was probably detected because I was pregnant. … My mom said, Granddaughter, thank you for saving my daughter's life.” (Participant G)*

Theme 3 : Self-sacrificing parental attitudes

This theme represents participants' attitudes toward the process of being diagnosed with and treated for cancer during pregnancy. Some participants made sacrifices as they underwent pregnancy, childbirth, and parenting alongside cancer treatment and recovery. The following two subthemes were derived: “efforts to protect the fetus during the cancer diagnosis process” and “prioritizing the child over cancer treatment.”

Efforts to protect the fetus during the cancer diagnosis process

Participants faced a mix of happiness associated with pregnancy and unhappiness associated with their cancer diagnosis, leading to feelings of anxiety rather than pure joy. Some believed that worry and anxiety about cancer could harm the fetus, so they tried their best to remain positive. They were willing to sacrifice their emotions related to the cancer diagnosis to protect the fetus.

> *“I felt a little bit unhappy at a time when I should have been happy.” (Participant E)*

> *“I knew subconsciously that if I had a hard time, it would affect the baby, so it was not that hard.” (Participant B)*

> *“I realize that talking about these things (anxiety and worry) can be a little stressful … It is just worrying to even think about it, so... … I think I tried so hard not to think about it as much as possible and to just do other things and get prenatal care.” (Participant F)*

> *“It is inevitable to have scary thoughts at some point in time, but I wonder if it was the baby that made it easier to shake them off.” (Participant C 2nd interview)*

Participant G underwent a biopsy without anesthesia due to concerns for her baby, despite medical staff informing her that partial anesthesia would not affect her fetus.

> *"They say you have to do the biopsy under anesthesia, and I was afraid that even the anesthesia would affect the baby. … I did the biopsy without anesthesia. … Even if there is a 1% chance of a side effect from the anesthesia, it could happen to me. There was also a relatively small risk that I would get cancer, but that still happened to me." (Participant G)*

Prioritizing the child over cancer treatment

Even when some participants were diagnosed with cancer, their immediate concern was for their children rather than their own health. The thought of giving up the baby was unthinkable, and they were confident that they would postpone cancer treatment for the baby, even if the cancer was severe. They could not focus on their own health, as caring for their children became a priority.

> *"I do not even remember being sick, and when I heard it was likely cancer … I thought of the baby first. … Even if I had breast cancer or severe thyroid cancer, I would (have) put off my treatment. I would have put the baby first. Baby first. … I was told to take my pills and apply my ointment, and I barely did it. … I was afraid (the ointment) might get on the baby. And now I am worried about that again, so I just do not put it on. … After the surgery, I did not even realize that I was a cancer patient anymore. I think it is probably because my baby is so young. … I do not think I actually even rested properly after the surgery." (Participant F)*

> *"My cancer comes second and my baby comes first, but I still feel the same way. I feel more like I need to be healthier for my baby. … All moms feel the same way. The thought is that the child comes first no matter what. (Participant F 2nd interview)*

Furthermore, Participant A, who was forced to terminate her pregnancy due to the doctor's decision to treat cancer, regretted the choice. These feelings persisted, leading to desperation for a child and depression. Therefore, she stopped hormone therapy after a year to try to conceive.

> *"After I was on them (hormone pills) for a year and I told my doctor that I was going to stop taking them, it is like … I felt self-conscious. I am perceived as someone who does not know what her priorities are. It is kind of like, "You are going to die—why are you getting pregnant?" But without it, I am so depressed, and it does not feel like living. I was so depressed for a year, and I was so obsessed with getting pregnant." (Participant A)*

Theme 4 : Impact of family support on pregnant women with cancer

This theme represents the family support experienced by participants diagnosed with cancer during pregnancy. Participants were able to survive the difficult process with adequate family support, but a lack of such support made the process more difficult. The following two subthemes were derived: "complete support from family to overcome the path" and "emotional baggage (unresolved feelings of hurt) due to a lack of understanding among family members."

Complete support from family to overcome the path

Participants stated that their family's support was instrumental in overcoming difficult situations. Conversations with partners were a way to work through difficulties. After childbirth, they had to care for their children while also managing their cancer, and their family's assistance with childcare and housework helped them navigate through the difficult treatment process.

> *"I was pretty much 100 percent supportive of what she wanted to do from start to finish." (Participant E)*

> *"My husband and I talk a lot. If there was something hard or I needed someone to lean on, I think I talked to him a lot and worked it out." (Participant D)*

> *"My husband took paternity leave for about three months, so he provided full-time care for our second child, and he was very supportive. My mom cooked all the meals, and I think that was really helpful. I do not think I could have survived without that." (Participant B)*

Emotional baggage (unresolved feelings of hurt) due to a lack of understanding among family members

One participant who did not have an adequate family support system felt hurt and lonely during her pregnancy. Although her family members supported her during her cancer treatment process, they did not communicate about emotions, leading to unresolved feelings about the experience at that time.

> *"But there is something really heavy, like emotional baggage. I do not have much faith in the other person to solve it. Will this person be able to solve my problem? Will they understand? … It is a little bit of a taboo, even among family members, so they do not talk about it. I wished I could just talk to someone about it, but I did not. … Even if we talk about it, it is a hurtful situation. … I thought a lot about how lonely I was because I did not have any (interaction with my husband). … I think that is probably why I have not tried to solve it even now because I was so hurt during that time." (Participant A)*

> *"I think everyone just followed what I said (about the treatment decision)." (Participant A)*

> *"I do not remember the depressing time like a blackout. Because I think I did not solve it. Even now, I am a little … After that, I felt like I was not the same person I used to be." (Participant A)*

Discussion

This study aimed to elucidate the lived experiences of pregnant women who were diagnosed with or treated for cancer. To the best of our knowledge, previous research in Korea has not clearly described the thoughts and feelings of pregnant women with cancer, as demonstrated in this study.

The participants experienced many heart-breaking challenges as they simultaneously dealt with pregnancy and cancer. This was a point that they reiterated and emphasized in the additional interviews. They felt great anxiety while waiting for their cancer diagnosis and treatment. Moreover, it was difficult for them to obtain accurate information; they had minimal knowledge about cancer during pregnancy before their diagnosis and the medical staff did not provide sufficient explanations regarding their situation. This finding is supported by Gu et al. [27], who suggest that the uncertainty of not knowing can lead to anxiety. An Australian study examining the maternal experiences of women diagnosed with gestational breast cancer also reported high levels of anxiety and stress among participants [28]. A similar trend was found in an Italian study, in which women's feelings of shock and confusion decreased or disappeared when they received information about their treatment decisions [19]. However, given the various stages of pregnancy and different types of cancer, obtaining the correct information can be challenging [29]. Thus, to reduce patients' anxiety following a cancer diagnosis during pregnancy, it is necessary to provide information about cancer during pregnancy to couples who are preparing to become pregnant or are already pregnant. Patients and their families should receive equal information on the benefits and risks of cancer treatment during pregnancy to ensure the health of both women and their fetuses.

Additionally, medical staff dismissed nipple bleeding and pain as normal pregnancy changes, resulting in delayed breast cancer diagnoses. Previous studies have also noted similarities between symptoms of malignancy and pregnancy [16]. Women who experienced cancer during pregnancy confused cancer symptoms with the physical changes of pregnancy [19], which delayed their cancer diagnosis (41%) [30]. This explains the need to change medical staff's perceptions of pregnancy and cancer, as it is important to diagnose cancer early. However, in a survey of physicians attending the International Breast Cancer Congress on breast cancer in pregnancy, 34.8% reported that they had never consulted international guidelines [31]. Additional training should be conducted to help medical staff recognize and comply with the available guidelines when addressing issues related to pregnancy and cancer.

The burden on participants regarding whether to continue their pregnancy was significant. This psychological distress is supported by previous research that found that these decisions were difficult for women to make as they impacted their own lives, the lives of their fetuses, and their families [28]. This study observed that medical staff criticized some participants who considered continuing their pregnancy or decided to terminate their pregnancy for cancer treatment when diagnosed with cancer. Participants who had experienced this condition were psychologically traumatized and did not return to the medical staff. Trust in medical staff relies on effective communication [29]. A previous study highlighted that pregnant women in Japan experienced internal conflict in balancing their own lives with that of the fetus but made the best decisions based on their interactions with medical staff [32]. Therefore, medical staff need to understand and consider a woman's difficulties in choosing whether to continue the pregnancy and make her feel that she is making decisions with their professional support rather than alone. A desirable interaction should be based on understanding the values of pregnant women rather than criticizing individual ethical standards [33]. Furthermore, practitioners should provide patients with sufficient information on the outcomes of pregnancy and cancer according to these decisions, as this will help the patients make autonomous decisions [34].

Additionally, the lack of communication among medical staff was also evident in the cancer treatment process. It was physically challenging for the participants to receive cancer treatment without a recovery period after childbirth. This suggests that cancer treatment for pregnant women or those who have given birth should be differentiated from the cancer treatment of other patients. Moreover, the recovery process through postpartum care has important implications for maternal health, and obstetric care should be incorporated into the cancer treatment process. Australian women diagnosed with cancer during pregnancy reported that the quality of care was determined by collaboration between care teams [29]. Several studies have cited the need for coordination when pregnancy and cancer must be managed simultaneously [35,36]. A coordinated multidisciplinary approach is essential for cancer treatment that considers the mother's physical condition during pregnancy and childbirth.

The participants, as patients with cancer and mothers, found it difficult to consider terminating their pregnancies. These findings differ from those of a study of Korean nurses, which examined their perceptions of cancer care during pregnancy. The nurses believed that women diagnosed with cancer during pregnancy would find it easier to consider terminating their pregnancies and had low confidence in nursing care for pregnant women with cancer [22]. However, studies in other countries have found that women generally do not consider terminating their pregnancies after a cancer diagnosis [37], and those who do often regret their decision [28,32]. These differences are not due to variations in perceptions or treatment approaches between the East and West but rather because of the contrasting experiences of those who have and have not faced such circumstances. Previous research indicating that women are more willing than their spouses to continue a pregnancy [37] may also explain the differences in maternal experiences. Therefore, nurses should strive to comprehend patients' perspectives, even without direct experience, and offer suitable care.

In many situations, the participants prioritized their children's needs over their own mental and physical well-being. As mothers, they tended to focus on childcare, sometimes neglecting their own health as their children became increasingly important to them. A study of female patients with cancer found that childcare could be a distraction from treatment and a source of psychosocial burden [38]. When cancer is diagnosed during pregnancy, women's healthcare becomes even more important because cancer management and postpartum care are required simultaneously. Therefore, women facing such diagnoses require support to balance their healthcare needs with those of their children.

The participants' cancer diagnoses during pregnancy elicited complex but responsible emotions within them toward their children. They often connected their health to that of their child, worrying about adverse effects and feeling guilty about not being able to breastfeed. This finding has been confirmed in several previous studies indicating that women diagnosed with cancer during pregnancy often experience fears and concerns about their children's health and development [37,39]. Furthermore, pregnant women diagnosed with breast cancer reported feeling less competent as mothers in their relationships with their children, a sentiment not observed in healthy pregnant women [19,39]. Support from others can help reduce these feelings of guilt. Medical staff, including nurses, should address postpartum issues such as child-rearing and breastfeeding, offering timely support to mothers. Meanwhile, some participants viewed their pregnancy as having facilitated early cancer detection, expressing gratitude toward their child and attempting to maintain a positive outlook. While this finding has been difficult to confirm in previous studies, research has shown that women with breast cancer during pregnancy see their future child as a supportive force that helps them cope with the situation [39]. However, they do not always express gratitude to their child. Implementing this cognitive shift in nursing interventions may help women and their families overcome the emotional challenges of a cancer diagnosis.

Family support was crucial for participants, offering strength during their challenging journey. However, when understanding and communication were lacking, the experience of cancer during pregnancy lingered as a psychological wound. This highlights the importance of adequate support in accepting the cancer experience during pregnancy. Social support can alleviate stress in cancer survivors; however, it can also be stressful if provided inappropriately [40]. Therefore, doctors, nurses, and counselors need to collaborate to help families communicate sincerely based on an understanding of pregnant women with cancer.

This study makes an important contribution to the literature on the lived experiences of pregnant women with cancer in Korea. However, the limitations include a small sample size, especially due to the limited participation of husbands, the fact that all participants were currently healthy and had children, and that they had already disclosed their disease experiences online before participating.

Purposive sampling might not have helped identify various perspectives of women diagnosed with cancer during pregnancy. Therefore, these findings may not be generalizable to people in different situations (e.g., when cancer has recurred or infertility issues arise).

Nonetheless, in this study, a second interview allowed us to observe how participants empathized with each other's experiences and thoughts, confirming that the common experiences of women diagnosed with cancer during pregnancy emerged. These findings provide valuable insights into how nursing care can be provided to women treated for or at risk of cancer during pregnancy and their families. This study will be a useful resource for developing prenatal educational interventions for cancers that may occur during pregnancy. The findings are also expected to help build socio-emotional support for pregnant women diagnosed with cancer. This study is notable as the first in Korea to interview women who experienced cancer during pregnancy, marking a significant exploration of this issue. Given the recruitment bias from a limited scope, future studies on cancer during pregnancy should target hospital-registered patients to enhance the diversity of participants.

Conclusions

This study reveals the complex but responsible emotions experienced by women diagnosed with and treated for cancer during pregnancy. The delay in cancer diagnosis and treatment caused by pregnancy led to anxiety among women, who had to decide whether to maintain their pregnancy before starting cancer treatment. As cancer patients and mothers, the women prioritized their children over themselves. Despite their heavy reliance on medical staff, the support they received was often inadequate. Therefore, providing educational programs that offer accurate information about cancer during pregnancy is crucial for these women and their partners, preferably through a multidisciplinary approach that balances postpartum care and cancer management.

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Conflict of interest

The authors declare no conflicts of interest.

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Research Article

Impact of Rumination, and Dyadic Coping on Parenting Sense of Competence Among Puerperal Women in China: A Cross-sectional Study

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SUMMARY

Purpose: This study aimed to explore the potential categories of parenting sense of competence and to analyze the influence of rumination and dyadic coping on the potential categories of parenting sense of competence.

Methods: A total of 199 postpartum women who met the criteria were surveyed from a tertiary grade-A hospital in Shanxi (China) from May 2023 to August 2023. The instruments included the general demographic characteristics, Chinese version of parenting sense of competence scale, Chinese event related rumination inventory, and Chinese version of dyadic coping inventory. Latent profile analysis (LPA) was used to classify the parenting sense of competence in postpartum women, and logistic regression analysis was used to identify the influencing factors.

Results: The characteristics of parenting sense of competence in postpartum women can be divided into two potential categories, namely, easy-to-satisfy group (39.3%) and strict-demand group (60.7%). Logistic regression analysis showed that years of marriage, place of residence, deliberate rumination, and dyadic coping were the influencing factors of the potential categories of parenting sense of competence in postpartum women ($p < .05$).

Conclusions: Through Latent profile analysis (LPA) analysis, it was found that postpartum women's parenting sense of competence exhibits different characteristics. Clinical workers should identify the characteristics and influencing factors of different categories of women and adopt targeted intervention strategies to promote the level of parenting sense of competence.

Introduction

The Global Strategy for Women's, Children's, and Adolescents' Health (2016–2030) proposes that scientific pregnancy and raising healthy babies in the process of parenting are very essential. [1] The puerperal period refers to the period from the delivery of the placenta to the recovery of or close to the normal non-pregnant state of all organs of the maternal body (except the breast), which usually takes 6 weeks. This stage is a critical period for mothers to make physical and psychological adjustments and begin to adapt and assume the maternal role. [2,3] Moreover, the confidence and ability to raise an infant are considered to be an important part of the adaptation to the maternal role during this transition period. [4] An important predictor of parenting ability is parenting sense of competence. [5] Parenting sense of competence refers to the effectiveness and ability of parents to meet various needs in the process of parenting, which can help medical staff understand the changes and needs of their role behaviors in this process of parenting. [6] Research has shown that a strong sense of competence in parenting can prompt newborn parents to complete the role changes quickly, which is of great significance for

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improvement of parenting quality as well as the cognitive and social improvement of preterm infants. [7,8] Therefore, it is very important to comprehensively understand the parenting sense of competence of postpartum women and its related effects, and the formulation of effective intervention measures accordingly to improve the overall development of newborns.

Currently, research on the factors influencing parenting sense of competence mainly judges it based on the total scores of its questionnaires. [9] While this method provides an overall assessment, it may overlook important differences in parenting sense of competence among individuals, thus failing to explore the reasons and impacts behind these differences. The latent profile analysis is individual-oriented. According to the score of the individual in the scale, the homogeneous individuals with similar characteristics are divided into different categories with significant characteristics, so as to maximize the differences between categories. [10] Parenting sense of competence is a multidimensional concept that includes parenting efficacy and parenting satisfaction. Latent profile analysis can help to better understand the combination and manifestation of these different dimensions across individuals. Additionally, interventions for parenting sense of competence should be individualized. Understanding the characteristics of different groups through latent profile analysis can help tailor interventions more effectively to each group, thus increasing the individualization and effectiveness of interventions. Thus, this analytical approach can provide a foundation for personalized interventions and support, better meeting the needs of different types of individuals.

The stress and coping model refers to a theoretical framework used to explain how individuals cope with stress and its effects. According to this model, individuals go through three stages when faced with stress: the first stage involves cognitive evaluation of the stressor, where individuals evaluate the stressor; the second stage involves the selection and implementation of coping strategies, where individuals choose and use strategies to cope with the stress; and the third stage involves the evaluation of the effectiveness of the coping strategies, where individuals assess the effectiveness of their coping strategies and adjust their behavior to adapt to the stress. [11] This model emphasizes the importance of cognitive evaluation of stressors in the coping process, as well as the impact of different coping strategies on coping outcomes. Rumination refers to the phenomenon that individuals spontaneously repeat their negative emotions and the environment and facts details of stressful events after experiencing negative life events or facing stressful events. [12] Postpartum women face stressors such as the transition to the parenting role, with rumination serving as a cognitive evaluation, reflecting individuals' subjective perceptions of these stressors. In this context, rumination may influence postpartum women's evaluations of their own parenting abilities, thus affecting their parenting sense of competence. Specifically, excessive rumination may lead to negative self-evaluations of parenting abilities, causing postpartum women to perceive themselves as ineffective in coping with parenting challenges, thereby reducing their parenting sense of competence. [13] Conversely, effective coping and alleviation of rumination may lead to more positive self-evaluations of parenting abilities, enhancing their parenting sense of competence. [13] Dyadic coping refers to the common reactions and strategies of both partners in the face of stressful events. [14] Dyadic coping as a form of coping, collaborative coping between spouses can make them feel more confident and capable of facing the challenges of parenting. [15] By supporting each other, jointly developing parenting plans, and solving problems together, couples can better cope with the stress of parenting, thereby enhancing their parenting sense of competence. [15] Therefore, based on the stress and coping model, this study takes the successful completion of the role change of postpartum women as the source of stress, determines rumination as cognitive evaluation and dyadic coping as coping style. In this study, latent profile analysis was used to explore the potential category characteristics of postpartum women's parenting sense of competence, and to clarify the relationship between general demographic data, rumination, dyadic coping, and potential category characteristics, so as to provide reference for formulating scientific and effective individualized intervention measures of parenting sense of competence.

Methods

Data collection procedure

This study was performed followed by the STROBE checklist. The ethics committee of the Shanxi Bethune Hospital approved the study protocol (No. YXLL-2023-060) and this cross-sectional study used a convenient sampling method. From May to August 2023, the study conveniently selected postpartum women as the survey subjects in a tertiary hospital in Shanxi. During the hospital stay, the researcher established a good relationship with the parturients and agreed to conduct questionnaire surveys when the parturients returned for outpatient follow-up visits to assess their recovery. The inclusion criteria were as follows: (1) age ≥20 years; (2) normal full-term newborns; (3) had a coparenting partner during the puerperal period; (4) good communication, reading, and writing ability; (5) no history of severe mental illness and family history; (6) voluntarily participate in this study and sign the informed consent form. Participants were excluded if they were cognitively impaired or unable to complete the questionnaires.

Based on Yang's recommendation, a minimum of 50 subjects per subgroup were needed for accurate model fit in latent profile analysis (LPA). [16] Since there were 2 subgroups in this study, the required sample size should be at least 100, accounting for a 20% attrition rate. Therefore, the minimum sample size needed was 125. With 199 subjects in our study, the sample size was adequate for LPA-based analysis under the above conditions.

Measurement

General demographic characteristics

It was designed by the researchers, including maternal age, years of marriage, education degree, occupational status, family per capita monthly income, place of residence, form of medical payment, number of childbirths, and type of delivery.

Chinese Version of Parenting Sense of Competence

The scale was developed by Gibaud-Wallston [17] and translated by Xiao Yang [18]. The scale includes two dimensions, namely parenting efficacy and parenting satisfaction, with a total of 17 items. The scale uses the Likert 6-level scoring method, from “absolutely disagree” to “absolutely agree,” which is counted as 1–6 points, respectively. Among them, such as 2–5, 8–9, 12, 14, and 16, were reverse scoring. The total score is from 17–102, and the higher the score, the stronger the sense of competence in parenting. The Cronbach's alpha coefficient of Chinese Version of Parenting Sense of Competence (C–PSOC), efficacy factor, and satisfaction factor were .82, .80, and .85, respectively. [18] The Content Validity Index (CVI) value of each item on the scale was ≥0.90, and the factor loadings were all greater than 0.40 ($p < .001$). [18] Therefore, the scale has good reliability and validity.

Chinese Event Related Rumination Inventory

The questionnaire was developed by American scholar Dr. Cann [19], and the Chinese version was introduced into China by Dong Chaoqun [20]. The questionnaire consists of 20 items, including intrusive rumination and deliberate rumination, which respectively represent the negative and positive aspects of the patient's cognitive process. The questionnaire used a Likert 4-level scoring method, with 0 indicating “never had this idea” and 3 indicating “often had this idea”. The total score of the questionnaire was 0–60 points, and the total score of each dimension was 30 points. The higher the score, the higher the frequency of rumination. The total Cronbach's alpha coefficient of the questionnaire was .92, and the Cronbach's alpha coefficients of each dimension were .93 and .85, which had good reliability. [20] The items of the scale have high loadings (>0.40) on their respective dimensions, indicating good structural validity of the questionnaire [20].

Chinese Version of Dyadic Coping Inventory

The questionnaire was compiled by Bodenmann [21] and then introduced into China by Chinese scholar Xu in 2016 [22], which was used to measure the way patients and their spouses cope with stress. And the questionnaire consists of 37 items, including 5 dimensions: stress communication, supportive, delegated, negative, and common dyadic coping. The questionnaire uses a Likert 5-scale scale, from “1 = rarely” to “5 = very frequently”. The higher the score of each dimension, the higher the level of positive or negative coping. The Cronbach's alpha coefficient of Chinese Version of Dyadic Coping Inventory (C-DCI), stress communication, supportive, delegated, negative, and common dyadic coping was .73, .85, .88, .77, .79, and .83, respectively. [22,23] The items of the scale have high loadings (>0.40) on their respective dimensions, indicating good structural validity of the questionnaire [22].

Data collection and procedure

The researchers screened the subjects strictly according to the inclusion and exclusion criteria. The purpose and content of this study were explained to the survey participants before the survey. After obtaining consent, the participants filled out the paper questionnaires themselves, which were collected on the spot. Upon collecting the questionnaires, the researchers promptly checked for any omissions or errors and supplemented them after verifying with the participants. All collected data were checked by two persons and recorded in Excel.

In this study, a total of 216 questionnaires were sent out, among which 7 answers were missing items, 10 answers were completely consistent, and 199 valid questionnaires were collected, with an effective recovery rate of 92.1%.

Statistical analysis

Exploratory latent profile analysis was performed using Mplus software (version 8.7) to identify clusters based on two scale dimensions. Data for the two dimensions were entered into the LPA, with one class initially and additional classes added incrementally, until a unique solution could not be determined with maximum likelihood methods. Several recommended fitness indexes, such as the Akaike information criterion (AIC), Bayesian information criterion (BIC), and sample size adjustment Bayesian information criterion (aBIC) were used to select the model. The smaller the value, the better the model fit. [23] The entropy value was close to 1.0, indicating a high classification accuracy. [23] In addition, the Lo–Mendell–Rubin (LMR) and Bootstrap Likelihood Ratio (BLR) tests were performed to calculate the *p*-value, with $p < .05$ indicating that the current model fits the data significantly better than the former [24].

In order to test the differences between sociodemographic and other variables and to determine the psychological characteristics of the subtypes based on LPA, SPSS 26.0 was used, and all statistical tests were two-sided ($\alpha = .05$). The statistical methods included descriptive statistical calculations (e.g. percentage, mean, and standard deviation), and *t* test, Kruskal–Wallis *H* rank sum test, and chi-square test were used to compare the variables. Variance analysis was used to analyze the differences in the scores of rumination and dyadic coping among different potential categories of parenting sense of competence. Logistic regression analysis was carried out with demographic characteristics, rumination, and dyadic coping as independent variables, and classification results of potential profile analysis as dependent variables to explore the influencing factors of potential categories of parenting sense of competence in postpartum women. The difference was statistically significant ($p < .05$).

Results

Demographic characteristics of the participants

Demographic characteristics of the participants showed that the age of postpartum women was 29.95 ± 3.59 years, and the years of marriage were 3.16 ± 1.88 years. Among them, 75.9% of the women had a bachelor's degree or below, and 24.1% had a master's degree or above. In terms of occupational status, 55.3% were public officials, 25.1% were engaged in freelance work, 13.6% were unemployed, and 6.0% were farmers. Regarding family per capita monthly income, 5.5% of the women had incomes of ≤3000, 28.1% had incomes ranging from 3001 to 4999, and 66.3% had incomes of ≥5000. 88.9% of the women lived in urban areas and 11.1% lived in rural areas. During childbirth hospitalization, 93.0% of the expenses were paid by medical insurance, and 7.0% were paid own medical expenses. The number of deliveries was once for 64.3%, twice for 33.2%, and three times for 2.5%. 65.3% of the women had vaginal deliveries, while 34.7% had cesarean sections. The specific general information is shown in Table 1.

Exploratory latent profile analysis of parenting sense of competence in postpartum women

In this study, the scores of each item of parenting sense of competence were used as explicit variables to establish a potential profile model for estimating the characteristics of parenting sense of competence in postpartum women. Starting from the fitting estimation of the potential profile model of the first category, the number of categories is gradually increased to determine the best model. The potential profile model fitting index of different categories is shown in Table 2. As the number of categories increases, the values of AIC, BIC, and aBIC gradually decrease. When three categories were retained, although the entropy value reached the maximum, the LMR value was not statistically significant ($p > .05$), so two categories were considered to be retained. The probabilities of each category of postpartum women belonging to each potential category were respectively 0.99 and 0.98, indicating that the model of the two potential categories was reliable. A potential profile is drawn according to the classification results, as shown in Figure 1. There were 79 cases (39.3%) in the Class 1 group. The parenting satisfaction dimension (item 2.3.4.5.8.9.12.14.16) was higher than the parenting efficacy dimension (item 1.6.7.10.11.13.15.17). Therefore, the Class 1 group of postpartum women was named the “easy-to-satisfy group.” There were 120 cases (60.7%) in the Class 2 group. The parenting satisfaction dimension (item 2.3.4.5.8.9.12.14.16) was lower than the parenting efficacy dimension (item 1.6.7.10.11.13.15.17). Thus, the Class 2 group of postpartum women was named “strict-demand group”.

Table 1 *Demographic Characteristics of Participants ($n = 199$).*

Characteristic	Total	Potential categories		$t/\chi^2/H$	p-value
		Easy-to-satisfy group ($n = 79$)	Strict-demand group ($n = 120$)		
Maternal age (M ± SD)	29.95 ± 3.59	28.99 ± 4.00	30.59 ± 3.16	$t = -3.00$	.003
Years of marriage (M ± SD)	3.16 ± 1.88	2.27 ± 1.55	3.74 ± 1.86	$t = -6.07$	<.001
Education degree (*N*, %)					
Bachelor degree or below	151 (75.9)	56 (37.1)	95 (62.9)	$H = -1.33$	.183
Master degree or above	48 (24.1)	23 (47.9)	25 (52.1)		
Occupational status (*N*, %)					
Public officials[a]	110 (55.3)	41 (37.3)	69 (62.7)	$\chi^2 = 7.25$	.064
Freelance work	50 (25.1)	20 (40.0)	30 (60.0)		
Unemployed	27 (13.6)	16 (59.3)	11 (40.7)		
Farmer	12 (6.0)	2 (16.7)	10 (83.3)		
Family per capita monthly income (CNY) (*N*, %)					
≤3000	11 (5.5)	11 (100.0)	0 (0)	$H = -3.08$	.002
3001–4999	56 (28.1)	24 (42.9)	32 (57.1)		
≥5000	132 (66.3)	44 (33.3)	88 (66.7)		
Place of residence (*N*, %)					
Urban	177 (88.9)	63 (35.6)	114 (64.4)	$\chi^2 = 11.27$	.001
Rural	22 (11.1)	16 (72.7)	6 (27.3)		
Form of medical payment (*N*, %)					
Medical insurance	185 (93.0)	76 (41.1)	109 (58.9)	$\chi^2 = 2.10$	.147
Pay your own medical expenses	14 (7.0)	3 (21.4)	11 (78.6)		
Number of childbirths (*N*, %)					
1 time	128 (64.3)	58 (45.3)	70 (54.7)	$H = -2.10$	.036
2 times	66 (33.2)	19 (28.8)	47 (71.2)		
3 times and above	5 (2.5)	2 (40.0)	3 (60.0)		
Type of delivery (*N*, %)					
Normal vaginal delivery	130 (65.3)	58 (44.6)	72 (55.4)	$\chi^2 = 3.79$	.052
Cesarean section	69 (34.7)	21 (30.4)	48 (69.6)		

Note: a = public officials include teacher, civil servant, office; t = t test; H = Kruskal–Wallis H test; χ^2 = chi-square test.

Univariate analysis of potential categories of parenting sense of competence in postpartum women

There were significant differences between the two groups in terms of maternal age ($p = .003$), years of marriage ($p < .001$), family per capita monthly income ($p = .002$), place of residence ($p = .001$), and number of childbirths ($p = .036$), but there was no significant difference in other univariate analysis ($p > .05$) (Table 1).

The results of the univariate analysis showed that deliberate rumination ($p = .021$) and the total score of rumination ($p = .009$) were all influencing factors for different categories of parenting sense of competence in postpartum women. In addition, stress communication ($p = .002$), supportive dyadic coping ($p = .004$), delegated dyadic coping ($p < .001$), negative dyadic coping ($p = .005$), common dyadic coping ($p < .001$), and the total score of dyadic coping ($p < .001$) were also influencing factors for different categories of parenting sense of competence in postpartum women. See Table 3 for details.

Logistic regression analysis of potential categories influencing factors of parenting sense of competence in postpartum women

A total of 13 significant variables in univariate analysis were inputted to the logistic regression analysis model. Finally, logistic regression identified four influencing factors for the potential categories of postpartum women (Table 4). These factors were dyadic coping (OR = 4.56, $p < .013$), years of marriage (OR = 1.92, $p < .001$), place of residence (OR = 1.12, $p = .001$), and deliberate rumination (OR = 1.03, $p < .019$).

Table 2 *Latent Profile Analysis Models and Fit Indices.*

Model	k	AIC	BIC	aBIC	Entropy	LMR p-value	BLRT p-value
1 Profile	34	8693.95	8805.92	8698.20	–	–	–
2 Profile	*52*	*8047.56*	*8218.81*	*8054.08*	*0.96*	*<.001*	*<.001*
3 Profile	70	7670.24	7900.77	7679.01	1.00	.123	<.001
4 Profile	88	7355.50	7645.31	7366.52	0.97	.220	<.001
5 Profile	106	7174.61	7523.70	7187.88	0.97	.605	<.001

Note. AIC = Akaike Information Criterion; aBIC = adjusted Bayesian information criteria; BIC = Bayesian Information Criteria; BLRT = Bootstrap Likelihood Ratio Test; k = free parameter; LMR = Lo–Mendell–Rubin Adjusted Likelihood Ratio Test. Italics values indicate the optimal model.

Discussion

The characteristics of parenting sense of competence in postpartum women were heterogeneous

In this study, 199 postpartum women were classified into two potential categories: the easy-to-satisfy group and the strict-demand group. The results show that the characteristics of parenting sense of competence in postpartum women were heterogeneous. Among them, some women are willing to devote all their care to their children and exhibit higher satisfaction with their own parenting, but lacked confidence in the parenting process, thus categorizing them into the easy-to-satisfy group. This group constituted 39.3% of the total. The reason for the appearance of this group's characteristics may be that postpartum women feel tired and powerless due to the pressure of physical recovery and newborn care, leading to a lower parenting efficacy. Additionally, the majority of the study participants in this research were primiparous women, who lack parenting experience, leading to a lack of confidence in their parenting abilities and thus exhibiting low parenting efficacy. At the same time, postpartum women's expectations for parenting can also affect their satisfaction. Although they lack confidence, their behavior that aligns with their own expectations increases their parenting satisfaction. Moreover, if their behavior is recognized by family, friends, or professionals, it will also correspondingly increase their parenting satisfaction. The research shows that providing education and guidance is crucial for increasing maternal confidence and competence in parenting [25]. Therefore, for this group of people, we suggest that medical staff can provide education and guidance on parenting for postpartum

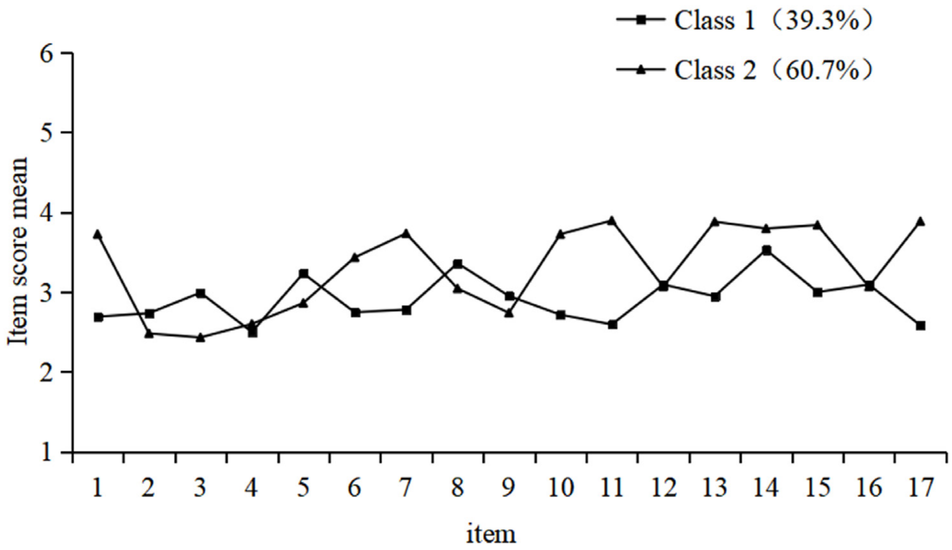

Figure 1. Latent profile analysis of parenting sense of competence in postpartum women.

women, encourage their participation in parenting activities, help them increase their parenting knowledge and skills, and enhance their sense of participation and responsibility in parenting.

In addition, another group of women may have high expectations and demands on themselves, but in reality, they found that their expectations do not match the reality in the parenting process, resulting in lower parenting satisfaction. Therefore, this group of women belongs to the strict-demand group. This group constituted 60.7% of the total, which showed that the vast majority of women in this study had a certain confidence in their ability to effectively organize and implement a series of parenting behaviors and abilities related to the parenting role. Postpartum women in this group may hold high expectations for themselves, but often discover that these expectations do not align with the realities of parenting, leading to reduced satisfaction with their parenting experiences. And they may make comparisons with other mothers, comparing the parenting abilities and behaviors, which may affect their own parenting satisfaction. They may perceive that they have not achieved an optimal state, leading to lower levels of parenting satisfaction. A study had shown that if mothers' inner needs are not met, they are more inclined to adopt negative parenting methods that are not conducive to the growth of newborns [26]. Therefore, we suggest that this group should be targeted for support by listening to and understanding the real feelings and demands of postpartum women in order to enhance their sense of security and satisfaction. Furthermore, family members, friends, or professionals can provide recognition and praise for their parenting behaviors, which can enhance parenting satisfaction. In conclusion, it is important to identify the differences in parenting sense of competence characteristics among postpartum women of different types and to implement personalized intervention measures.

Influencing factors of potential categories of parenting sense of competence in postpartum women

As a coping style for couples, dyadic coping can be divided into positive dyadic coping (stress communication, supportive dyadic coping, delegated dyadic coping and common dyadic coping) and negative dyadic coping. The results of this study found that dyadic coping had an influence on the characteristics of parenting sense of competence in postpartum women. The reason for the analysis is that during the puerperal period, the spouse, as the closest companion of the postpartum women, bears the important task of taking care of the pregnant woman and the newborn, and its importance is beyond doubt. When both husband and wife can cope well together, they will work together to learn parenting skills, which will help promote the improvement of both sides' parenting sense of competence. Moreover, research shows that open communication and mutual disclosure of ideas and feelings between husband and wife can promote mutual support and understanding and reduce the coping pressure between husband and wife to a certain extent [27]. Therefore, when facing the stressful event of newborn birth, both husband and wife should deal with it together, rather than the mother alone. In addition, studies have found that the bad mood of the newborn father during the puerperal period is closely related to the harmful mood and behavior of the child [28]. Therefore, it is suggested that clinical workers should pay attention to the coping style and psychological state of the father while paying attention to the maternal. In the prenatal period, we can organize related courses for newborn fathers to convey knowledge related to the change of paternal role, the ways to deal with the stress caused by the role change, the change and response of postpartum psychological problems, and neonatal care to help him better cope with it. In addition, by fully promoting the change of the role of the father, the family support system of postpartum women is improved to enhance the emotional connection, cooperation, and adaptability within the family, and thus improve the parenting sense of competence.

The results of regression analysis showed that years of marriage were the potential categories of parenting sense of competence in postpartum women (OR = 1.92, $p < .001$). This may be related to the fact that the longer couples have been married, the higher their marital intimacy, and the better they cope when faced with common stress. Research shows that when couples face pressure together, they mainly deal with it through the internal cohesion between the couple, such as adopting active coping methods, avoiding negative avoidance, and other coping methods [29]. Both spouses support each other and cope together to achieve a better coping outcome [30,31]. Therefore, with the birth of newborns, couples who have been married for a longer time will consider each other's experience, go deep into each other's psychology, empathize with each other, and actively communicate the problems they are facing, thus promoting the improvement of their sense of competence in parenting. This suggests that clinical workers should

Table 3 *Comparison of the Different Classes by Rumination and Dyadic Coping.*

Variables	Dimensions	Easy-to-satisfy group ($n = 79$)	Strict-demand group ($n = 120$)	t	p-value
Rumination	Intrusive rumination	15.76 ± 3.50	16.63 ± 3.43	−1.75	.083
	Deliberate rumination	11.47 ± 5.39	13.40 ± 5.94	−2.33	.021
	Total	27.23 ± 6.32	30.03 ± 8.01	−2.63	.009
Dyadic coping	Stress communication	28.84 ± 3.35	30.43 ± 3.52	−3.17	.002
	Supportive dyadic coping	35.66 ± 5.13	37.86 ± 5.16	−2.95	.004
	Delegated dyadic coping	17.80 ± 2.73	19.36 ± 2.63	−4.04	<.001
	Negative dyadic coping	28.09 ± 3.86	29.73 ± 4.03	−2.85	.005
	Common dyadic coping	17.68 ± 2.75	19.34 ± 2.67	−4.23	<.001
	Total	128.06 ± 16.51	136.71 ± 16.82	−3.57	<.001

Table 4 *Logistic Regression Analysis of Potential Categories Influencing Factors of Parenting Sense of Competence in Postpartum Women.*

Variables	B	SE	Wald $\chi 2$	p	OR	95% CI
Constant	−9.00	1.94	21.56	<.001	<.001	
Years of marriage	0.65	.13	27.28	<.001	1.92	1.51–2.46
Place of residence (urban)	0.11	.03	10.49	.001	1.12	1.04–1.19
Deliberate rumination	0.03	.01	5.51	.019	1.03	1.00–1.05
Dyadic coping	1.52	.61	6.13	.013	4.56	1.37–15.18

focus on newlyweds and other couples who have been married for a short time in future work and should jointly conduct health education for both spouses, so that they can jointly participate in and cope with the birth of newborns to improve the sense of parenting sense of competence.

The results of this study found that compared to postpartum women living in rural areas, women in urban areas showed a stronger sense of parenting competence. Analysis of the reasons, the education level of the urban population is generally higher than that of the rural population. Therefore, women living in urban areas have better mastery of parenting knowledge and skills and stronger parenting efficacy [32]. And rural women generally enter marriage earlier and become mothers relatively earlier. However, becoming a mother at an early age often has its own mental immaturity, which leads to its inability to enter the role of a mother and has lower parenting efficacy [33]. In addition, rural women still have a more conservative sense of childbearing, believing that the main task of wives is to take care of the family, while men should pay more attention to their work roles [34]. Moreover, the composition of family members in rural areas is more complex than that in urban areas, and there is a large proportion of people living with parents-in-law after marriage. In the process of child-rearing, postpartum women inevitably have to listen to some traditional customs of parents-in-law and parents [35]. Between traditional and modern ideas, there will inevitably be more or less conflicts due to incompatible value systems, which will affect their parenting efficacy and satisfaction. Therefore, in the future, clinical nursing work, we should pay attention to place of residence. We should provide rural women with child-rearing knowledge and intervention measures as soon as possible to help them establish a correct concept of child-rearing, encourage them to seek help from nurses or other peers in time when they have problems, so as to reduce their poor coping in the puerperal period and affect their sense of child-rearing competence as much as possible.

As a cognitive strategy, rumination can be divided into intrusive rumination and deliberate rumination [36]. Intrusive rumination is a way of thinking that arises from the individual's repeated attention to stressful events, which can lead to their own persistent psychological distress [36]. Deliberate rumination refers to an individual's active thinking process, which includes actively understanding stressful events, seeking solutions to problems and exploring inner feelings [36]. It is an adaptive thinking that promotes positive behavior change and improves overall well-being. The results of this study found that deliberate rumination had an influence on the characteristics of parenting sense of competence in postpartum women. This is similar to previous research [37]. Research has shown that deliberate rumination is an important predictor of personal growth and improved well-being [38,39]. The reason for this result is that postpartum women with a high level of deliberate rumination are in a fragile and unstable state psychologically [40]. In the face of a series of postpartum problems, postpartum women with a high level of deliberate rumination are able to establish constructive cognition, make reasonable use of external support systems, and adopt positive coping methods [41]. This enables individuals to be in an advantageous position in the process of resisting external stimuli and promotes the sense of parenting competence. On the contrary, if the postpartum women have a high level of invasive rumination, they will not be able to establish a constructive understanding, and will adopt negative coping styles, resulting in a cycle of evil behavior in depression and a lower parenting sense of competence. Therefore, it is suggested that clinical workers should timely identify the frequency of rumination in postpartum women, distinguish the types of cognitive processing, guide and intervene in time to help them form adaptive thinking and understanding. For example, through gratitude diary writing, attention transfer, mindfulness decompression, mindfulness meditation, and mindfulness walking. We can help them accept the present, improve their way of thinking and problem-solving, increase their purposeful ruminant meditation, reduce their psychological stress, reduce their frequency of repeated thinking about stress events, and then help them improve their psychological state and adjust their coping styles, so as to improve their parenting sense of competence.

Limitations

This study has several limitations. The participants comprised a convenience sample from one tertiary hospital in the Shanxi Province (China). Therefore, the external validity of our findings may be limited. And the factor loadings of the C-PSOC scale as low as 0.22 may compromise its validity. This could be related to variations in the results when the scale is applied to different populations. Therefore, future research could consider exploring its validity or alternative measures of the C-PSOC to enhance its validity for the target population. In addition, this study investigated only one point in time, and the causal relationship between variables cannot be clarified. A longitudinal study can be used to further explore the change trajectory of rumination and dyadic coping in puerperal period and its predictive effect on parenting sense of competence. The project is currently underway. Finally, all the instruments used in this study were self-reported; thus, the risk of reporting bias cannot be ruled out. Furthermore, although the statistical results divided parenting sense of competence into two categories, the fact that it is not three or more categories may be related to the sample size and the choice of measurement for parenting sense of competence. Further exploration is needed in the future to determine if there are any new discoveries in order to better formulate corresponding intervention measures.

Conclusions

Postpartum women's parenting sense of competence can be divided into two potential categories: easy-to-satisfy group and strict-demand group. Logistic regression analysis showed that years of marriage, place of residence, deliberate rumination, and dyadic coping were the influencing factors of the potential categories of parenting sense of competence in postpartum women. Clinical workers should pay attention to the type of women's parenting sense of competence, give timely targeted support according to their different characteristics to improve their deliberate rumination and dyadic coping level, so as to improve their parenting sense of competence.

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Conflict of interest

The authors declare that they have no competing interests.

Data availability

Datasets used and analyzed during this study are available from the corresponding author on reasonable request.

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Review Article

The Illness Experiences of Adolescents with Type 1 Diabetes Mellitus: A Qualitative Meta-synthesis

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SUMMARY

This study aims to systematically review the illness experience of adolescent patients with type 1 diabetes mellitus (T1DM). The JBI qualitative systematic review method was used and meta-aggregate analysis of 14 qualitative studies was performed. Qualitative studies on the disease experience of adolescent patients with T1DM were obtained from Cochrane, PubMed, Web of Science, CINAHL, Embase, Wanfang, CNKI, and VIP, and the search period was from 1995 to 2024. The qualitative research quality evaluation tool of JBI the Evidence-based Health Care Center in Australia was used to evaluate the analysis results. Thirty-one results were distilled and categorized into 7 themes and then synthesized into 3 overarching findings: (1) experiencing psychological distress and developing coping mechanisms following adjustment; (2) acknowledging self-management shortcomings and actively seeking support; and (3) overcoming challenges and growing through experiences. The findings illuminate that adolescents with T1DM often experience negative physical and emotional challenges during their illness. Transitioning from dependency to independence poses numerous obstacles that can be overcome by improving both internal and external support, cultivating self-management skills, strengthening coping mechanisms, and achieving control over the disease while fostering personal growth.

Introduction

Type 1 diabetes mellitus (T1DM) is a chronic autoimmune disease that results in an absolute lack of insulin due to damage to pancreatic β cells [1]. It is a prevalent endocrine and metabolic disorder among children and adolescents, accounting for more than 90.0% of diabetes cases in this age group. According to data from the International Diabetes Federation (IDF), the global annual incidence rate of T1DM is increasing at a rate of 3% to 4% annually. Furthermore, as only 45% of countries worldwide have reported a T1DM incidence rate, the actual number of cases is likely greater [2]. A recent study indicated that while China has one of the lowest T1DM incidence rates globally, the sheer size of the population suggests that the actual number of affected individuals is likely higher than reported [3]. Although clinical research and epidemiological studies in the field of T1DM started relatively late in China [4,5], previous studies have indicated an underestimation of incidence rates and a trend toward a younger age of onset for T1DM in China [6].

Owing to their young age at onset, adolescent patients with T1DM require life-long care to manage their blood sugar levels effectively to prevent complications such as hypoglycemia and diabetes ketoacidosis and subsequent hospitalization. Many studies have corroborated this fact. Adolescents with T1DM who exhibit poor blood sugar control or poorer health status are at greater risk of developing complications and experiencing a lower quality of life, which can lead to increased medical resources and treatment costs, thereby exacerbating the financial burden on their families [7–10].

Our study posits that T1DM is an integral part of adolescent's daily life and that they can take control of their blood sugar management through self-care. Therefore, delving into the authentic lived experiences of adolescents with T1DM in their daily lives across different countries and cultural backgrounds will help in comprehending these adolescents' perspectives and experiences

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and offer insights into diverse perspectives on the disease management of pediatric T1DM. This research is crucial, as it will serve as a reference for subsequent quantitative studies or qualitative studies. The findings are also valuable for healthcare providers and relevant policymakers, as they offer decision-makers information and resources related to the care of adolescents with T1DM without the need to sift through extensive qualitative data. This study aims to systematically review and synthesize the experiences of adolescents with T1DM to provide recommendations for clinical management policies and practices.

Methods

This study follows the JBI qualitative systematic review method [11]. A meta-aggregate analysis of 14 qualitative studies was performed to understand the illness experiences of adolescents with T1DM. This qualitative meta-synthesis is reported according to the guidelines of Enhancing Transparency in Reporting the Synthesis of Qualitative Research (ENTREQ) guidelines [12]. The protocol was registered a priori in the International Prospective Register of Systematic Reviews (PROSPERO) under registration number (CRD42024478976). Integrating qualitative research results involves seeking further understanding or unique perspectives on the phenomenon under study that may not be obtained from individual qualitative studies [13]. The synthesis of qualitative research provides rich information, but there are inherent heterogeneities among studies in terms of their theoretical foundations and analysis methods, which poses technical challenges [14]. Our comprehensive report addresses the following questions: What are the illness experiences of adolescents with T1DM? Which illness experiences have an impact on the economic burden?

Search strategy

This study included searches of an evidence-based medicine database (Cochrane) and original literature databases (PubMed, Web of Science, CINAHL, Embase, Wanfang, CNKI, and VIP). The researchers searched for peer-reviewed papers published in English between 1995-2024. The Population, Exposure, and Outcome (PEO) framework guided the development of the search terms [15]. The search terms included (P) *adolescent, teenager, and youth*; (E) *type 1 diabetes mellitus, insulin-dependent diabetes mellitus, juvenile-onset diabetes mellitus, autoimmune diabetes, brittle diabetes mellitus, and ketosis-prone diabetes mellitus*; and (O) *experience, feeling, perception, view, opinion, perspective, psychology, attitude, thought, qualitative research, qualitative study, observation, mixed method, descriptive qualitative research, ethnography, narrative, content analysis, focus group, case study, interview, phenomenon, and grounded theory*. MeSH headings, free text searching, Boolean operators, and truncations were used to expand the literature search. The search strategy is presented in Appendix S1 *Search Strategy*.

Selection of studies

This study followed the population, phenomena of interest, context, and study design (PICoS) strategy to formulate the selection criteria for primary studies [16]. The inclusion criteria for the studies included (1) population: adolescents with T1DM; (2) phenomena of interest: the real experiences, perceptions, and feelings of adolescents with T1DM; (3) context: everyday life scenarios such as home, school, and community; and (4) study design: focus on qualitative data, including but not limited to phenomenological studies, interviews, and grounded theory. Additionally, the selection criteria encompassed qualitative data extractable from mixed-methods research. The exclusion criteria were as follows: (1) conference papers, review papers, quantitative studies, or mixed studies for which qualitative content could not be extracted; (2) studies for which the full text was not available or the content was incomplete; and (3) studies that were not published in English. (Considering the language differences present in the original studies, we have excluded research outcomes from China unless they were published in English. This decision was made to maintain the coherence of translation and mitigate any potential biases that might have arisen during the translation of research findings into English.) Figure 1 shows the study process. Study selection was progressively conducted in two steps: first, two researchers identified studies on the basis of titles and abstracts and then further screened the studies for inclusion by reading the full text. Disagreements were resolved through discussion with a third researcher. For example, during the screening process, there was a disagreement among the researchers regarding the inclusion of a particular article. Two researchers disagreed on whether blood glucose management should be considered part of the illness experience. A third researcher suggested excluding this article because although blood glucose management is indeed part of the illness experience, the focus of the article was on cognition and self-management rather than on feelings and perspectives. Therefore, the article was excluded.

Quality assessment

A quality appraisal of the studies that met the selection criteria was performed by two researchers (Zhang Wenjuan and Zhang Yibao). The two researchers subsequently used the JBI Critical Appraisal Tool to evaluate the studies [17]. Ten subcategories that address the following were included in the JBI: research methods, research purposes, philosophical foundations, data collection methods, data analysis methods, consistency of result interpretation, sources of conclusions, consideration of researchers' influence on the study, representativeness of participants, and ethical considerations. Each question has three options: “Yes”, “No”, “Unclear”, or “Not Applicable”. Grade A studies met all the evaluation criteria, Grade B studies partially met the criteria, and Grade C studies did not meet any of the criteria, and the likelihood of bias ranged from low to high. Disagreements were resolved via discussion with a third researcher.

Data extraction

Two researchers, Zhang Wenjuan and Wang Jiaqi, independently extracted the necessary information via the JBI Qualitative Assessment and Review Instrument Data Extraction Tools for Qualitative Research (JBI-QARI) checklist [18]. The extracted data included authors, country, publication date, participants, interview methods, methodology, and key findings regarding illness experiences. Conclusions were summarized and classified on the basis of the similarity of meanings, and integrated categories were then generated to produce comprehensive results. Any differences were discussed, and a consensus was reached.

Data synthesis

In this study, qualitative interpretive meta-synthesis [19], comprising four stages, was used to combine the primary studies. The process was as follows: (1) *the data familiarization stage*, which involved an iterative process of reading the original results; (2) *the code generation stage*, which required two researchers to generate codes and themes; (3) *the theme emergence stage*, which focused on the extraction of overarching themes by comparing similarities, differences, and patterns; and (4) *the theme review stage*, which involved a review process of checking themes and developing a model.

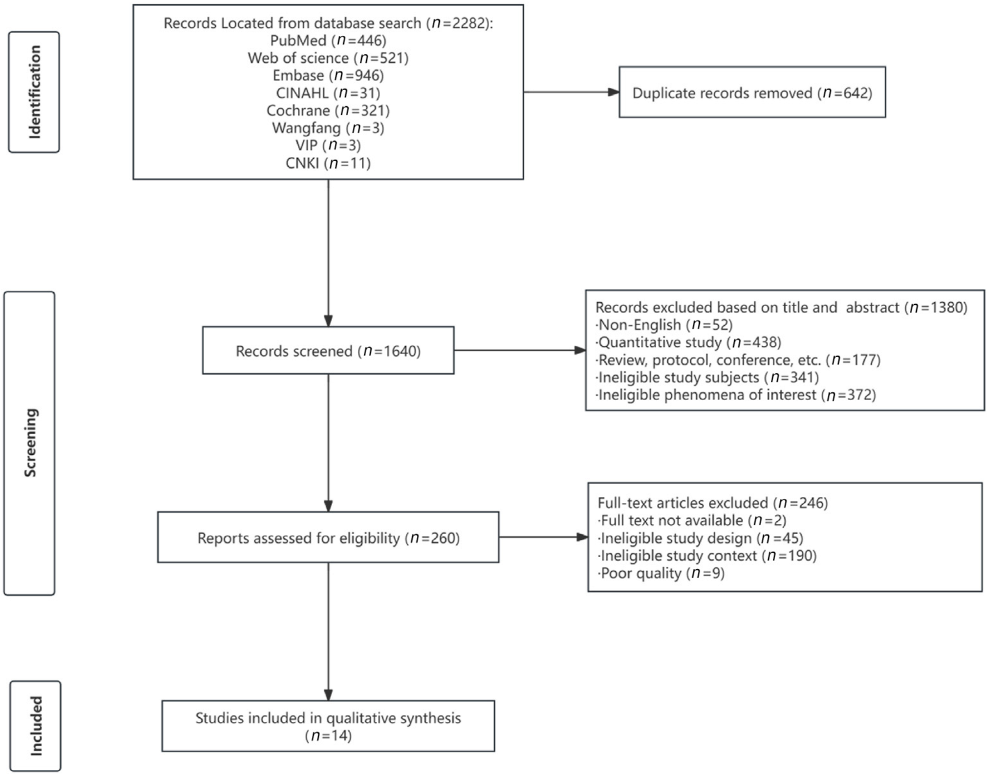

Figure 1. Selection Process.

First, each included study was analyzed to identify the research objectives, participants, and findings, including quotations from participants and explanations from the authors. The researchers thoroughly reread and interpreted each study, compared the similarities and differences between them, and then summarized and refined new categories. This iterative process was repeated multiple times. Finally, the newly summarized categories were aggregated into integrated results that were reviewed and agreed upon by the team of authors.

Results

Summary of the search

A total of 2282 results were retrieved from the search. 642 duplicated articles were excluded using EndNote v.21. After reviewing the titles and abstracts of the remaining 1640 studies, 1380 articles were excluded due to their language, study subject, etc. Subsequently, researchers excluded 246 articles on the basis of study design, study context, literature quality, etc. Finally, fourteen full-text articles were assessed for methodology quality. All of the fourteen articles were included in the final analysis after critical appraisal.

Characteristics of the included studies

Table 1 shows that the included articles were published between 1995 and 2024. The studies were conducted in Brazil [20,21], the United States [22–26], the United Kingdom [27,28], Korea [29], Finland [30], Palestine [31], and China [32,33].

The data for these articles were collected through focus groups ($n = 3$), semi-structured interviews ($n = 7$), interviews ($n = 5$), open-ended qualitative interviews ($n = 1$), and unstructured interviews ($n = 1$). Two articles utilized both focus group and semi-structured interview methods concurrently. One article utilized open-ended and semi-structured methods. The analysis approaches reported by the included articles included phenomenology ($n = 7$), grounded theory analysis ($n = 6$), and descriptive-exploratory analysis ($n = 1$).

Quality appraisal

The results of the quality assessment via JBI's critical appraisal tools are shown in Table 2. Twelve articles were considered B quality and received ‘yes’ answers for at least seven questions. Two articles were considered A quality which received ‘yes’ answers for all the questions. Two researchers resolved any disputes through discussion with a third researcher.

Findings

As shown in Figure 2, the illness experiences of adolescents with T1DM were grouped into three main themes: “Experiencing psychological distress and developing coping mechanisms following adjustment,” “Acknowledging self-management shortcomings and actively seeking support,” and “Making strategic adjustments from dependency to independence and experiencing growth”. The three main themes were identified via consensus by all the authors after analysis and generalization of the original themes.

Experiencing psychological distress and developing coping mechanisms following adjustment

Persistent negative emotional experiences. Some adolescents diagnosed with T1DM were in denial and expressed concern about it [22,33]. They blamed themselves for failing to control the disease [30]. Moreover, the lack of knowledge also inevitably led to depression and anxiety [20,30]. A few adolescents with T1DM even

Table 1 *Overview of Included Articles.*

Author (year) Country	Participants	Interview methods	Design	Findings
Aguiar GB et al. (2021) [20], Brazil	$N = 5$ (2M, 3W), aged 8–11, diagnosis > 1 year	semi-structured interviewed	Phenomenology study	Themes included: 'Challenges to disease coping', 'Family participation and support in the disease process'.
Babler and Strickland (2015a) [22], USA	$N = 11$ (3M, 8W), aged 11–15 years (mean, 13.9 years)	interview	Grounded theory	6 themes emerged. These were (i) recognizing life is changing, (ii) taking action to prevent a crisis, (iii) disclosing to engage support, (iv) taking on the burden of care, (v) accepting the 'new normal', (vi) hoping for a normal future.
Babler and Strickland (2015b) [23], USA				Themes included: 'taking over care', 'experiencing conflict with parents', 'realizing diabetes is hard'.
Babler and Strickland (2016) [24], USA				5 themes resulted, which were: 'learning to accept diabetes', 'believing it's possible to manage their diabetes', 'showing responsibility', 'staying on track'.
Cruz, Déa Silvia Moura da et al. (2018) [21], Brazil	$N = 9$ aged 12–17	focus group, semi-structured interviewed	Descriptive-exploratory study	2 themes resulted, which were: (i) learning of diagnosis; (ii) living with diabetes.
Donna Freeborn et al. (2013) [25], USA	$N = 16$ (11M, 5W) aged 7–16	focus group	Phenomenology study	3 themes resulted, which were: (i) low blood glucose; (ii) self-care activities; (iii) feeling different and/or alone.
Jane K. Dickinson et al. (2004) [26], USA	$N = 10$ aged 15–17 duration 5–12 years	unstructured interviewed	Phenomenology study	5 core variables emerged, which were (i) blending in with the adolescent culture; (ii) standing out and being watched; (iii) weighing the options and making choices; (iv) being tethered to the system and to diabetes; (v) struggling with conflicts.
J. E. Spencer et al. (2013) [27], UK	$N = 20$ (9M, 11W) aged 13–16	in-depth interviews	Interpretive phenomenology	3 themes resulted, which were (i) adapting to the diagnosis; (ii) learning to live with Type 1 diabetes; (iii) becoming independent
Kim et al. (2022) [29], Korea	$N = 12$ (5M, 7W), aged 13–19, diagnosis > 1 year, injected insulin	open-ended and semi-structured questions	grounded theory	5 themes resulted, which were: (i) tied, (ii) overwhelmed, (iii) running away, (iv) struggling, (v) conciliating.
Kyngäs et al. (1995) [30], Finland	$N = 51$ (28M, 23W), aged 13–17, mean age = 15.1 years, diagnosis > 1 year, mean diabetes duration = 7.0 years	interview	Grounded theory	4 core variables emerged, which were (i) habit, (ii) a little devil, (iii) a nightmare, (iv) stress, (v) prison, (vi) death, (vii) hell.
Lobna Harazneh et al. (2024) [31], Palestine	$N = 14$ (5M, 9W) aged 12–18 diagnosis > 1 year, mean diabetes duration = 3.4 (SD ± 1.3)years	semi-structured interviewed	Grounded theory	Themes identified were: (i) difficulties in the management of T1DM; (ii) burdens of TIDM; (iii) fears and worries of unexpected future life.
Tom Palmer et al. (2022) [28], UK	$N = 15$(7F, 8W) aged 5–17	focus group semi-structured interviewed	Phenomenological approach	Themes presented were: (i) knowledge and awareness; (ii) economic exclusion; (iii) the importance of social support; (iv) striving for normality.
Yueh-Ling Wang et al. (2010) [32], China	$N = 2$ (1M, 1W) aged 12–16 diagnosis > 1 year	semi-structured interviewed	hermeneutic Phenomenology study	Themes emerged under the following categories: (i) learning to be master of their disease, (ii) learning to find ways to feel comfortable, (iii) learning to not be different, (iv) learning to not let others (especially parents) worry about them.
Yueh-Ling Wang et al. (2013) [33], China	$N = 14$ (8M, 6W) mean aged 14.20 (SD ± 1.20) years mean HbA1c = 9.43% (SD = 2.06%)	semi-structured interviewed	hermeneutic Phenomenology study	Themes identified were: (i) the same yet different, (ii) covert and overt, (iii) limitations and freedom, (iv) independent and dependent, (v) derailing and being on track, (vi) disease identity and denial.

Note. HbA1c = glycated hemoglobin; M = Man; T1DM = Type 1 Diabetes Mellitus; W = Woman.

Table 2 *Literature Quality Evaluation Form.*

#	Studies	Questions										Quality Grade
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	
1	Aguiar GB et al. (2021) [20]	Y	Y	Y	Y	Y	N	N	Y	Y	Y	B
2	Babler (2015a) [22]	Y	Y	Y	Y	Y	N	U	Y	Y	Y	B
3	Babler (2015b) [23]	Y	Y	Y	Y	Y	N	U	Y	Y	Y	B
4	Babler (2016) [24]	Y	Y	Y	Y	Y	N	U	Y	Y	Y	B
5	Cruz, Déa Silvia Moura da et al. (2018) [21]	Y	Y	Y	Y	Y	N	N	Y	Y	Y	B
6	Donna Freeborn et al. (2013) [25]	Y	Y	Y	Y	Y	N	N	Y	Y	Y	B
7	Jane K. Dickinson et al. (2004) [26]	Y	Y	Y	Y	Y	N	U	N	Y	Y	B
8	J. E. Spencer et al. (2013) [27]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	A
9	Kim et al. (2022) [29]	Y	Y	Y	Y	Y	N	N	Y	Y	Y	B
10	Kyngäs et al. (1995) [30]	Y	Y	Y	Y	Y	N	N	Y	Y	Y	B
11	Lobna Harazneh et al. (2024) [31]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	A
12	Tom Palmer et al. (2022) [28]	Y	Y	Y	Y	Y	N	N	Y	Y	Y	B
13	Yueh-Ling Wang et al. (2010) [32]	Y	Y	Y	Y	Y	N	N	N	Y	Y	B
14	Yueh-Ling Wang et al. (2013) [33]	Y	Y	Y	Y	Y	N	N	Y	Y	Y	B

Note. N = No; U = Unclear; Y = Yes.
Note. Adapted from JBI Critical Appraisal Tool (2015), https://jbi.global/critical-appraisal-tools.
Q1: Is there congruity between the stated philosophical perspective and the research methodology?
Q2: Is there congruity between the research methodology and the research question or objectives?
Q3: Is there congruity between the research methodology and the methods used to collect data?
Q4: Is there congruity between the research methodology and the representation and analysis of data?
Q5: Is there congruity between the research methodology and the interpretation of results?
Q6: Is there a statement locating the researcher culturally or theoretically?
Q7: Is the influence of the researcher on the research, and vice-versa, addressed?
Q8: Are participants, and their voices, adequately represented?
Q9: Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body?
Q10: Do the conclusions drawn in the research report flow from the analysis, or interpretation, of the data?

developed a sense of stigma due to fear of being ridiculed or ostracized by their peers. For example, “I don't want to be seen walking down the hallway” [32]. The symptoms of T1DM and the pain caused by insulin injection made T1DM adolescents suffer from treatment fatigue [25]. They lacked confidence in maintaining long-term treatment. Furthermore, some adolescents feared the complications of diabetes (e.g., blindness, amputation, and kidney disease) [21,30]. Compared with healthy peers, adolescents with T1DM experienced more feelings of loss of control and uncertainty about their current life and future, including feeling perplexed and feeling pressured regarding marriage and pregnancy. Adolescents reported saying, “Our future is not clear” [31] and “I don't know if I can get married and become pregnant and have children” [31].

Accepting reality and adapting to changes in life. In some cases, adolescents, with a familial history of diabetes, possessed a certain level of disease knowledge and realized that they had acquired the same condition [28]. However, most adolescents, lacking the necessary knowledge, may fail to promptly discern the onset of diabetes when symptoms arise. An adolescent noted, “When I was little, when my mother found out, I did not know what was going on” [21]. After being diagnosed with the condition, they gradually understood the symptoms of diabetes. Consequently, they began to comprehend that symptoms such as dizziness, fatigue, increased thirst, or frequent urination are indicative of diabetes. For example, “When diabetes strikes, I get tired, my back hurts” [20], “you lose your voice, you go blind, you can't speak” [20].

Adolescent patients with T1DM gradually came to terms with their condition, incorporating diabetes management into their daily lives and embracing the new normalcy, “when I was about 10–12 maybe between that time frame that I started doing it on my own” [24]. As illness duration increases, adolescents with T1DM begin to independently manage their blood glucose levels and insulin administration. Adolescents must consistently monitor blood sugar levels and overcome temptations related to food [24]. After acknowledging the reality of their condition, adolescents with T1DM endeavored to address challenges on their own, and they began believing in their capabilities and actively adapting to change [26]. For example, “Something came over me and I just wasn't scared anymore, I just overcame my fear, and that was the best day of my life actually because I took control” [23].

Gaining motivation to manage illness. Adolescents perceived the onset of T1DM as an opportunity to embark on a healthier lifestyle journey, “The disease, care, and treatment do not limit or interfere with my life, it is a part of me and my life is the same as that of my friends” [30]. As they transitioned from a focus on altering health behaviors to finding motivation, they started to approach the future with optimism and hope. As some adolescents noted, “Now if I take care of myself later on, I'll be a lot healthier and so… one of my biggest goals is just to maintain my health while I am young” [23], “but now I think now one of my biggest goals is to just either be a researcher or be an endocrinologist” [22].

Acknowledging self-management shortcomings and actively seeking support

Facing deficits in coping abilities. Adolescents sought continuous professional guidance, such as diabetes education, owing to their lack of knowledge about diabetes and insulin injection skills [20]. Strict dietary restrictions may lead to adolescents viewing self-management as a burden, causing exhibiting low self-efficacy [27], “I tend to put it on the back burner” [26] “I can't believe that diet plays a necessary role in therapy” [31]. Healthcare providers should improve their communication with adolescents with T1DM and encourage or guide them through positive feedback [26]. Conflict may arise within the families of some adolescents with T1DM because siblings with T1DM may receive more attention than other siblings [31]. The cost of treating T1DM, including transportation, medications, and medical supplies, can be a significant financial burden for some families, “We are four brothers

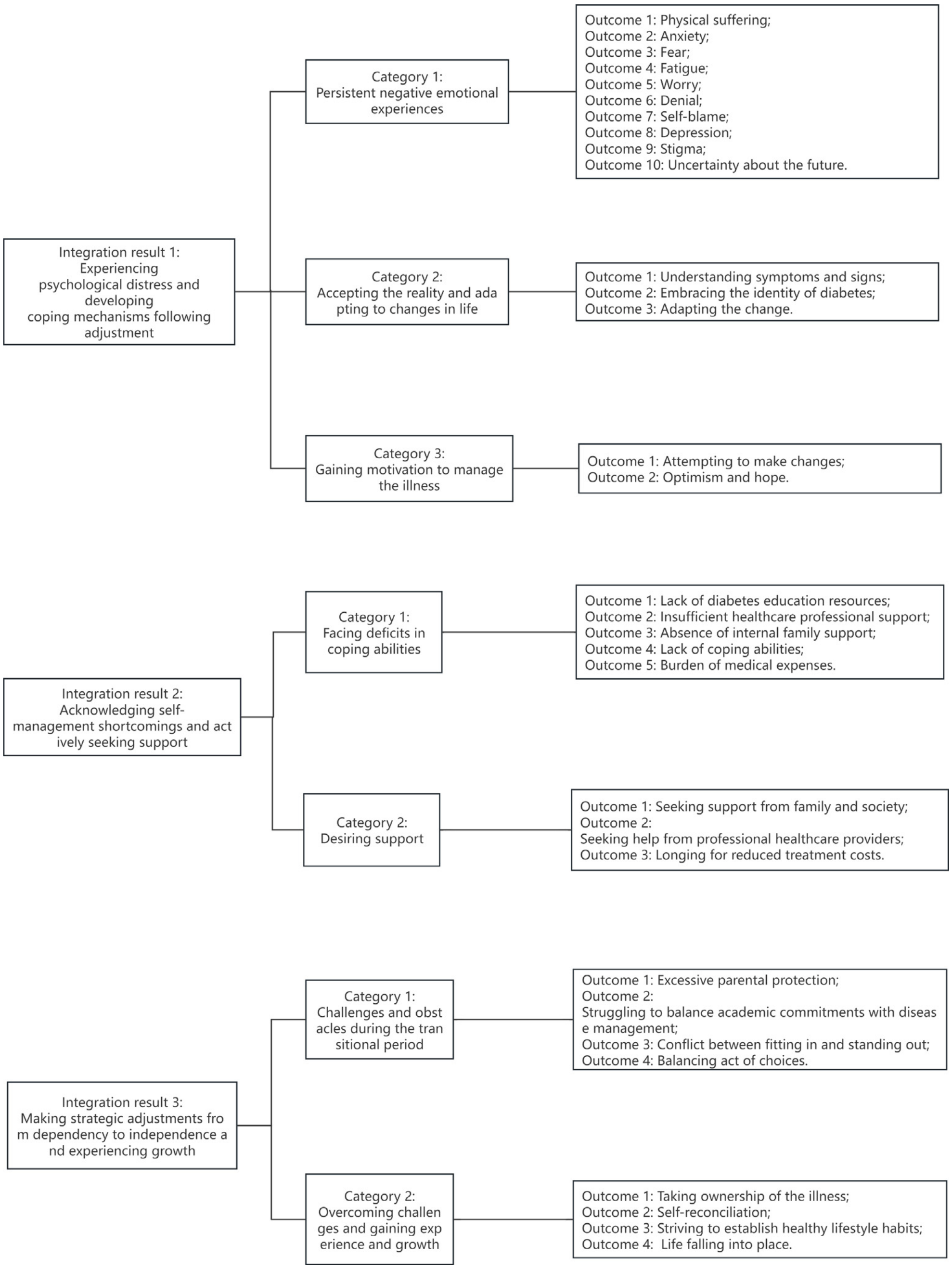

Figure 2. Integration of Results.

with diabetes, and my family income is not enough to pay for our clinic visits" [31].

Desiring support. Adolescents with T1DM sought understanding from family and friends, "You have to let your good friends know. The teacher and school nurses should also know. It's dangerous if no one knows. Because if something happens, they can save you" [33]. Reliable information about the disease can be obtained from healthcare professionals [21,23]. For example, the difference between HbA1c and blood sugar, and how to avoid hypoglycemia. Moreover, adolescents diagnosed with T1DM also sought to reduce the cost of treatment "My (insulin pump) supplies are gone. So, I have not been using it for a month" [21], "I could not get insulin, I only got one Lantus (insulin glargine injection)." [21].

Making strategic adjustments from dependency to independence and experiencing growth

Challenges and obstacles during the transitional period. The parents of adolescents with T1DM may exhibit excessive protectiveness during their children's transition from dependence to independent management of the disease, and this can hinder adolescents from autonomously managing their blood sugar levels [29]. The fatigue and hospitalizations associated with the disease prevented adolescents from focusing on their studies, resulting in academic decline, "I need to prepare for the college entrance examination and attend cram school every day. I am feeling exhausted and hungry" [22]. Furthermore, the restrictions imposed on adolescents by the illness often impeded their integration into social circles with peers, which was an important part of adolescence. An adolescent noted, "When we're in a really good game with my friends when I'm low I don't want to go in and get something from my class [to eat]. But I know I have to. So that's hard to leave" [25]. Additionally, owing to issues of self-esteem, adolescents with T1DM frequently oscillated between disclosing and concealing their condition [26]. Disclosing illness can receive help from friends and teachers, but lead to isolation and overprotection. Concealing illness can help integrate into peers' social circles, but it is not conducive to manage blood sugar.

Overcoming challenges and growing through experiences. As adolescents grow, their mental maturity and cognitive abilities gradually improve. They realized T1DM was a part of life and tried to establish a healthy lifestyle. For example, "They had a regular timetable to follow in conjunction with advice about diet and exercise. They were pleased that they had sufficient and relevant knowledge enabling them to follow a healthy lifestyle" [29]. They managed T1DM through diet, exercise, medication, and gained a sense of achievement in controlling the disease, "It seems like since I entered junior high, everything is different and I have to take responsibility for myself" [32]. In the process of controlling T1DM, adolescents with T1DM constantly adjusted their mentality, reconciled with themselves, and gradually form a complete personality, "My puberty went without a hitch. If you have diabetes and take good care of your mental health, you will not experience any problems" [29]. T1DM adolescents with well-controlled blood glucose adapted to the life coexisting with diabetes, and their life gradually falls into place. This kind of life was no different from what they hoped for, just like anyone else [30].

Discussion

Alleviating negative emotions and fostering positive behavioral motivation

The meta-integration results revealed that the emotions of almost all adolescents with T1DM are affected to varying degrees. Additionally, the psychological impact of a disease often extends to the physiological level [34]. The presence of negative emotions affects the growth and development of adolescents with T1DM, increasing the likelihood that they will develop conditions such as obesity and hypertension [35]. In female adolescent patients in particular, T1DM can lead not only to irregular menstruation but also to ovarian dysfunction and infertility, etc. [36], which inevitably causes individuals to experience negative emotions such as anxiety, fear, depression, and burnout. Therefore, it is crucial to assess the psychological status of adolescents with T1DM regularly and provide them with effective emotional support and pathways for emotional release. Family members should be encouraged to actively communicate with adolescents, appropriately guide their negative emotions and attitudes, and inform them that good blood sugar control is the basis for a smooth future life and work. Moreover, when adolescents are unable to self-relieve negative emotions, they should actively seek help from trusted family members, friends, or healthcare professionals. For adolescent patients with anxiety about academic performance, they can seek help from teachers to establish reasonable learning goals under the guidance of teachers and the school, and complete their academic tasks. In addition, seeking assistance from a professional psychologist can be beneficial, as behavioral therapy, cognitive therapy, and other psychological interventions can also play a positive role in mental health.

Providing both intrinsic and extrinsic support and enhancing the coping abilities of adolescents with T1DM

The results of this study indicate that adolescents with T1DM lack external support, such as diabetes education resources and support from medical institutions. Some healthcare facilities organize regular peer-sharing sessions or establish patient clubs where T1DM-related disease knowledge and insulin injection skills can be shared through lectures or workshops. Adolescents with T1DM can attend these clubs or sessions. And adolescents can also receive peer education, participate in diabetes camps, meet patients, and use peer power to improve disease management skills. Moreover, they can also obtain knowledge about T1DM from online public platforms (e.g., WeChat, LittleRedBook) and game apps (a kind of app specifically developed for adolescents with T1DM). Additionally, owing to the high cost of treatment, the government could increase medical insurance coverage or reimbursement to alleviate the financial burden on patients. In terms of intrinsic support, family members and friends should fully understand the challenges faced by adolescents with T1DM and provide enhanced life support. Furthermore, patients should increase their confidence. Strengthening self-efficacy can enhance self-management skills and help in controlling T1DM [37].

Overcoming transitional obstacles, mastering the disease, and achieving personal growth

The transition from relying on parents to manage blood sugar to independently managing the disease poses certain obstacles for adolescents with T1DM. In accordance with the psychosocial development characteristics of adolescents, pubescent teenagers place high value on social relationships, particularly with their peers [38]. Therefore, some adolescents adopt measures such as avoidance, selective disclosure, and compromising on blood sugar management strategies to integrate with their peers. Society needs to create a supportive and safe environment to alleviate the concerns of adolescents with T1DM about being misunderstood, stigmatized, and socially isolated. For example, schools can organize anti-bullying activities, encourage students to respect diversity and reduce societal prejudices. Additionally, due to the lack of transitional consultation clinics (from pediatric to adult) in China, hospital managers can learn from foreign experience [39] and establish consultation clinics on the basis of actual needs.

Influenced by traditional culture, parents typically play authoritative and protective roles in parent–child relationships, whereas children are expected to be obedient and compliant, and this threatens adolescents' opportunities to develop autonomy [40]. Therefore, encouraging adolescents to make autonomous decisions regarding the management of their illness can help reduce the need for interventions regarding their behaviors and decisions. Adolescents should demonstrate to their parents that they are capable of managing the disease. For example, adolescents can independently monitor their blood sugar, inject insulin or take medicine, while parents supervise them; adolescents can also independently develop exercise and diet plans, while their parents guide them.

Through successful experiences with disease management, adolescents with T1DM gain motivation, courage, and a sense of responsibility for self-managing their condition. A multifaceted home-school-community support system can help adolescents better control diabetes, promoting a positive attitude and healthy lifestyle. Furthermore, a diverse support system can stimulate the inherent resilience of adolescents with T1DM when facing sudden crises and enduring challenges in the disease management process, thereby enhancing their coping abilities.

Conclusion

Our findings provide insight into the illness experiences of adolescents with T1DM. Adolescents with T1DM often experience negative physical and emotional challenges during their illness. Transitioning from dependency to independence poses numerous obstacles that, can be overcome by improving both internal and external support, cultivating self-management skills, strengthening coping mechanisms, and achieving control over the disease while fostering personal growth. It is crucial for clinical practitioners to pay attention to the psychological experiences of adolescents and for adolescents with T1DM to receive diverse support from family, community, and society, thereby constructing a disease management model tailored to adolescents with T1DM in our country. These efforts will assist patients in successfully transitioning from adolescence to adulthood.

This study excluded literature in languages other than English, which implies the absence of results from some sources and a certain lack of cultural representation. Furthermore, the majority of the literature included in this study did not report the influence of the researchers' own cultural backgrounds on the research, leading to potential biases in the analysis of the results. Therefore, in future qualitative research, it is important to acknowledge the impact of the researchers' cultural backgrounds on the study and to consider the alignment between philosophical foundations and specific methodologies. Moreover, on the basis of the author's ethnic identity, researchers inevitably apply previously unrelated or contradictory knowledge to the interpretation of findings and the data synthesis process, especially in the theme emergence and review stages. Therefore, researchers should strive to minimize personal biases and provide interpretations and recommendations based on their own experiences.

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Patient and public involvement

Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication

Not applicable.

Data availability statement

Data are available on reasonable request. All data relevant to the study are included in the article or uploaded as online supplemental information.

Ethical review

Not applicable.

Conflict of interest

None declared.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.anr.2024.07.004.

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