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Effects of On-Campus and Off-Campus Smartphone Overdependence Prevention Programs Among University Students

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ABSTRACT (ENGLISH)

SUMMARYPurpose

The purpose of this article is to evaluate effects of self-determination theory-based on-campus and off-campus prevention programs on smartphone overdependence among university students.

Methods

This was a pre-posttest quasi-experimental study with a nonequivalent control group (CG). Seventy-eight students were recruited as participants. They were allowed to choose either an experiment group (EG) or a CG. On-campus smartphone overdependence prevention program was provided to participants in experimental group 1 (EG1), while on-campus program combined with off-campus prevention camp was provided to those in experimental group 2 (EG2). Instruments used in this study included a smartphone overdependence self-diagnosis scale, a basic psychological needs scale, and a self-regulation ability scale. Data collection was performed at baseline, immediately after intervention, at 1 month and 3 months after intervention. Data were analyzed using mixed analysis of covariance. Focus group interview was performed for qualitative evaluation.

Results

After the intervention, smartphone overdependence and basic psychological needs exhibited significant interactions between group and time. Smartphone overdependence scores decreased in EG1 and EG2 but increased in CG ($F = 4.56$, $p = .001$). Basic psychological needs improved in EG1 and EG2 but deteriorated in CG ($F = 5.04$, $p = .009$). Focus group interviews revealed that participants strived to control their smartphone usage through individual efforts and by interacting with new friends in college even after completing the program.

Conclusion

In this study, on-campus only program and combined intervention of on- and off-campus programs were both effective in maintaining and managing smartphone use. However, participants perceived that the off-campus program provided an opportunity to apply the theory learned in on-campus to the real world.

FULL TEXT

Introduction

Smartphone overdependence or addiction is characterized by excessive smartphone use or unable to control smartphone use. It can interfere with daily lives such as work, school, and social activities [1]. Currently, the rate of smartphone usage in the Korean population is 93.6% [2]. About 99.8% of Korean university students have a smartphone, of them 25.0% are at risk of being dependent on smartphones [2]. Smartphone overdependence is associated with poor academic achievement, stress, and difficulty in adapting to college life [3,4]. It has been reported that smartphone addiction is positively associated with anxiety, depression, and obsessive–compulsive disorder [5]. In particular, college freshman year is a time when students network with others and focus on their studies in order to build a foundation for a successful college life and career after graduation [4,6]. Therefore, interventions are needed to modify smartphone overdependence behavior among college freshmen. A previous study has reported that self-regulation is negatively associated with dependence on smartphone use [7]. Accordingly, it is necessary to improve students' self-regulatory ability associated with smartphone use.

The self-determination theory (SDT) emphasizes the satisfaction of universal psychological needs and internalization of motivation based on a growth-oriented view of humans [8]. It posits that human behavior is induced, maintained, and continued by intrinsic motivation. In addition, behavior change is viewed as a process of using one's volitional control with an emphasis on self-regulation [8].

According to the SDT, an individual's behavior is motivated and determined by oneself. Basic psychological needs such as autonomy, competence, and relatedness are important promoters of individual growth and satisfaction that can increase intrinsic motivation [9]. Therefore, interventions to facilitate satisfaction with basic psychological needs and increase self-regulation using strategies to promote intrinsic motivation might be effective in overcoming smartphone overdependence based on the SDT [9,10].

Most former intervention studies about smartphone users have focused on psychosocial symptom relief or cognitive behavior changes targeting overdependent smartphone users [11,12]. SDT-based intervention studies have also been performed to modify self-management behaviors of those who suffer from chronic diseases [13,14] or to promote smoking cessation [10]. However, studies on SDT-based intervention for preventing smartphone overdependence among college students who have not yet developed smartphone overdependence are scarce. Thus, the aim of this study was to evaluate effects of SDT-based on-campus and off-campus prevention programs on smartphone overdependence among university students. Specifically, this study has the following objectives: (1) to examine effects of on-campus and off-campus interventions for preventing smartphone overdependence and determine whether such interventions could influence basic psychological needs and self-regulatory ability of college students and (2) to assess changes in feelings and perceptions of smartphone use as results of participating in the program and individual efforts to prevent smartphone overdependence.

Methods Design

This was a pre-posttest quasi-experimental study with a nonequivalent control group (CG) to determine effects of an on-campus smartphone overdependence prevention program (SOPP) alone and in combination with an off-campus prevention camp. In addition, two focus group interviews (FGIs) were performed to explore subjective perceptions of these programs.

Participants

Participants of this study were freshmen from H University in C city through a convenience sampling. Potential participants were recruited using a poster on campus bulletin board. Inclusion criteria were freshmen who were enrolled in the H University at the time of recruitment, those who could understand Korean language, and those who agreed to participate in this study. Freshmen who are interested in the program were allowed to participate regardless of their degree of smartphone overdependence. Exclusion criteria were those who had addiction problems other than smartphone overdependence.

Potential participants were allowed to choose group allocation (either in an experiment group [EG] or a CG). Participants were divided into three groups: (1) experimental group I (EG1), an on-campus program; (2) experimental group II (EG2), on-campus program + off-campus prevention camp; and (3) CG. FGIs were conducted for participants in EG1 and EG2.

The sample size required for this study was calculated using the G*Power 3.1 program. With a large effect size ($f = .40$) and 80.0% power ($\alpha = .05$), at least 42 subjects were required for mixed analysis of covariance (ANCOVA) at four time points for three groups. The effect size was calculated based on research results of Park and Kim [15]. They tested the effect of self-determination by applying the internet addiction group counseling program for high school students, which yielded a large effect ($d = .86$).

Considering potential withdrawals from the study, 30 participants were required for each group. A total of 84 students (28 in EG1, 26 in EG2, and 30 in the CG) were enrolled. Of them, two from EG1, three from EG2, and one from the CG withdrew from this study after completing the baseline survey due to their academic schedules. Thus, a total of 78 (92.9%) participants (EG1, n = 26; EG2, n = 23; and CG, n = 29) completed posttests. Among those who completed the intervention, 14 students (seven students from EG1 and seven students from EG2) voluntarily participated in FGIs (Figure 1).

Measurements Smartphone overdependence

Smartphone overdependence was measured using the smartphone overdependence self-diagnosis scale developed by the National Information Society Agency of Korea [16] with permission from the agency. This 10-item scale comprised three subscales: self-control failure (three items), salience (three items), and serious consequences (four items). Each item was rated on a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree), with a higher score indicating a higher risk of smartphone overdependence. The total score ranged from 10 to 40. Based on total scores, individuals were divided into three user groups based on smartphone usage: general users (score: 10–22), potential-risk users (score: 23–30), and high-risk users (score: 31–40) [16]. Cronbach's alpha was .84 in the former study [16]. It was .83 in the current study.

Basic psychological needs

The basic psychological needs scale developed by Lee and Kim [17] was used with permission from the developers. This 18-item tool comprised six items for autonomy, six items for competence, and six items for relatedness. Each item was rated on a 6-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree), with a higher score indicating a greater basic psychological need. In the study by Lee and Kim [17], Cronbach's α was .87 for the whole scale, .70 for autonomy, .75 for competence, and .79 for relatedness. In this study, Cronbach's α was .86 for the whole scale, .68 for autonomy, .78 for competence, and .83 for relatedness.

Self-regulatory ability

The short form of the Volitional Components Inventory developed by Kuhl and Fuhrmann [18] and modified for Koreans by Yoon [19] was used with permission from the developers. This self-regulatory ability scale consisted of 10 items for self-regulation mode and 11 items for volitional inhibition mode. Cronbach's α was .76 for self-regulation mode and .75 for volitional inhibition mode [19]. Each item was rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The total score ranged from 21 to 105, with a higher score indicating a greater self-regulatory ability. Cronbach's α of this scale was .82 in the present study. It was .76 for the self-regulation mode and .80 for the volitional inhibition mode.

Intervention

Two interventions were used in this study. EG1 was provided with an on-campus program (SOPP), while EG2 was provided with both an on-campus program and an off-campus camp program. First, an on-campus, eight-session SDT-based SOPP was provided to EG1 and EG2 to improve autonomy, competence, and relatedness of participants. SOPP was a modified version of the former program developed by Kwon and Yu [20]. The eight-session program consisted of two 90-minute sessions per week for 4 weeks between April 22, 2019, and May 16, 2019. Contents of the SOPP included building intimate relationship with participants, promoting motivation and reinforcement for control of smartphone use by identifying strengths and weaknesses, and exploring and practicing alternative activities to control smartphone use. The program also included reassessment of modified behaviors and commitment to action for further behavior changes [20]. Second, a three-day/two-night off-campus smartphone overdependence prevention camp program (SOPCP) was offered to EG2 in an environment with limited internet access from June 14, 2019, to June 16, 2019. The camp program was operated on weekends, avoiding midterm and final exam periods. SOPCP was focused on planning and practicing appropriate use of smartphones (Table 1). In the current study, sequences of on-campus program activities were modified, and off-campus program was added to the intervention of the former study [20].

EG2 was also provided SOPP at the same period as EG1. In other words, EG1 participated only in an SOPP, while EG2 additionally participated in a SOPCP within 1–3 months after the SOPP to maintain intervention effects. Both programs were conducted by a counselor, an expert in the field of smartphone addiction prevention. The counselor also participated in the development of the program used in the current study.

Procedure

Data were collected via self-report questionnaire from April 15, 2019, to September 11, 2019. Data were collected at four points: baseline, immediately after, 1 month after, and 3 months after the intervention. Participants were informed that confidentiality would be maintained throughout the study. Pretest and posttest data were collected by two research assistants.

Two rounds of FGIs were performed from November 26, 2019, to November 28, 2019, after data were collected from the 3-month follow-up. FGIs were conducted in a quiet and soundproof lecture room within the H University. Seven volunteers from EG1 and seven volunteers from EG2 participated in FGIs. The interview lasted for 60–90 minutes. The audio was recorded after obtaining permission from participants. Open and semistructured questions were used to allow participants to freely describe their experiences. Interview questions were developed with advice from an expert panel (four counseling experts, one psychiatrist, one psychiatric nursing professor, one community nursing professor, and one advertising and public relations professor). Questions for EG1 and EG2 were: “What has changed after participating in the program?” “What are you currently doing to prevent smartphone overdependence?” and “What content or activities should be added to the SOPP?” An additional question was asked for EG2 as follows: “How were the SOPP and SOPCP different?” These FGIs were conducted on different dates for each group. Three researchers participated in the interview. These researchers listened to recordings repeatedly immediately after the interviews to transcribe ad verbatim. Personally identifiable information was deleted from the transcript.

Data analysis

All data were analyzed using SPSS WIN 25.0 software. Shapiro–Wilk test for normality revealed that all dependent variables were normally distributed (W = .92-.97, *p* = .053-.655). Sociodemographic characteristics were analyzed using descriptive statistics. Homogeneity of sociodemographic characteristics and dependent variables was analyzed using the χ^2 test, Fisher's exact test, and analysis of variance. To test the effectiveness of the program, a mixed ANCOVA was conducted with main effects of group (three groups) and time (four time in points) and interaction effect of group*time. If the assumption of Mauchly's sphericity was not met, a Greenhouse–Geisser correction was applied. In the mixed ANCOVA, gender was included as a covariate, which showed a significant difference among groups. ANCOVAs were performed to examine differences among groups at four time points. Post hoc tests were performed to examine differences between groups and within groups using the Scheffé test and the Games–Howell test, respectively.

FGI data were analyzed using content analysis. First, three researchers (one counseling expert, one nursing professor with experience in qualitative study, and one nursing PhD student with experience in developing and implementing a program) read the transcripts to gain an overall understanding of the raw data. They read the transcripts repeatedly to identify key statements for each question. The validity of the data was further examined by two nursing professors with experience in student counseling and qualitative methodology.

Ethical considerations

This study was approved by the Institutional Review Board of H University (approval number: HIRB-2017-024-3-CRM). The first IRB approval was obtained in 2017. IRB extension was approved twice in 2018 and 2019. Participants signed a consent form after being informed of the purpose and procedure of this study, their freedom to participate and withdraw from the study, the use of collected data for research purposes only, and audio-recording of interviews. Participants were also informed that no extra point would be awarded for grade or test and that there would be no penalty for nonattendance or withdrawal. This study excluded students who were taking classes instructed by the principal investigator. Participants were provided a copy of the information sheet and consent form. Benefits of participation were communicated. Each participant was given a small gift (10 USD per participation) upon completion of the study.

Results Homogeneity test of participant characteristics and measured variables

A total of 78 subjects were enrolled in this study: 26 in EG1, 23 in EG2, and 29 in CG. The mean age of participants was 19.04 ± 0.33 years. Female students accounted for 82.1% and biomedical students constituted 59.0% of participants.

Among the three groups (EG1, EG2, and CG), gender (x^2 = 7.78, p = .017) and smartphone overdependence (F = 5.77, p = .005) differed significantly at baseline. EG1 had the highest proportion (96.2%) of female participants, and EG2 had the highest proportion (34.8%) of male participants. Mean score for smartphone overdependence was the highest in EG2 (25.09 ± 5.24) but the lowest in CG (20.83 ± 4.31). Other dependent variables such as basic psychological needs (F = 1.93, p = .152) and self-regulatory ability (F = 0.39, p = .675) were not significantly different among groups at baseline (Table 2).

Effects of program

For mixed ANCOVA results of smartphone overdependence, the interaction between group and time was found to be statistically significant (Wilks' lambda = 0.80, F (4.91, 181.49) = 4.56, p = .001, η^2_p = 0.13). However, the main effect of group (F (2, 74) = 2.37, p = .100, η^2_p = 0.06) and the main effect of time (Wilks’ lambda = 0.97, F (2.45, 181.49) = 0.87, p = .441, η^2_p = 0.03) were not significant. Group comparison by each time point using a simple ANCOVA indicated that differences among groups in smartphone overdependence were not statistically significant at T1, T2, or T3 (all p > .05). Similarly, within-group differences by time point were not statistically significant in EG1 or CG (p > .05). However, smartphone overdependence was significantly decreased in EG2 after the intervention (p = .027) (Table 3). Smartphone overdependence scores trended consistently decreased in EG1 and EG2 but increased in CG (Figure 2).

Considering basic psychological needs, the main effect of the group was statistically significant (F (2, 74) = 5.04, p = .009, η^2_p = 0.12). The mean score of basic psychological needs was higher in EG1 (88.29 ± 1.52) than in EG2 (82.48 ± 1.63) and CG (82.22 ± 1.40). Scores of basic psychological needs increased in EG1 and EG2 but decreased in CG. However, the main effect of time (Wilks' lambda = 0.96, F (3, 222) = 0.39, p = .759, η^2_p = 0.01) and the interaction between group and time (Wilks’ lambda = 0.85, F (3, 222) = 1.82, p = .097, η^2_p = 0.05) were not statistically significant (Table 3).

Among subfactors of basic psychological needs, the main effect of the group on autonomy was statistically significant (F (2, 74) = 6.39, p = .003, $\eta2_p$ = 0.15), where the autonomy score was higher in EG1 (30.55 ± 0.53) than in EG2 (28.16 ± 0.56) and CG (28.26 ± 0.49). However, the main effect of time (Wilks' lambda = 0.84, F (5.39, 199.23) = 0.10, p = .949, η^2_p = 0.00) and the interaction between group and time (Wilks’ lambda = 0.72, F (2.49, 184.29) = 0.52, p = .634, η^2_p = 0.01) were not statistically significant (Table 3).

Considering competence, the main effect of group (F (2, 74) = 2.47, p = .091, η^2_p = 0.06), the main effect of time (Wilks' lambda = 0.91, F (2.44, 180.66) = 0.03, p = .982, η^2_p = 0.00), and the interaction between group and time (Wilks’ lambda = 0.72, F (2.49, 184.29) = 1.80, p = 0.117, η^2_p = 0.01) were not statistically significant (Table 3). Competence scores trended to increase in EG1 and EG2 but decrease in CG (Figure 2).

Considering relatedness, the interaction between group and time (Wilks' lambda = 0.78, F (2.49, 184.29) = 4.21, p = .001, η^2_p = 0.10) and the main effect of group (F (2, 74) = 8.87, $p\ 2_p$ = 0.19) were statistically significant. However, the main effect of time (Wilks’ lambda = 0.72, F (2.49, 184.29) = 0.52, p = .634, η^2_p = 0.01) was not statistically significant (Table 3). Relatedness score maintained or improved over the follow-up period among participants in EG1 and EG2, while it fluctuated among those in CG (Figure 2). Group comparison by each time point using a simple ANCOVA indicated that differences among groups in relatedness were statistically significant at T1 only (p p > .05) (Table 3).

Considering self-regulatory ability, the main effect of group (F (2, 74) = 1.53, p = .224, η^2_p = 0.04), main effect of time (Wilks' lambda = 0.92, F (2.63, 194.80) = 1.53, p = .224, η^2_p = 0.04), and the interaction between group and time (Wilks’ lambda = 0.92, F (2.63, 194.80) = 0.97, p = .438, η^2_p = 0.03) were not statistically significant (Table 3).

Subjective effects on program experience

The interview was focused on the following: changes after program participation, personal effort to prevent smartphone overdependence, things to be corrected or added for future programs, and benefits of the off-campus camp program.

Changes after program participation

Participants reported improved confidence, autonomy, determination, and self-control, which are components of basic psychological needs. Regarding competence, participants realized how much they used their smartphones and expressed an improvement in self-esteem. Regarding relatedness, participants looked forward to meeting friends from varying backgrounds and stated that they observed improvements in their health such as better sleep, recovery from fatigue, and reduced headache.“The program wasn’t simply a lecture but more like a group activity, where you have to keep expressing your opinions. I think my self-confidence and autonomy have improved compared to before.” (1A, F/19)“Through this program, I was able to check the amount of time I spent on it on my own and I realized that I really did use my smartphone a lot. I tried to control that.” (2A, F/19)

Personal effort to prevent smartphone overdependence

Applying three engineering control mechanisms (substitution, isolation, and ventilation) [21], participants substituted smartphone use with other activities such as talking to family or friends, watching a movie, or exercising. They were isolated from their smartphones by turning on the “do not disturb” mode or using the smartphone screen time feature. Using the ventilation mechanism, they read letters they had written to themselves or looked at the certificate they had received during the program.“How should I spend my leisure time?… I will take a walk or go on a trip. I am trying to go out every weekend with my family except during midterms or finals.” (2A, F/19)“I think it was the letter that I wrote … when I feel like I am kind of becoming addicted to my smartphone again, I read the letter and motivate myself again.” (3A, F/19)

Strengths of the camp program

The SOPP was theoretical. However, the SOPCP allowed participants to engage in various alternatives to smartphones while staying at the camp without a smartphone. The camp provided students an opportunity to pay attention to others and realize they could spend time without their smartphones. They also grew confident and explored new hobbies.“… like the camp better because the campus activity was more theoretical and the camp was real world stuff …” (4B, M/19)“There’s no Wi-Fi, and I can’t make calls. I think I discovered new hobbies through this camp.” (1B, F/19)

Suggestions for the program

Suggestions made by participants are summarized as follows: (1) lengthening the program duration; (2) forming social support groups by networking with friends or providing continuous monitoring; (3) providing advanced education for smartphone overdependence; (4) analyzing the relationship between health and smartphone overdependence; and (5) providing an undergraduate-specific education program that could reflect the latest trends.“Reducing smartphone usage cannot be achieved in a short period of time … I think if you want to see changes in the long-term, it would be better to extend the program to the second semester …” (6A, F/19)“This is for smartphone prevention … I thought it would be better if the program was more advanced … then I think people would realize how serious the issue is.” (1B, F/19)

Discussion

This study aims to apply an SDT-based SOPP to college students and to determine the program's effects. We developed two types of interventions and tested them on two experimental groups. Participants in EG1 received SOPP, while those in EG2 received SOPCP in combination with SOPP. Effects of these interventions were assessed using self-report surveys, while FGIs were performed as a supplementary process to obtain qualitative evaluations. Accordingly, the discussion was conducted focusing on quantitative research results. FGI results were also provided as backup data to help us understand quantitative results and to provide in-depth information for the study phenomenon.

Interventions based on the SDT were intended to promote basic psychological needs (autonomy, competence, and relatedness) in the current study. To promote autonomy, students were asked to set specific goals for controlling smartphone use. To enhance competence, the program focused on the strengths of students and explored alternative activities over smartphone use. Relatedness was supported through collaborative activities. Combined effects of these activities might have produced significant changes in basic psychological needs, which in turn influenced the self-regulatory ability of participants about smartphone use.

In this study, the level of smartphone overdependence significantly changed in all groups, consistent with a previous study [13]. During the follow-up period, smartphone overdependence scores continued to decrease in EG1 and EG2, but increased in CG. Further analysis by time point revealed that within-group differences were statistically significant in EG2 only, indicating that combined intervention of SOPP and SOPCP was more effective in modifying behavior regarding smartphone overdependence than SOPP or SOPCP alone. In the current study, participants strived to prevent smartphone overdependence using substitution, isolation, and ventilation methods described in a previous study [21]. Example strategies included substituting smartphones with other activities, isolating themselves from the smartphone, and covering the screen so that they could use the smartphone less often. Findings of the current study are in line with previous results showing that smartphone overdependence is reduced even after completion of the program when participants learn how to use smartphones appropriately [12]. EG2 participants who received SOPCP (off-campus camp) showed a greater change in the score for smartphone overdependence across four time points than EG1 participants although such difference was not statistically significant between the two groups. FGIs revealed that EG2 participants perceived the on-campus program as a theoretical process. However, they recognized SOPCP as an experiential learning program where they could learn how to actually use a variety of alternative activities during the camp. This study introduced alternative activities to participants and provided them with an opportunity to explore alternatives that they could practice on their own. Alternative activities such as art, meditation, and physical activities have been suggested as effective methods to alleviate smartphone overdependence [11,22,23]. Therefore, continuous encouragement and support are needed so that students can apply various measures they have learned during the camp to prevent smartphone addiction. However, in the current study, we did not consider the level of smartphone overdependence for study participants recruited. General users were included in the study. Therefore, future intervention studies should recruit potential- or high-risk users for smartphone overdependence.

In this study, there were significant differences in basic psychological needs among groups after the intervention. EG1 and EG2 showed an increase in basic psychological needs at 3 months after the intervention compared to baseline, whereas basic psychological needs decreased in CG participants during the same period. This is similar to the results of a previous study on internet addiction counseling programs [15]. Among the three basic psychological needs, autonomy significantly differed among groups, similar to the results of previous studies on internet addiction in high school students [15] and smoking cessation in adults [10]. Interventions in the current study might have promoted autonomy among experimental group participants by providing clear evidence for the negative impact of smartphone overreliance. The intervention also included various alternatives to replace smartphone overuse so that participants could choose their own control methods [24]. FGI participants reported that group discussions and hands-on experience improved their confidence and motivated them to control their smartphone usage, which in turn increased their autonomy. Autonomy encompasses a property in which an individual acknowledges and accepts a problem and is willing to maintain healthy behaviors as an agent of change [24]. This calls for various tailored strategies to promote autonomy. Meanwhile, although competence scores were not statistically significant, EG1 showed a decrease in competence score at 3-month follow-up, while EG2 showed an increasing trend. These results suggest that the off-campus camp program could facilitate an effective interaction with the social environment and that the positive feedback might have contributed to the improvement in competence [25]. Additionally, it was speculated that overcoming the environment with limited smartphone access and engaging in new activities might have motivated participants to reduce smartphone use even after the program ended. Relatedness significantly differed among the three groups. EG1 and EG2 showed a significant increase in relatedness compared to CG immediately after the intervention. In particular, college freshmen have the burden of adapting to the changing external environment and building interpersonal relationships [24]. The sense of belonging formed through group activities with common interests at the beginning of the semester can have a positive effect on improving relatedness [8,15]. Considering that participants of this program were college freshmen, positive relationships built by the program and group efforts to control smartphone use might have contributed to enhanced relatedness [20]. Since intimate relationships have a positive effect on the control of smartphone use [25], social support is needed to maintain relationships formed through the program.

In the present study, the self-regulatory ability showed an increase during the follow-up period in EG1 and EG2 although such increase was statistically insignificant. This result was similar to results of a previous study on smartphone overdependence among college students [20]. We speculate that with the support of peers, participants could recognize their problematic behavior regarding smartphone use. Additionally, development of their own action plans to control smartphone use [20] might have contributed to the improvement of their self-regulatory ability. Failure to self-regulate can increase media use [26] and the risk for smartphone addiction [27]. College students who have experienced smartphone overuse want to change this problem behavior. However, they find it difficult to self-regulate their smartphone use [24]. Thus, it is necessary for them to recognize, pay attention, and correct wrong behaviors by observing themselves [25]. In particular, feedback from close family or friends offers a stronger motivation for individuals to evaluate themselves. Such relationships as a social support resource and increased motivation by competition have positive effects [25]. Therefore, it is necessary to create an environment where they can receive continuous monitoring from colleagues through the formation of social network relationships.

However, participants of this study were exposed to external influence because they participated in the program while performing their daily activities. Therefore, tension and academic stress due to their regular exam schedules might have impacted study results. The lack of control for external influences was a limitation of this study.

Nevertheless, the camp program (SOPCP) helped students clearly recognize their problems and provided a stronger motivation for them to change their behaviors with their external environment being controlled. Contrary to most theories, it has been reported that the SDT may help sustain behavioral changes when basic psychological needs are met [10]. Therefore, by using various social networks, interventions such as support, encouragement, and monitoring are required to maintain modified behaviors [25]. However, pressure and influence from external environments should be minimized to maintain personal autonomy [10]. Some participants mentioned that long-term programs that could span for more than one year and social support groups are needed to ensure control of smartphone usage in the long term. As part of the program, participants wrote letters to themselves during the intervention period and sent these letters to themselves at 3 months after the intervention was finished. It provided an opportunity to check their current smartphone usage behavior among study participants after the program ended. Long-term quantitative evaluation was not performed for more than 3 months in the current study. However, FGI participants stated that the letter motivated them to continue controlling their smartphone usage and to maintain their changes. Long-term support for college students who have the motivation to control smartphone use is required. A previous study reported that maintenance of tobacco abstinence was achieved when the 6-month smoking cessation program was extended to 12 months based on the needs of participants [10]. If the period for maintaining behavioral changes is considered 6 months to 5 years [28], a short-term intervention cannot produce long-term outcomes. Thus, subsequent studies should provide extended interventions with long-term evaluations of at least 6 months to 1 year to maintain long-term behavioral changes.

Study limitations

This study has some limitations. Since participants were recruited during the semester, it was difficult to control for exogenous variables such as midterms and finals, which might have influenced participants' intention to participate in the program, increasing the possibility of withdrawal. In addition, this study did not employ random sampling methods. Participants were allowed to choose their group assignments, which might have caused a systematic selection bias. Indeed, some study variables differed significantly at pretest among the three groups, which might have influenced results of this study. Therefore, care should be taken when interpreting research results of this study.

Conclusion

This study implemented and evaluated effects of a program developed based on strategies to improve components of basic psychological needs (autonomy, competence, and relatedness) of college students by applying the SDT. Results of this study confirmed the effectiveness of the program in reducing smartphone overdependence by improving basic psychological needs. This study was significant as it verified the effectiveness of on-campus and off-campus interventions for smartphone overdependence prevention based on SDT and provided a comprehensive evaluation of the research phenomenon by exploring practical experiences of smartphone use through a qualitative approach. In conclusion, results of this study revealed that on-campus only program and combined intervention of on- and off-campus programs were both effective in maintaining and managing smartphone use. However, the off-campus program has the advantage of providing an opportunity to apply the theory learned from the on-campus program to practice. Therefore, combined intervention of theory and practice would be a practical strategy to induce and improve behavior modification of university students for smartphone use. Incorporating these programs into university curricula and extracurricular activities will encourage students to have an appropriate use of smartphones.

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Declaration of interest

The authors declare no conflict of interest.

Day	Objective	Activities	BPN	Operating time
1st day	Orientation	•Program orientation		
•Group activity by art	R	2 hours	2nd day	Explore and plan alternative activities
•Explore and running alternative activities•Presenting and sharing alternative activities.	A, C, R	2 hours	Implementation and restructuring of alternative activities	•Readjustment of alternative activities•UCC shooting about alternative activities

A, C, R	2.5 hours	Creating UCC	•Sharing practice of alternative activities• Making UCC for correct use of smartphone or enjoying alternative activities	A, C, R

2.5 hours	3rd day	Wrap-up	•Presentation produced UCC• Make a commitment to control your smartphone use.	A, C, R

Characteristics	Categories	EG1[a](n = 26)	EG2[b](n = 23)	CG[c](n = 29)	x²/F	p
n (%)/M±SD	n (%)/M±SD	n (%)/M±SD	Gender	Men	1 (3.8)	8 (34.8)
5 (17.2)	7.78	.017[d]	Women	25 (96.2)	15 (65.2)	24 (82.8)
Age		19.12 ± 0.33	19.09 ± 0.29	18.93 ± 0.38	1.97	.147
Department	Social science and humanities	5 (19.2)	4 (17.4)	5 (17.2)	1.40	.844

Nature science	6 (23.1)	7 (30.4)	5 (17.2)	Biomedical science	15 (57.7)	12 (52.2)
19 (65.5)	Satisfaction with college life	Satisfied	21 (80.8)	14 (60.9)	20 (69.0)	2.38
.305	Unsatisfied	5 (19.2)	9 (39.1)	9 (31.0)		
Satisfaction with family life	Satisfied	20 (76.9)	19 (82.6)	26 (89.7)	1.64	.479[d]
Unsatisfied	6 (23.1)	4 (17.4)	3 (10.3)			Usage motivation
Latest trend	9 (34.6)	9 (39.1)	11 (27.9)	9.75	.112	Information searching
1 (3.8)	1 (4.3)	(4 (13.8)	Relation with people	16 (61.5)	8 (34.8)	11 (37.9)
Others	0 (0.0)	5 (21.7)	3 (10.3)	Mainly used function of smartphone[e]	Voice call and SMS	4 (15.4)
1 (4.3)	4 (13.8)	1.70	.450[d]	Entertainment function (gaming, hobby etc.)	2 (7.7)	3 (13.0)
1 (3.4)	1.68	.429[d]	Web searching	6 (23.1)	9 (39.1)	12 (41.4)

2.32	.364	Playing music, movie and YouTube	11 (42.3)	15 (65.2)	11 (37.9)	4.24
.127	SNS (kakao talk etc.)	24 (92.3)	17 (73.9)	22 (75.9)	5.03	.077
Daily smartphone using time (hours)	1≤~<3	4 (15.4)	6 (26.1)	5 (17.2)	1.82	.769
3≤~<6	15 (57.7)	13 (56.5)	19 (65.5)	≥6	7 (26.9)	4 (17.4)
5 (17.2)	Satisfaction of smartphone usage[e]	Information searching	16 (61.5)	18 (78.3)	23 (79.3)	0.18
.835	Networking through SNS	18 (69.2)	10 (43.5)	19 (65.5)	1.12	.333
Relieve stress	9 (34.6)	8 (34.8)	4 (13.8)	1.16	.320	Others (Financial effect, use for learning)
7 (26.9)	7 (30.4)	8 (27.6)	0.03	.971	Dissatisfaction of smartphone usage[e]	High smartphone bill

5 (19.2)	4 (17.4)	4 (13.8)	0.41	.929[d]	Decreased health	11 (42.2)
10 (43.5)	13 (44.8)	0.04	.982	Decreased academic achievement	13 (50.0)	16 (69.6)
16 (55.2)	2.03	.362	Others (including conflict with parents)	8 (47.1)	9 (39.1)	12 (41.4)
0.71	.700	Health status[e]	Sleep deprived.	4 (15.4)	5 (21.8)	9 (31.0)
1.92	.382	Loss of vision/dry eye	6 (23.1)	9 (39.1)	9 (31.0)	1.48
.478	Headache/memory loss	2 (7.7)	2 (8.7)	2 (6.9)	0.29	>.999[d]
Etc. (including decreased physical condition)	4 (15.4)	0 (0.0)	2 (6.9)	3.70	.151[d]	Smartphone overdependence
22.58 ± 3.95	25.09 ± 5.24	20.83 ± 4.31	5.77	.005	Basic psychological needs	Total
86.88 ± 6.28	82.39 ± 9.38	84.21 ± 8.41	1.93	.152	Autonomy	30.73 ± 2.51

29.13 ± 3.57	29.66 ± 1.91	2.30	.107	Competence	25.77 ± 3.70	25.52 ± 3.94
25.52 ± 3.97	0.04	.965	Relatedness	30.38 ± 2.06	27.74 ± 4.78	29.03 ± 3.90
3.11	.051	Self-regulatory Ability		65.96 ± 9.79	63.57 ± 13.97	63.62 ± 9.46

Variables	Groups	T0	T1	T2	T3	Source	F (p)	η^2_p
M±SD	M±SD	M±SD	M±SD	Smartphone overdependence	EG1[a] (n = 26)	22.58 ± 3.95	20.85 ± 2.77	19.65 ± 4.66
19.12 ± 4.12	T	0.87 (.441)	0.01	EG2[b] (n = 23)	25.09 ± 5.24	22.48 ± 4.72	21.65 ± 5.04	20.13 ± 4.49
G	2.37 (.100)	0.06	CG[c] (n = 29)	20.83 ± 4.31	21.34 ± 4.58	22.31 ± 5.22	20.41 ± 4.26	T*G
4.56 (.001)	0.11	Basic psychological needs	EG1[a] (n = 26)	86.88 ± 6.28	88.69 ± 8.95	88.15 ± 8.20	88.62 ± 6.94	T
0.39 (.759)	0.01	EG2[b] (n = 23)	82.39 ± 9.38	81.30 ± 9.06	83.17 ± 9.27	84.04 ± 9.56	G	5.04 (.009)

0.12	CG[c] (n = 29)	84.21 ± 8.41	81.48 ± 10.52	80.31 ± 9.54	82.83 ± 7.75	T*G	1.82 (.097)	0.05
Autonomy	EG1[a] (n = 26)	30.73 ± 2.51	30.50 ± 3.58	30.08 ± 3.64	30.42 ± 3.21	T	0.01 (.949)	0.00
EG2[b] (n = 23)	29.13 ± 3.57	27.57 ± 3.88	28.30 ± 3.77	28.22 ± 3.41	G	6.39 (.003)	0.15	CG[c] (n = 29)
29.66 ± 1.91	27.93 ± 4.40	27.38 ± 3.62	28.03 ± 2.91	T*G	0.99 (.431)	0.03	Competence	EG1[a] (n = 26)
25.77 ± 3.70	27.69 ± 5.18	27.31 ± 3.81	27.27 ± 3.75	T	0.03 (.982)	0.00	EG2[b] (n = 23)	25.52 ± 3.94
25.48 ± 4.33	25.83 ± 5.04	26.52 ± 4.82	G	2.47 (.091)	0.06	CG[c] (n = 29)	25.52 ± 3.97	25.00 ± 4.25
24.14 ± 4.49	25.93 ± 3.23	T*G	1.80 (.117)	0.05	Relatedness	EG1[a] (n = 26)	30.38 ± 2.06	30.19 ± 2.28
30.77 ± 2.72	30.92 ± 2.12	T	0.52 (.634)	0.01	EG2[b] (n = 23)	27.74 ± 4.78	26.87 ± 2.14	29.04 ± 4.05

29.30 ± 2.70	G	8.87 (<.001)	0.19	CG[c] (n = 29)	29.03 ± 3.90	24.69 ± 3.01	28.79 ± 3.63	28.86 ± 4.22
T*G	4.21 (.001)	0.10	Self-regulatory ability	EG1[a] (n = 26)	65.96 ± 9.79	66.69 ± 7.55	68.65 ± 9.94	69.19 ± 11.30
T	2.30 (.087)	0.03	EG2[b] (n = 23)	63.57 ± 13.97	61.61 ± 12.40	62.48 ± 14.59	64.09 ± 13.03	G
1.53 (.224)	0.04	CG[c] (n = 29)	63.62 ± 9.46	62.62 ± 9.64	64.69 ± 8.12	64.55 ± 8.02	T*G	0.97 (.438)
0.03	Group comparisons by time-point and time-point comparisons by groups							
Smartphone overdependence	EG1[a] (n = 26)	22.58 ± 3.95	20.85 ± 2.77	19.65 ± 4.66	19.12 ± 4.12		0.21 (.892)	
EG2[b] (n = 23)	25.09 ± 5.24	22.48 ± 4.72	21.65 ± 5.04	20.13 ± 4.49		3.28 (.027)		CG[c] (n = 29)
20.83 ± 4.31	21.34 ± 4.58	22.31 ± 5.22	20.41 ± 4.26		0.44 (.660).		F(p)	5.77 (.005) (b>c)[d]

1.47 (.237)	2.83 (.065)	1.11 (.336)				Relatedness	EG1[a] (n = 26)	30.38 ± 2.06
30.19 ± 2.28	30.77 ± 2.72	30.92 ± 2.12		0.16 (.845)		EG2[b] (n = 23)	27.74 ± 4.78	26.87 ± 2.14
29.04 ± 4.05	29.30 ± 2.70		2.24 (.113)		CG[c] (n = 29)	29.03 ± 3.90	24.69 ± 3.01	28.79 ± 3.63
28.86 ± 4.22		2.15 (.127)		F(p)	3.11 (.051)	30.89 (<.001) (a>b>c)[d]	1.83 (.168)	2.78 (.068)

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Adaptive Behavior in Stroke Survivors: A Concept Analysis

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ABSTRACT (ENGLISH)

SUMMARYPurpose

This study aims to explore a clear and evidence-based definition of adaptive behavior in stroke survivors and establish the antecedents, attributes, consequences, and empirical referents of the concept.

Methods

The concept analysis was performed using the Walker and Avant method as a framework. Data from 90 publications were collected using various databases (PubMed, EMBASE, CINAHL, RISS, and KISS) and applied in the analysis.

Results

Adaptive behavior in stroke survivors was defined according to four attributes: realizing change, taking an optimistic view, restructuring daily activities to suit oneself, and carrying out one's own daily life. The conceptual structure of their adaptive behavior comprised stroke onset, functional changes, and emotional liability as antecedents and autonomy, family equilibrium, and quality of life as consequences.

Conclusions

Clarifying the concept of adaptive behavior in stroke survivors provides an understanding of the underlying attributes of this concept. Furthermore, it will facilitate the development of scales to measure the concept and the application of a theory-based intervention program that can improve adaptive behavior.

FULL TEXT

Introduction

In 2019, the World Health Organization declared stroke as the third leading cause of disability-adjusted life years [1], indicating that its disease burden is high. Stroke is a major cause of long-term disability and a leading diagnosis, accounting for approximately 70.0% of brain lesion disorder in Korea [2]. The prevalence of stroke in the population aged 30 or older remained at about 1.7% from 2014 to 2020 [3]; however, its mortality (per 100,000 people) has significantly decreased from 53.2 in 2010 to 42.6 in 2020 [4]. This means that as the number of stroke survivors increases, the population with acquired disabilities due to stroke is continuously increasing. This is a global trend, and the absolute number of stroke survivors is expected to continue to rise rapidly with the aging population [5]. Therefore, more attention should be paid to stroke survivors' health problems and adaptation.

Adaptation is a long and widely used term in nursing to capture the central concern of discipline, such as an individual's adaptation to a health problem, disease, or disability. Although adaptation was initially described in connection with evolutionary change, increasingly short-term and non-evolutionary changes have also been studied [6]. Even in the Roy adaptation model, adaptation is the process and outcome of making people think and feel, and conscious awareness and choice are used to create integration between human and the environment [7]. Behavior is described as a result of coping or response to coping [6]. Since stroke survivors experience sudden and shocking change, adaptive behavior should not appear as a result of adaptation, but should start from the process of realizing the change and re-establishing goals.

The term adaptive behavior has been used for a long time in the fields of psychology [8] and special education [9]. It has primarily been studied in children with congenital disabilities, such as autism spectrum disorder, intellectual disabilities, and developmental disabilities; it is a variable related to their quality of life [10].

Stroke causes sudden and profound changes in someone. They experience limited physical function due to hemiplegia [11]; limited roles at home and in the society [12]; economic difficulties due to job loss [13]; negative emotions, such as anxiety, anger, depression, and helplessness, due to a sudden onset of disease, an uncertain prognosis, and long-term rehabilitation [14]. Consequently, the quality of life of stroke survivors and their families declines [15]. Stroke survivors, regardless of its severity, refer to it as a turning point because it can make a profound difference in one's life. They must survive the uncertain consequences of the disease and their post-stroke future, as well as struggle to adapt to a new self; they find it challenging to manage the resultant changes [16,17]. Although the general clinical features of stroke survivors' recovery patterns have been described, there is not enough explanation for adaptive behavior, including the complexity of an individual's response to sudden and painful life events [18].

Clarifying the concept of adaptive behavior in stroke survivors can provide a basic understanding of the nature of adaptation in this demographic and ensure consistency in use and application. It can also enable theorists and researchers to construct statements or hypotheses that clearly reflect the relationships between related concepts and facilitate the development of scales for assessing the adaptive behaviors of stroke survivors. Additionally, healthcare professionals caring for stroke survivors may be able to apply interventions that can improve adaptive behavior. Therefore, this study aimed to explore a clear and evidence-based definition of adaptive behavior in people who have suffered a stroke and establish its antecedents, attributes, consequences, and empirical referents.

Methods

Literature search and data collection were conducted using several databases (PubMed, EMBASE, CINAHL, RISS, and KISS) from November 28, 2020 to January 12, 2021 to confirm the basic elements of the concept. The keywords employed were “stroke”, “cerebrovascular accident”, “adaptive behavior”, “adaptive AND behavior”, and “adaptation”, and the search terms were used individually or in combination with each other. Each PubMed, CINAHL, and RISS database was searched from their inception to November 28, 2020, the KISS database from their inception to November 30, 2020, and the EMBASE database from their inception to January 12, 2021. The initial exploration identified 1,798 papers and the duplicate (n = 151) were excluded. After reviewing the titles and abstracts of the remaining articles, 1,340 literatures were removed, the full texts of 307 studies were evaluated, and 1 paper was added through manual search. The inclusion criteria were qualitative, quantitative, and mixed method research that can confirm the concept of adaptive behavior using stroke survivors as samples; additionally, only the literature written in English or Korean was selected. Of the 308 documents whose full texts were evaluated, 218 papers were removed for the following reasons; studies in which the subject is a caregiver (n = 35) or healthcare provider (n = 15), studies that do not deal of adaptive behavior (n = 49), biomedical measurement papers after stroke (n = 46), case studies (n = 38), studies of instrument evaluation (n = 23), literatures with conference article abstracts only (n = 9), studies that are not written in English or Korean (n = 3). Overall, 90 publications were included in this study (Figure 1). The search process followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) search strategy guidelines [19].

Concept analysis was conducted according to the method suggested by Walker and Avant [20]. Concept analysis is that analyzes words or phrases and their meaning and usage and is the basis of theory development. Similarities or differentiations among the disciplines of a concept can be distinguished through the concept analysis process. The Walker and Avant's method provides a precise definition that reflects concept's theoretical base and, by its very nature, has construct validity. It can help clarify concepts that are used vaguely [20]. Through this, concepts can be clarified and theoretical definitions are derived, which are the basis for developing measurement tools [20]. The development of measurement tools can further enable practical application. The eight steps of this concept analysis are as follows: (i) select a concept, (ii) determine the aims or purposes of analysis, (iii) identify all the uses of the concept that you can discover, (iv) determine the defining attributes, (v) identify a model case, (vi) identify borderline, related, contrary, invented, and illegitimate cases, (vii) identify antecedents and consequences, and (viii) define empirical referents.

Results Dictionary definition

There is no dictionary that defines adaptive behavior in one word. However, the dictionary well defines adaptation and behavior, respectively. To define the adaptive behavior, the existing literatures related to the adaptive behavior of stroke survivors were searched.

The American Psychological Association (APA) Dictionary describes adaptive behavior as the level of everyday performance of tasks that is required for a person to fulfill typical roles in a society; this includes maintaining independence and meeting cultural expectations regarding personal and social responsibilities. Categories that are usually assessed comprise self-help, mobility, health care, communication, domestic abilities, consumer skills, community use, practical academic skills, and vocational capabilities [21]. Adaptive behavior is an action that enables people to survive in their environment with the greatest success and least conflict with others. Similar to the term ‘life skills,’ it relates to the everyday skills or tasks that the average person is able to complete; moreover, it reflects an individual's social and practical competence to meet the demands of daily life [22]. Thus, adaptive behavior is a skill that enables individuals to maintain their independence from their environment and perform the tasks required in daily life and by society.

In a longitudinal qualitative study (A75) interviewed 6, 12, 24, and 36 months after stroke, the process of adaptation was described as an ongoing process of shock, confusion, and fear, understanding what happened, adapting to what was provided, finding what suits oneself and developing new standards, and managing life's ups and downs. In addition, in a phenomenological qualitative study of survivors who first suffered a stroke 5 years ago (A58), stroke survivors are in an unstabilized process of continuous change, dealing with disability, self-identity, and lifestyle changes, and they dealt with continuous processes, including resignation and personal growth. According to previous studies, the adaptive behavior in stroke survivors should be defined as a comprehensive concept that appears simultaneously.

Use of the concept

In 1900, adaptive behavior was used as a criterion for the informal evaluation of intellectual disabilities. In 1936, the Vineland Social Maturity Scale was developed, which can be considered the first assessment of the adaptive behavior constructs. It measures individual's abilities and growth in relation to everyday situations; it consists of three categories: self-help, locomotion, and socialization [9]. In 1959, maturation, learning, and social adjustment were added to the diagnostic criteria for intellectual disabilities [8], and the American Association on Intellectual and Developmental Disabilities formally included adaptive behavior deficits as an integral part of the definition of intellectual disability [9]. Furthermore, the concept of adaptive behavior has been developed both socially and theoretically. The Diagnostic Adaptive Behavior Scale measures it by assessing the conceptual (literacy; self-direction; and concepts of number, money, and time), social (interpersonal skills, social responsibility, self-esteem, naïveté [i.e., wariness], social problem solving, following rules, obeying laws, and avoiding being victimized), and practical skills (activities of daily living [personal care], occupational skills, use of money, safety, health care, travel/transportation, schedules/routines, and use a the telephone) [23]. It evaluates the skills that average people naturally acquire through experiences in everyday life. The concept of adaptive behavior has been mainly used in people with congenital disabilities. It was initially used only as a tool for diagnosis, but it is moving toward a multidimensional approach by discussions that focus on individual functionality rather than fixed deficits.

Studies addressing concepts similar to adaptive behavior in stroke survivors have been found in the fields of nursing, medicine, psychology, clinical speech and language, physiology, occupational therapy, social sciences, and social work. Most of these are exploratory qualitative studies regarding life, experience, adaptation, and solution strategies after stroke (A75): communication difficulties (A88), pain (A44), dysphagia (A51), urinary incontinence (A30), visual impairment (A68), sexual problems (A54), and movement changes (A72). And several quantitative studies explored the association between adaptive behavior and psychosocial factors such as acceptance and social support (A10).

Attributes of adaptive behavior in stroke survivor

The adaptive behavior in stroke survivors were found to be realizing change, taking an optimistic view, restructuring daily activities to suit oneself, and carrying out one's own daily life. Details of each attribute are described below.

Realizing change: This means knowing and accepting the physical, psychological, and social changes caused by stroke. Knowing and accepting what has happened subsequent to a stroke reduces maladaptive behaviors and emotions, creates a balance between independence and receiving help from others, helps in the struggle with the belief that ‘I must return to normal,’ leading to the rebuilding of a routine and a new normal (A75).

Taking an optimistic view: This means that stroke survivors have a positive meaning in life by hoping for recovery, gaining self-efficacy, maintaining meaningful relationships, and securing self-worth in situations where they experience sudden changes in physical functioning and social relationships. Having an optimistic view of life after a stroke promotes goal-oriented action, which in turn promotes the restructuring of identity, learning about individual abilities and limitations, and continued acquisition of new adaptive skills (A58).

Restructuring daily activities to suit oneself: This refers to modifying and negotiating activities to suit oneself so that one can safely and smoothly carry out daily life in their new, stroke-altered physical, psychological, and social situations. They develop customized strategies to manage difficulties in communication (A2, A88), dysphagia (A51), fatigue (A76), pain (A44), urination problems (A30), and vision impairment (A68) that occur after stroke. In addition, they have to modify and redefine their roles in the home or society due to functional disturbances, such as physical or psychological problems (A39). Stroke survivors structure a new routine by tailoring their daily activities to suit them [17].

Carrying out one's own daily life: This means actually performing daily activities that are modified and negotiated to suit oneself. Stroke survivors have established their own new normal and living their daily lives. They perform functional activities to their fullest potential, perform healthy behaviors, including taking medications or rehabilitating exercises, and participate in family or community activities to reintegrate (A50, A73). They have clear expectations of themselves and are well aware of what others expect of them (A75).

Model case

A model case is an example that contains all the defining attributes of the concept [20].

Mrs. A is 68 years old and was usually healthy. One day she suddenly had a stroke and was paralyzed on her right side. She was shocked, but did not want to spend her life lying in bed. She also believed that she would be able to withstand crises on her own. After being discharged from the hospital, she made plans to keep her routine under the changed situation. She woke up at 5 am, did the exercises she learned at the hospital, and walked around her house with the help of a cane and her husband. Their meals were mainly prepared by her husband; she sat down to do the laundry or mop with one hand. When she needed help, she turned to her daughters for help. She found solace in interacting with other people with stroke when she visited a physical therapy center near her home. Besides, she got information on how to manage shoulder pain, go to the bathroom, and change clothes. She also faced challenges and tried to be more active in her daily life. She felt her potential as she heard her family and neighbors say her movement and strength improved. She said she lives a meaningful life. She hopes to be able to travel alone someday.

Mrs. A's case contains all the previously discussed defining attributes of adaptive behavior in stroke survivors.

Borderline case

Borderline cases are those that contain most of the defining attributes, but differ significantly in time or intensity in one of them. These help to identify inconsistencies in the concept under study and to define their attributes clearly [20].

Mr. B is 76 years old and has left hemiplegia. After the death of his wife, he had a stroke while living alone. He knows that a stroke involves a slow recovery and that hemiplegia makes it difficult to live independently. Thus, when his son suggested that they live together, he agreed. However, he feels like a burden on his son and does not want to show his daughter-in-law or grandchildren his changed circumstance; hence, he says he would rather die. He believes that his grandchildren ignore him; therefore, he avoids talking to them and hates them. He attaches a great importance to exercising as he believes that if his illness becomes more severe or he is unable to move, he will become a greater burden on his son and the balance of his son's family will be disrupted. He learned how to wash and change clothes by himself. Furthermore, he took a taxi to the community or the public health center to see if there were any services that could help him. He walks around the house with his cane and talks and plays chess with the locals. He tries to perform his daily life activities by himself as much as possible. However, he has no hope that things will get better and [feels that] this situation that has no end in sight is hard to bear.

Mr. B's case contains the attributes of realizing change, restructuring daily activities to suit oneself, and carrying out one's own daily life, but he did not take an optimistic view. He does not have a meaningful relationship with his family and is unable to find hope and meaning in life.

Related case

Related cases are instances that are in some way related to the concept being examined but do not include all the defining attributes. These help us understand how the concept under study fits into the network of concepts surrounding it [20].

Mr. C is 47 years old and has left hemiplegia. He is embarrassed by the physical changes caused by [his] stroke. However, if he works hard on rehabilitation, he will be better than now and hopes to return to work as soon as possible. He spends too much time exercising. Excessive exercise can cause shoulder and leg pain, but [he] does not control the level of exercise. He also strives to carry out daily activities alone. However, he sometimes falls while walking alone without using a cane or a walker and bruises his face and body. He also had a car accident while driving his own car.

Mr. C's case contains the attributes of realizing change and taking an optimistic view. However, he does not understand the characteristics of a stroke with a long-term rehabilitation. In addition, he has not modified his activities to suit him and is unable to perform his daily activities safely.

Contrary case

Contrary cases are clear examples of not following the concept [20] as the one described below.

Mrs. D is 58 years old and has right hemiplegia. She is divorced and lives with her unmarried daughter. She is outraged about her stroke "…and now it is all over," she says. She makes no effort to carry out her daily life activities by herself and depends on her daughter for everything. One day, her daughter invited her mother's friends to the house. Mrs. D spilled food while eating and salivated when talking; thus, her friends wiped her with napkins. Subsequently, she decided that she did not want other people to look at her pitifully. [Now] She stays alone in her house and weeps.

The case of Mrs. D does not include any attributes of adaptive behavior. She is angry and frustrated without accepting the changes caused by the stroke. She does not make any effort to reconstruct and carry out her own new daily life.

Antecedents and Consequences Antecedents

Antecedents are incidents or events that must exist or occur prior to the concept's occurrence [20]. It is not synonymous with causation, and may contribute to the occurrence of a concept, relate to its occurrence, or may have to exist in order for the concept to exist [24]. Those events that occur before the adaptive behavior in stroke survivors include stroke onset, functional changes, and emotional lability. A stroke occurs, and survivors experience changes in physical and social functions, such as movement limitations (A72), communication difficulties (A88), dysphagia (A51), urinary incontinence (A30), visual impairment (A68), and sexual problems (A54). They also experience grief and anger due to the destructive diagnosis, and the shock and confusion of relapses, disability, and worries about the future tend to be profound and long-lasting (A75). Approximately 20.0% of stroke survivors are at risk of clinically significant depression [14].

Consequences

Consequences are incidents that happen due to the occurrence of the concept. Specifically, they are the outcomes of a concept [20]. The results of the occurrence of adaptive behavior in stroke survivors include autonomy, family equilibrium, and quality of life. The adaptive behavior of stroke survivors helps them regain autonomy by acting according to norms and gaining a sense of competence in them (A30, A72). When individuals recover capacity for daily activities, the burden on spouse and children is minimized and family equilibrium can be maintained (A39). Furthermore, it reduces maladaptive behaviors and emotions and has a positive effect on quality of life (A80).

The conceptual structure of the adaptive behavior in stroke survivors, including the relationships between antecedents, attributes, and consequences is shown in Figure 2.

Empirical referents

Empirical referents are the categories of real phenomena that prove the occurrence of the concept itself. In the final step of concept analysis, the question arises: How can I measure this concept or verify its existence in the real world? Empirical referents are not tools for measuring concepts, they are means by which defining attributes can be recognized or measured, not the whole concept itself [20].

The attributes of adaptive behavior in stroke survivors are examined using the tools for evaluating post-stroke status. The Stroke Impact Scale 3.0 [25] is a 59-item scale that consists of the domains of strength, memory and thinking, emotion, communication, ADL, mobility, hand function, and social participation. The items in this tool are similar to taking an optimistic view and carrying out one's own daily life among the attributes of adaptive behavior in stroke survivors. The Preference-Based Stroke Index [26] consisted of 10 items to measure walking, climbing stairs, physical activities, recreational activities, work/activity, driving, memory, speech, coping, and self-esteem. Its items are similar to taking an optimistic view and carrying out one's own daily life attributes among the findings of this study. The Post-Stroke Checklist [27] consists of 14 items to evaluate secondary prevention, ADL, mobility, pain, stiffness, incontinence, communication, mood, cognition, relationships with family, fatigue, intimate relationships, work, and social activities. Its items are similar to carrying out one's own daily life attribute of adaptive behavior in stroke survivors. In addition, some studies have suggested that realizing change is an important factor for the rehabilitation of stroke survivors. Failure to acceptance stroke and its changes have been reported to be associated with anxiety and depression after stroke and behaviors that lowered the risk of complications and accelerated recovery (A10).

Discussion

As a result of concept analysis through rigorous literature review, four attributes were derived: realizing change, taking an optimistic view, restructuring daily activities to suit oneself, and carrying out one's own daily life. We discuss the meaning and characteristics of each attribute.

Stroke onset might be a turning point in the lives of individuals who experience it. This is because, for them, the stroke and its effects were not present from the beginning (birth) but rather come as a sudden change. They have to know and accept their new physical, psychological, and social statuses (classified as ‘realizing change’ in this analysis). An interview described in a qualitative study by Wottrich et al. (A87): “*I have to walk with a crutch and my balance is poor; further, my hand does not quite follow when I pick something up.*” supports this attribute. People who have suffered a stroke are often unable to accept these changes, resulting in physical and psychosocial dissonance or unrealistic expectations regarding recovery (A87), which negatively affects their adaptation and rehabilitation processes (A10). Understanding and accepting illness is related to physical, emotional, and social adaptation and plays a pivotal role in determining life satisfaction (A10, A80). In this situation, healthcare professionals should support patients adjust to real life by balancing realistic views and expectations about the prognosis (A87).

The second attribute, ‘taking an optimistic view,’ can appear based on the ‘realizing change’ attribute. Stroke onset leads to disturbing life changes but taking an optimistic perspective has shown to be an indicator of reinforcing limitations and a force that drives survivors to do their best to gain new normalcy (A3, A86). The interviews described in the study by Kitzmüller et al. (A38) and Price et al. (A63): *“We are closer to each other. Nowadays, we talk more about our problems, we are more open with each other.”, “I can be innovative when challenged.”* support this attribute. People who take an optimistic view are characterized by having hope for recovery, gaining self-efficacy, maintaining meaningful relationships, and securing self-worth. Consciously seeking and positively experiencing the benefits of their changes can enhance survivors' self-care confidence and hope for rehabilitation, and can reduce negative emotions such as anger, depression, and sadness (A63). Studies have reported that these characteristics play an important role in adaptive behavior that requires various learning through rehabilitation. For example, psychological constructs such as self-efficacy have been shown to predict disability, quality of life, and functional independence after stroke [18,28,29]. All processes of learning survival skills such as eating (A51), voiding (A30), communicating (A88), connecting with society, and maintaining identity and role (A2, A21), require an optimistic view.

They also develop strategies to modify their activities and negotiate with themselves to accommodate their stroke-induced functional changes. This appeared as the third attribute, ‘restructuring daily activities to suit oneself.’ Stroke survivors may restructure their daily life activities to ensure a smoother way of living. In an interview described in a study by Williams and Murray (A86), *“When I was discharged from the hospital I had to rethink how to do things. They told me how to shower, they taught me how to dress; thus, I was not extremely bad [at] them.”* supports this attribute. Such restructuring has been reported not only in the physical but also in the psychosocial aspect in several studies. For example, communication restructuring strategies include slowing speech or breaking long words into syllables (A88). Other strategies include modifying food and drinks to avoid aspiration (A51), adopting time voiding decisions to manage incontinence (A30), distracting attention to manage fatigue and pain (A44, A76), managing sexual problems (A54), and re-establishing one's role in the home or society (A38, A39). These strategies are quantitatively and qualitatively diverse and creative depending on the individual. The timeframe for re-establishment may also vary. Healthcare providers should support survivors by advocating these various strategies and assisting them with the strategies they have failed or missed.

The last attribute of adaptive behavior in stroke survivors was ‘carrying out one's own daily life.’ They carry out their own routines, individually coordinated and negotiated with themselves. They can perform daily activities to their full potential and utilize human, social, and physical resources according to negotiations. Many stroke survivors look forward to participating in social activities again; they do not hesitate to walk, use public transportation, or drive and utilize appropriate means of transportation to travel (A6). The interviews described in studies by Williams and Murray (A86) and Taule et al. (A73): *“Initially, I was similar to a trapped animal, and then I thought ‘slow down, do not panic.’ Thus, I bought a scooter …it gets me around the area”, “To have something to do and someone to mingle with, I have many nice co-workers who I like to talk to and socialize with. Just to get out of bed, catch the bus, get to work, and be where you were previously”* support this attribute. Studies have reported that carrying out everyday activities and participating in social activities help to secure independence, minimize burden on family members, and affect depression and quality of life (A39, A50, A73).

The significance, limitation, and implication of this concept should be discussed as to how it relates to existing adaptation-related theories and whether it can be applied to adaptive behavior in other situations such as chronic or congenital condition.

First, similar to various theories explaining adaptation to chronic diseases, it was confirmed through concept analysis that the adaptive behavior of stroke survivors is a complex, multidimensional, and dynamic process. There are already several theories that have contributed to the concept of adaptation. For example, in Roy's adaptation model, the ‘adaptation level’ defines the state of the multidimensional life process [7] and individual coping process, situational background, and personal resources affect the characteristics of adaptation process in theory of stress, coping, and adaptation by Lazarus and Folkman [30]. Stroke survivors experience disability, identity, and life changes amidst shock and grief, developing new standards for themselves and managing their lives. This is not a linear process, it is an unstable process that is constantly changing and renegotiation continues in the process (A58, A75).

Second, there is a question as to whether a phenomenon similar to the results of this study also exists in other chronic diseases such as diabetes or hypertension. Since the derivation of these attributes are for stroke survivors (somewhat limitation), it is necessary to study whether there is similarity or differentiation in other situations. However, existing theories explain that disease should be considered when understanding or interpreting the adaptation process due to have disease-specific task such as symptom management. Situational attributes from the disease experience shape the individual characteristics of adaptive process in theories [31]. Considering this point, many researchers are studying how the adaptations of subjects with various situational contexts are different and similar. In the same context, it is necessary to research whether similarity or differentiation is seen in various chronic disease situations through future tool development.

Nevertheless, a third implication is that the attributes of adaptive behavior in stroke survival can be distinguished from congenital disorders. Adaptive behaviors in people with a congenitally disabilities, such as developmental disability, include conceptual (concepts of number, money, and time, etc.), social (obeying laws, avoiding being victimized, etc.), and practical (use of money, use of the telephone, etc.) skills [32]. It is the intentional education and training of skills that average people, from birth, learn and perform naturally through experience in their daily lives. However, the adaptive behaviors in stroke survivors are self-directed behaviors including acceptance, perspective, and negotiation. Self-directed behavior leads to adaptive behaviors in stroke survivors, such as realizing change, taking an optimistic view, and restructuring daily activities to suit oneself.

This concept analysis is useful to provide a fundamental understanding of adaptive behavior in stroke survivors. Furthermore, it will contribute to constructing scale items or clinically validating by reflecting the attributes defined according to the researcher's aims. However, there are some considerations. Specifically, we only referenced published papers focusing on “stroke,” “cerebrovascular accident,” “adaptive behavior,” “adaptive AND behavior,” and “adaptation” and analyzed limited the languages to English and Korean. In addition, since there are methodological limitations, further study that sufficiently reflects the actual field is needed, and a study of the evolutionary method to confirm whether the conceptual structure presented in this result is consistent with other disciplines will also be meaningful.

Conclusion

This study explored the evidence-based definition of adaptive behavior in stroke survivors and its antecedents, attributes, consequences, and empirical referents. In conclusion, adaptive behavior in stroke survivors was defined as realizing the physical, psychological, and social changes caused by stroke, taking an optimistic view, restructuring daily activities to suit oneself, and carrying out one's own daily life. These results provide a basic understanding of the nature of adaptive behavior in stroke survivors. It can facilitate the development of scales for assessing the adaptive behaviors in stroke survivors and the application of theory-based intervention programs that can improve adaptive behavior.

Author contributions

Study design: Choi H, Lim A, Song Y, Data collection: Choi H, Lim A, Data analysis: Choi H, Lim A, Song Y, Manuscript writing: Choi H, Lim A, Song Y.

Conflict of interest

No conflict of interest has been declared by the authors.

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Appendix A Supplementary data

The following is the Supplementary data to this article:**Multimedia component 1**Multimedia component 1

Appendix A Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.anr.2022.07.002.

Appendix. List of literatures included in the concept analysis

No.	Literature included in the concept analysis
A1	Anderson S, Whitfield K. Social identity and stroke: ‘they don't make me feel like, there's something wrong with me’. Scand J Caring Sci. 2013; 27(4):820-30. http://doi.org/10.1111/j.1471-6712.2012.01086.x
*A2	Armstrong E, Hersh D, Hayward C, Fraser J. Communication disorders after stroke in Aboriginal Australians. Disabil Rehabil. 2015; 37(16):1462-9. http://doi.org/10.3109/09638288.2014.972581
*A3	Arnaert A, Filteau N, Sourial R. Stroke patients in the acute care phase: role of hope in self-healing. Holist Nurs Pract. 2006; 20(3):137-46. http://doi.org/10.1097/00004650-200605000-00008
A4	Arntzen C, Hamran T, Borg T. Body, participation and self transformations during and after in-patient stroke rehabilitation. Scand J Disabil Res. 2015; 17(4):300-20. http://doi.org/10.1080/15017419.2013.868823

A5	Arwert HJ, Meesters JJL, Boiten J, Balk F, Wolterbeek R., Vliet Vlieland TPM. Poststroke Depression: A Long-Term Problem for Stroke Survivors. Am J Phys Med Rehabil. 2018; 97(8):565-71. http://doi.org/10.1097/phm.0000000000000918
*A6	Barnsley L, McCluskey A, Middleton S. What people say about traveling outdoors after their stroke: a qualitative study. Aust Occup Ther J. 2012; 59(1):71-8. http://doi.org/10.1111/j.1440-1630.2011.00935.x
A7	Baseman S, Fisher K, Ward L, Bhattacharya A. The relationship of physical function to social integration after stroke. J Neurosci Nurs. 2010; 42(5):237-44. http://doi.org/10.1097/jnn.0b013e3181ecafea
A8	Bourland EL, Neville MA, Pickens ND. Loss, gain, and the reframing of perspectives in long-term stroke survivors: a dynamic experience of quality of life. Top Stroke Rehabil. 2011; 18(5):437-49. http://doi.org/10.1310/tsr1805-437
A9	Ch'ng AM, French D, McLean N. Coping with the challenges of recovery from stroke: long-term perspectives of stroke support group members. J Health Psychol. 2008; 13(8):1136-46. http://doi.org/10.1177/1359105308095967
*A10	Chai Q, Yuan Z, Jin Y, Zhang Q. Factors influencing acceptance of disability among stroke patients in Tianjin, China:A cross-sectional study. NeuroRehabilitation. 2016; 38(1):37-44. http://doi.org/10.3233/nre-151293
A11	Chau JP, Thompson DR, Chang AM, Woo J, Twinn S, Cheung SK, et al. Depression among Chinese stroke survivors six months after discharge from a rehabilitation hospital. J Clin Nurs. 2010; 19(21-22), 3042-50. http://doi.org/10.1111/j.1365-2702.2010.03317.x
A12	Chiu SY, Livneh H, Tsao LL, Tsai TY. Acceptance of disability and its predictors among stroke patients in Taiwan. BMC Neurol. 2013; 13(1):175. http://doi.org/10.1186/1471-2377-13-175
A13	Cho NO, Suh MJ, Kim KS, Kim IJ, Choi HJ, Jung SH. Social readjustment and relating factors in stroke survivors. Korean J Adult Nurs. 2001; 13(1):96-107.
A14	Clark MS, Smith DS. Changes in family functioning for stroke rehabilitation patients and their families. Int J Rehabil Res. 1999; 22(3):171-9. http://doi.org/10.1097/00004356-199909000-00003
A15	Connolly T, Mahoney E. Stroke survivors' experiences transitioning from hospital to home. J Clin Nurs. 2018; 27(21-22):3979-87. http://doi.org/10.1111/jocn.14563
A16	Cooper CL, Phillips LH, Johnston M, Whyte M, MacLeod MJ. The role of emotion regulation on social participation following stroke. Br J Clin Psychol. 2015; 54(2): 181-99. http://doi.org/10.1111/bjc.12068
A17	Crowley D, Andrews L. The longitudinal relationship between acceptance and anxiety and depression in people who have had a stroke. Aging Ment Health. 2018; 22(10):1321-28. http://doi.org/10.1080/13607863.2017.1348478

A18	Dalvandi A, Heikkilä K, Maddah SS, Khankeh HR, Ekman SL. Life experiences after stroke among Iranian stroke survivors. Int Nurs Rev. 2010; 57(2):247-53. http://doi.org/10.1111/j.1466-7657.2009.00786.x
A19	Darlington AS, Dippel DW, Ribbers GM, van Balen R, Passchier J, Busschbach JJ. Coping strategies as determinants of quality of life in stroke patients: a longitudinal study. Cerebrovasc Dis. 2007; 23(5-6):401-7. http://doi.org/10.1159/000101463
A20	Della Vecchia C, Préau M, Carpentier C, Viprey M, Haesebaert J, Termoz A, et al. Illness beliefs and emotional responses in mildly disabled stroke survivors: A qualitative study. PLoS One. 2019; 14(10):e0223681. http://doi.org/10.1371/journal.pone.0223681
*A21	Dickson S, Barbour RS, Brady M, Clark AM, Paton G. Patients' experiences of disruptions associated with post-stroke dysarthria. Int J Lang Commun Disord. 2008; 43(2):135-53. http://doi.org/10.1080/13682820701862228
A22	Donnellan C, Hevey D, Hickey A, O'Neill D. Adaptation to stroke using a model of successful aging. Neuropsychol Dev Cogn B Aging Neuropsychol Cogn. 2012; 19(4):530-47. http://doi.org/10.1080/13825585.2011.638976
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A24	Ellis-Hill CS, Payne S, Ward C. Self-body split: issues of identity in physical recovery following a stroke. Disabil Rehabil. 2000; 22(16):725-33. http://doi.org/10.1080/09638280050191990
A25	Erikson A, Park M, Tham K. Belonging: a qualitative, longitudinal study of what matters for persons after stroke during the one year of rehabilitation. J Rehabil Med. 2010; 42(9): 831-8. http://doi.org/10.2340/16501977-0608
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A28	Gallagher P. Becoming normal: a grounded theory study on the emotional process of stroke recovery. Can J Neurosci Nurs. 2011; 33(3):24-32.
A29	George S, Hayes A, Chen C, Crotty M. Are vision-specific quality of life questionnaires important in assessing rehabilitation for patients with hemianopia post-stroke? Top Stroke Rehabil. 2011; 18(4):394-401. http://doi.org/10.1310/tsr1804-394

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A31	Hama S, Yamashita H, Kato T, Shigenobu M, Watanabe A, Sawa M, et al. 'Insistence on recovery' as a positive prognostic factor in Japanese stroke patients. Psychiatry Clin Neurosci. 2008; 62(4):386-95. http://doi.org/10.1111/j.1440-1819.2008.01816.x
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A33	Hilari K. The impact of stroke: are people with aphasia different to those without? Disabil Rehabil. 2011; 33(3):211-8. http://doi.org/10.3109/09638288.2010.508829
A34	Jeong YJ, Kim HS. Post-traumatic Growth among Stroke Patients: Impact of Hope, Meaning in Life, and Social Support. Korean J Adult Nurs. 2019; 31(6):605-17. http://doi.org/10.7475/kjan.2019.31.6.605
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*A50	Meijering L, Nanninga CS, Lettinga AT. Home-making after stroke. A qualitative study among Dutch stroke survivors. Health Place. 2016; 37:35-42. http://doi.org/10.1016/j.healthplace.2015.11.006
*A51	Moloney J, Walshe M. “I had no idea what a complicated business eating is …": a qualitative study of the impact of dysphagia during stroke recovery. Disabil Rehabil. 2018; 40(13):1524-31. http://doi.org/10.1080/09638288.2017.1300948
A52	Murray CD, Harrison B. The meaning and experience of being a stroke survivor: an interpretative phenomenological analysis. Disabil Rehabil. 2004; 26(13):808-16. http://doi.org/10.1080/09638280410001696746
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*A72	Takashima R, Murata W, Saeki K. Movement changes due to hemiplegia in stroke survivors: a hermeneutic phenomenological study. Disabil Rehabil. 2016; 38(16):1578-91. http://doi.org/10.3109/09638288.2015.1107629
*A73	Taule T, Råheim M. Life changed existentially: a qualitative study of experiences at 6-8 months after mild stroke. Disabil Rehabil. 2014; 36(25):2107-19. http://doi.org/10.3109/09638288.2014.904448
A74	Taule T, Strand LI, Skouen JS, Råheim M. Striving for a life worth living: stroke survivors' experiences of home rehabilitation. Scand J Caring Sci. 2015; 29(4):651-61. http://doi.org/10.1111/scs.12193
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Relationships among Type-D Personality, Fatigue, and Quality of Life in Infertile Women

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ABSTRACT (ENGLISH)

SummaryPurpose

The objective of the present study was to investigate the prevalence of the type-D personality and identify the relationship between type-D personality, fatigue, and quality of life (QoL) in infertile women.

Methods

A total of 149 infertile women were recruited between October 2020 and January 2021. The participants were assessed through self-administered questionnaires using the type- D personality scale-14, fatigue severity scale, and fertility QoL instrumental questionnaire. Data were analyzed using the independent t-test, chi-square test, Pearson's correlation coefficients, and multiple regression analysis using the SPSS/WIN 25.0 program for Windows.

Results

Approximately 40.9% of infertile women were classified into the type-D personality group, which showed significantly higher fatigue and lower QoL than the non-type-D personality group. Fatigue was the most influential factor on the QoL of infertile women (β = −.23, *p* = .003), followed by the duration of infertility treatment (β = −.22, *p* = .003), type-D personality (β = −.18, *p* = .025), and relationship with spouse (β = −.17, *p* = .024). These variables account for approximately 22% of the variance.

Conclusions

Intervention programs that consider fatigue, type-D personality, relationship with spouses, and treatment duration may be useful for improving QoL in infertile women.

FULL TEXT

Introduction

In general, infertility is defined as the inability to conceive after 1 year or longer of unprotected sexual intercourse [1]. About 19% of married women aged 15–49 years in the United States report being unable to conceive even after one year of trying [1]. Among 1,289 married women aged 15–49 years in South Korea, 52.1% experienced infertility [2]. Despite the increased cost of treating infertility, the domestic fertility rate remains low [3]. Among the Organization for Economic Cooperation and Development (OECD) member countries, South Korea has the lowest fertility rate (.84 in 2020, compared to 1.64 in the United States, 1.70 in China, 1.33 in Japan, and 1.24 in Italy) [4].

Infertility is a global public health problem, and the proportion of infertile couples worldwide is increasing [5]. Infertility can easily act as a chronic stressor [6] and is a low-control stressor [7]; even if the cause of infertility is in men, women are more affected than men [8]. Recently, infertility has been increasing due to frequent miscarriages, age, long-term use of contraceptives, social stress, changes in eating habits and lifestyle, increases in women's social activities, and delays in marriage [1]. Therefore, in situations where the number of infertile women is increasing and various health problems caused by infertility are related [9], it is necessary to investigate the factors related to the QoL of infertile women.

The QoL of infertile women is generally low [10]. According to previous research, infertile Italian women perceive QoL as very low [11], and infertile women in China also report lower QoL [12]. Compared with women of childbearing age, infertile women experience lower QoL [13]. Moreover, women undergoing in vitro fertilization (IVF) for infertility have a lower QoL than other women of childbearing age [14,15], which affects not only infertile women but also the QoL of their spouse [16].

Various factors have been reported to affect the QoL of infertile women. Infertile women experience various physical, psychological, and relational problems that affect their QoL [17]. Among these are demographic factors such as the duration of marriage and burden of the cost of infertility testing, burden of infertility, age [18], education level, duration of infertility treatment [19], relationship with spouse [10,20], physical factors such as fatigue [17,21], psychological factors such as stress [10], uncertainty [18], depression [17,22], and type-D personality [22].

Fatigue is a symptom of physical problems that occur when attempting to conceive through fertility procedures [17]. In a study of 140 infertile women, approximately 37% complained of fatigue, and the higher the fatigue of infertile women, the lower the QoL [17].

Type-D personality refers to a personality that is vulnerable to negative emotions, such as depression, anxiety, and stress, and tends to consciously suppress self-expression in social interactions [23,24]. Negative affectivity refers to a persistent negative emotional state regardless of time and place, and social inhibition means suppressing the expression of emotions and behaviors to avoid the potential fear of being rejected in social relationships with others [23,24]. According to previous studies, people with a type-D personality are more likely to experience lower QoL than people with a non-type-D personality [25]. According to a study on infertile women with type-D personality, depression and type-D personality were higher in the infertility group, and type-D personality had a significant correlation with infertility. In particular, it was confirmed that there was a negative correlation with young infertile women (22]; therefore, it is necessary to investigate the QoL of infertile women according to their type-D personality. Despite social changes, in which the number of subjects diagnosed with infertility is increasing, research so far has been limited to the fragmentary evaluation of each variable, and considering the classification according to the type-D personality of infertile women, it is difficult to find studies that affect QoL according to type-D personality. Therefore, researchers have identified factors affecting QoL in infertile women and investigated the correlation between fatigue and QoL according to the type-D personality. The specific purposes were as follows: i) to identify general characteristics, fatigue, and QoL related to infertility according to type-D personality of infertile women, ii) investigate QoL according to participant characteristics, iii) investigate the correlation between variables, and iv) identify factors affecting infertility-related QoL in infertile women.

Methods Design

This study used a descriptive correlational research design to identify factors affecting fertility-related QoL in infertile women through a cross-sectional survey.

Setting and study participants

The present study was conducted on 150 infertile women who did not have children naturally, even after more than one year of marriage. All women with infertility problems, including primary and secondary infertility, were targeted, and the specific criteria were as follows. In the present study, convenience was extracted from women who were diagnosed with infertility at a fertility hospital located in the J province. As for the sample size, multiple regression analysis with a significance level of .05, power of .8, and effect size of .15 median based on a previous study [[26]], was performed using G*Power 3.1.9.7 (Universität Düsseldorf, Düsseldorf, Germany). When 11 predictors (women' age, spouse's age, religion, occupation, education level, monthly income, duration of infertility treatment, experienced infertility treatment methods, relationship with the spouse, fatigue, type-D personality) were input, 123 was the minimum sample size. A total of 150 questionnaires were distributed and collected considering the omission of responses. After excluding one questionnaire owing to insincere responses and errors in filling out, 149 subjects participated in the study (response rate: 99.3%). Data were collected from October 30, 2020, to January 8, 2021. Data were collected from two obstetrics and gynecology clinics and two public health centers. After obtaining permission from the heads of the institutions, a poster was attached to the centers to guide the recruitment of research participants. After obtaining voluntary consent, participants filled out the self-administered questionnaires in offices at centers with quiet, comfortable, and private places. The questionnaire took approximately 20 minutes and was sealed and collected thereafter. The inclusion criteria were as follows: i) infertile women older than 19 years and ii) diagnosed with infertility at a hospital. The exclusion criteria were as follows: i) those with diseases other than infertility, and ii) those who had been diagnosed with depression or had a disease that may affect fatigue.

Ethical considerations

This study was approved by the Institutional Review Board of Jeonbuk National University (no. 2020-08-008-001). In accordance with the Helsinki Declaration, voluntary written consent was obtained after explaining the privacy guarantee, research content, purpose, anonymity, and possibility of opting out.

Measures Type-D personality

The type-D personality measured by the type-D scale-14 (DS14) [[24]] consists of seven items each for the “negative affectivity” (NA) and “social inhibition” (SI) domains. Each item is measured on a five-point Likert scale and composed of 0–4 points. The NA and SI scales range from 0 to 28 points, respectively. The cutoff on both subdomains is 10 points; a score of 10 or more in each domain is classified as a type-D personality (i.e., NA ≥ 10 and SI ≥ 10), and others are classified as non-type-D personality [[24]]. The Cronbach's α of original version of the DS 14 was .88 for the NA and .82 for the SI [[24]], and the those of Korean version was .88 for the NA and .86 for the SI [[27]]. In this study, Cronbach's α was .87 for the NA and .85 for the SI. It was used after receiving approval from the copyright holder (Copyright Clearance Center) of original version [[24]] and translator's Korean version.

Fatigue

The fatigue was measured The Fatigue Severity Scale (FSS) [28] The FSS consists of a total of nine questions, “not at all” 1 to “strongly agree” 7 points. The total score was calculated as the average of the scores for each item and ranged from 1 to 7, with a higher average value indicating more severe fatigue. If the average score was 4 or higher, it was interpreted as the fatigue group, and if it was less than 4, it was classified as the non-fatigue group. Cronbach's α of the original version of the FSS was .89 [28] and that of the Korean version of the FSS was .94 [29]. In this study, the Cronbach's α was .91. It was used after the receiving approval from the translator's Korean version and ©1985 Lauren B. Krupp. reproduced with permission from the author.

Quality of life

The Fertility QoL tool (FertiQoL) was used to measure the QoL of infertile women [30]. This scale was developed to measure the QoL of people with infertility problems, as presented by Boivin and Schmidt in collaboration with the European Association for Reproductive Embryology and the American Society of Reproductive Medicine [30]. The Korean version of the FertiQoL, translated into 45 languages, was used, and its validity was confirmed in Korean infertile women [31]. It has 34 items, and the higher the total score, the higher the QoL related to infertility. The Cronbach's α of the original version of the FertiQoL was .92 [30]. In this study, the Cronbach's α was .92.

General characteristics

General factors such as age (women with infertility, spouse), religion, occupation, education level, average monthly income, and fertility-related characteristics, including the duration of infertility treatment, experience of infertility treatment methods, and relationship with the spouse during infertility treatment.

Statistical analysis

The collected data were statistically analyzed using SPSS (version 25.0; IBM SPSS Statistics for Windows, IBM Corp., Armonk, NY, USA). An independent t-test and chi-square test were conducted to compare the differences in infertility-related QoL according to participants' demographic characteristics. Pearson's correlation analysis was performed to investigate the correlation between age, fatigue, and QoL. Hierarchical multiple regression analysis was used to identify the factors affecting the QoL of infertile women according to their type-D personality.

Results General characteristics, fatigue, and QoL according to type-D personality

The mean age of the participants and spouses was 35.61 ± 4.62 years (range 25-46) and 37.57 ± 5.00 years (range 27–55), respectively. Of those who had undergone infertility treatment for >36 months, 22.8%. Among the participants, 40.9% belonged to the type-D personality group. Participants with and without type-D personality showed significant differences in their relationship with their spouses ($\chi^2 = 4.44$, $p = .035$) (Table 1). The group with type-D personality had significantly higher fatigue than the group with non-type-D personality (t = 17.38, p 2 = 12.75, p p Table 1 and Figure 1).

QoL according to general characteristics

Women who had undergone over 36 months' duration of infertility treatment (t = 4.20, p p = .004) had higher QoL scores than those with less than 36 months' duration of infertility treatment and poor relationship with spouse (Table 2).

Correlation between variables in infertile women

Fatigue in infertile women was negatively correlated with QoL (r = −.35, p p Table 3).

Factors affecting QoL in infertile women

A hierarchical regression analysis was performed to investigate the factors that affected QoL in women who were infertile. Based on previous studies [32–34], the main variables entered were general characteristics that showed differences in QoL (duration of infertility treatment and relationship with spouse) in the first model and fatigue and type-D personality as physical and psychological factors in the second model, respectively. To confirm the assumption of linear regression, the linearity of all variables and normality were examined. The Durbin–Watson value was close to 2 (1.87), which indicated no problem of autocorrelation. The tolerance ranged from .86 to .97, which was greater than .10, and the variation inflation factor showed that values of all variables were not greater than 10 (1.03 to 1.16), which indicated no issue of multicollinearity. The residual histogram and residual normal probability and homoscedasticity graphs were examined to confirm the normality of residuals. The results were deemed satisfactory. Cook's distance was less than 1.0, at .00 to .06, which implied that no cases needed to be deleted.

In model 1, duration of infertility treatment [>36 months] (β = −.29, *p* p = .006) were demonstrated to be statistically significant. This model was statistically significant (F = 11.75, *p* p = .003) was the most significant factor, followed by duration of infertility treatment [>36 months] (β = −.22, *p* = .003), type-D personality [yes] (β = −.18, *p* = .025), and relationship with spouse [bad] (β = −.17, *p* = .024). Model 2 was also statistically significant (F = 11.64, *p* Table 4).

Discussion

This study attempted to identify the factors affecting the QoL of infertile women and discuss the factors that have the greatest influence on QoL. The duration of treatment among the general characteristics had the greatest influence on the QoL. Fatigue had the greatest influence on the QoL of infertile women in this study. Infertility treatment causes physical and psychological fatigue during examinations [22]. Physical fatigue due to frequent hospital visits and invasive procedures (ovulation induction, intrauterine insemination, and in vitro fertilization) can cause anxiety and tension, making it difficult to treat infertility [35]. Therefore, considering that the fatigue of infertile women may be aggravated after the failure of the infertility treatment procedure, it is necessary for healthcare providers to understand the patient through information regarding their individual coping style checked in advance and induce them to use the active coping style and music therapy to reduce fatigue during treatment [36]; Therefore, various active nursing interventions or strategies are needed to reduce the fatigue of infertile women and improve their QoL in the future.

The second factor was the duration of treatment among the general characteristics. QoL was found to be low when the infertility treatment period was long, which was similar to the results of previous studies [37]. Thus, to improve the QoL related to infertility, an educational program can help infertile women recognize infertility early and actively treat it through education or promotion as a policy for infertile women.

The third factor influencing QoL was type-D personality. The type-D personality of infertile women also affects QoL. In this study, 40.9% of the participants had a type-D personality; 22.4% to 36.2% of foreign university students [25,38], 30.8% of college students in Korea [39], 34.5% of middle-aged women [40], and 56% of ovarian cancer patients receiving chemotherapy [41] had type-D personality. Considering that hemodialysis patients account for 42.9% of hemodialysis patients [42], the type-D personality of infertile women is higher than that of general college students and middle-aged women, showing a similar aspect to the type-D prevalence of subjects with disease, indicating that active management of infertile women with type-D personality is urgently needed. Considering that the type-D personality is vulnerable to negative affectivity, people belonging to this group experience many negative emotions regardless of time and place and have a tendency to isolate themselves due to social inhibition [24,43]. It is thought that the special situation of infertile women and the phenomenon of infertility treatment increase their negative affectivity and social inhibition. One reason for this improvement is that infertile women express their feelings and negative emotions to those close to them, such as their spouses and family [44]. It seems that interventions that allow people to express their emotions are necessary. As social inhibition intensifies social alienation, it is necessary to find ways to alleviate social inhibition and strengthen social belonging by encouraging not only infertile women, but also their spouses to participate in social activities such as infertility-related lectures and self-help groups. As lifestyle interventions, including physical activity and stress reduction, were effective in reducing type-D personality traits in middle-aged women [45]. Further studies are needed to confirm the effect of applying a lifestyle intervention program for infertile women during the treatment process.

In the present study, participants with type-D personality had higher fatigue and lower QoL than those in the non-type-D group. Type-D personality has a direct impact on QoL [39], and people with type-D personality have been reported to have a lower QoL [46]. These personality traits are said to have a significant correlation with infertility. Therefore, there is a need for interest in and support for the QoL of infertile women with this type-D personality, and efforts are needed to actively cope with infertility problems, such as developing interventions including education, music therapy, lifestyle intervention, spousal cooperation, and active management to improve the type-D personality and QoL of infertile women. In this study, the type-D personality group had a negative relationship with the spouse. These results suggest that social isolation may have a relationship with one's spouse. Therefore, it is necessary to assess the type-D personality of women with infertility because those with a type-D personality have a worse relationship with their spouse.

The fourth factor was the relationship with the spouse, which influenced the QoL of infertile women. When the relationship with the spouse was poor, QoL related to infertility in infertile women was low. This is in line with a study [17] that shows that the spouse's attitude has an effect on QoL, and that QoL is higher when the spouse's attitude is active than when it is passive. Therefore, during the infertility treatment period, spouses' active cooperation with the treatment and support for infertile women is necessary. Infertility is not solely a woman's problem—couples must face it together, as there are limits to individual coping strategies [6]. Thus, it is necessary to develop and apply nursing education and related programs for infertile couples who value relationships with their spouses during infertility treatment.

This study had some limitations. First, there are various infertility treatment methods experienced by women, which may lead to differences in fatigue and QoL. Second, this study used a cross-sectional design; thus, we did not demonstrate the longitudinal impact of type-D personality on QoL. Nevertheless, this study identified the influence of fatigue, type-D personality, and demographic characteristics on QoL in infertile women.

Conclusion

The present study is significant as it is the first to be conducted in South Korea on infertile women according to type-D personality type. To improve the QoL of infertile women, it is necessary to develop and apply various nursing interventions such as education, lifestyle interventions, music therapy, and stress management programs in which the spouse participates in consideration of the infertility treatment period.

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Authorship

All authors listed meet the authorship criteria according to the latest guidelines of the international Committee of Medical Journal Editors, and all authors are in agreement with the article.

Conflicts of interest

The authors declare no potential conflicts of interest with respect to the research, authorship, or publication of this article.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author.

Variables	Categories	Total (n = 149)	Type-D (n = 61)	Non-type-D (n = 88)	t or χ^2 or F	p	Range
M ± SD, n (%)			Demographic characteristics				
Age (year)	Women	35.61 ± 4.62	35.75 ± 4.26	35.51 ± 4.88	.31	.754	25–46
<35	64 (43.0)	22 (36.1)	42 (47.7)	2.00	.180		≥35
85 (57.0)	39 (63.9)	46 (52.3)				Husband	37.57 ± 5.00

37.49 ± 4.99	37.63 ± 5.04	−.16	.874	27–55	<35	43 (28.9)	18 (29.5)
25 (28.4)	.02	.884		≥35	106 (71.1)	43 (70.5)	63 (71.6)
			Religion	Yes	75 (50.3)	30 (49.2)	45 (51.1)
.06	.868		No	74 (49.7)	31 (50.8)	43 (48.9)	
Occupation	Yes	95 (63.8)	41 (43.2)	54 (56.8)	.53	.465	
No	54 (36.2)	20 (37.0)	34 (63.0)		Education	≤High school	29 (19.5)
9 (14.8)	20 (22.7)	1.46	.294		≥University	120 (80.5)	52 (85.2)
68 (77.3)		Monthly income (thousand won)	<3,000	45 (30.2)	18 (29.5)	27 (30.7)	2.92
.231		3,000–4,000	49 (32.9)	16 (26.2)	33 (37.5)		≥4,000
55 (36.9)	27 (44.3)	28 (31.8)				Fertility-related characteristics	
Duration of infertility treatment (in months)		24.24 ± 18.61	29.26 ± 21.20	20.76 ± 15.78	−2.66	.009	
<36	115 (77.2)	42 (68.9)	73 (83.0)	4.07	.044		≥36
34 (22.8)	19 (31.1)	15 (17.0)				Experienced treatment (double choice)	OI (yes)
88 (59.1)	40 (65.6)	48 (54.5)	1.81	.178		(no)	61 (40.9)

21 (34.4)	40 (45.5)				IUI (yes)	74 (49.7)	32 (52.5)
42 (47.7)	.32	.570		(no)	75 (50.3)	29 (47.5)	46 (52.3)
			IVF (yes)	81 (54.4)	35 (57.4)	46 (52.3)	.38
.538		(no)	68 (45.6)	26 (42.6)	42 (47.7)		
	Others (yes)	16 (10.7)	5 (8.2)	11 (12.5)	.70	.404	
(no)	133 (89.3)	56 (91.8)	77 (87.5)				Relationship with spouse
Good	128 (85.9)	48 (78.7)	80 (90.9)	4.44	.035		Bad
21 (14.1)	13 (21.3)	8 (9.1)				Fatigue	Total
3.48 ± 1.24	3.97 ± .97	3.13 ± 1.29	4.52	<.001[a]	1.11–6.11	Yes (≥4)	51 (34.2)
31 (50.8)	20 (22.7)	12.63	<.001		No (<4)	98 (65.8)	30 (49.2)
68 (77.3)				Fertility-related Quality of Life	Total	58.98 ± 11.99	54.46 ± 12.93
62.11 ± 10.25	−3.86	<.001[a]	28.65–88.02	Overall physical health	2.27 ± .71	2.21 ± .76	2.31 ± .68
−.79	.432[a]	1–4	QoL Life satisfaction	2.50 ± .71	2.28 ± .66	2.66 ± .71	−3.31
.001[a]	0–4	Core Ferti QoL	62.86 ± 14.94	57.55 ± 16.39	66.55 ± 12.69	−3.61	<.001[a]

21.88–92.71	Emotional	61.86 ± 18.37	56.15 ± 21.06	65.81 ± 15.14	−3.08	.003[a]	12.50–100.0
Mind-body	61.88 ± 19.19	57.04 ± 19.80	65.25 ± 18.11	−2.62	.010[a]	12.67–100.0	Relational
65.41 ± 17.06	59.77 ± 17.49	69.32 ± 15.69	−3.48	.001[a]	20.83–100.0	Social	62.30 ± 16.65
57.24 ± 17.64	65.81 ± 15.05	−3.19	.002[a]	12.50–95.83	Treatment FertiQoL	55.09 ± 11.56	51.37 ± 11.63
57.67 ± 10.85	−3.39	.001[a]	30.21–85.42	Environment	51.96 ± 11.96	49.45 ± 12.21	53.69 ± 11.54
−2.15	.033[a]	25.00–87.50	Tolerability	58.22 ± 18.47	53.28 ± 18.99	61.65 ± 17.40	−2.78

Variables	Categories		Quality of life	t or F	p
M ± SD	Women's age (in years)		<35	59.37 ± 9.95	.36
.721		≥35	58.68 ± 13.38		
Husband's age (in years)		<35	58.36 ± 11.64	−.41	.523
	≥35	59.23 ± 12.18			Religion
	Yes	57.83 ± 10.34	−1.17	.244	
No	60.14 ± 13.43			Occupation	
Yes	58.99 ± 12.44	.01	.990		No
58.96 ± 11.28			Education		≤High school

60.52 ± 12.59	.77	.440		≥University	58.60 ± 11.87
		Monthly income (thousand won)		<3,000	58.60 ± 11.02
.37	.690		3,000–4,000	60.17 ± 10.92	
		≥4,000	58.22 ± 13.69		
Duration of infertility treatment (month)		<36	61.11 ± 10.91	4.20	<.001
	≥36	51.78 ± 12.84			Experienced treatment (double choice)
OI	Yes	57.64 ± 12.50	−1.64	.103	No
60.90 ± 11.04			IUI	Yes	57.24 ± 12.54
−1.77	.080	No	60.69 ± 11.25		
IVF	Yes	57.36 ± 13.53	−1.86	.065	No
60.90 ± 9.61			Others	Yes	62.21 ± 11.91
1.14	.255	No	58.59 ± 11.99		
Relationship with spouse		Good	60.10 ± 11.53	2.90	.004

Variables	Women's age	Husband's age	Fatigue
r (p)	r (p)	r (p)	Husband's age
.69 (<.001)			Fatigue
−.01 (.920)	−.04 (.620)		QoL

Variable (constant)	Step 1					Step 2				
B	SE	β	t	p	B	SE	β	t	p	62.38
1.16		53.80	<.001	71.19	2.59		27.45	<.001	Duration of infertility treatment[a]	−7.49
1.98	−.29	−3.78	<.001	−5.71	1.91	−.22	−2.99	.003	Relationship with spouse[b]	−7.42
2.64	−.22	−2.81	.006	−5.77	2.53	−.17	−2.28	.024	Fatigue	
				−2.25	.75	−.23	−2.99	.003	Type-D personality[c]	
				−4.30	1.90	−.18	−2.27	.025	Adjusted R^2	.13
.22					Adjusted R^2 change	.13				
.09					F	11.75				

11.64	F change	11.75
10.07	p	<.001

DETAILS

Subject:	Research; Quality of life; Womens health; Age; Marriage; Personality; Questionnaires; Public health; Fertility; Infertility
Location:	United States--US; China; South Korea
Company / organization:	Name: Organization for Economic Cooperation &Development; NAICS: 928120
Identifier / keyword:	fatigue; infertility; personality; quality of life; women's health
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Evaluating the Dimensionality and Reliability of the Thai Self-Care of Hypertension Inventory Version 2.0

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ProQuest document link

ABSTRACT (ENGLISH)

SummaryPurpose

Self-care is essential for hypertensive individuals to promote optimal health and illness treatment. We developed the Thai Self-Care of Hypertension Inventory (SC-HI) version 2.0 from the original US version using a multi-stage approach for cross-cultural adaptation. Scales previously studied outside a US context had different dimensions and factor solutions. Therefore, we examined the Thai SC-HI's factorial validity, construct validity, and internal reliability within a Thai context.

Methods

We administered a cross-sectional survey with hypertensive patients in 10 primary care settings, and conducted exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) on two sets of separate samples from each of five sites to examine the model's factorial validity and construct validity. We estimated scale reliability with Cronbach's alpha and McDonald's omega coefficients.

Results

Participants were predominantly female, older adults, with mean age 66 years (SD = 11.94; range 36–97 years). The self-care maintenance scale had three factors and demonstrated good fit when the error covariances were respecified. The two-factor self-care management scale had different factorial solutions compared to previous models. The CFA result showed good fit indices for the Thai, original US, and Brazilian models. The self-care confidence scale was unidimensional, with partially supported fit indices that improved after we respecified the error covariances. Reliability coefficients estimated by difference methods were nearly equal: slightly lower than desired for self-care maintenance (.68–.70) and inadequate for self-care management (.62–.65); self-care confidence reliability was adequate (.89–.90).

Conclusion

The Thai SC-HI has good psychometric characteristics and reflects the original instrument's theoretical basis.

FULL TEXT

Introduction

High blood pressure is the primary cause of cardiovascular disease, and is showing increased global prevalence. In Thailand, one in four adults has hypertension [1]. Better self-care that leads to appropriate lifestyle modifications is essential for controlling high blood pressure and reducing heart disease and stroke [2–4]. As with other chronic illnesses, self-care is a surrogate hypertension health outcome, where a treatment regimen can promote and optimize overall health status [5]. Recommended hypertension self-care behaviors include: consuming optimal vegetable and fruit amounts, limiting sodium and fat, staying physically active, maintaining optimal body weight, reducing psychological stress, observing health condition changes, and managing high blood pressure symptoms [6]. Although self-care's core concepts are universal, self-care behaviors are culturally embedded [5]. Because self-care is important to clinical outcomes, it is essential to have an effective measurement of hypertension self-care in diverse cultures.

Self-care involves maintaining health and handling health condition changes through health promotion and illness management behaviors. The self-care instrument named Self-care of Hypertension Inventory (SC–HI) version 2.0 was developed in the US [6]; therefore, cross-cultural adaptation was necessary to ensure its reliability and validity in a different cultural setting [7–10]. Two of three SC–HI scales (self-care maintenance and self-care management) measure self-care behaviors; the remaining self-care confidence scale measures self-care motivation [5,6]. The Thai SC–HI [7] was developed using a global framework for the instrument's cross-cultural adaptation. Initial tests demonstrated that the Thai SC–HI was valid and reliable. Good relevance, clarity, simplicity, and ambiguity were reflected by the larger content validity indices supporting the original version [7]. The Thai SC–HI's factorial validity, construct validity, and reliability required further testing because they are influenced by cultural context. Studies conducted outside the US that evaluated SC–HI versions showed that cross-cultural adaptations differed [8–10]. For example, the self-care maintenance scale had a multidimensional structure [8–10], different items were allocated to the self-care management scale's autonomous and consultative dimensions [9], and item correlations differed in the self-care confidence scale [9]. The cross-culturally developed SC–HI's dimensionality and psychometric properties showed that it is valid and reliable, has cultural diversity, and generally verified and re-conceptualized [8–10].

Few cross-cultural SC–HI's have been adapted within an Asian context [7,10], and these have only preliminary testing. Full psychometric property evaluation has not been conducted. The SC–HI is a theory-based instrument developed to assess naturalistic chronic illness self-care [5,6]. Hence, it measures the generic concept of self-care that reflects health-promoting and illness-related behaviors employed to maintain health, manage symptoms, and enhance confidence and efficacy. Each of the three scales includes items that measure specific self-care actions followed within a hypertension treatment regimen. Although self-care is a global concept and self-care behavior is disease specific (hypertension in this case), behavioral practices (e.g., dietary patterns, consumed foods, health care contacts, stress management) vary by cultural background [7,10]. Thus, a cross-cultural adaptation instrument is needed to test whether it is valid and reliable within the cultural context of where it is used. Previous validated and reliable hypertension self-care instruments were developed, tested, or used in Asia countries [11–13]. However, most were used to determine health maintenance behaviors that shared common self-care actions, and they were not comprehensive. A theory-based instrument is needed to evaluate overall self-care tasks that manage both stable illness stages and symptom changes in chronic illness, including hypertension [14].

This study tested the SC-HI's psychometric properties in Thai individuals with hypertension. First, we conducted an exploratory analysis (EFA) to assess the three scales' factorial validity. Next, validate the US and Brazilian versions of the self-care management scale with Thai data using confirmatory factor analysis (CFA) to test construct validity [15]. A modification model that fit the Thai data was respecified for all scales. We also evaluated discriminant and convergent validity. Cronbach's alpha coefficients and other criteria for multidimensional scales were used to test each scale's internal consistency reliability. We used composite reliability [16] or McDonald's omega [17] to evaluate multidimensional scales' reliability [14,18,19] because these methods were less biased [18]. We hypothesized that the SC–HI Thai version was valid and reliable, with adequate goodness of fit indices, discriminant validity, convergent validity, and the internal coherence.

Theoretical framework

The SC–HI is a theory based and disease specific measure of hypertension self-care that includes maintenance, management, and confidence components. It was derived from the middle-range self-care for chronic illness theory [5], and the situation-specific heart failure self-care theory [20]. The theories describe self-care as a realistic decision-making process that promotes health behavior and disease treatment. Self-care maintenance includes behaviors used to maintain physical and emotional stability. Self-care management involves responding to symptoms. Both self-care maintenance and management are motivated by self-confidence [5,6].

Methods Study design

A multi-site, cross-sectional study design was conducted from May 2017 to April 2019 to evaluate the scales' psychometric properties. We investigated cardiometabolic risk factors, self-care, and hypertension outcomes as described in Identification of Complex Care Needed in Patients with Hypertension Treated at Primary Care (ICNHT) [7].

Ethical considerations

Approval was obtained from the University Ethics Board Committee (code number: 59/075). The study adhered to standards delineated in the Declaration of Helsinki.

Participants

Participants were recruited from ten health promotion hospitals (HPH) in one Southern Thailand province. Inclusion criteria: individuals with hypertension who are treated with any antihypertensive medication for at least six months. Pregnant women with hypertension and individuals who were unable to communicate were excluded. EFA was conducted with data from the first set of participants from five sites to test the dimensionality and factor loading on each of the scales' dimensions. CFA was conducted on a different set of samples from five other sites to evaluate validity (construct, discriminant, and convergent) and internal coherence. Generally, a sample size of 200 is required for psychometric testing [21]. However, for this analysis we enrolled the entire sample from the target settings to allow cross-validation [14].

HPHs are Thailand's first level health care facilities; they provide primary care in the subdistrict area and are covered by the district hospital. Our setting is among Thailand's largest provinces, reaching 1.6 million people, with four geographical areas: provincial or central district, hill-side, sea-side, and field or catchment basins. Each HPH treats 200 to 500 patients. Participants were recruited using a multi-stage cluster sampling method. Seven districts and one center were randomly selected based on geographical area. Two HPHs were chosen using simple random sampling, which yielded eight rural and two urban settings, with ten HPHs in total. Four rural and one urban setting were assigned to the EFA and CFA groups. Approximately 100 to 150 participants were selected by simple random sampling from each HPH. The target sample was stratified by 10-year age groups (i.e., **Thai SC–HI (version 2.0) instrument**

The Thai SC–HI's content validity, face validity, test–retest reliability, and interobserver reliability was presented elsewhere [7]. In brief, following the original US version [6], we used a multi-stage approach for cross-cultural adaptation (https://self-care-measures.com). The SC–HI's 23 items comprise three scales: self-care maintenance (11 items: scmt 01–11 of the original version), self-care management (6 items: scmn 12–17 or items 13–18 of the original version), and self-care confidence (6 items: scc 18–23 or items 19–24 of the original version). The items are rated on Likert-type scales from 0 to 4 or 1 to 4. The self-care management scale is administered to individuals who experience hypertension-related symptoms or uncontrolled blood pressure within four weeks. Response choices for all items are standardized for scores from 0 to 100, where higher scores indicate better self-care. The Thai SC–HI's item-level and scale-level content validity index was 1.00. The item-level intraclass correlation coefficients (ICCs) ranged from .97 to 1.00 for interobserver agreement and .95 to 1.00 for test–retest. The overall scale and three distinct scales' interobserver ICCs were .99. The test–retest ICCs were .99 for the total scale, and ranged from .97 to .99 for the three individual scales [7].

In the original version, self-care management and self-care confidence were one-factor models, whereas self-care management was a two-factor model [6]. We found the following differences in the items allocated to self-care management components across the two existing models [6,9]: autonomous (US: scmn 14, 15, and 17; Brazilian: scmn 12, 15, and 17); and consultative (US: scmn 12, 13, and 16; Brazilian; scmn 13, 14, and 16). Thus, we conducted CFA on all Self-Care Management models where the Thai model EFA factorial differed from the previous models.

Data collection

Data were collected by five graduated nursing students. All attended the 72-hour clinical-based sessions on cardiometabolic risk and self-care assessment research protocols. The SC–HI data were collected during a face-to-face interview at the HPH or the participant's home, according to their preference. Participants were asked to complete the questionnaire by themselves or have the research assistant read it for them. Participants' sociodemographic and clinical data were obtained from electronic health records and physical examination, including: an average of two blood pressure measurements, body mass index, waist circumference, history of diabetes, history of dyslipidemia, self-reported daily or occasional smoking or alcohol consumption within the last six months. The sociodemographic and clinical data were record in a data collection form.

Data analysis

Descriptive statistics, EFA, and internal consistency reliability were analyzed with IBM SPSS Statistics, version 28.0; CFA was conducted with AMOS version 24.0. We checked for multivariate outliers using Mahalanobis distance and excluded them from all subsequent analyses [22]. Descriptive statistics included percentage (%), number, median (interquartile rank [IQR]) and mean (standard deviation [SD]), and assessed individual item skewness and kurtosis to identify the estimator [15,23]. Each scale's scores were standardized [6] on a scale of 0 to 100.

EFA was conducted before CFA, using the first data set to test the three separate scales' dimension structure. A Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy of .60 or greater and a significant Bartlett's test of sphericity showed that the correlation matrix was suitable for factor analysis [24]. EFA was first performed unrotated, using principal axes factoring with non-normality data and maximum likelihood with multivariate normality [15]. Factors with eigenvalues greater than 1.00 were retained [15]. We performed EFA with varimax rotation and enforced one-, two- and three-factor solutions to evaluate the scale's factorial validity.

CFA was conducted on the second data set to validate the three scales' construct validity. We used the robust maximum likelihood method to estimate the parameters because various non-normalized items and factor loadings above .30 were acceptable [14,25]. As done for the original version [6] and other self-care instruments [14,25], we used numerous goodness of fit indices to analyze the model fit: the Tucker–Lewis index (TLI), comparative fit index (CFI), standardized root mean square residual (SRMR), and root mean square error of approximation (RMSEA). CFI and TLI values above .95 indicate good model fit, and .90–.95 values indicate acceptable fit [26]. However, the TLI is a non-normed incremental fit index; therefore, the values can fall outside the 0–1.00 range [26]. We used these values to compare the desirable model with a null model. We used RMSEA to estimate model fit, where a value of .05 or less indicates good fit; .05–.08, moderate fit; .10 or above, poor fit [27]. We used SRMR to measure absolute fit, where a value of .08 or less indicates good fit, and .10 or above indicates poor fit [27]. The Chi-square likelihood ratio is sensitive to sample size; hence, we reported the traditional Chi-square test, but did not use it to interpret model fit. We used the CFA data set to evaluate others characteristic of construct validity, discriminant validity and convergent validity [28]. Discriminant validity is the extent to which the factors are distinct and not highly correlated [29]. A new criterion for assessing discriminant validity, the heterotriat-monotrait (HTMT) ratio was used for the multidimensional scales, using a criterion of 30]. For the HTMT technique, the scale score correlation is converted to an error-adjusted correlation using parallel reliability [31]. Also, convergent validity provides supporting evidence for construct validity. We considered the correlation between factors within the scale to measure the same construct. We analyzed Pearson's coefficient correlation (r) by using the standardized scores of the multidimensional scales. A positive and significant correlation between two factors within the same scale was considered evidence of convergent validity [28]. Internal consistency was also tested using the CFA data set. We estimated scale reliability with Cronbach's alpha coefficients and composite reliability [16] or McDonald's omega coefficients [17], with .70 or above considered acceptable [32]. Similar to the alpha coefficient, the omega coefficient evaluates scale-level reliability. However, omega has an advantage with multidimensional scales [18]. We calculated omega from each scale's total items, similar to the relevant self-care instruments, because self-care interpretation is meaningful by the scale-level [6,14]. Item discrimination was estimated using item-total corrected correlation coefficients, with .30 or above considered acceptable [33].

Results Participant characteristics

We enrolled 1,262 adults from ten primary care settings; the final sample included 1,214 individuals after excluding 48 outlier cases. Participants were predominantly female, older adults, with and mean age of 66 years (range 36–97 years), and were socioeconomically well off (Table 1). Rates of each clinical risk factor, including uncontrolled blood pressure, were 6.8%–60.7%, and 81.5% had been treated for hypertension for over two years. The standardized mean scores (± SD) of each scale were 54.84 (SD = 14.51), 52.19 (SD = 13.57), and 50.93 (SD = 19.38) for self-care maintenance, self-care management, and self-care confidence, respectively. EFA and CFA showed different rates in literacy, known and treated diabetes, known and treated dyslipidemia, and abdominal obesity, while the three scales' self-care scores and total SC–HI scores did not differ.

Item response

Table 2 shows item response means and distribution. All items had scores above the lowest, except one Self-Care Management scale item (scmt 01); two items had below average mean scores (items: scmt 01 and scmt 12); and two items had non-normal distributions (items: scmt 04 and scmt 07).

Factorial validity

The scale structure was evaluated based on EFA and the rotated factor loadings matrix in 640 samples, as shown in Table 3. The self-care maintenance, self-care management, and self-care confidence scales' KMO values were .68, .62, and .88, respectively. Bartlett's test of sphericity yielded *p* 15] with no rotation and exacted three factors for self-care maintenance, and two factors for self-care management. We used the maximum likelihood method [15] with no rotation and exacted one-dimension for self-care confidence. Each scale's eigenvalues were: self-care maintenance (factor 1 = 2.59, factor 2 = 1.63, and factor 3 = 1.31); self-care management (factor 1 = 2.04 and factor 2 = 1.27); and self-care confidence (one-factor = 3.97). One-factor and two-factor models for self-care maintenance revealed eigenvalues as follows: one-factor (factor 1 = 1.82); and two-factor (factor 1 = 1.84 and factor 2 = 1.07).

Self-care maintenance scale

The principal axes factor method [15] with varimax rotation exacted three factors with the following total variance: Factor 1 comprised five items and explained 12.8% of the variance; Factor 2 comprised four items and explained 12.2% of the variance; and Factor 3 comprised two items and explained 9.9% of the variance. Factor loadings for each item in Factors 1, 2, and 3 ranged from .471 to .566, .200 to .768, and .729 to .734, respectively, explaining 34.8% of the total variance. The extraction communalities values were .048 to .602, and one item (scmt 01) with a rotated factor loading matrix was below .30. A two-factor model shows the factors' explanation power relative to the total variance: Factor 1 comprised nine items and explained 16.6% of the variance, and Factor 2 comprised two items and explained 9.9% of the variance. Factor loadings for each item in factors 1 and 2 ranged from .206 to .580 and .668 to .723, respectively, explaining 26.6% of the total variance. The extraction communalities values were .043 to .525, and one item (scmt 01) with a rotated factor loading matrix was below .30. Finally, when we fixed the number of factor to a one-factor model as of the original US model, the factor loading was .056 to .592 and explained 16.6% of the total variance. The extraction communalities values were .003 to .350, and three items (scmt

01, scmt 04, and scmt 07) with a rotated factor loading matrix were below .30.

Self-care management scale

The principal axes factor method [15] with varimax rotation exacted two dimensions: Factor 1 comprised four items and explained 25.7% of the variance; Factor 2 comprised two items and explained 16.5% of the variance. Factor loadings of each item in Factors 1 and 2 ranged from .206 to .920 and .336 to .904, respectively, explaining 42.2% of the total variance. The extraction communalities values were .056 to .853, and one item (scmn 15) with a rotated factor loading matrix was below .30.

Self-care confidence scale

The maximum likelihood method [15] with varimax rotation exacted a one-factor model. The explanatory power of the factors relative to the total variance of 66.3% had factor loadings ranging from .789 to .837. The extraction communalities values were .622 to .701.

Construct validity

Table 4 and Figures 1–3 show the CFA results. We evaluated the initial model fit indices with 547 participants, and respecified models for self-care maintenance (Figure 1), self-care management (Figure 2A–C), and Self-Care Confidence (Figure 3).

Self-care maintenance scale

Three models of self-care management were analyzed. We first specified a one-factor confirmatory model per the original version [6]. The model's goodness of fit indices was unacceptable: χ^2/df (44, N = 574) = 465.79, p 14], we specified a two-factor model. The EFA results allocated nine items from health promoting behavior and two items from illness related behavior dimensions. The model's goodness of fit indices was partially supported: χ^2/df (43, N = 574) = 249.34, p 2/df (39, N = 574) = 92.08, p

Finally, we tested a three-factor model. Items allocated to each factor followed the EFA results. The model's goodness of fit indices was good: χ^2/df (41, N = 574) = 125.25, p Figure 1). The modification indices estimated two error covariances between items scmt 11 “try to lower your weight” and scmt 02 “eat a variety of vegetables, fruits, and grains,” and between scmt 11 and scmt 06 “exercise for at least a half-hour.” The final model's goodness of fit indices was improved: χ^2/df (39, N = 574) = 98.94, p **Self-care management scale**

The recent Thai, and the previous US [6] and Brazilian [9] self-care management models had different items belonging to autonomous and consultative dimensions. We conducted CFA on these three models. All models' goodness of fit indices suggested a perfect fit (Table 4, Figure 2A–C). Thai model: χ^2/df (8, N = 305) = 3.83, p = .872, CFI = 1.000, TLI = 1.037, RMSEA = .000 (90% CI = .000–.034), SRMR = .010); US model: χ^2/df (8, N = 305) = 6.12, p = .634, CFI = 1.000, TLI = 1.016, RMSEA = .000 (90% CI = .000–.056), SRMR = .012); and Brazilian model: χ^2/df (8, N = 305) = 5.94, p = .654, CFI = 1.000, TLI = 1.018, RMSEA = .000 (90% CI = .000–.055), SRMR = .012). All factor loadings for each model were positive and significant. Item scmn 12 from the US [6] and Brazilian [9] models had factor loading below .30. The two dimensions were positively correlated at .64, .97, and .91 for the Thai, US, and Brazilian models, respectively.

Self-care confidence scale

When we tested the one-factor CFA from the original model, the goodness of fit indices were adequate but only partially supportive (Table 4): χ^2/df (9, N = 574) = 96.14, p Table 4 and Figure 3): χ^2/df (7, N = 574) = 22.48, p = .002, CFI = .992, TLI = .983, RMSEA = .062 (90% CI = .036–.093), SRMR = .008). All factor loadings were positive and significant. No items had factor loadings below .30.

Discriminant validity

We examined discriminant validity in the self-care maintenance scale three-factor model by calculating HTMT ratios [30] among the three factors, which were less than .85, indicating acceptable discriminant validity. The HTMT ratios were .54 between health promoting behavior and medical care behavior, .12 between health promoting behavior and medical care behavior, and .23 between illness related behavior and medical care behavior. Self-care management discriminant validity was also supported by HTMT ratios [30] lower than .85. The HTMT ratio within the Thai two-factor model was .65 between consultative behavior and autonomous behavior.

Convergent validity

We evaluated convergent validity within the self-care maintenance scale three-factor model and found positive and significant correlations between pair dimensions [28]. Pearson correlation coefficients were 0.38 (p = .01) between health promoting behavior and illness related behavior, .11 (*p* p = .01) between illness related behavior and medical care behavior. Also, we observed a positive and significant correlation [28] between consultative behavior and autonomous behavior (*r* = .24, *p* = .01) in the self-care management scale. This confirmed acceptable convergent validity for the two multidimensional scales.

Internal consistency and item analysis Self-care maintenance scale

When the internal consistency of the self-care maintenance was calculated with all 11 items using the 574-CFA sample, the alpha coefficient was .70 and McDonald's omega coefficient was .69. If the items were deleted, the omega coefficient ranged from .64 to .69; no item was expected to significantly increase the coefficient if deleted. When the multidimensional scale's composite reliability was tested [16], the coefficient remained at .68, which is inadequate [33]. Most items presented adequate discrimination; the corrected item-total correlation of all items was >.30, excluding one item (scmt 04).

Self-care management scale

The self-care management scale's internal consistency was calculated with all five items using the 305-sample CFA data from participants who had experienced hypertension-related symptom within the last four weeks. The alpha coefficient was .62 and McDonald's omega coefficient was .65. The coefficient if items were deleted ranged from .49 to .68, while one item (scmt 01) was expected to significantly increase the coefficient if deleted. The composite reliability test on this multidimensional scale [16] yielded a coefficient of .64, which was still inadequate [33]. Most items presented adequate discrimination, with the corrected item-total correlation of all items >.30, excluding one item (scmt 04).

Self-care confidence scale

The self-care maintenance scale's internal consistency was calculated with all six items using the 574-sample CFA dataset. The alpha coefficient was .90, and McDonald's omega coefficient was .89. The omega coefficient if items were deleted ranged from .87 to .88, with no item expected to significantly increase the coefficient if removed. All items presented adequate discrimination, with item to total corrected >.30.

Discussion

We evaluated the factorial validity, construct validity, and internal reliability of a Thai cross-cultural adaptation of the SC–HI (version 2.0). This is one of two recent studies outside the US to use EFA and CFA to evaluate the SC–HI. The dimensionality and psychometric properties we found partially supported the original model [6]. The self-care maintenance scale had a multidimensional construct. Factor loadings on the self-care management scale's autonomous and consultative dimensions differed from those of previous studies [6.9]. The relationship between the Thai self-care confidence scale items differed from those of the Brazilian model [9]. The respecified self-care management and self-care confidence scales improved the goodness of fit indices, supporting construct validity. The HTMT ratios and Pearson correlation coefficients confirmed acceptable discriminant validity and convergent validity of a three-factor self-care maintenance, and a two-factor self-care management scale. We used a new method to estimate discriminant validity because traditional methods, such as the Fornall–Larcker criterion and cross-loading method, had unacceptably low sensitivity compared to the HTMT ratios [30]. The self-care maintenance and self-care management scales' reliability coefficients were inadequate, whereas the self-care confidence reliability coefficient was acceptable. Overall, the study results illustrate that the cross-cultural adaptation of the Thai SC–HI is valid, but the reliability needs further testing.

Self-care of hypertension inventory

We used EFA to examine the dimensionality of the Thai SC–HI in this study, followed by CFA testing. We conducted EFA because it was already known that the scales characteristic of the US [6] and international SC–HI versions [8–10] differed. As expected, the Thai self-care maintenance and self-care management scales have a multidimensional structure, and the self-care confidence scale has a unidimensional structure. The multidimensional self-care maintenance scale in the Thai version does not support the previous models [6,9]; however, the multidimensional self-care maintenance scale has psychometric characteristics in Chinese [10], Arabic [8] and other relevant self-care measures [14,34,35]. Although the original self-care management scale was a two-factor model [6], items loaded on the autonomous and consultative dimensions in Thai model differ from those of the US and Brazilian models [6,9]. The self-care confidence items covariance matrix differed for the Thai and Brazilian models. The modified Thai SC–HI model had a moderate to high factor loading matrix for all items in the final three scales; one item (scmn 02) from the US and Brazilian self-care management models had poor factor loading. Our findings confirmed the Thai SC–HI model's construct validity is consistent with other international SC–HI models [6,8,9,36].

The Self-care maintenance and self-care management reliability coefficients were slightly lower, but the self-care confidence reliability coefficient was adequate. We used McDonald's omega and a composite reliability coefficient for the multidimensional scales instead of Cronbach's alpha alone. For multidimensional scales, the Cronbach's alpha coefficient overestimates reliability for the general common factor and underestimates the reliability of all model factors [18]. With Cronbach's alpha [36], the highest coefficient values were observed in the self-care confidence scale followed by the self-care maintenance and self-care management scales. However, in the Chinese version [10], the lowest Cronbach's alpha coefficients were found in the self-care maintenance scale. The Cronbach's alpha differences may depend on individuals' sociodemographic backgrounds, and the manner in which they perform self-care. The self-care maintenance and self-care management scales' lower internal consistency could be expected because self-care behaviors are largely independent of each other; they are controlled by various motivators, personal and cultural aspects, and change over time [25].

Self-care maintenance and self-care management items with lower corrected item-total correlation were expected to have high factor loading on other dimensions. The results were supported by both EFA and CFA. For example, we found that item scmt 01 “check your blood pressure” had the lowest score, because this self-care behavior is difficult to perform daily. Therefore, this finding supported deleting this item from the updated SC–HI version [37]. Although the CFA and EFA samples had different characteristics, the model was considered valid. Also, this finding may demonstrate the Thai SC–HI's external validity in patients with various sociodemographic and clinical characteristics.

Self-care maintenance

Thai self-care maintenance was multidimensional, as theorized. CFA indicated better fit indices with either a three-factor or two-factor model, but not with a unidimensional model. The multidimensional structure is consistent with the Chinese SC–HI [10], the Self-Care of Chronic Illness Inventory (SC–CII) [14], and the Caregiver Contribution to Self-Care of Chronic Illness Inventory (CC–SC–CII) [34,35], which were developed under similar theories [5]. We justified this scale's three-factor model based on KMO values and self-care actions' characteristics for each item and factor loading matrix. Items allocated to health promoting behaviors and illness related behaviors supported the self-care maintenance scale of the Self-Care of Chronic Illness Inventory [14]. Moreover, our findings revealed a third factor specific to medical care behaviors. The final three-factor model improved the fit indices and better explained the covariation effects in the two sets of three items. Each of the self-care behaviors correlated with the others. For example, patients trying to lose weight may eat a variety of vegetables, fruits, and grains (scmt02), and perform regular exercise (scmt 06).

Our findings support the conceptual basis [5] of daily self-care maintenance to promote health, coupled with specific treatment to control hypertension. The Thai self-care maintenance dimensions supported the self-care of chronic illness theory and relevant self-care measurement in general [5,14,25]. Health promoting behaviors and illness related behaviors are two known dimensions [14,25]. Our study revealed another dimension, medical care behaviors. To control blood pressure and reduce cardiovascular risk, patients need to make lifestyle changes (e.g., diet, physical activity, weight control) and follow specific hypertension treatment protocols (e.g., medication, follow-up) [2–4].

Self-care management

Self-care management was bidimensional based on theory and in the original SC–HI [5,6]. Our analysis revealed autonomous and consultative dimension item numbers and factor loadings that differed from those of the US [6] and Brazilian [9] models. The factorial structure supported the Brazilian model and reflected cultural diversity.

Autonomous dimension items focused on controlling symptoms, while consultative dimension items focused on daily self-care promoting behaviors. The controlling symptoms dimension in this study was similar to the self-care of heart failure index, which adequately addresses the theory of self-care, but it is not a self-care management subscale [25]. This finding supported a new revised SC–HI component [37] that separates items relevant to the self-care monitoring scale from the alternative self-care management scale.

Interestingly, CFA confirmed a good fit and supported all Thai, US, and Brazilian models. Our model had a better factor loading matrix with all items, specifically recognizing symptoms (item: scmn 12). The Self-Care Management process could be dissimilar but share commonality in one experience. Response to body changes may be related to emotion and illness. However, the response to change depends on physiological or disease/health related personal, psychological, sociological, and developmental factors [38]. Cross-cultural adaptations of the SC–HI must verify self-care management structures for the targeted population. Unlike other cardiovascular diseases, such as heart failure [25], hypertension has less severe symptoms. Common hypertension symptoms include headache, dizziness, and visual impairment; however, these symptoms are not disease specific and may occur in normotensive individuals. Therefore, hypertensive patients may not know when their blood pressure is elevated because they might not feel this change. Timely response to uncontrolled blood pressure and adequate behavioral change may depend on patient awareness, interpretation, and recognition of hypertensive conditions [38].

Self-care confidence

We found that self-care confidence was a unidimensional construct similar to the original model [6]. Despite the high factor loading matrix of all six items, the model partially supports most fit indices (CFI, TLI, and SRMR), except RMSEA. Unlike the Brazilian model [9], we found a high covariance between items scc 18 and scc 19 and scc 18 and scc 20. The final modified model improved all relevant fit indices and better explained the covariation effects among these items. This correlation was not present in the US [6], Chinese [10], or Polish [36] models; however, the Brazilian model [9] showed correlation between items scc 22 “evaluate changes in your blood pressure” and scc 23 “take action that will control your blood pressure.” Since the self-care confidence items scc 18, scc 19, and scc 20 measured different actions, our model demonstrated the relationship between confidence in blood pressure control, following a treatment regimen, and recognizing changes in health. Self-care confidence is a motivating factor for self-care maintenance and self-care management. The scale is a promising measure of self-efficacy within a health belief model; individuals' confidence facilitates specific self-care tasks [6]. Higher self-efficacy is associated with better hypertension self-care behaviors, including dietary changes, physical activity, and medical adherence [39].

Limitation and strengths

One limitation is that the self-care maintenance and self-care management scales' reliability coefficients were only partially accepted. This might be because factor loadings for the two items were lower than desired (items: scmt 01 “check your blood pressure,” scmn 15 “be strict on taking your blood pressure-lowering medicines”). However, because the indexes reliability in the population is unknown, we cannot know whether these conditions were met, hence further testing is needed to identify areas with compromised reliability in a national-level hypertension population. Also, we were unable to provide evidence for concurrent validity in this analysis because we lacked adequate data and an appropriate instrument. A third limitation is that the majority of the participants were recruited from rural primary care facilities, where lifestyle, behaviors, and environment may differ from those of urban or inner-city area. Study strengths include: participant enrollment from several settings; large sample sizes that were adequate for psychometric property testing; and participants (females, older adults, socioeconomic advantages, and various cardiometabolic risk factors) who were generally representative of Thailand's hypertensive population. We used two data sets: one to explore factorial validity using EFA, and the second to confirm construct validity. Thus, our analysis may reflect both hypothesis testing and generalizability. Implications for future research include testing those who may require hypertension self-care for complicated health conditions, such as older adults. Concurrent validity is also needed for full scale evaluation. Further research is needed to verify that the measure predicts hypertension results internationally.

Conclusion

The Thai SC–HI is a valid reflection of the theoretical concept on which it is based. This instrument is a useful clinical tool to assess and guide self-care development for promoting optimal health, hypertension treatment regimens, symptom management, and self-care confidence for Thai individuals with hypertension.

Ethical consideration

Approval was obtained from the Walailak Ethics Board Committee (code number: 59/075). The study adheres to standards delineated in the Declaration of Helsinki.

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Data statement

The original study is registered at Open Science Framework (https://osf.io/8j95k/).

Conflict of interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Characteristics	Overall sample	EFA sample	CFA sample	p
Participant, n (%)	1,214 (100)	640 (52.7)	574 (47.3)	
Sociodemographic				
Women	889 (73.2)	477 (74.1)	412 (72.3)	.483
Age, mean (SD)	66.12 (11.94)	65.89 (11.46)	66.39 (12.47)	.466
Age, range in years	36–97	37–95	36–97	
Age ≥ 65 years old	672 (55.4)	345 (53.6)	327 (57.4)	.184
Living with spouse or family members	984 (81.1)	516 (80.1)	468 (82.1)	.379
Primary education	1,102 (90.8)	578 (89.8)	524 (91.9)	.191
Literate	1,120 (92.3)	616 (95.7)	504 (88.4)	<.001
Agriculture	1,117 (92.0)	593 (92.1)	524 (91.9)	.923
Working or employed	645 (53.1)	359 (55.7)	286 (50.2)	.052

Family income sufficiency	900 (74.1)	467 (72.5)	433 (76.0)	.171
Clinical characteristics				
Systolic blood pressure ≥ 140 mmHg	291 (24.0)	168 (26.1)	123 (21.6)	.066
Diastolic blood pressure ≥ 90 mmHg	98 (8.1)	56 (8.7)	72 (7.4)	.397
Known and treated diabetes	371 (30.6)	252 (39.1)	119 (20.9)	<.001
Known and treated dyslipidemia	639 (52.6)	405 (62.9)	234 (41.1)	<.001
Body mass index ≥ 25.0 kg/m^2	532 (43.8)	295 (45.8)	237 (41.6)	.128
Abdominal obesity	737 (60.7)	422 (65.5)	315 (55.3)	<.001
Currently smoking	132 (10.9)	74 (11.5)	58 (10.2)	.463
Currently drinking alcohol	83 (6.8)	46 (55.4)	37 (6.5)	.653
Number of hypertension medication use, median (IQR)	2 (1, 3)	2 (1, 3)	2 (1, 3)	.295
Duration of hypertension >2 years	989 (81.5)	524 (81.4)	465 (81.6)	.924
Self-care of hypertension				
Self-care maintenance scale	54.84 (14.51)	53.46 (13.90)	54.46 (15.03)	.367
Self-care management scale	52.19 (13.57)	51.70 (13.90)	52.69 (13.20)	.370
Self-care confidence scale	50.93 (19.38)	51.41 (19.66)	50.39 (19.06)	.358
Self-care of hypertension total	54.81 (11.33)	54.67 (11.27)	54.94 (11.41)	.770

Items	Mean (SD)	Skewness	Kurtosis
Self-care maintenance scale			
Scmt 01. Check your blood pressure.	1.70 (0.85)	1.11	0.53
Scmt 02. Eat a variety of vegetables, fruits …	2.70 (0.79)	0.07	−0.66

Scmt 03. Exert on doing daily busy activity, …	2.84 (0.91)	−0.23	−0.89
Scmt 04. Attend hospital for routine follow-up …	3.77 (0.51)	−2.18	4.09
Scmt 05. Eat a less salty foodstuff.	2.67 (0.98)	−0.05	−1.07
Scmt 06. Exercise for at least a half-hour.	2.52 (1.01)	0.08	−1.11
Scmt 07. Take medicines as prescribed.	3.82 (0.45)	−2.52	6.13
Scmt 08. Selected less salty food choices …	2.22 (0.93)	0.45	−0.61
Scmt 09. Use a system to help you remember your medicines …	2.21 (1.28)	0.36	−1.44
Scmt 10. Avoiding high-fatty foodstuff.	2.39 (0.89)	0.22	−0.69
Scmt 11. Try to lower your weight …	2.27 (1.01)	0.28	−1.01
Self-care management scale			
Scmn 12. How quickly did you recognize that your blood pressure was up …	1.79 (0.72)	0.85	1.01
Scmn 13. Reduce the salt or salty recipes in your meal …	2.86 (0.78)	−0.35	−0.23
Scmn 14. Mindful relaxation, be aware of stress …	2.89 (0.71)	−0.37	0.13
Scmn 15. Be strict on taking your blood pressure-lowering medicines more regularly.	3.49 (0.67)	−1.04	0.30
Scmn 16. Contact your healthcare provider …	2.39 (1.06)	0.04	−1.26
Scmn 17. How sure were you that the action helped …	2.01 (0.69)	0.04	1.56
Self-care confidence scale			
Scc 18. Control your blood pressure.	2.49 (0.71)	0.22	−0.24
Scc 19. Follow your hypertension treatment regimen.	2.59 (0.73)	0.19	−0.39
Scc 20. Recognize when your health is out of the ordinary.	2.51 (0.71)	0.11	−0.26
Scc 21. Evaluate whether either your blood pressure was up …	2.49 (0.70)	0.03	−0.23
Scc 22. Take action that will control your blood pressure.	2.53 (0.71)	0.14	−0.27

Scc 23. Evaluate how well a self-care action works.	2.57 (0.70)	0.10	−0.29

	One-factor		Two-factor			Three-factor			
Factor 1	h^2	Factor 1	Factor 2	h^2	Factor 1	Factor 2	Factor 3	h^2	Self-care maintenance scale (N = 640)
Scmt 01.	.203	.041	.206	.001	.043	.088	.200	.024	.048
Scmt 02.	.395	.156	.409	.090	.175	.229	.335	.051	.168
Scmt 03.	.425	.180	.457	.167	.237	.065	.683	.046	.473
Scmt 04.	.056	.003	.011	.668	.446	.029	.015	.729	.533
Scmt 05.	.387	.150	.377	.078	.148	.471	.049	.003	.224
Scmt 06.	.483	.233	.515	.150	.288	.102	.768	.024	.602
Scmt 07.	.076	.006	.034	.723	.525	.073	.029	.734	.545
Scmt 08.	.546	.299	.535	.067	.291	.566	.179	.002	.352
Scmt 09.	.445	.198	.433	.091	.196	.484	.105	.024	.246
Scmt 10.	.458	.210	.443	.155	.221	.537	.076	.074	.300
Scmt 11.	.592	.350	.580	.127	.352	.508	.274	.094	.342
Self-care management scale (N = 298)									
Scmn 12.			.108	.336	.124				
Scmn 13.			.920	.077	.853				

Scmn 14.			.660	.199	.476				
Scmn 15.			.206	.118	.056				
Scmn 16.			.451	.035	.205				
Scmn 17.			.025	.904	.817				
Self-care confidence scale (N = 640)									
Scc 18.	.830	.689							
Scc 19.	.789	.622							
Scc 20.	.810	.656							
Scc 21.	.794	.630							
Scc 22.	.837	.701							
Scc 23.	.823	.677							

	Chi-square	df	p	CFI	TLI	RMSEA (90% CI)	SRMR
Initial models							
Self-care maintenance scale							
One-factor	465.79	44	<.001	.594	.492	.129 (.119–.140)	.063
Two-factor	249.34	43	<.001	.801	.746	.092 (.081–.103)	.060
Three-factor	125.25	41	<.001	.919	.891	.060 (.048–.072)	.044
Self-care management scale							
Thai model	3.83	8	.872	1.000	1.037	.000 (.000–.034)	.010
US model	6.12	8	.634	1.000	1.016	.000 (.000–.056)	.012
Brazilian model	5.94	8	.654	1.000	1.018	.000 (.000–.055)	.012

Self-care confidence scale							
One-factor	96.14	9	<.001	.955	.925	.130 (.107–.154)	.019
Respecified models							
Self-care maintenance scale							
Two-factor	92.08	39	<.001	.950	.928	.049 (.036–.062)	.037
Three-factor	98.94	39	<.001	.942	.919	.052 (.039–.065)	.038
Self-care confidence scale							
One-factor	22.48	7	.002	.992	.983	.062 (.036–.093)	.008

DETAILS

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Psychometric Evaluation of the Korean Version of PROMIS Self-Efficacy for Managing Symptoms Item Bank: Item Response Theory

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ABSTRACT (ENGLISH)

SummaryPurpose

To evaluate the psychometric properties of the Patient-Reported Outcomes Measurement Information System (PROMIS) self-efficacy for managing symptoms of the version 1.0 item bank in Korea.

Methods

This study consisted of two phases: first, developing the Korean version of the item bank following the translation guidelines; and second, performing a cross-sectional study to evaluate its psychometric properties using the item response theory. This study enrolled 323 patients with type 2 diabetes mellitus between July and August 2020.

Cronbach's α was used to assess the reliability of this item bank. Confirmatory factor analysis, using diagonally weighted least squares, was used to identify the assumptions of item response theory. Item parameter estimates including discrimination and thresholds were derived using the graded response model of the item response theory to reflect patient-reported outcomes as individualized responses.

Results

The Korean version of the item bank demonstrated good reliability (Cronbach's α = .98) and its discrimination ranged from 1.82 to 4.93. The thresholds resulted in the establishment of a category response curve for each item. However, no overlap was observed among the category curves. Moreover, the differential item functioning was not significant for age, gender, and income variables.

Conclusion

The graded response model and differential item functioning provided qualitative evidence that demonstrated acceptable psychometric properties of symptom management self-efficacy among patients. This item bank is expected to provide adequate assessments of self-efficacy of symptom management for patients with a chronic disease, which can contribute to nursing research and intervention.

FULL TEXT

Introduction

The Patient-Reported Outcomes Measurement Information System (PROMIS) was established in 2004 to develop improved patient-reported outcomes (PRO) [1]. The multicenter collaborative PROMIS has produced more than 300 item banks within the physical, mental, and social domains. The PROMIS scales are advantageous for their high precision, which facilitates the assessment of a wide range of various aspects regarding patients' contexts. The information compiled by the PROMIS Health Organization has been translated into multiple languages and used worldwide [2]; thus, the study developed the PROMIS self-efficacy for managing symptoms item bank (version 1.0) in Korean, using the item response theory (IRT) and evaluated its psychometric properties.

The PRO is pertinent for establishing a scientific framework for patient experience in healthcare research [3,4]. The United States National Institutes of Health recognized the need for PRO measurement tools to ensure validity and reliability in high-quality care [1]. There has been a significant demand from patients for the expression and measurements of their "real" symptoms and experiences [5]. The PROMIS item banks from a physical category have been translated and validated more frequently than those in the psychosocial health categories [6,7].

The evaluation of self-care abilities among patients with chronic diseases is important for the maintenance, monitoring, and management of their medical information. According to the self-care of chronic illness theory, the improved management of chronic diseases results in positive self-care outcomes [8]. As shown by the health action process approach theory, initiating health-related behaviors, such as self-care, requires a *pre-intentional motivation process.* In a previous study, it was reported that self-efficacy had an effect on self-care in patients with chronic diseases such as heart failure, asthma, and hypertension [9–11]. Self-efficacy is relevant to this process, as it is the belief in one's own abilities to complete a task or achieve a goal [12,13]. Thus, self-efficacy for managing symptoms refers to a set of patients' beliefs about their ability to control their symptoms successfully.

The PROMIS self-efficacy scales for managing chronic conditions fall within the mental health category [14]. Patients are impacted by various needs and symptoms depending on their respective contexts; hence, evaluating patients can help to provide effective individualized care [15,16]. Standardized PRO measurements are necessary to evaluate the patients' cultural backgrounds, which are done during psychometric evaluations. Standardizing PRO measurements is crucial because multiple understandings could arise from different cultural backgrounds, even in the same given sentence [17].

According to the evidence, chronic diseases have consistent guidelines that include symptoms management and complication prevention. However, treatment goals and management processes vary among patients [18,19]. With an understanding of the patients' integrative context, nurses should be able to make sound clinical judgments [20]. For instance, a previous scoping review study emphasized the increasing need for cross-cultural studies that analyze indicators of Diabetes Mellitus (DM) in the context of the patients' life and experiences. Particularly, social factors can be considered in order to manage blood glucose levels [21]. Nurses' monitoring and intervention to manage chronic disease patients' symptoms make up a substantial axis of social factors. Thus, measuring self-efficacy for managing symptoms using the PROMIS self-efficacy scales is essential for patients with chronic disease.

Self-efficacy of patients with chronic disease for self-care and symptom management is a significant topic that has continuously piqued interest in healthcare [22–25], and instruments have been developed in response [26–28]. A systematic review of the self-efficacy instruments for patients with chronic diseases reported that most instruments had unclear purposes and measurement properties [29]. The widely used self-efficacy scale [30] is limited to general aspects of self-efficacy and not for assessment of patients' self-efficacy in managing symptoms. There is a need to assess patients' psychological readiness for the management of complications or acute exacerbations through the incorporation of voluntary self-care strategies. The PROMIS self-efficacy for managing symptoms item bank assesses self-efficacy in a variety of domains, ranging from daily symptom management activities to strategies for coping with unexpected changes.

The original PROMIS item banks were developed using the IRT model [31,32]. The IRT analysis highlighted the functions of each item and encompassed the characteristics of items in the whole measurement [33]. With regard to measuring, IRT is concerned with the item of measurement, whereas classical test theory depends on the entire measurement [34]. Using IRT, it is possible to determine how each item contributes to a total measurement and how each item performs on the measurement [35]. Each PROMIS item bank measures specific categories and domains and is considered a one-factor model [6,36]. The PROMIS seeks to expand the understanding of patients' experiences by using item banks in the global healthcare domain. Therefore, developing the PROMIS item bank in a different language through strict and systematic methods can help generate individualized PRO evidence.

This study aimed to develop the PROMIS self-efficacy to manage symptoms using the version 1.0 item bank that has been translated and adapted culturally to Korean. Furthermore, to investigate psychometrics using the IRT model for patients with type 2 DM.

Methods Design

This is a methodological study designed to evaluate the validity and reliability of the Korean version of PROMIS self-efficacy for managing symptoms item bank (version 1.0) with original data from the survey.

The current study comprises two main phases. First, the Korean version of PROMIS self-efficacy for managing symptoms item bank was developed. The details of the first step are described in the following section, "Translation including cross-cultural context." Second, a cross-sectional study was conducted to evaluate the psychometric properties of the final version of the Korean item bank. After the survey, raw data was analyzed using the IRT model, in accordance with the reporting checklist for PROMIS [37]. Furthermore, this study adhered to the *Strengthening the Reporting of Observational Studies in Epidemiology* (STROBE) guidelines [38].

Translation process and validation

The license agreement to translate the PROMIS self-efficacy for managing symptoms item bank (version 1.0) into Korean was obtained from the PROMIS Health Organization (PHO). The PHO presented the guidelines for translation and development. Figure 1 presents an overview of the translation process. The translation process followed the PROMIS translation guidelines based on the Functional Assessment of Chronic Illness Therapy (FACIT) translation methodology [39,40]. One of two independent Korean speakers translated the first version of the item bank, and the other reviewed the first version. A Korean-English bilingual translator back-translated the version, and three Korean speakers reviewed the back-translation. All the translators used during this process were healthcare providers. The research team finalized the translated item bank and reached a consensus with the PROMIS center. Thereafter, five Korean patients with type 2 DM were enrolled in the cognitive testing and linguistic validation process. The study research team reported the cognitive interview results to the PROMIS center. The final version of the Korean version of PROMIS self-efficacy for managing symptoms item bank was completed based on the cognitive interview report and discussion.

Sample/Participants

A total of 354 patients with type 2 DM were recruited using convenience sampling from the DM center of a tertiary hospital in Seoul, South Korea. The study participants were adults aged 19 and above and had volunteered to participate in completing the questionnaires between July and August 2020. We chose type 2 DM patients as the study population. The first reason is to reduce participant heterogeneity and to control exogenous variables for psychometric evaluation. Second, DM is one of the most common chronic diseases that can be treated and managed with regular evaluations and treatments such as diet, physical activity, and medication [41]. It thus becomes vital for patients with type 2 DM to manage symptoms through medication and treatment [42].

A total sample of 323 patients (91.2%) completed the survey, and thus were included in the study utilized. Confirmatory factor analysis (CFA) was used to test the assumptions of the IRT model. The minimum sample size for CFA was 200 cases [43], with a previous study reporting that the IRT model can be applied to at least 200 patients depending on the model complexity in healthcare research [44]. Moreover, the sample size used in this study exceeded the minimum criterion for the IRT model.

Data Collection Instrument

The main instrument used was the PROMIS self-efficacy for managing symptoms version 1.0 item bank for adults, which includes 28 items. A five-point Likert scale was used to assess the responses, ranging from a scale of “1 = not at all confident” to “5 = very confident.” A higher score implies an increased sense of self-efficacy in managing symptoms. This item bank measures patients’ self-efficacy regarding the degree to which symptoms are controllable and the ability to prevent symptoms from worsening.

In addition, two measurements were used to analyze the convergent validity, namely the Diabetes Self-Management Assessment Report Tool (D-SMART) and the Korean version of the Summary of Diabetes Self-Care Activities Questionnaire (SDSCA), after approval from the original authors. These two instruments have established good validity and reliability in previous studies.

The original version of D-SMART was developed by the American Association of Diabetes Educators via Peyrot and colleagues to assess the self-management behavior of patients with DM [45]. The Korean version of D-SMART was used in previous studies [46,47]. Among the D-SMART questions, 23 items were used to evaluate the self-management skills confidence [45]. The evaluation of skills confidence for DM self-management behavior in seven categories, including exercise/activity, nutrition, medication, and monitoring, is conducted using a 4-point Likert scale, with higher scores indicating greater skills confidence. In this study, Cronbach's alpha value of scale was 0.91.

Toobert and colleagues revised SDSCA in 2000, which is used mainly in self-management activity studies for patients with DM and consists of 25 items, including six subscales: general and specific diet, exercise, blood sugar test, foot care, and smoking [48]. Chang and Song (2009) translated and modified the revised SDSCA in Korean and it has 17 items, excluding eight items that could not be scored [49], and five domains—diet, exercise, medication, blood sugar test, and foot care—were included [50]. This measurement asks participants to indicate on an 8-point scale (‘0 day’ to ‘7 days’), the number of days they engaged in self-care activities corresponding to each item during the previous week. Cronbach's alpha for the Korean version of this study was as follows: 0.58 for diet, 0.80 for diet, 0.36 for medication, 0.92 for blood sugar test, and 0.63 for foot care.

Assumptions of the IRT

The IRT model requires several robust assumptions, namely: *unidimensionality, invariance, local independence,* and *monotonicity* [43]. First, the CFA and coefficient omega (ω_h) were used to analyze *unidimensionality* and *invariance* [51,52]. The criteria of the CFA results of *unidimensionality* required the comparative fit index (CFI) or Tucker-Lewis Index (TLI) to exceed .95 or root mean square error of approximation (RMSEA) to be less than 0.06 [51]. In addition, the results of ω_h were used to assess *unidimensionality* [52]. The generally accepted criterion for ω_h is .70 [53]. Second, the chi-square (χ^2) value assessed whether the model was fit for *invariance*. When the *p*-value of χ^2 was not statistically significant, it was considered an appropriate model fit [51]. Confirming the assumption with χ^2 is a theoretical concept, and every case does not meet the χ^2 assumption. When χ^2 was not satisfied, it could be assumed that each subgroup has a varied differential item functioning (DIF) [35]; therefore, age, gender, and income were selected as the anchor variables to confirm the DIF in this study. Thirdly, using Yen's *Q*3, *local independence* was tested by residual correlations [54]. A study reported that *local independence* did not have a single critical value [55]. However, based on previous research and consensus-based standards for the selection of the health measurement instruments (COSMIN) manual for systematic reviews of PROMs, this study established criteria: 51,56]. Finally, *monotonicity* was supported by an adequate graph of discrimination and thresholds [51,57].

Data analysis

The data was analyzed using SPSS (version 25.0; IBM, Armonk, NY, USA) and the *lavaan, psych, mirt,* and *lordif* packages in *R* version 4.1.2. A descriptive statistical test was performed for the demographic and clinical variables. Univariate normality was confirmed before analysis to identify the selection bias of the study. Cronbach's α coefficients were used to confirm the reliability of the measurements. This study applied diagonally weighted least squares (DWLS) to determine the CFA results using the *lavaan* package in *R,* because the item bank was an ordinal variable, and the ceiling effect was identified [58,59]. The ω_h were estimated using the *psych* package, and the residual correlation was tested using *mirt* package in *R*.

T-score

Following the PROMIS scoring guide, the standardized T-score was used in this study [21]. T-score is a standard score of reference samples including United States (U.S.) general population [31]. The underlying T-score of the self-efficacy for managing symptoms item bank was calibrated to reach an average of 50, with a standard deviation of ±10 for the U.S. clinical sample. The PROMIS center provides the PROMIS T-score maps on the website for some short-form item banks. The T-score was obtained using the website of the Health Measures Scoring Service (powered by the Assessment Center℠) that provides underlying item parameters and scoring for the U.S.

IRT model

This study used the graded response model (GRM) of the IRT model because the item bank has ordered categories, such as the Likert scale [43]. For the GRM, discrimination and thresholds were estimated, and category response curves were derived. The IRT model was implemented to reflect the patients' ability level for psychometric evaluation using the *mirt* package in *R* [43,60].

Differential item functioning

The DIF was analyzed to evaluate the validity of this item bank, which was constructed using a five-point Likert ordinal scale. Three group variables, including age, gender, and income, were used to analyze whether each question functions differently between groups. Among the group variables, the age group was divided into under 60 years [61] and above, with a male gender group as a reference. The income group was divided into less than four million South Korean won [62] and more.

The *lordif* package used the ordinal logistic regression model for DIF estimating methods [38]. The DIF analysis was conducted in two steps. First, the likelihood ratio χ^2 test was carried out without using the anchor item. Second, the DIF item was extracted from 28 items. The DIF can be categorized as either a uniform DIF (if the effect is constant) or a non-uniform DIF (if the effect varies depending on the trait level) [63,64]. The χ^2 difference test (df = 1) was conducted for each of the two types of DIF using logistic regression. The overall χ^2 difference test ($df = 2$) for the total DIF was identified for the two inclusive types of DIF effect. A significance level of .01 was used as the criterion for each χ^2 test. Thereafter, the DIF was evaluated using the items that were not extracted during the first step as anchor items. In this step, at least 2.0% of the items within McFadden's pseudo R^2-change were extracted as a DIF [65].

Results Demographics and clinical characteristics

The average age of the patients was 62.16 ± 10.54 years, with a DM period of 14.23 ± 10.33 years in this study. Male patients made up 68.4% of the participants, and the majority of the participants were married (91.6%). Monthly income was reported as less than four million South Korean won by 52.3% of participants and as more than four million South Korean won by 47.7% of participants. The participants' average Body Mass Index (BMI) was 25.11 ± 3.57 kg/m^2, ranging from 16.60 to 42.82 kg/m^2. The average recent hemoglobin A1c (HbA1c), which measures the amount of glucose attached to hemoglobin, was 7.5 ± 1.5% according to patients' electronic health records. The majority of participants (90.1%) managed their DM through oral administration, 33.4% via insulin injection, and 26.9% through a combination of medication and insulin. Most of the participants did not receive DM group education (77.4%) and managed their DM through administering oral medications (90.1%).

Item analysis

In total, 28 items were analyzed using mean and standard deviation (Table 1). Considering the criteria that the average value should be between 1.5 and 4.5 on a five-point Likert scale, all items were within the range [66]. The patients in this study reported moderate self-efficacy for managing symptoms (T = 52.6, SD = 8.25). The T-Score differed merely by two points as compared to the T-score derived for the general U.S. population. Baseline self-efficacy for managing symptoms (T = 51.38, SD = 8.353) improved after two weeks of follow-up (T = 53.82, SD = 7.98).

Reliability and convergent validity

The Cronbach's α of this item bank was .98 (Table 1). All measures met the reliability criteria (>.70). In addition, if the items were deleted, lower levels of Cronbach's α would be observed as opposed to the total Cronbach's α (Table 1). This study tested convergent validity using the D-SMART and the revised SDSCA. The correlation coefficients of the item bank and D-SMART was r = .59 (*p* p = .054), exercise 0.11 (*p* = .059), medication −0.02 (*p* = .731), blood sugar test 0.05 (*p* = .420), and foot care 0.03 (*p* = .633).

Assumptions and the expected scores curves for the IRT

First, *unidimensionality* was the primary assumption for IRT [43,67]. For this study, the CFA results were verified by applying the DWLS. As PROMIS item banks were developed as a unidimensional model [68,69], we determined the *unidimensionality* by conducting CFA to test the convergent validity without exploratory factor analysis [70]. The estimation result of χ^2 (d*f* = 350) was 8809.65, and the model did not perfectly fit the data (*p* 51,71,72] but the RMSEA, 0.274, did not. As the COSMIN methodology for PRO measures [51] recommends that either CFI/TLI or RMSEA should be satisfied with the criteria for *unidimensionality*; thus, the *unidimensionality* of the Korean version of the item bank was identified. In addition, these results comply with the recommended value ω_h for this item bank, which was .87 (Table 1). Second, the *p*-value of χ^2 > .01 provides an appropriate criterion for the *invariance* model fit. The χ^2 value of this item bank was 8809.649 (*p* invariance [35]. Using age, gender, and income as anchor items, a DIF analysis was conducted, and the results confirmed that this model showed *invariance*. Third, the results of residual correlation among the items as a unidimensional model using Yen's *Q*3 were less than 0.37, except for the residual correlation between items 1 (SEMSX001) and 2 (SEMSX002), which ranged from −0.24 to 0.33 [51]. The residual correlation between items 1 and 2 was estimated to be 0.51, and a previous study confirmed *local independence* [56]. Lastly, all category response curves indicated an adequate monotonic relationship between the item thresholds and participants' self-efficacy ability. These inform the *monotonicity* of the basic assumptions for IRT. Figure 2 displays the example of the category response curve for item 22.

Estimating graded response model

The GRM evaluated item discrimination (*a*) and thresholds (*b*) based on participants' response patterns regarding the IRT model (Table 2). Overall, the discrimination of this item bank was high, ranging from 1.82 to 4.93. The threshold values in the item bank were estimated in the order of low to high values according to the GRM (Table 2). For item 11, no patient selected the first category. Thus, the threshold of item 11 was analyzed using only four categories, from the initial two to five. When identifying the category response curve derived using the estimated item parameter, the category curve did not indicate complete overlap with another curve. The figures of the 28 items were interpreted to ensure that each item category had appropriate functions. An example of item 22 (SEMSX022) is shown in Figure 2.

Analyzing the DIF

This study used three group variables for DIF analysis: age, gender, and income.

First, as a result of conducting the likelihood ratio χ^2 test using the age group variable, items 1 (SEMSX001), 21 (SEMSX021), and 27 (SEMSX027) had DIF. Items 1 and 21 represented the non-uniform DIF, and item 27 described the uniform DIF. All three DIF items (1, 21, and 27) had statistical significance in the total DIF effect (*p* 2-change of over 2.0% or more; the R^2-change value of uniform DIF was 3.4%, and the total DIF was 3.9% (*p* Figure 3 shows the test characteristic curves (TCC) of item 27. The effect of item 27 on the expected score of the entire item bank was interpreted to be minimal.

Next, the χ^2 test results according to the gender group variable were described. Item 27 had a uniform DIF (*p* p = .211). After the ordinal logistic regression was re-conducted with the remaining items, excluding item 27, there was no item with McFadden's pseudo R^2-change. Finally, the χ^2 test was conducted with the income group variable, and no item indicated the DIF.

Discussion

This study developed the Korean version of PROMIS self-efficacy for managing symptoms item bank. The PROMIS item banks are globally used instruments to assess self-reported patient outcomes, which include integrative factors that identify patients as individualized people [35]. Previous studies have translated psychometric evaluations into other languages using the IRT [73,74]. The IRT model underscores the functions of each item and outlines the item characteristics across the instrument [35,75]. Cleanthous and his colleagues verified that the IRT was suitable for PROMIS® measurement applications [76]. The IRT model was advantageous for measuring human abilities, attitudes, and other attributes using actual survey data.

Cronbach's α identified the reliability of this item bank as appropriate. This study used the D-SMART and the revised SDSCA to test convergent validity. The current item bank showed a significant correlation with D-SMART, which is evaluating the self-efficacy for self-management skills [70]. It indicates that the item bank was reliable and suited conceptually in terms of self-efficacy among participants of this study. On the contrary, none of the subdomains of the revised SDSCA, measuring self-care activities in the past week, showed statistical significance. A systematic review of measurements for self-care among DM patients reported that the revised SDSCA had low quality of comprehensiveness and comprehensibility [77]. This psychometric limitation of the revised SDSCA needs careful interpretation of the current result of convergent validity with the PROMIS item bank.

This study partially fulfilled the four basic IRT assumptions. The study adopted the COSMIN guidelines even though there was no absolute standard for the criteria of IRT assumptions. The CFA was conducted to validate the *unidimensionality* of the original PROMIS scale. Since the item bank comprised ordinal data, the DWLS was selected for the estimation method in this study [35]. A small sample of fewer than 200 participants may face an increased risk of an overestimated correlation using DWLS [58]. However, the number of participants in this study met this criterion (n = 326). The overall fit of this item bank fulfilled the requirements of the validity of CFA and supported the *unidimensionality* of CFI. The Root Mean Square Error of Approximation and Standard Root Mean Residual did not meet the inclusion criteria. These results implied the possibility that the Korean version of the PROMIS self-efficacy for managing symptoms item bank may possibly have a multiple factor structure. According to the original PROMIS item banks [31,32] as well as previous studies based on a psychometric evaluation of the PROMIS item banks, analyses were performed using a single factor model [2,52,76,78]. Since this study aimed to verify the results by applying PROMIS measurements to a Korean context, the IRT was performed without further modification of the items. Thus, further research is required to analyze the subcategories in the item bank across various settings and populations.

Data for this study was collected from the diabetes center at a tertiary hospital in Korea. The participants displayed effective outcomes with regard to DM control. For example, the HbA1c was 7.5 ± 1.5%, performing lower than that reported in previous studies [79,80]. In addition, over 90% of the participants controlled their glucose with oral medication. These results can result in the ceiling effect, indicating good control of their glucose levels. Ceiling effects negatively affect the CFA results [81]. This study was analyzed using the DWLS in consideration of the ceiling effect. Statistical calibration serves as one method to solve this problem; however, the flooring or ceiling effects need to be considered when developing psychological evaluation tools such as self-efficacy instruments.

As a result of the psychometric evaluation using the IRT model in this study, the Korean version of PROMIS self-efficacy for managing symptoms was a suitable instrument. The discrimination (*a*) range of the Korean version of this item bank was from 1.82 to 4.93. All the category response curves of the items were independent. The proper item showed discrimination that exceeded zero, indicating that the higher the values, the better the associated discrimination [43]. In a previous study that analyzed the PROMIS self-efficacy for managing daily activities item bank through the IRT model, discrimination was scored between 1.90 and 4.03 [82]. This is similar to the present study.

The independent category response curves derived from the threshold (*b*) values indicated that the scale of the item (five-point Likert scale) had its own traits [43]. The results of category response curves suggest that each item of the Korean version of this item bank did not need to be tuned or revised.

The major strength of this study was that it identified the global utility of the PROMIS item bank of self-efficacy for managing symptoms. The DIF results, comprising subgroups of age, gender, and income, suggested that specific general characteristics did not interfere with the total item bank. Psychological measurements generally target participants from various contexts. Each item should function similarly for the same ability of participants [83]. In this study, item 27 was identified as the DIF in the age group variable. The test characteristic curve of item 27 (*I can find the information I need to manage my symptoms*), showed a negligible difference between the total and item 27 graphs. The confidence or ability to obtain health-related information was affected by the use and access level of digital devices [84,85]. Although there was no significant difference observed from the graph, item 27 reflected the increased tendency of health literacy toward using smart devices to induce vulnerability among older adults [86,87]. This result suggests that nurses and nursing scientists should consider older adults’ self-efficacy for information-seeking behavior.

Limitations

The Korean version of PROMIS self-efficacy for managing symptoms can be used to enhance healthcare providers' understanding of patients with chronic diseases and to individualize care plans according to a person's self-efficacy. In addition, it has become possible to benchmark the self-efficacy of chronic diseases on a global level. However, this study has some limitations. First, the study was conducted in a single tertiary hospital and recruited patients with type 2 DM. Therefore, its application to patients with other chronic diseases may be limited. Since the item bank is intended for patients with chronic diseases in general, it is suggested that future studies expand to include other chronic diseases. Second, we evaluated convergent validity using self-care instruments that are frequently used in patients with DM, as the self-efficacy instrument for symptom management can rarely be found; thus, consideration needs to be given to the interpretation of the convergent validity results of this study. Finally, the data had a ceiling effect and the probability of multi-dimensionality. The statistical results indicated that the ceiling effect affected the outcome. In future studies, the inclusion of various patient groups or situations is required to evaluate the psychometric properties of self-efficacy while considering the ceiling effect and multi-dimensionality.

Conclusions

For the Korean version of PROMIS self-efficacy for managing symptoms item bank, the IRT model for psychometric testing was used. The results indicated decent reliability and validity of the measurement. Increasing self-efficacy for managing symptoms in patients with chronic diseases can play a significant role in improving the capability of maintaining their health. Thus, this instrument can facilitate healthcare providers’ evaluation of the degree of self-efficacy required to manage symptoms among patients as well as develop educational tools and interventions for their effective management.

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Conflict of interest

The authors declare no conflicts of interest.

This manuscript is not under consideration by another journal and has not been published or presented elsewhere in part or in its entirety except Research Square of a preprint.

Ethical approval

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted from the Institutional Review Board of Severance Hospital (4-2019-0257) prior to the translation and survey. The purpose and process of this study were explained by the researchers to the participants. The study participants were guaranteed confidentiality and voluntary participation and provided their written informed consent.

Consent to participate

Informed consent was obtained from all individual participants included in the study.

Item	Mean ± SD	Cronbach's α if deleted
SEMSX001	3.53 ± 1.16	.98
SEMSX002	3.68 ± 1.07	.98
SEMSX003	3.17 ± 1.26	.98
SEMSX004	3.89 ± 1.05	.98
SEMSX005	3.74 ± 1.11	.98
SEMSX006	3.93 ± 1.05	.98
SEMSX007	4.18 ± 0.88	.98
SEMSX008	3.88 ± 1.01	.98
SEMSX009	3.72 ± 1.14	.98
SEMSX010	3.95 ± 1.01	.98
SEMSX011	3.89 ± 1.02	.98
SEMSX012	3.90 ± 1.05	.98
SEMSX013	3.77 ± 1.09	.98
SEMSX014	3.93 ± 1.01	.98
SEMSX015	3.84 ± 1.08	.98
SEMSX016	3.79 ± 1.05	.98
SEMSX017	3.85 ± 1.03	.98
SEMSX018	3.85 ± 1.07	.98
SEMSX019	3.73 ± 1.08	.98
SEMSX020	3.90 ± 1.03	.98

SEMSX021	3.73 ± 1.14	.98
SEMSX022	3.86 ± 1.02	.98
SEMSX023	2.85 ± 1.03	.98
SEMSX024	2.73 ± 1.08	.98
SEMSX025	2.73 ± 1.08	.98
SEMSX026	2.89 ± 1.03	.98
SEMSX027	2.73 ± 1.14	.98
SEMSX028	2.86 ± 1.02	.98

Item	Discrimination a (SE)	Threshold			
b1 (SE)	b2 (SE)	b3 (SE)	b4 (SE)	SEMSX001	2.34 (.22)
−2.43 (.24)	−1.18 (.12)	−0.08 (.09)	.73 (.10)	SEMSX002	1.99 (.19)
−2.18 (.21)	−0.84 (.11)	.27 (.09)	1.15 (.13)	SEMSX003	2.52 (.23)
−2.62 (.28)	−1.10 (.12)	−0.27 (.08)	.64 (.10)	SEMSX004	1.82 (.17)
−1.98 (.20)	−0.86 (.11)	.15 (.10)	1.08 (.13)	SEMSX005	2.55 (.23)
−1.84 (.17)	−1.08 (.11)	−0.19 (.08)	.76 (.10)	SEMSX006	2.42 (.23)
−2.19 (.21)	−1.38 (.13)	−0.33 (.09)	.67 (.10)	SEMSX007	1.93 (.18)
−1.73 (.17)	−0.67 (.10)	.20 (.09)	1.07 (.13)	SEMSX008	3.21 (.30)
−2.44 (.23)	−1.36 (.12)	−0.51 (.08)	.30 (.08)	SEMSX009	2.68 (.25)
−2.26 (.21)	−1.22 (.12)	−0.37 (.08)	.48 (.09)	SEMSX010	3.48 (.33)
−2.37 (.22)	−1.31 (.12)	−0.52 (.08)	.26 (.08)	SEMSX011	3.50 (.35)
N/A	−1.62 (.14)	−0.88 (.10)	.13 (.08)	SEMSX012	3.37 (.31)

−2.50 (.25)	−1.38 (.12)	−0.55 (.08)	.37 (.08)	SEMSX013	2.52 (.24)
−2.30 (.22)	−1.10 (.11)	−0.43 (.09)	.50 (.09)	SEMSX014	3.50 (.33)
−2.23 (.21)	−1.41 (.13)	−0.56 (.08)	.30 (.08)	SEMSX015	4.20 (.40)
−2.22 (.20)	−1.30 (.11)	−0.48 (.08)	.33 (.08)	SEMSX016	4.93 (.48)
−2.10 (.18)	−1.29 (.11)	−0.49 (.08)	.32 (.07)	SEMSX017	4.75 (.45)
−2.05 (.17)	−1.23 (.11)	−0.51 (.08)	.29 (.07)	SEMSX018	3.46 (.32)
−2.21 (.21)	−1.25 (.11)	−0.43 (.08)	.36 (.08)	SEMSX019	3.50 (.32)
−2.11 (.19)	−1.14 (.11)	−0.44 (.08)	.43 (.08)	SEMSX020	4.20 (.40)
−2.44 (.25)	−1.27 (.11)	−0.55 (.08)	.28 (.07)	SEMSX021	3.33 (.31)
−2.28 (.21)	−1.18 (.11)	−0.50 (.08)	.35 (.08)	SEMSX022	2.39 (.23)
−2.50 (.25)	−1.37 (.13)	−0.47 (.09)	.54 (.09)	SEMSX023	2.30 (.22)
−2.85 (.34)	−1.44 (.14)	−0.53 (.09)	.45 (.09)	SEMSX024	2.57 (.24)
−2.25 (.22)	−1.33 (.13)	−0.62 (.09)	.43 (.09)	SEMSX025	2.90 (.27)
−2.22 (.21)	−1.21 (.12)	−0.40 (.08)	.53 (.09)	SEMSX026	4.57 (.43)
−1.99 (.17)	−1.30 (11)	−0.52 (.08)	.34 (.07)	SEMSX027	2.08 (.20)
−2.32 (.23)	−1.27 (.13)	−0.50 (.09)	.53 (.10)	SEMSX028	3.70 (.34)
−2.20 (.20)	−1.28 (.12)	−0.48 (.08)	.42 (.08)	Range	1.82 to 4.93

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Sex-Based Differences in Outcomes of Coronavirus Disease 2019 (COVID-19) in Korea

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ABSTRACT (ENGLISH)

SUMMARYPurpose

This study examined the factors affecting mortality and clinical severity score (CSS) of male and female patients with Coronavirus Disease 2019 (COVID-19) using clinical epidemiological information provided by the Korea Disease Control and Prevention Agency.

Methods

This is a retrospective, observational cohort study. From January 21 to April 30, 2020, a total of 5624 patients who were released from quarantine or died were analyzed.

Results

The factors influencing release or death that differed by sex were high heart rate and malignancy in males and chronic kidney disease in females. In addition, the factors influencing progression to severe CSS were high BMI (severe obesity) and rheumatic disease in males and high temperature, sputum production, absence of sore throat and headache, chronic kidney disease, malignancy, and chronic liver disease in females. Older age, low lymphocyte count and platelets, dyspnea, diabetes mellitus, dementia, and intensive care unit (ICU) admission affected mortality in all the patients, and older age, low lymphocyte count and platelets, fever, dyspnea, diabetes mellitus, dementia, and ICU admission affected progression to severe stage of CSS.

Conclusions

This study is expected to contribute to the general results by analyzing nationally representative data. The results of this study present an important basis for development of differentiated nursing and medical management strategies in consideration of factors that influence treatment effects and outcomes according to sex of patients with COVID-19.

FULL TEXT

DETAILS

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Profile of non-communicable Disease Risk Factors Among Nurses in a Tertiary Care Hospital in South India

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ABSTRACT (ENGLISH)

SummaryPurpose

The work nature of nurses and the associated lifestyle changes put them at high risk of developing noncommunicable diseases (NCDs). This study was conducted to estimate the prevalence of NCD risk factors among nurses working in a tertiary care hospital in Puducherry and to determine the associated factors among nurses.

Methods

We conducted a cross-sectional study among all nurses (N = 1217) in the tertiary care hospital aged between 21 and 60 from May 2019 to April 2020. We assessed NCDs behavioral, physical, and biochemical risk factors using a self-administered questionnaire. The adjusted prevalence ratio was calculated using a generalized linear regression model to determine factors associated with NCD risk factors.

Results

The response rate was 99.0% (1217/1229), and 77.5% of the participants were women. Current tobacco use and alcohol consumption were 1.5% (95% CI: 0.8–2.2) and 2.9% (95% CI: 2–3.9), respectively, with significantly higher prevalence among men. Overweight or obesity (body mass index ≥ 23 kg/m2) was 77.7%, with a significantly higher prevalence among those aged ≥30 and married. Prevalence of hypertension was 14.4% (95% CI: 12.5–16.4), and diabetes mellitus was 11.5% (95% CI: 9.7–13.6). Both were significantly higher among those aged ≥50 years. One-third of nurses, 34.3% (95% CI: 31.6–37.1), had hypercholesterolemia, significantly higher among men.

Conclusion

We found a high prevalence of various NCD risk factors among the nurses. We highlight the urgent need for initiating health promotion interventions, especially to improve intake of healthy diet and physical activity among nurses aged ≥30 years.

FULL TEXT

DETAILS

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Epidemiological Characteristics of Carbapenemase Producing Carbapenem-Resistant Enterobacteriaceae Colonization

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ABSTRACT (ENGLISH)

SummaryPurpose

This study identified the epidemiological characteristics, including the size and major strains, of carbapenemase-producing carbapenem-resistant *Enterobacteriaceae* (CP-CRE) and CP-CRE-related factors by comparing the characteristics of patients in the CP-CRE and non-CP-CRE groups and the CP-CRE and non-CRE groups.

Methods

This secondary data analysis study included 24 patients in the CP-CRE group, 113 patients in the non-CP-CRE group, and 113 in the non-CRE group. The size and type of CP-CRE were analyzed in terms of frequency and percentage, and CP-CRE risk factors were identified using multiple logistic regression analysis.

Results

The rate of CP-CRE positivity among patients with CRE was 17.5%, and the most common causative organism in the CP-CRE group was *Klebsiella pneumoniae* (81.8%). There were no significant differences between patients in the CP-CRE and non-CP-CRE groups. When compared with the non-CRE group, the isolation of multidrug-resistant organisms except for CRE, particularly vancomycin-resistant *Enterococcus*, was confirmed as a major risk factor.

Conclusion

To prevent CP-CRE acquisition, patients with multidrug-resistant organisms require treatment with more thorough adherence to CRE prevention and management guidelines.

FULL TEXT

Introduction

Carbapenem-resistant *Enterobacteriaceae* (CRE) are antibiotic-resistant strains and refer to *Enterobacteriaceae* that have acquired resistance to carbapenem antibiotics [1]. CRE emerged after carbapenem antibiotics were used as a treatment for extended-spectrum beta-lactamase-producing gram-negative strains [2] and have become a global public health threat due to widespread antibiotic resistance and high mortality rates [3–7]. In the United States, there were 13,100 cases of CRE infection in 2019, with 1100 infections resulting in death [8]. In Korea, the number of reported CRE infections rose from 5717 in 2017 to 18,113 in 2020, with the number of deaths increasing sharply from 37 to 226 over the same period [9]. According to recent studies, including systematic literature review studies, exposure to antibiotics, especially carbapenems, is the most important risk factor for CRE acquisition [10,11]. In addition, underlying diseases, invasive procedures including mechanical ventilation, use of medical devices such as central venous tubes, admission to intensive care units (ICUs) [11–13], multidrug-resistant organism (MDRO) colonization or infection [13], Acute Physiology and Chronic Health Evaluation (APACHE) II score [12,13], and transfer between hospitals [12] are related to CRE acquisition.

Carbapenemase-producing CRE (CP-CRE) is a CRE that exhibits resistance to β-lactam antibiotics through the production of carbapenemase-producing enzymes [10,14] and is distinguished from non-CP-CRE, which exhibits antibiotic resistance through mechanisms such as the production of extended-spectrum β-lactamases (ESBL) or AmpC cephalosporinases with decreased outer membrane permeability [15,16]. Since the carbapenemase gene of CP-CRE is located in a mobile genetic element, such as a plasmid or transposon, it can demonstrate faster patient-to-patient transmission than non-CP-CRE [5,15]. Therefore, it is necessary to develop an effective CP-CRE management strategy based on an understanding of the characteristics that distinguish CP-CRE from non-CP-CRE or non-CRE.

According to previous studies, the positivity rate for CP-CRE differs depending on the CRE-infected or colonized patients varies widely from 20% [17] to 67.9% [18]. CP-CRE-related characteristics also showed different results depending on which of the CRE-infected or colonized patients were targeted. In a case-control study in which patients with CRE bacteremia were classified into CP-CRE and non-CP-CRE groups in China, old age, cancer, and use of carbapenem antibiotics were identified as risk factors for CP-CRE [19]. In a cohort study of US veterans, heart disease and gastroesophageal reflux disease [18] were identified as risk factors for CP-CRE. In contrast, in a study that divided patients with CRE into CP-CRE and non-CP-CRE groups at an Israeli tertiary hospital, prehospital antibiotic use, experience in nursing homes, and the presence or absence of pressure sores were identified as risk factors for CP-CRE; age was not a risk factor [20]. The use of mechanical ventilation was a protective factor for CP-CRE when the CP-CRE and non-CP-CRE groups were compared, whereas the use of mechanical ventilation appeared as a risk factor when compared with the non-CRE group [20]. In another study with CRE colonized group, the mechanical ventilation was identified as a risk factor for CP-CRE because the use of mechanical ventilation [21] in the CP-CRE group was higher than that of the non-CP-CRE group.

As a result of the literature review, studies on the CP-CRE positivity rate and related factors have been limited to a few countries, such as the United States, Israel, and China; therefore, information on epidemiologic characteristics is limited, and consistent results are not reported, with varying findings depending on the study population or design. In particular, the Korean government is strengthening efforts to identify the epidemiological characteristics of CP-CRE through the revision of regulations by requiring that CP-CRE clusters are identified, and an epidemiological investigation conducted to identify the source of infection [22]; nevertheless, there is very little research in this regard. Therefore, the purpose of this study was to identify the epidemiological characteristics of CP-CRE colonization in patients admitted to the ICU, a department where patients are at high risk of acquiring CRE. The specific objectives of this study were to investigate the size and major strains of CP-CRE and identify the CP-CRE-related factors by comparing the characteristics of patients in the CP-CRE and non-CP-CRE groups and the CP-CRE and non-CRE groups.

Methods Study design

This case-control study used secondary data analysis to understand the epidemiological characteristics of CP-CRE in patients in the ICU.

Study participants

The primary data for this study came from previous studies that developed a CRE acquisition risk prediction model [13] and evaluated the external validity of the developed predictive model [23]. Each study was conducted using data between October 1, 2016 and October 31, 2017 and between November 1, 2017 and May 31, 2018, respectively. Eight hundred fifty-eight patients admitted to the ICU of a tertiary general hospital located in Y-city, and acquired CRE from the CRE active surveillance culture test at least once within 1 week of admission and from 1 week after admission until discharge, were included in the primary data (137 in the CRE acquisition group and 721 in the nonacquired group). In the study hospital, CRE active surveillance culture test was performed for every patient admitted to the ICUs using a perirectal swab within 7 days of hospitalization (baseline screening), and weekly thereafter until 7 days after discharge [13,23]. And all patients with CRE isolated from clinical specimens were also subjected to the test. CRE acquisition was confirmed not using clinical specimens but using a rectal swab for the purpose of active surveillance testing for CRE colonization. CRE colonization was confirmed by carbapenem antimicrobial susceptibility testing (imipenem ≤22 mm, ≥2 μg/mL minimum inhibitory concentration (MIC); ertapenem ≤21 mm, ≥1 μg/mL MIC) using the disk diffusion method, which was performed in accordance with the legal communicable disease diagnostic criteria of the Korea Centers for Disease Control and Prevention (KCDC) [24]. For CRE cases, carbapenemase production was tested using the modified Hodge test (MHT) method based on the Clinical &Laboratory Standards Institute's recommendations. MHT is known to have a high level of sensitivity (>90.0%) and specificity (>90.0%) in detecting *Klebsiella pneumoniae* carbapenemase-type carbapenemases [25]. As a result of the test, 24 and 113 patients were allocated to the CP-CRE and non-CP-CRE groups, respectively. The study participants were classified into three groups: CP-CRE, non-CP-CRE, and non-CRE groups. The non-CRE group was randomly selected to have the same number of participants as the non-CP-CRE group. For achieving this, 721 people in the non-CRE group were assigned a serial number; random numbers were generated using Excel, and 113 subjects with a serial number matching the generated numbers were selected as the non-CRE group. Therefore, the final numbers of the study participants were 24, 113, and 113 in the CP-CRE, non-CP-CRE, and non-CRE groups, respectively. The sample size for the case-control study design was calculated using an online program called the Open Source Epidemiologic Statistics for Public Health [26] at .05 as the significance level (α), .80 as the power, and 1:5 as the ratio of cases to controls [27]. For an exposure ratio of 20.8% and odds ratio of 4.1 for the control group, assuming that mechanical ventilation was a risk factor for CP-CRE based on a previous study [21], the minimum sample required was 19–24 in the case group and 94–119 in the control group.

Study variables

The variables examined in this study were demographic characteristics, clinical characteristics at the time of admission to the ICU, and clinical characteristics during ICU stay, which were mainly considered for CRE-related factor studies [11–13,17] or CP-CRE-related factor studies [18–21]. Sex and age variables were included as demographic characteristics, and clinical characteristics at the time of admission to the ICU included APACHE II score, Charlson comorbidity index score (CCIS), and underlying diseases (diabetes, heart disease, respiratory disease, renal disease, liver disease, and solid cancer). APACHE II score was used instead of APACHE III because the study hospital uses a computerized system that automatically calculates the APACHE II score. A recent study showed a very similar diagnostic accuracy of in-hospital mortality between APACHE II and III [28]. Clinical characteristics during the ICU stay included three items: invasive procedures and instruments, use of antibiotics, and isolation of multidrug-resistant organisms (MDROs). Invasive procedures and instruments included surgery, transplantation, endoscopy, bronchoscopy, continuous renal replacement therapy, indwelling catheters, central venous catheters, ventilators, and drainage tubes. Antibiotics comprised penicillin, carbapenem, cephalosporin, fluoroquinolone, and vancomycin. The isolation of multidrug-resistant bacteria included vancomycin-resistant enterococci (VRE), methicillin-resistant *Staphylococcus aureus* (MRSA), extended-spectrum beta-lactamase (ESBL), and MDR *Acinetobacter baumannii*. Data were collected from the date of hospitalization until the date of CRE colonization for the CRE-colonized group (CP-CRE group and non-CP-CRE group) and until the date of discharge from ICUs for the non-CRE group.

Data analysis

The collected data were analyzed using the SPSS/WIN software (version 25.0; IBM Corp., Armonk, NY, USA). A two-tailed test was performed with a significance level (α) of .05. The size and type of CP-CRE and participants' baseline characteristics were analyzed as frequency and percentage for categorical data and median and interquartile range for continuous data because they were not normally distributed.

Bivariate analysis was conducted using simple logistic analysis to compare the baseline characteristics between the two groups (CP-CRE group vs. non-CP-CRE or non-CRE group), and the unadjusted odds ratios (ORs) and associated 95.0% confidence intervals (CIs) were calculated. With all variables as significant factors at a significance level (α) of .05, the adjusted ORs and the associated 95.0% CIs were calculated through forward stepwise multiple logistic regression analysis after confirming no deviation from the assumption of multicollinearity with a coefficient of determination of less than .80 [29], and variance inflation factor of ranging from 1.03 to 1.19.

Ethical considerations

This study was conducted after receiving approval of exemption from review (No. 05-2021-127) from the Institutional Review Board (IRB) of Pusan National University Yangsan Hospital. All data were anonymized.

Results

Among the 137 patients in the CRE group in this study, 24 patients were included in the CP-CRE group, giving a CP-CRE positivity rate of 17.5%. The most common infectious agent in the CP-CRE group was *K. pneumoniae* (79.1%), followed by *Escherichia coli* (12.5%); in the non-CP-CRE group, *K. pneumoniae* (82.3%) was the most common, followed by *Enterobacter* spp. (8.8%) and *E. coli* (7.1%) ([Table 1]).

[Table 2] presents the baseline characteristics of the participants. For the CP-CRE group, 62.5% were male, 20.8% were transferred from another medical institution, the median CCIS score was 1.5, 79.2% had an underlying disease, 50.0% underwent bronchoscopy, 41.7% received carbapenem antibiotics, and 79.2% had MDROs other than CRE. There was no significant difference in variables between the CP-CRE and non-CP-CRE groups; however, the CP-CRE group had a higher median CCIS score (1.50 vs. 1.00, *p* = .044), bronchoscopy rate (50.0% vs. 26.5%, *p*

= .027), and overall MDROs (except MRSA) isolation rate (79.2% vs. 34.5%, *p* Table 2).

Table 3 shows the results of multiple logistic regression analyses to identify the CRE risk factors using variables that were significant in the simple logistic regression analysis for the CP-CRE and non-CRE groups as explanatory variables. In Model 1, regardless of the type of multidrug-resistant bacteria, isolation was used as an explanatory variable, and as a result, the risk factor for acquiring CP-CRE was confirmed as an isolate of multidrug-resistant bacteria, which was related to a 5.88 times increase the risk of acquiring CP-CRE (*p* = .001) relative to when multidrug-resistant bacteria were not isolated. In Model 2, when individual multidrug-resistant bacteria were included in the model, only VRE was identified as a risk factor for acquiring CP-CRE.

Discussion

In this study, CP-CRE was confirmed in 17.5% of patients in the CRE group. This result is similar to the 20.0% CP-CRE-positive rate [17] obtained in a study in patients with CRE admitted to ICUs and transplant wards of a single hospital in the United States. However, it is much lower than the 27.7% [18] reported in a study using a cohort of patients admitted to 127 veterans hospitals in the United States and the 31.5% reported by the US Centers for Disease Control and Prevention' Antibiotic Resistance Laboratory Network [30], and 44.7% of national surveillance report using both active surveillance cultures and clinical samples from 189 institutions in Korea [31]. This result may be related to the difference in the sample mix; colonized by or infected with CRE. The former two studies, including this study, targeted those colonized by CRE, while the latter three studies with higher positivity rates for CP-CRE examined the CRE-infected group or both. In particular, it showed a higher CP-CRE positivity rate in patients with bloodstream infections. Zou et al [19] study of patients with CRE bacteremia showed a CP-CRE-positive rate of 67.9%. In a cohort study of patients with CRE bacteremia at a tertiary hospital in Korea, the CP-CRE positivity rate was as high as 47.4% [32]. Therefore, even in the same CRE group, it seems that the CP-CRE positivity rate is higher in patients who are infected, especially in the bloodstream infection stage, compared with those at the colonized stage. Nevertheless, it is necessary to confirm this through repeated studies in various settings.

The major strain in the CP-CRE group in this study was *K. pneumoniae*, which supports the results of previous studies which reported that *K. pneumoniae* was the most common CP-CRE strain, regardless of whether it was a CP-CRE-colonized [21] or CP-CRE-infected group [18,19]. In addition, *K. pneumoniae* is the most common CP-CRE strain over the past 10 years from the analysis of national surveillance data in the Korea [31,33]. *K. pneumoniae* accounted for 62.8% [31] to 88.7% [21] of CP-CRE strains, and the result in this study was within this range. The next most frequently isolated strains were *E. coli* and *Enterobacter* spp., which is consistent with the previous reports using national surveillance data [31,33]. However, the rankings differed depending on the study. *E. coli* was found in 4.4% [18] to 20.0% [19,21] of the CP-CRE group, and *Enterobacter* spp. in 9.1% [19] to 13.1% [18]. In this study, only *E. coli* was detected in the CP-CRE group, whereas both strains were detected in the non-CP-CRE group.

For CP-CRE-related factors, some variables, such as invasive procedures and instruments, and antibiotics, were analyzed for correlations with CP-CRE depending on whether they were used [19–21] or their period of use [18]. In this study, only the model including this category was used because there was a difference in the data collection period between the CRE group and non-CRE group, which may distort the results. After confirming the factors related to CP-CRE, there were no distinct characteristics between the CP-CRE and non-CP-CRE groups. However, when compared with the non-CRE group, the isolation of MDROs except for CRE, particularly VRE, was confirmed as a major risk factor. A previous study showed that the presence of MDRO colonization within one year in patients admitted to acute-care hospitals from long-term care facilities is a risk factor for new MDRO colonization [34]. However, it is difficult to find results suggesting that other types of MDRO are risk factors for CP-CRE. In a study conducted in Israel, other types of multidrug-resistant bacteria were associated with CP-CRE, but these were not identified as significant variables in the multiple logistic regression analysis [21]. Unlike other MDROs, VRE was derived as a risk factor for acquiring CRE. The reason may relate to the fact that the major reservoir of VRE and CRE is common in the lower gastrointestinal tract [35]. A healthy gastrointestinal microbiota can provide resistance to multi-drug resistant organisms such as VRE and CRE. However, antibiotic-mediated destruction of the intestinal microbiota and consequent loss of colonization resistance leads to antibiotic-resistant organisms' colonization and infection [36–38].

CCIS and bronchoscopy use were associated with CP-CRE in the univariate analysis but not with CP-CRE in multivariate analyses. The CCIS score of the CP-CRE group was higher than that of the non-CRE group in this study. In a study by Kassem et al [20] conducted in Israel, the CCIS score was significantly higher in the non-CP-CRE group than in the CP-CRE group, but multiple logistic regression analysis showed that CCIS was not related, which was consistent with the finding that it was not a risk factor for CP-CRE. CCIS is an index developed to predict the risk of death within one year of hospitalization based on the number of comorbidities and is often used to evaluate the prognosis or survival of patients [39]. Kassem et al [20] reported that as the CCIS score increased by 1 point, the in-hospital mortality rate increased by 1.09 times, indicating that CCIS reflects in-hospital mortality. The CCIS score has been reported to be related to increased mortality rates for the coronavirus disease in 2019 [40]. Regarding the relationship between bronchoscopy and CRE infection, Mehta and Muscarella [41] reported suspected cases of CRE infection due to inappropriate reprocessing of bronchoscopy following literature review and Internet searches. In these cases, the risk of CRE transmission due to bronchoscopy is underestimated, emphasizing the interest of healthcare workers and the importance of appropriate reprocessing of bronchoscopies [41]. In this study, the statistical power of the use of bronchoscopy was only 42.0%; therefore, it was not confirmed as a factor related to CP-CRE. Repeated studies using a larger sample are required in the future.

Clinical implications

As a result of this study, CP-CRE acquisition was found to occur frequently in patients admitted to the ICU. Factors that increase the risk of CP-CRE in patients with CRE were not identified, but the risk of CP-CRE increases when MDROs are isolated from patients without CRE. When a specific MDRO is identified in a patient, even though precautions such as contact isolation are applied, inappropriate or incomplete application of precaution or the patient's vulnerability to any kind of MDRO should be considered [21]. If MDROs are isolated from a patient for any reason, such patients require treatment with more thorough adherence to CRE prevention and management guidelines. Our findings added the importance of prevention and control of CRE acquisition and spread in the ICUs, as CP-CRE is more easily transmitted between patients by using a mobile genetic element than non-CP-CRE [5,15]. In addition, with the advancement of personalized care, CP-CRE/non-CP-CRE/non-CRE stratification can better guide the prevention and control of CP-CRE acquisition.

Strengths and limitations

Management of CP-CRE through an understanding of the epidemiologic characteristics of CP-CRE is important to prevent the rapid transmission of CRE. In particular, when the CP-CRE test is difficult to perform or the patient refuses the test, the population at high risk of CP-CRE can be managed more effectively by identifying the characteristics that distinguish CP-CRE from non-CP-CRE or non-CRE. Given that studies on the epidemiologic characteristics of CP-CRE at home and abroad are very limited, the results of this study can improve understanding of the progression of CP-CRE among CRE-colonized patients or non-CRE patients admitted to ICUs.

However, careful interpretation of the results is required because of the following limitations. First, since this study is a secondary data analysis study using existing data, variables identified as CP-CRE-related factors in previous studies [20] but were not included in the primary data sources (for example, pressure ulcers and use of antibiotics prior to admission) were excluded from the explanatory variables. Second, data were collected from the date of hospitalization until the date of CRE colonization for the CRE colonized group (CP-CRE group, non-CP-CRE group) and until the date of discharge from the ICU for the non-CRE group, where differences in data collection time can influence the length of stay in the ICU. Therefore, the duration of ICU stay was not considered in this study. Consequently, while the length of stay in the ICU has been identified as a factor related to CP-CRE in previous studies [19], it was excluded as an explanatory variable in this study. Third, this study could not identify the factors related to the acquisition of CP-CRE among those with CRE colonization. This is thought to be because poor statistical power was expected when the sample size was calculated, and repeated studies using a larger sample are suggested in the future. Last, the primary data included ICU patients hospitalized in a single hospital, and the generalizability of the findings to other hospitals or settings may be limited.

Conclusion

As a result of this study, approximately 2 out of 10 patients who were colonized by CRE after admission to the ICU had CP-CRE, and the most common causative strain was *K. pneumoniae*. The CP-CRE group did not have any characteristics distinguishing it from the non-CP-CRE group; however, the isolation rate of multidrug-resistant bacteria, especially VRE, was higher than that in the non-CRE group. When multidrug-resistant bacteria are primarily isolated from hospitalized patients, strict adherence to CRE prevention and management guidelines is required to prevent the rapid spread of CRE between patients. In the case of patients with isolated VRE, it is recommended to conduct a screening test to confirm the presence of CP-CRE colonization and isolate carriers promptly, according to the results.

Conflicts of interest

The authors declared no conflict of interest.

Microorganisms	CP-CRE (n = 24) n (%)	Non-CP-CRE (n = 113) n (%)	Total (137) n (%)
Klebsiella pneumoniae	19 (79.1)	93 (82.3)	112 (81.8)
Escherichia coli	3 (12.5)	8 (7.1)	11 (8.0)
Enterobacter aerogens	0 (0.0)	6 (5.3)	6 (4.4)
Enterobacter cloacae	0 (0.0)	4 (3.5)	4 (2.9)
Citrobacter freundii	1 (4.2)	1 (0.9)	2 (1.5)
Serratia marcescens	1 (4.2)	0 (0.0)	1 (0.7)
Providencia rettgeri	0 (0.0)	1 (0.9)	1 (0.7)

Variables	CP-CRE (n = 24)	Non-CP-CRE (n = 113)	Non-CRE (n = 113)	CP-CRE vs. Non-CP-CRE	CP-CRE vs. non-CRE

n (%) or median (IQR)	n (%) or median (IQR)	n (%) or median (IQR)	OR (95% CI)	p	OR (95% CI)	p	Demographic characteristics
Men	15 (62.5)	76 (67.3)	67 (59.3)	.81 (.33–2.03)	.654	1.14 (.46–2.84)	.771
Age (years)	56.5 (24–69)	59.0 (26–67)	60.0 (28–74)	1.00 (.98–1.02)	.951	1.00 (.98–1.01)	.646
Clinical characteristics at ICU admission							
Transfer from LTCF	4 (16.7)	7 (6.2)	7 (6.2)	.73 (.25–2.12)	.561	.88 (.30–2.59)	.817
APACHE II	19 (12–27)	21 (16–25)	16 (12–22)	.97 (.91–1.03)	.289	1.06 (1.00–1.14)	.069
CCIS	1.50 (0–3)	2.00 (0–3)	1.00 (0–2)	1.03 (.79–1.33)	.846	1.35 (1.01–1.82)	.044
Underlying disease							
DM	4 (16.7)	26 (23.0)	23 (20.4)	0.67 (.21–2.13)	.497	.78 (.24–2.51)	.681
CHD	11 (45.8)	44 (38.9)	56 (49.6)	1.33 (.55–3.22)	.532	.86 (.36–2.08)	.740
CRD	4 (16.7)	13 (11.5)	7 (6.2)	1.54 (.46–5.21)	.489	3.03 (.81–11.31)	.099
CLD	5 (20.8)	22 (19.5)	18 (15.9)	1.09 (.37–3.24)	.879	1.39 (.46–4.20)	.561
CKD	1 (4.2)	11 (9.7)	7 (6.2)	.40 (.05–3.28)	.396	.66 (.08–5.61)	.702

Cancer	4 (16.7)	19 (16.8)	9 (8.0)	.99 (.30–3.22)	.986	2.31 (.65–8.24)	.197
Any disease	19 (79.2)	82 (72.6)	80 (70.8)	1.44 (.49–4.18)	.506	1.57 (.54–4.55)	.408
Clinical characteristics during ICU stay							
Invasive procedures/device							
Surgery	11 (45.8)	52 (46.0)	36 (31.9)	.99 (.41–2.40)	.987	1.81 (.74–4.43)	.194
Transplantation	4 (16.7)	18 (15.9)	13 (11.5)	1.06 (.32–3.46)	.929	1.54 (.46–5.21)	.489
Bronchoscopy	12 (50.0)	51 (45.1)	30 (26.5)	1.22 (.50–2.94)	.664	2.77 (1.12–6.82)	.027
Endoscopy	7 (29.2)	28 (24.8)	15 (13.3)	1.25 (.47–3.33)	.655	2.69 (.96–7.57)	.061
CRRT	6 (25.0)	41 (36.3)	25 (22.1)	.59 (.22–1.59)	.294	1.17 (.42–3.27)	.760
Urinary catheter	23 (95.8)	108 (95.6)	105 (92.9)	1.07 (.12–9.55)	.955	1.75 (.21–14.71)	.605
CVC	21 (87.5)	106 (93.8)	93 (82.3)	.46 (.11–1.93)	.291	1.51 (.41–5.54)	.538
MV	19 (79.2)	98 (86.7)	71 (62.8)	.58 (.19–1.79)	.345	2.25 (.78–6.47)	.133
Drainage tube	14 (58.3)	71 (62.8)	48 (42.5)	.83 (.34–2.03)	.680	1.90 (.78–4.63)	.160
Antibiotic treatment							
Penicillin	18 (75.0)	91 (80.5)	67 (59.3)	.73 (.26–2.04)	.543	2.06 (.76–5.58)	.156
Carbapenem	10 (41.7)	61 (54.0)	28 (24.8)	.61 (.25–1.49)	.276	2.17 (.87–5.43)	.098

Cephalosporin	20 (83.3)	84 (74.3)	80 (70.8)	1.73 (.55–5.47)	.354	2.06 (.66–6.50)	.216
Fluoroquinolone	17 (70.8)	78 (69.0)	62 (54.9)	1.09 (.42–2.86)	.862	2.00 (.77–5.19)	.156
Vancomycin	9 (37.5)	52 (46.0)	37 (32.7)	.70 (.29–1.74)	.447	1.23 (.49–3.08)	.654
MDROs carrier							
VRE	14 (58.3)	46 (40.7)	23 (20.4)	2.04 (.83–4.99)	.118	5.48 (2.16–13.91)	<.001
MRSA	2 (8.3)	20 (17.7)	6 (5.3)	.42 (.09–1.94)	.269	1.62 (.31–8.57)	.569
ESBL	7 (29.2)	46 (40.7)	13 (11.5)	.60 (.23–1.56)	.295	3.17 (1.11–9.08)	.032
MDR A. baumannii	6 (25.0)	31 (27.4)	10 (8.8)	.88 (.32–2.43)	.807	3.43 (1.11–10.62)	.032
Any MDROs	19 (79.2)	93 (82.3)	39 (34.5)	.82 (.27–2.45)	.718	7.21 (2.50–20.79)	<.001

Variables	B	SE	OR (95% CI)	p	VIF
Model 1					
Charlson comorbidity index score	.27	.17	1.32 (.95–1.82)	.097	1.03
Any MDROs isolated	1.77	.55	5.88 (1.99–17.43)	.001	1.12
Bronchoscopy	.66	.50	1.93 (.73–5.13)	.187	1.10
Model 2					
Charlson comorbidity index score	.19	.17	1.21 (.86–1.70)	.280	1.11

Vancomycin resistant enterococci	1.37	.51	3.92 (1.44–10.70)	.008	1.15
Extended spectrum beta-lactamase	.76	.61	2.14 (.65–6.99)	.210	1.05
MDR A. baumannii	.98	.68	2.67 (.70–10.13)	.150	1.14
Bronchoscopy	.51	.53	1.67 (.59–4.75)	.339	1.19

DETAILS

Subject:	Patients; Ventilators; CRE bacteria; Multidrug resistant organisms; Mortality; Catheters; Antibiotics; Risk factors; Staphylococcus infections; Cardiovascular disease; Hospitals; Public health; Data analysis; Literature reviews; Intensive care; Drug resistance; Health surveillance
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Development and Validation of Clinical Nursing Teacher Self-Efficacy Scale and Investigation of Self-Efficacy among Clinical Nursing Teachers

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ABSTRACT (ENGLISH)

SummaryPurpose

The purpose of this study was to (1) add relevant contemporary items to develop an assessment instrument for the self-efficacy of clinical nursing teachers, to verify and evaluate the validity and reliability of the instrument, and (2) investigate the self-efficacy of clinical nursing teachers.

Method

A cross-sectional study was designed. A total of 205 clinical nursing teachers were recruited in Taiwan. Data were collected using the Clinical Nursing Teacher Self-efficacy Scale. An exploratory factor analysis was performed to examine the scale.

Results

The degree of self-efficacy of clinical nursing teachers was moderate to high. The 35-item scale showed great psychometric qualities. The Cronbach coefficient of the overall scale was 0.92; and 0.83, 0.91, 0.93, and 0.87 on the four subscales were acceptable. Four factors were extracted by exploratory factor analysis and explained 68.53% of the total variance. Four factors were (i) teachers' professional growth ability, (ii) teaching ability, (iii) clinical nursing competencies, and (iv) personality traits. The highest self-efficacy category evaluated by teachers was personality traits; the second was clinical nursing competencies; after that, teaching ability and teachers’ professional growth ability. The item with the lowest self-efficacy was foreign language ability (English).

Conclusion

Clinical nursing teachers have a moderate to high degree of self-efficacy. This scale with good reliability and validity can be used for the training and evaluation of the self-efficacy of clinical nursing teachers.

FULL TEXT

Introduction

Clinical nursing teachers (CNTs) are those who teach nursing students in a clinical setting. The term “clinical nursing teacher” is defined as someone who integrates theory into practice and creates an optimal learning environment [1]. In Taiwan, CNTs are typically experienced clinical nurses and registered nurses employed in university or college nursing schools to provide clinical instruction to nursing students in a variety of clinical settings [2] and are responsible for helping nursing students achieve learning outcomes. Taiwanese CNTs are full-time employees of nursing school; they were assigned to guide a group of six to seven students to perform clinical practice at clinical sites [3]. Since clinical practice is a compulsory and very important part of the nursing curriculum, CNTs are essential to promote students learning in clinical practice, improve students' professionalism, and improve their professional ability [4]. CNTs are considered to be able to guide differences between students and nurses; it means the difference from theory to practice; the gap between theory and practice is defined as the difference between knowledge and theory learned by student nurses in the classroom and their practical experience in clinical settings [5]. CNTs must create a supportive learning environment to achieve learning integration, especially the learning environment related to differences in theory and practice in the clinical environment [6].

The significance and importance of self-efficacy of CNT are that when CNTs teach nursing students in clinical practice, it is necessary to help students achieve a balance between the theoretical knowledge obtained in the class and the application of the theory in the clinical setting [6,7]. Therefore, CNTs must be aware of effective self-efficacy and equipped with the necessary competencies [8]. Nursing also emphasizes the need for a hands-on experience [7,9]; it is important to identify what kinds of behavior or characteristics of CNT are effective and modify clinical teaching methods to achieve learning effectiveness [10]. Furthermore, to ensure the quality of clinical teaching, CNTs are required to apply classroom theory to concrete clinical situations; they need to demonstrate the clinical skills and abilities to create strategies that are conducive to clinical learning and help students combine theory with practice to improve clinical decision-making [10,11]. CNTs must demonstrate good self-efficacy to facilitate the best clinical teaching, evaluate students' critical thinking, provide support, and establish good relationships with students to guide students toward achieving clinical learning goals and outcomes [12].

The concept of self-efficacy was derived from Bandura's social cognitive theory of behavioral change [13,14]. Bandura describes self-efficacy as “a judgment of a person's ability to organize and execute a course of action to achieve a specified type of performance” [14]. Teacher efficacy is “a teacher's confidence in his or her ability to promote student learning” [15,16]. According to Bandura (1997), teacher efficacy refers to teachers' beliefs about their ability to influence student achievement [14]. It refers to the belief of teachers that they have the ability to cope successfully with tasks, obligations, and challenges related to their professional activities, thus playing a key role [15]. Teachers use their professional abilities, professional attitudes, and confidence to demonstrate their professional knowledge to help students learn effectively and achieve learning goals [17]. It is important for its implications for teaching effectiveness, teaching practices, and student academic results (e.g., student achievement and motivation) [16]. Self-efficacy will be used throughout this paper to refer to teacher's efficacy (confidence) in their influence on students' achievement.

Knox and Mogan (1985) [18] pointed out that the effectiveness of nursing clinical teachers is teaching ability, nursing competence, evaluation, interpersonal relationships, and personality traits. The effectiveness and competencies of clinical teaching are the key determinants of the quality of clinical learning; the most effective behavior was teaching ability/competence, which was reported to be 96% [19]. The definition of competence is the application of skills in all domains for the role of practice, focusing on specific outcomes, improving levels of competence, accountability of the learner, practice-based learning, self-assessment, and individualized learning experience [20]. The effective clinical teaching characteristics of CNT included nursing competencies, teaching ability, professional knowledge, interpersonal relationships, and positive personality traits [17]. Several studies report that teaching ability and nursing competence were the highest rated evaluations, which were more important than evaluation skills, personality factors, and relationships with students [21,22]; however, personality was the most favored teaching characteristics of students [10]. Additionally, factors that affect teaching competence include knowledge expansion; Kelly (2007) [23] found that teacher knowledge is the most important, become a knowledgeable teacher; followed by feedback and communication skills, create a positive learning environment, demonstrate professionalism and academic characteristics, and provide support [18,24]. Teacher efficacy includes showing motivation to teach and being a good role model in a clinical setting. Collaboration between CNTs and nurses transforms the patient care unit into an environment that supports the learning of nursing students [19]. Furthermore, the internationalization of nurses continues to be a common phenomenon today. With the globalization and collaboration of educational programs, increased mobility requires nurses to have a foreign language ability and good language skills to communicate with patients and nurses from other countries [25].

Overall, the characteristics of effective clinical educators and the most important competencies included teaching abilities, nursing competencies [4,11], clinical teaching skills, professional knowledge, clinical skills, interpersonal relationships [16,17], personality traits [16], among which being a role model is important for nurse educators [18,19,21,26]. The conceptual framework of self-efficacy of CNTs is shown in Figure 1.

Aims

To evaluate the self-efficacy of CNTs in complex clinical situations, this study aimed to (1) add contemporary applicable items to develop an assessment tool for the self-efficacy of CNTs (the Clinical Nursing Teachers Self-Efficacy Scale), validate psychometric properties and evaluate its validity and reliability; and (2) survey and describe the self-efficacy of CNTs.

Methods Study design

This was a descriptive cross-sectional study conducted in the nursing department of universities and colleges.

Participants

A convenience sample was used and CNTs were recruited from 43 universities and colleges [27]. The average number of CNT members in each nursing school is five to ten; therefore, the total sample size of CNT was estimated to be 215–430 in Taiwan. The inclusion criteria were (1) currently employed full-time CNTs by the department of nursing in colleges and universities, (2) more than 3 months of clinical nursing teaching experience; exclusion criteria were (1) within 3 months of probation period, (2) part-time employed, (3) according to the voluntariness principle, teachers who refused to participate were excluded. A previous exploratory factor analysis (EFA) study has shown acceptance of a small sample size [21]. The latest review of psychological research reports that a sample of 200 subjects or less is acceptable in 40–60% of studies [28]. A total of 35 items were included on the scale in this study, and considering the attrition rate, a sample size between 175 and 350 (*n* = 205 in our study) was estimated.

Measurement Demographic questionnaire

This questionnaire includes gender, age, education level, years of clinical nursing work, and years of clinical nursing teaching.

Clinical Nursing Teachers Self-Efficacy Scale

The Clinical Nursing Teacher Self-Efficacy Scale (CNT-SES) was developed to comprehensively measure the self-efficacy of CNTs in guiding students' clinical practice. The CNT-SES survey tool developed by the authors determined the CNT-SES items through a literature review [10–12,16–19,21–26,29–33], expert consultation, and a preliminary small sample survey.

Morgan and Knox (1987) [11] developed the Nursing Clinical Teacher Effectiveness Scale, which divided teacher characteristics into five categories: teaching ability, nursing competence, personality traits, interpersonal relationship, and evaluation. In addition, Hou et al. (2011) [21] developed a clinical nursing faculty competence inventory (CNFCI) that indicated the competencies of clinical nursing faculty, including leadership ability, problem-solving ability, educational intelligence, general teaching ability, and clinical nursing skills. The difference between our CNT-SES and these two inventories was that we have added contemporary applicable items, focus on the future development trends of the nursing profession; apply modern education technology and innovative teaching methods [30], pay attention to the development of nursing science, proficiency and ability in nursing research, participating in interdisciplinary research projects and interdisciplinary learning [31], presentation at international conferences, international foreign language ability [25], decision-making [32] and evidence-based nursing [33]. Finally, we develop the “CNT-SES” consisting of 35 items. There are four dimensions: (1) teachers' professional growth ability (1–8; 8 items), (2) teaching ability (9–19; 11 items), (3) clinical nursing competencies (20–24; 5 items) and (4) personality traits (25–35; 11 items). The scoring range for each item was 0–4; participants were instructed to rate all items on a 5-point Likert scale (4 = strongly agree, 3 = agree, 2 = neutral, 1 = disagree, 0 = strongly disagree); and the total score range was 0–140. The range of subscale scores was 0–32, 0-44, 0–20, and 0–44, respectively; the higher the score, the stronger the self-efficacy of the CNTs.

Data collection

The investigation of CNT self-efficacy was divided into three stages: (1) item generation and content validity; (2) preliminary survey; and (3) collect data in the descriptive and cross-sectional study.

Stage 1: Item generation and content validity

The instrument development procedure was based on a theoretical and literature review [2,4,6,8,10–13,16–20,23,24,28–33] and initially constructed a list of 60 items in six categories: (1) teachers' professional growth ability, (2) teaching ability, (3) clinical nursing competency, (4) personality traits, (5) fostering student learning ability, and (6) competencies of clinical nursing educators. Three experienced nursing education experts were invited to review the initial 60 items to examine the content validity of the generated items. The experts offered comments and suggestions and also rated the suitability of each item on a 5-point scale. According to experts’ suggestions, categories and some items were merged, the content validity index of these items ranged from 0.85 to 1 [34], and the scale-level CVI calculated based on the experts' score was 0.95 [35]; therefore, the questionnaire was revised to 50 items in four categories.

Stage 2: Preliminary survey

At this stage, the procedure included recruiting 20 CNTs to assess the suitability of the 50 items. Twenty participants from a university in central Taiwan conducted a questionnaire survey of 50 items, hoping to find out whether the description of the items was clear, readable, unambiguous, equivocal, and accurately reflects the self-efficacy of CNTs. They reported that it takes approximately 10–15 minutes to complete the instrument. In the preliminary study, the 50 items were carefully modified to make them more specific and explicit. A preliminary survey showed that the mean age of 20 CNTs was 43.25 (±5.39) years; clinical nursing teaching experience was 9.50 (±4.56) years, and clinical nursing work experience was 9.35 (±4.58) years. Respondents said that these items were easy to understand; it takes an average of 10 to 15 minutes to complete the questionnaire.

Stage 3: Collect data in the descriptive and cross-sectional study

We collected descriptive and cross-sectional data from July 2019 to January 2020. Data were collected from nursing schools in northern, central, southern, and eastern Taiwan. We do our best to contact all potential participants to complete the questionnaire electronically by sending an email invitation with a link to the questionnaire to potential participants. All participants were informed of the purpose of the study, read informed consent, and the time required to complete the survey. 400 emails were sent and 205 questionnaires were returned, and the response rate was 51.25%. The questionnaire was distributed and returned at the appointed time. Since the design of the questionnaire required that all questions be answered, otherwise the questionnaire was invalid and the valid questionnaires were 100%. After collecting the data, 15 items that did not meet the statistical significance were eliminated by item discriminant analysis; the initial 35 items were retained. The flow chart of data collection and item generation is shown in Figure 2.

Data analysis

SPSS version 26.0 was used for data analysis. The statistical significance level was set at p SD) and frequency (rate). Psychometric properties consider validity, reliability, and rigor. The content validity index was used to assess the content validity of the scale. Internal consistency was determined by the Cronbach's α coefficient (>0.70). Item analysis is the process of examining the responses to individual items to assess the quality of the items; and identify the underperforming items; including the mean and standard deviation [[34–37]]; the critical ratio (CR) is a test for item discrimination, and good item discrimination is statistical significance [[34–37]]. Pearson correlation analysis is used to test the correlation between the items and the total score, and the significance level is 0.01 [[21],[34],[38]]. EFA was used to determine the construct validity of the scale and used principal component analysis. To determine whether it is suitable for factor analysis, the Kaiser–Meyer–Olkin (KMO) value was used to measure the adequacy of the sampling. Bartlett's test of sphericity, factor loading, and measure of sampling adequacy were used to determine the suitability of items. Items with factor loading .70 was acceptable, and significant on the Bartlett's test of sphericity [[39]].

Ethical considerations

This study was approved by ethics committees; the approval came from an Institutional Review Board (No. CS2-19024). All participants gave their informed consent. Research data will be strictly protected and confidential. All participants were informed that they could withdraw from the study at any time without affecting their rights.

Results Demographic characteristics

A total of 205 participants came from 43 nursing schools in different regions of Taiwan. CNTs (400 in total) were invited to participate; 205 questionnaires were completed for data analysis, with a response rate of 51.25%. The age of the CNTs was between 26 and 57 years, with a mean age of 41.20 (±6.41) years; all were women (n = 205, 100%). Participants with a master's degree were 71.70% (n = 146) and with a bachelor's degree were 28.30% (n = 59). The mean clinical nursing work experience was 9.42 (±5.11) years, and the clinical nursing teaching experience was 8.38 (±5.76) years. Most of the clinical nursing experience was 11–15 years (n = 76, 37.07%), the clinical teaching experience was 1–5 years (n = 68, 33.17%) and 11−15 years (n = 66, 32.20%) accounted for the majority ([Table 1]).

Overall status of the Clinical Nursing Teacher Self-efficacy Scale

The CNTs demonstrated moderate to high self-efficacy (neutral to strongly agree); in this study, the most highly rated category was personality traits, which implies that the CNTs demonstrate confidence in their personality traits (3.04 ± 0.34); the second was clinical nursing competencies, that is, the CNTs recognize the importance of having clinical competencies (3.02 ± 0.45); after that was teaching ability (2.89 ± 0.43) and the teachers' professional growth ability (2.50 ± 0.65). Among the 35 items, the mean of each item ranges from 2.09 (±0.79) to 3.27 (±0.49), indicating that the respondents were neutral or strong agree on this scale. Twenty-four of these items had a mean score of 2.09 (±0.79)–2.99 (±0.47), indicating that the respondents were neutral or agree with the 24 items. There were 11 items with a mean score was higher than 3.0, which means that the CNTs in these 11 items showed agree or strong agree on self-efficacy ([Table 2]). However, the item with the lowest mean score of 2.09 (±0.79) was "Foreign language ability - English" ([Table 2]).

Items discrimination analysis and homogeneity test

Add all items in each subscale to get the total score. In the item discriminant analysis, the high-score group was in the top 27% and the low-score group was in the bottom 27%. Item analysis focuses on item and test quality and explores difficulty index (p-values; p-values converted to percentages) and discrimination index. The observed proportions in the two extreme groups into measures of item difficulty and item discrimination. Item discrimination helps to detect the ability of items to discriminate between low-achieving group and high-achieving score group [[40],[41]]. Item analysis constructs a high-low-27% group method. Generally, the top 27% are regarded as the high-achieving group, and the last 27% (73%) are regarded as the low-achieving group [[40],[41]]. In this study, item analysis was performed showing the discrimination indices, as well as the percentage of people in the upper and lower 27% who responded to each alternative. To examine the significant differences between the high-score group and the low-score group, an independent t-test was used; there was a significant difference between two groups (t

 = −10.634, *p* 34–37]. A total of 15 items that did not meet the significant difference were eliminated; the remaining items showed statistically significant in CR values ([Table 2]).

Internal consistency

The overall scale reliability of the Cronbach α coefficient (>0.7 was acceptable) was 0.92, and 0.83, 0.91, 0.93, and 0.87 for the four sub-scales were acceptable [[42]]. Regarding the correlation of each item with the total score, the results of Pearson's correlation analysis between the items and the total scale score ranged from 0.310 to 0.662 (*p* Table 2), which means that the 35 items correlated well with the scale, showing satisfactory reliability.

Exploratory factor analysis

EFA was conducted to examine the psychometric properties of the developed scale, in this study, EFA extracted four factors: (1) the teachers' professional growth ability; (2) teaching ability; (3) clinical nursing competencies; and (4) personality traits. Our result showed that the KMO value was 0.949, and Bartlett's test of sphericity was significant ($\chi 2$ = 6457.117, *df* = 595, *p* Table 3), and the variance explained for each factor (21.523, 19.633, 15.348, and 12.021) was presented in [Table 3]. The final version of the CNT-SES consists of four factors and 35 items.

Discussion Demographic characteristics

In this study, the majority of teachers have a master' degree (71.70%), with clinical teaching experience 6–10 years (26.83%) and 11–15 years (32.20%) accounting for the majority, which means that more than half of the CNTs are experienced (59.03%). The result of this study showed the self-efficacy of CNT, with 33 out of the 35 items were agreed or strongly agreed (mean ≥ 2.5). This study was consistent with Cayır and Ulupınar (2021) who found that perceptions of general self-efficacy and performance levels increased with age, occupational experience, and academic experience [[43]]. Although the individual items on the scale range from strongly disagree to strongly agree, the participants conducted a highly consistent assessment of these 33 items.

Construct validity and reliability of the CNT-SES

The newly developed CNT-SES showed a satisfactory estimation of psychometric properties. In the original CNT-SES development process, an item analysis was performed to guarantee fitting items for EFA; the results of the item analysis showed that 15 items were excluded because they did not meet the statistically significant and these 15 items obviously showed caring for students. Additionally, previous studies emphasized problem-solving ability, general teaching ability, nursing competence, clinical nursing skills, interpersonal relationships, and personality traits [[11],[21]]; in this study, the item analysis of these items was considered a high score. The item analysis identified the high-score group and the low-score group, and an independent sample *t*-test was required to test whether there was a significant difference in the total score between the high-score group and the low-score group. The CR was statistically significant, indicating that the total score of the high-score group and the low-score group had good discrimination [[44]]. Additionally, correlation analysis was used to test whether the scores of each item were correlated with the total scale score. The higher the correlation coefficient, the stronger the internal consistency between items. Pearson correlation coefficients were interpreted as weak (*r* = .10–.30), moderate (*r* = .40–.60), strong (*r* = .70–.90) or very strong (*r* = 1.00) [[45]]. The correlation coefficient is reported weakly with an *r* of .30; and consider removing items with correlation coefficients below .30 [[34],[36],[43]]. Fortunately, in this study, the correlation coefficient for each item was >.30. In addition, the results of the Cronbach α coefficient reliability test for the overall scale and for the four sub-dimensions were acceptable, ranging from 0.83 to 0.90, showing that the higher the value of Cronbach α, the higher the internal consistency between items. Furthermore, factor analysis is the most effective method to test construct validity; from these factors, some structural elements of psychostatistical concepts can be identified to understand the valid measurement factors [[39]]. The four dimensions explained 68.53% of the total variance, which met the criteria for selecting factors.

Self-efficacy of CNTs and the significance of each attribute of the scale in clinical practical implications

This study surveyed the self-efficacy of CNTs in clinical teaching settings by developing a structured questionnaire; CNT-SES was divided into 4 factors with a total of 35 items.

Teachers' professional growth ability

Items 1 to 8 were professional growth, research ability, and innovative teaching methods to facilitate teaching;

according to our results, the CNT showed that the lowest self-efficacy was the professional growth ability. Hou et al. (2011) [11] found that teaching ability and clinical practice ability were the top two competence characteristics of clinical faculty; which was the same as our study included teachers' professional growth ability and proficiency in theoretical knowledge, teaching ability, clinical nursing competencies, and clinical skills proficiency. However, despite having the lowest score in the four categories, the CNTs still highly recognized by the professional growth ability. This result was consistent with the results of previous studies on teaching effectiveness and competencies among CNTs [11,21]. Professional growth can effectively improve the general professional ability and teaching ability of teachers, which is conducive to mastery of the clinical knowledge and operational practices of nursing students [8]. In addition, especially in item 8 "International foreign language ability-such as English" (2.09 ± 0.79), indicating that CNTs lack the ability or confidence to speak a foreign language (English). This result showed that the lowest ability was the ability to speak a foreign language, which means that the confidence of CNTs in the ability to speak a foreign language was not as good as other items, which was consistent with the study [21]. Therefore, we suggest that teachers pay more attention to cultivating foreign language skills. Nursing professions face new challenges at any time, and these challenges are accompanied by the need for new technologies and skills development to ensure that clinical nursing continues to advance and educate its profession. Teachers are more confident when they have extensive experience and expertise in the field they teach, use advanced technology to aid learning, and serve as role models for their students [46]. The self-professional growth of nursing teachers enables them to achieve proficiency in clinical competencies [47,48], and implementing optimal teaching of nursing curriculum, support training programs, and provide nursing students with quality nursing education is critical. Therefore, the promotion of professional growth and development of CNTs is of great significance and administrators should consider investing in the professional growth and development of CNTs.

Teaching ability

In this study, the teaching ability score was 2.89 (±0.43). Good clinical teaching leads to good clinical learning [8]. The focus of CNTs is clinical practice teaching; they must be able to instruct students while providing care to the patient, including helping students learn to care for patients, nursing technology and skills, planning assignments or evaluating students' learning outcomes, maintaining patient safety and fostering relationships with students, patients and nursing staff [3,17,21,47]. CNTs are responsible for cultivating students' abilities in decision-making, critical thinking, and developing successful interpersonal relationships in clinical practice [3,21]. They guide students to implement the correct nursing interventions to improve their skills and prepare them to be a good nurse [6,49]. In addition, CNTs' assignments include classroom lecturing, research, or participation in seminars to improve their teaching ability.

Clinical nursing competencies

Additionally, CNTs recognize the importance of having clinical competencies (3.02 ± 0.45). The clinical nursing competencies of CNTs are the most important factor that affects the clinical learning [47,48]. However, when teachers have insufficient clinical experience and lack the relevant skills to facilitate student learning, students cannot learn effectively in the clinical field, and the level of CNT skills may affect students' perception of the teacher's ability [38,45,50]. Professional competence has been proposed as a core element of nursing [39,49]. The development of professional competence, that is, the provision of nursing services according to professional standards, is crucial. In the past, the professional competence of nurses was defined as the combination of skills, knowledge, attitudes, values, and competencies that lead to effective or high performance in occupational and professional positions [51]. Similarly, the professional competence of nursing teachers is an essential requirement, and nursing teachers must be more competent and committed to their nursing or clinical teaching.

Personality traits

Items 25–35 are related to personality traits; they demonstrate self-efficacy in their personality traits. The literature indicated that the personality traits and characteristics of CNTs have a profound impact on the clinical experiences of students [17,19]. In this category, teachers showed greater confidence in communication skills and interpersonal relationships, which was consistent with previous studies showing that the ability to develop interpersonal relationships is the most valued skill by clinical teachers [12,16,25]. Certain items such as empathy, open-mindedness and enthusiasm are also consistent with Collier (2018) who identified approachability as the most important personality trait of clinical teachers [15]. Furthermore, being responsible for behavior, emotional stability, punctuality, obedience to rules, and understanding self-limitations, which means focusing on proactive behaviors, including aspirations and efforts to start changing yourself and/or the environment, as well as self-initiated (as opposed to passive) and change-oriented (as opposed to maintaining the status quo) and focus on the future (instead of focusing on the current situation) [52].

Looking toward the future

In this study, the author suggested that the definition of self-efficacy of CNT was that the CNTs possessed four characteristics: professional growth ability, teaching ability, clinical nursing competencies, and positive personality traits. In recent years, with the rapid development of international health issues and international nursing education, several studies have appeared on teacher self-efficacy. However, the strengths of the tool we developed and compared to similar tools in the past were that this study highlights the potential and self-efficacy of CNT in the future nursing profession, modern education technology, innovative teaching methods, nursing science, international conferences, leadership, evidence-based nursing, research competence, and interdisciplinary learning; these issues have received more attention [53]. To maintain the pace and progress in nursing practice and education, we may need to pay more attention to the application of EBN and independent research ability in clinical nursing practice rather than traditional concepts of competency [54].

Study limitations

The limitation of this study was that it was not easy to collect data while having direct face-to-face contact with all CNTs in Taiwan because the participants were teachers of nursing schools and assigned to various hospitals and scattered in various regions. Therefore, the sample was not expanded, which was our main limitation. Additionally, it was not easy to collect data directly and complete the questionnaire, which may limit sample sizes. Therefore, we sent email notifications and questionnaires to collect data, and the email was sent many times to all potential participant; however, the response rate was not as expected. Furthermore, more comprehensive studies are needed to explore the self-efficacy of CNTs in different cultures and contexts.

Recommendations

We encourage researchers to use the entire scale for future research or clinical practice. In future research, we suggest that this tool can be used to explore the perceptions of nursing students about CNT in nursing education. We suggested modifying the CNT-SES from the views of nursing students to measure students' perceptions of the effectiveness and competence of CNTs. This tool can serve as the basis for creating a self-efficacy assessment tool in the field of nursing education, which can be used to train and assess the self-efficacy of CNT. CNT-SES can also serve as an assessment tool for observational and intervention studies of teacher self-efficacy in future research. The significance of using this tool depended on the evaluation results of each attribute of the scale, to formulate strategies for CNTs to improve self-efficacy. Therefore, it is important to refer to the various items of the CNT-SES in clinical practice to develop teaching strategies to promote the self-efficacy of CNTs and further facilitate the clinical learning of students. Our suggested strategies include an appropriate continuing education course should be formulated for each attribute of the item, encouraging the setting of personal goals, sharing teaching experiences and participating in Nursing Teachers Associations, building self-confidence and empowerment to help teachers improve their self-efficacy.

Conclusions

The 35-item CNT-SES provides an available assessment tool with good reliability and validity. CNTs showed moderate to high self-efficacy. The study findings offered information on the characteristics of self-efficacy of CNT, including nursing professional growth, teaching ability, nursing competence, ability to develop interpersonal relationships, and certain personality traits. These efficacy characteristics are mainly reflected in the perception of self-efficacy of CNT, and their identification can guide clinical nursing teaching strategies.

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Ethical approval

The study protocol was reviewed and approved by the Ethics Committee of Chung Shan Medical University Hospital (No. CS2-19024). Date of approval: May 15, 2019.

The author agrees to be responsible 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 that they have no competing interests.

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Appendix A Supplementary data

The following are the supplementary data to this article:**Multimedia component 1**Multimedia component 1**Multimedia component 2**Multimedia component 2

Appendix A Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.anr.2022.05.001.

Characteristic	n (%)	Mean (SD)
Age (years)		41.20 ± 6.41
Gender		
Women	205 (100)	
Education level		
Bachelor	59 (28.30)	
Master	146 (71.70)	
Years of clinical nursing work		9.42 ± 5.11
1−5	44 (21.46)	
6−10	68 (33.17)	
11−15	76 (37.07)	
≥16	17 (8.29)	
Years of clinical nursing teaching		8.38 ± 5.76
1−5	68 (33.17)	

6−10	55 (26.83)	
11−15	66 (32.20)	
≥ 16	16 (7.80)	

No	Items	Mean (SD)	Critical ratio (CR)	p value	Correlation coefficient (r)	p value
A. Teachers' professional growth ability						
1	Ability to read and study extensively in one's own professional field.	2.73 (0.58)	4.425	<.01	.467	<.001
2	Ability to understand current or future development trends of the nursing profession.	2.53 (0.62)	8.035	<.01	.507	<.001
3	Ability to learn and use modern and innovative teaching methods to assist in teaching.	2.60 (0.58)	8.857	<.01	.574.	<.001
4	Ability to develop nursing science and apply evidence-based nursing (EBN).	2.61 (0.61)	8.849	<.01	.525	<.001
5	Ability to conduct independent nursing research.	2.52 (0.65)	6.972	<.01	.590	<.001
6	Have the ability to read the nursing research literature.	2.55 (0.59)	5.199	<.01	.451	<.001
7	Have self-improvement ability (such as participating in continuing education, academic conferences, presentation at international seminars, participating in teamwork, or interdisciplinary research projects).	2.35 (0.77)	5.054	<.01	.516	<.001
8	International foreign language ability (English etc.)	2.09 (0.79)	3.899	<.01	.311	<.001
B. Teaching ability						

9	Ability to assess students' knowledge and clinic skills.	2.94 (0.36)	2.768	<.01	.527	<.001
10	Answer students' questions carefully and accurately.	2.95 (0.38)	1.714	<.01	.364	<.001
11	Stimulate students' reasoning ability.	2.87 (0.44)	4.086	<.01	.603	<.001
12	Ability to assess students' knowledge and clinic skills.	2.89 (0.45)	3.703	<.01	.661	<.001
13	Stimulate students' interest in nursing.	2.71 (0.57)	6.304	<.01	.662	<.001
14	Effectively organize and arrange clinical teaching plans.	2.90 (0.44)	2.230	<.01	.431	<.001
15	Guide students to solve problems based on literature and evidence.	2.89 (0.42)	3.037	<.01	.623	<.001
16	Establish a good learning environment.	2.92 (0.43)	3.921	<.01	.540	<.001
17	Show students the clinical decision-making process.	2.86 (0.43)	3.935	<.01	.611	<.001
18	When students encounter difficulties, provide individual help.	2.97 (0.43)	4.221	<.01	.546	<.001
19	Quickly grasp the meaning of students' questions or students' words.	2.87 (0.39)	4.069	<.01	.598	<.001
C. Clinical nursing competency						
20	Have good clinical nursing skills.	3.06 (0.48)	4.989	<.01	.546	<.001
21	Have a good clinical problem assessment ability.	3.01 (0.43)	4.900	<.01	.621	<.001
22	Have the ability to make judgments and analyses based on clinical data assessment.	3.03 (0.43)	3.524	<.01	.508	<.001

23	Possess professional knowledge of the subject.	3.02 (0.42)	3.339	<.01	.548	<.001
24	Ability to handle emergencies properly.	2.99 (0.47)	4.420	<.01	.589	<.001
D. Personal traits						
25	Establish interpersonal relationships and a harmonious teamwork spirit.	3.10 (0.43)	2.269	<.01	.423	<.001
26	Empathy	3.08 (0.53)	3.744	<.01	.493	<.001
27	Effective self-management (such as emotional stability, punctuality, and compliance with rules).	3.08 (0.49)	3.558	<.01	.541	<.001
28	Understand self-limitations.	3.09 (0.46)	3.460	<.01	.524	<.001
29	Good communication skills.	2.97 (0.43)	3.979	<.01	.506	<.001
30	Open-minded and not critical.	2.96 (0.48)	2.569	<.01	.418	<.001
31	Enthusiastic and energetic.	2.92 (0.60)	3.960	<.01	.510	<.001
32	Be responsible for your behavior.	3.27 (0.49)	2.838	<.01	.310	<.001
33	Be a good role model for nursing students.	3.09 (0.44)	3.180	<.01	.429	<.001
34	Master the level of student learning ability.	2.90 (0.40)	4.770	<0.01	.581	<.001
35	Touch people's hearts (understand students to express their thoughts and feelings, so as to perceive and evaluate their own behavior).	3.02 (0.46)	4.358	<0.01	.656	<.001

Item		Components			
A. Teachers' professional growth ability					
1	Ability to read and study extensively in one's own professional field.	.182	.163	.698	.195
2	Ability to understand current or future development trends of the nursing profession.	.204	.267	.768	.128
3	Ability to learn and use modern and innovative teaching methods to assist in teaching.	.284	.216	.720	.147
4	Ability to conduct independent nursing research.	.121	.177	.692	.209
5	Ability to develop nursing science and apply evidence-based nursing (EBN).	.126	.201	.722	.311
6	Have the ability to read the nursing research literature.	.183	.117	.738	.135
7	Have self-improvement ability (such as participating in continuing education, academic conferences, presentation at international seminars, participating in teamwork, or interdisciplinary research projects).	.002	.202	.679	.197
8	International foreign language ability (English etc.)	.148	.188	.560	.235
B. Teaching ability					
9	Ability to guide students to organize patients' problems.	.296	.675	.212	.430
10	Answer students' questions carefully and accurately.	.369	.701	.182	.231
11	Stimulate students' reasoning ability.	.291	.676	.332	.200
12	Ability to assess students' knowledge and clinic skills.	.304	.723	.308	.308
13	Stimulate students' interest in nursing.	.329	.658	.240	.104
14	Effectively organize and arrange clinical teaching plans.	.261	.700	.235	.360
15	Guide students to solve problems based on literature and evidence.	.322	.750	.286	.249
16	Establish a good learning environment.	.462	.635	.265	.177

17	Show students the clinical decision-making process.	.421	.668	.294	.223
18	When students encounter difficulties, provide individual help.	.453	.668	.260	.134
19	Quickly grasp the meaning of students' questions or students' words.	.414	.599	.284	.234
C. Clinical nursing competency					
20	Have good clinical nursing skills.	.314	.274	.269	.745
21	Have a good clinical problem assessment ability.	.339	.354	.288	.726
22	Have the ability to make judgments and analyses based on clinical data assessment.	.333	.325	.250	.767
23	Possess professional knowledge of the subject.	.341	.299	.263	.742
24	Ability to handle emergencies properly.	.398	.241	.244	.725
D. Personal traits					
25	Establish interpersonal relationships and a harmonious teamwork spirit.	.744	.230	.116	.258
26	Empathy.	.731	.245	.134	.212
27	Effective self-management (such as emotional stability, punctuality, and compliance with rules).	.694	.285	.158	.174
28	Understand self-limitations.	.715	.252	.141	.174
29	Good communication skills.	.759	.244	.197	.172
30	Open-minded and not critical.	.687	.315	.199	.171
31	Enthusiastic and energetic.	.695	.237	.169	.186
32	Be responsible for your behavior.	.690	.239	.118	.247
33	Be a good role model for nursing students.	.679	.307	.106	.289
34	Master the level of student learning ability.	.614	.455	.202	.195

35	Touch people's hearts (understand students to express their thoughts and feelings, so as to perceive and evaluate their own behavior).	.578	.464	.281	.148

DETAILS

Subject:	Students; Validity; Nursing education; Personality traits; Collaboration; Teaching methods; Clinical medicine; Cross-sectional studies; Personality; Knowledge; Decision making; Interdisciplinary aspects; Questionnaires; Nursing schools; Colleges &universities; Role models; Foreign language learning; Nursing skills; Nurses; Personal relationships; Teachers; Clinical nursing
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Factors Influencing Military Nurses' Reporting of Patient Safety Events in South Korea: A Structural Equation Modeling Approach

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ABSTRACT (ENGLISH)

SummaryPurpose

This study explored how just culture, authentic leadership, safety climate, patient safety knowledge, and safety motivation all affect military nurses' reporting of patient safety events.

Methods

This study adopted a cross-sectional and descriptive correlational design. Data were collected from 303 nurses working across eight military hospitals under the jurisdiction of the Armed Forces Medical Command in South Korea, from June 17 to July 25, 2020. The hypothesized model was then validated using structural equation modeling.

Results

The participating military nurses did not show any proactive attitudes toward reporting near misses when compared with their responses to adverse or no-harm events. The final model exhibited goodness of fit. Herein, both safety climate ($\beta = 0.35$, $p = .009$) and patient safety knowledge ($\beta = 0.17$, $p = .025$) directly influence patient safety event reporting. Moreover, just culture indirectly influences patient safety event reporting ($\beta = 0.31$, $p = .002$). The discovered influencing factors account for 22.9% of the variance in explaining patient safety event reporting.

Conclusions

Our findings indicate that just culture, safety climate, and patient safety knowledge either directly or indirectly affected patient safety event reporting among military nurses. These findings then serve to provide a theoretical basis for developing more effective strategies that would then improve military nurses' patient safety behaviors.

FULL TEXT

Introduction

Internationally, patient safety is one of the most important goals in healthcare institutions. The occurrence of any adverse events caused by unsafe care is one of the top ten causes of death and disability worldwide [1]. In South Korea (hereafter, Korea), the number of adverse events voluntarily reported by medical institutions has more than doubled from 2586 in 2017 to 6932 in 2020 [2]. Patient safety event reporting plays an important role in preventing the recurrence of any adverse events through the initiation of investigations and analyses, which then result in improvements in patient safety, awareness, and the institution's internal and external systems [3]. It has been found that sentinel and adverse events are often eventually disclosed, but that near misses may go underreported if the organizational culture favors concealing or downplaying said events [4].

Nurses comprise the largest proportion of the workforce in medical institutions and are at the frontline of patient care, which then facilitates their ability to identify medical errors [5]. The study by Lee indicated that Korean nurses feel more comfortable reporting events directly rather than filing event reports, as well as the fact that their rate of medication error reporting was 6.3%–29.9% regardless of hospital type [6]. In Taiwan, Chiang et al. found that nearly 60% of nurses demonstrate a non-proactive attitude toward reporting errors or near-miss events [7]. Underreporting then reduces opportunities for shared learning and hinders stakeholders' ability to generate effective changes within the healthcare system that are aimed at preventing the recurrence of errors and improving patient safety [8]. Research has shown that patient safety event reporting is associated with both organizational (e.g., culture, safety climate, and leadership) and individual factors (e.g., safety knowledge and motivation) [9–13].

A just culture refers to an organizational climate in which individuals feel that they are treated fairly when issues like patient safety events occur, which then creates a balance between the organizational system and individual accountability [14]. Woo and Avery outlined the fact that nurses often have insufficient experience with voluntary error reporting, with them also pointing out the limitations of organizations in advocating a just and open safety culture to help support error reporting [11]. Furthermore, Lee et al., in a qualitative study of tertiary hospital doctors and nurses, reported themes like fear of blame, inappropriate responses, and the possibility of potential blame as factors that hinder safety event reporting in Korea [4]. Other studies have noted that an open and just culture increases nurses' patient safety activity and has a positive influence on their error reporting experiences [11,15]. Furthermore, others have reported that, within a just culture, authentic leadership has a positive impact on nurses' trust in their managers, which then provides them with a supportive practice environment, encourages them to speak up, and is able to accurately predict patient safety and quality of care [13]. Walumbwa et al. posited that authentic leadership implies a positive leadership style that focuses on ethics, an understanding of oneself and others, the prioritizing of individual growth, the embracing of a transparent relationship between leaders and followers, and the promoting of a positive ethical climate [16]. Further, Dirik and Intepeler found that managers' authentic leadership is an important predictor of safety climate among nurses [17].

Specifically, safety climate refers to a shared perception of the importance and value of safety-related procedures and practices within an organization [18]. Safety climate influences individual factors, such as safety knowledge and safety motivation [19]. Previous research has reported a significant correlation between safety climate and error reporting, with it being established that a positive safety climate fosters better safety event reporting [20].

The knowledge underlying patient safety practices, as outlined in the extant literature, is reported to be a facilitating factor for patient safety event reporting [10,11]. Brasaite et al. found that one of the main requirements in ensuring patient safety is the development and maintenance of medical professional safety knowledge. Moreover, undesirable patient outcomes can be avoided by ensuring knowledge sharing and facilitating error reporting among staff [21]. Safety motivation refers to an individual's willingness to enact safety behaviors according to their own interests and beliefs [22]. Prior research has shown that nurses' lack of motivation acts as a barrier in their reporting of patient safety events [12]. Moreover, it has been demonstrated that safety motivation and knowledge influence corresponding safety behaviors [19].

Nursing staff at military hospitals, specifically, have a clear understanding of the hierarchical relationships therein because of the uniform command system that exists within the class-oriented climate, which is a distinguishing characteristic of military culture [23]. The characteristics of military hospitals (wherein healthcare providers regularly rotate every one or two years through various network hospitals or departments) require nurses to function consistently in new work environments, with them then being exposed to an increased risk of patient safety issues [24,25]. Therefore, identifying the factors that affect military nurses' reporting of patient safety events is critical for improving patient safety in military hospitals. Except for studies that focus on the relationships between patient safety culture, safety management activities and competency, and communication with other healthcare professionals [24–26], few have comprehensively investigated the factors that influence military nurses' safety behaviors at both the organizational and individual levels. Thus, this study examined the organizational (including just culture, authentic leadership, and safety climate) and individual (including patient safety knowledge and safety motivation) factors that influence military nurses' patient safety event reporting, while also verifying factors that have a mediating effect on this relationship. This study's findings then provide evidence to facilitate the development of effective intervention strategies to ensure patient safety in military hospitals.

Hypothesized model

The hypothesized model for this study was derived from both a literature review [9–13,15,17,19,20] and the safety model developed by Neal et al. [18]. Their model assumes that organizational climate (which encompasses leadership, work roles, and communication) significantly impacts the overall safety climate, while this climate then influences safety behaviors through its impact on staff members' relevant safety knowledge and motivation. Thus, the hypothesized model of this study (Supplementary Figure S1) is as follows: (1) just culture and authentic leadership have a direct effect on safety climate and patient safety event reporting; (2) just culture and authentic leadership indirectly affect patient safety event reporting through the impact of safety climate, patient safety knowledge, and safety motivation; (3) safety climate has a direct effect on patient safety event reporting; (4) safety climate indirectly affects patient safety event reporting through patient safety knowledge and safety motivation; and (5) patient safety knowledge and safety motivation are individual factors that directly influence patient safety event reporting.

Methods Study design

This was a cross-sectional, descriptive-correlational study conducted in eight military hospitals under the jurisdiction of the Armed Forces Medical Command in Korea.

Setting and sample

The sample included 396 nurses working at eight military hospitals across Korea who gave their informed consent to participate in this study. The inclusion criteria were as follows: (1) nurses who had been working for at least six months in the same department and (2) nurses who delivered care directly to patients. Nursing managers that worked as head nurses or had an equivalent position were excluded. This study's sample size was found to be adequate because the minimum sample required for the maximum likelihood method (which is commonly used in structural equation modeling) was found to be 200 [27]. Of the 396 candidates, 378 responded (95.4% response rate). Of these 378 responses, 75 were excluded due to incomplete or incorrect responses. Thus, 303 responses were included in our final analysis.

Measurements

Participants were provided with a self-administered questionnaire (specifically developed for this study) that collected data about their general characteristics, patient safety event reporting, the overall just culture, authentic leadership, safety climate, patient safety knowledge, and safety motivation. The general characteristics included their age, sex, educational level, clinical experience in their current department, clinical career, and patient safety education experience.

Patient safety event reporting

Patient safety event reporting was assessed using nurses' perceived levels of their own reporting rates on adverse, no-harm, and near-miss events. These factors were measured using three questions from the translated [28] and modified versions [29] of the Hospital Survey on Patient Safety Culture (HSOPSC) [30], including: (1) “If a patient safety event that causes harm to a patient occurs, how frequently is it reported?” (adverse event report); (2) “If a patient safety event occurs but the patient is unharmed, how often is this reported?” (no-harm event report); and (3)

"If a patient safety event is detected and corrected before it affects the patient, how often is this reported?" (near-miss report). The participating nurses responded to the HSOPSC's items on a 5-point Likert scale ranging from 1 ("never") to 5 ("always"). In this study, the Cronbach's α of this scale was found to be 0.71.

Just culture

Just culture was measured using the translated Korean version [31] of the Just Culture Assessment Tool (JCAT) [32]. The JCAT comprises 27 items across six subdomains, including: trust, continuous improvement, quality of the event reporting process, balance, openness of communication, feedback, and communication. The participating nurses responded to the JCAT's items on a 5-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). At the time of development, the Cronbach's α for all of its sections was higher than 0.7, except for the quality of the event-reporting process (≥ 0.63). In this study, the Cronbach's α of this scale ranged from 0.83 to 0.86.

Authentic leadership

Authentic leadership was measured using the translated Korean and modified versions [33,34] of the Authentic Leadership Questionnaire (ALQ) [16]. The ALQ has 16 items across four subdomains: self-awareness, rational transparency, internalized moral perspective, and balanced processing sections. Nurses responded to the ALQ's items on a 5-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). The instrument's original Cronbach's α was 0.79 [16], whereas it was found to be 0.95 in this study.

Safety climate

Safety climate was measured using the translated Korean version [35] of the Safety Attitudes Questionnaire Short Form [36]. This tool includes 31 items measuring teamwork climate, safety climate, job satisfaction, stress recognition, perception of management, and working conditions. Again, nurses responded to this instrument's items on a 5-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). The stress recognition domain was eliminated due to it having a factor loading lower than 0.1 in this study ($p > 0.05$). The instrument's original Cronbach's α was 0.90 [36] and was 0.90 in this study.

Patient safety knowledge

Patient safety knowledge was measured using the patient safety knowledge domain from the Patient Safety Competency Tool [37]. This tool has six items, with the nurses then rating these on a 5-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). Cronbach's α was 0.89 in the study by Jang [37] and was found to be 0.87 in this study.

Safety motivation

Safety motivation was measured using the translated Korean version [38] of the Safety Motivation Tool [39]. This tool includes five items that were each rated on a 5-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). The instrument's original Cronbach's α was 0.93 [39]. In this study, specifically, its Cronbach's α was 0.93.

Data collection

Eight military hospitals in Korea were visited by the researchers to brief potential candidates on the objectives of this study and to obtain their consent for data collection. Nurses who wished to participate were provided with survey packets that included information on the study, the questionnaire, an informed consent form, and a return envelope. Participants were then asked to complete the questionnaire and return it to a sealed box placed in each ward. In addition, they were also informed that they could withdraw from the study at any time. Each participant was provided with a gift certificate of $5 (USD). Research data were collected from June 17 to July 25, 2020.

Statistical analyses

All collected data were analyzed using SPSS 26.0 and AMOS 26.0 software. A descriptive statistical analysis method and Pearson's correlation coefficient were used to analyze participants' characteristics, the mean and standard deviations of the data, the skewness, the kurtosis, and any correlations between variables. Structural equation modeling was then used to test the hypothesized model. First, a confirmatory factor analysis (CFA) was performed to identify the validity of the latent variables [40]. Then, a model estimation and an examination into the effects between variables were performed using the maximum likelihood estimation method. The bootstrapping method was then used to determine the significance of the indirect effects among the study variables. The model's goodness of fit was evaluated using the following indices: the X^2/df ratio index 27], the comparative fit index (CFI) ≥ .90 [41], the standardized root mean square residual (SRMR) ≤ .08 [41], and the root mean square error of approximation (RMSEA) ≤ .08 [27].

The RMSEA was reported using the AMOS software with a 90.0% confidence interval. If the RMSEA is 0, the confidence interval becomes one-sided, wherein the upper bound estimate is greater than the RMSEA. Hence, the 90% confidence level was used in this study instead of the more common 95%, which is more conventional for use within two-sided confidence intervals [42].

Ethical considerations

This study received ethical approval from the institutional review board of the Armed Forces Medical Command (approval no: AFMC-20102-IRB-20-102).

Results Participants' characteristics

As shown in Table 1, the mean age of the participants was 29.46 years (*SD* = 5.91). Women constituted 76.6% of the total number of participants and 83.8% held a bachelor's degree in nursing. Only 11.2% of the nurses had worked in their current department for more than three years. Additionally, the participating nurses had worked for an average of 6.08 years (*SD* = 5.22). Finally, 85.5% of the nurses had participated in patient safety training at least once in the past year.

Descriptive statistics and factor loading of the confirmatory factor analysis

As shown in Table 2, the reporting level of near misses (mean = 3.84 ± 0.84, range 1–5) was lower than that of adverse (mean = 4.50 ± 0.80, range 1–5) and no-harm events (mean = 4.11 ± 0.87, range 1–5). Furthermore, participants reported moderate levels of just culture (mean = 3.70 ± 0.50, range 2–5). Additionally, the quality of the event reporting process domain scored the highest, whereas that of trust scored the lowest. Nurses perceived their managers' authentic leadership (mean = 3.64 ± 0.50; range 1–5) and safety climate (mean = 3.61 ± 0.47; range 2–5) as being moderate. Among the individual factors, although nurses did not exhibit high levels of patient safety knowledge (mean = 3.71 ± 0.68; range 1–5), they did report high levels of safety motivation (mean = 4.59 ± 0.51; range, 3–5). The absolute values of all measures of skewness were less than 2 and the absolute value of the measure of kurtosis was less than 7. Thus, the measured variables were normally distributed. Based on the CFA, the criteria for convergent validity (factor loading ≥ 0.5, AVE ≥ 0.5, and CR ≥ 0.7) were satisfied; however, an AVE value was not greater than the square of the correlation coefficient, therefore, the discriminant validity was only partially satisfied (see the diagonal line in Supplementary Table S1) [27].

Correlations of study variables

Table 3 shows the relationships between the study variables. Patient safety event reporting was found to be significantly and positively associated with just culture (r = .32, *p* p = .002), safety climate (r = .40, *p* p p = .001).

Testing the hypothesized model

The hypothesized model fit the data well (X^2/df = 2.468, CFI = .908, RMSEA = .070 [90% CI: .064–.075], and SRMR = .068). The model was tested by including all the participants' general characteristics as control variables. The results were consistent with those of the model without control variables (Figure 1).

As shown in Table 4, just culture indirectly but significantly influences patient safety event reporting (β = 0.31, *p* = .002). Regarding the specific indirect effect, just culture indirectly influences patient safety event reporting via the safety climate (β = 0.25, 95.0% CI: .080–.153) as well as via both safety climate and patient safety knowledge, serially (β = 0.06, 95.0% CI: .003–.513) (Supplementary Table S2). Furthermore, safety climate directly influences patient safety event reporting (β = 0.35, *p* = .009), with patient safety knowledge affecting safety event reporting (β = 0.17, *p* = .025). Additionally, authentic leadership and safety motivation had no significant direct or indirect effects on patient safety event reporting. These influencing factors accounted for 22.9% of the variance in explaining patient safety event reporting.

Discussion

The findings of this study partially support our hypothesized model. The patient safety event reporting of military nurses was found to be both directly and indirectly affected by organizational factors, such as safety climate and just culture, as well as by more individual factors, such as patient safety knowledge. Our finding that organizational factors are greater contributors to nurses' patient safety event reporting than are individual ones confirms the importance of enhancing patient safety in hospital settings through the use of more holistic organizational efforts. Although these results possess an explanatory power similar to those in a previous study [43], it would have been higher if authentic leadership and safety motivation had a significant relationship with patient safety event reporting. Further research is thus needed to examine other factors related to patient safety event reporting given the non-significant effects of the examined variables in our study.

Our study also reveals that military nurses perceive the need to report adverse events and no-harm events more often than near misses, which is consistent with the results of Kim et al. [29]. Chen et al. stated that a high proportion of nurses in Taiwan had limited experience with medical incident reporting [5]. Patient safety event reporting is an important tool for the timely detection and correction of adverse events in order to create a safe medical environment [4]. However, mistakes considered as having a lower severity are not reported as often as more serious errors. Employees often do not feel the need to report errors they perceive as acceptable, being likely that this behavior results in the underreporting of patient safety events [3,7]. Furthermore, military nurses did not show a proactive attitude toward reporting near misses, as compared to adverse events or no-harm events.

Among all the variables, safety climate had the most significant effect on patient safety event reporting. This study found that, specifically, safety climate positively correlates with nurses' safety behavior [44]. Lee et al. reported that a positive safety climate reduces barriers for nurses to report errors [45]. This is important to note as military nurses must constantly adapt to new working environments due to their profession's rotational policy [23,24]. Thus, to improve their safety climate, nursing managers should promote unit-based patient safety programs that contain resources that would help staff nurses understand the patient safety mechanisms while improving their patient safety communication and teamwork [46]. It is also necessary to conduct periodic leadership walks to ensure that staff nurses trust their managers and are able to communicate with them proactively about patient safety [44,46].

In this study, patient safety knowledge was found to directly affect patient safety event reporting; this finding is supported by those of previous studies [9,47]. For example, Agustian et al. reported that, between organizational and individual factors, patient safety knowledge is the variable with the most significant effect on Indonesian nurses' patient safety event reporting [9]. Additionally, Kim and Eun reported that patient safety knowledge is a predictor of nurses' safety activity. They emphasized the importance of training and education on nurses' patient safety knowledge in increasing their safety-based behaviors [47]. The development of a standardized patient safety education program for nurses in military hospitals is thus necessary to reduce the relevant knowledge gaps among them. In addition, the implementation of objective measurements and differential patient safety training programs according to individual knowledge levels are both required [20].

This research also found that just culture indirectly influences patient safety event reporting via safety climate. This finding is supported by the results of previous studies, which found that organizational factors, such as incident-reporting cultures, just cultures, and safety climates, have a significant effect on safety event reporting [7,15,45]. Our study also found that just culture has a direct effect on safety climate. Thus, it is important to create a just culture in military hospitals to improve patient safety behaviors among nurses. Military hospitals are characterized by a one-sided command system culture and discourage open communication [23,24]. Considering these organizational characteristics and this system's rotational position policy, military nurses are influenced more by the climate of their specific unit rather than by any widescale organizational culture. Therefore, continuous education should be conducted to disseminate the conception and awareness of a widescale just culture among nursing managers and frontline nurses in military hospitals in order to create a positive safety climate for each unit [8]. In addition, just culture was found to have a indirect effect on patient safety event reporting through both safety climate and patient safety knowledge serially. This finding is supported by those of previous studies that outline the fact that organizational factors and safety knowledge are both significant factors within the process of safety event reporting [10,45,47]. This research also found that a positive safety climate enhances safety knowledge through the resulting generation of an environment of training or discussion in which safety information is communicated, either formally or informally [19]. Therefore, in order to improve patient safety reporting by military hospital nurses, efforts to improve the overall system, create a safety culture, and to form a positive working environment should be conducted.

Contrary to our expectations, as well as in contradiction to previous studies, just culture did not directly affect patient safety event reporting [7,15]. This study found that military nurses did not positively perceive the organization's just culture, which is consistent with previous studies on clinical nurses [15,48]. Levine, Carmody, and Silk mentioned that current hospital organization cultures do not facilitate the reporting of medical errors because nurses do not associate organizational culture with patient safety [49]. Patient safety education should thus be provided to frontline nurses so that they can recognize the overall just culture and patient safety in connection with clinical practice [14].

Interestingly, nursing managers' authentic leadership did not influence the safety climate or directly influence patient safety event reporting, which is a significant difference from the findings of previous studies [17,50]. Labrague et al. stated that nursing managers' authentic leadership significantly affects nurses' safety actions and their quality of care [50]. Nursing managers in military hospitals are mainly active-duty officers, with military nurses being trained to obey the instructions of their superiors. These organizational characteristics encourage frontline nurses to familiarize themselves with managers who have a clear vision, charisma, and the capability to motivate them [23]. Ma et al. reported that military nurse managers need to develop a team leadership ability, set a clear vision, motivate their team personnel, manage conflict and stress, be adaptable, and be able to manage change [51]. Although authentic leadership did not have a significant effect on military nurses' safety event reporting level, to promote their safety behavior, studies need to explore the leadership type most appropriate for nursing managers in military hospitals.

Moreover, safety motivation had no direct effect on patient safety event reporting, which again represents a significant difference from previous studies that posited the influence of safety motivation on safety behavior [19,39]. For example, Toren et al. stated that most nurses (80.0%) demonstrated an intention to report medical errors and near misses, although 53.0% of them had not reported near misses in the past year [52]. Thus, there was a difference found between participants' reported intentions and their actual near-miss reporting. Another prior study showed that 58.0% of nurses did not report adverse events in the preceding 12-month period [20]. For military nurses within a distinct hierarchical relationship, organizational factors and patient safety knowledge (rather than safety motivation that is comprised of a more voluntary nature) have a significant impact on patient safety event reporting [9,10,20,22]. However, few studies have explored the relationship between safety motivation and patient safety event reporting. Further studies on the individual factors of this relationship are thus required.

Strengths and limitations

Our study is the first to identify the organizational and individual factors that affect military nurses' patient safety event reporting, based on Neal et al.'s safety model [18]. This study verified that safety climate and patient safety knowledge directly affect patient safety event reporting. Another notable finding is our confirmation that just culture indirectly influences patient safety event reporting.

Our study contributes to nursing research by comprehensively exploring factors affecting the safety activities of military nurses in ensuring patient safety in military medical institutions. Further, it elucidates a rationale for developing effective strategies and programs to create a just culture and safety climate, as well as for improving military nurses' safety knowledge, in a way that takes into account the unique characteristics of military nursing personnel.

This study does possess several limitations. First, patient safety event reporting was measured through nurses' subjective responses, rather than through their actual reporting rate, meaning that our results should be interpreted with care. Second, because closed questions and direct surveys have inherent limitations in revealing participants' honest answers, other data collection methods (e.g., online surveys and in-depth interviews) should be used in future studies in consideration of the vertical hierarchical structure of the military nursing organization.

Conclusions

This study confirms that safety climate (an organizational factor) and patient safety knowledge (an individual factor) significantly influence military nurses' reporting of patient safety events. Further, this study found that just culture has an indirect effect on patient safety event reporting. However, authentic leadership and safety motivation are not statistically significant factors for patient safety event reporting. This study emphasizes the fact that leaders and nursing managers in military hospitals should create a just culture and a safety climate that fosters nurses' safety activities, keeping in mind the unique characteristics of this organization. Further, nurses should be provided with adequate training that then improves their knowledge of patient safety and the importance of reporting errors so as to enhance the quality of care in military medical organizations.

Funding

This research received no funding.

Data availability

The data generated and analyzed during the current study is confidential; however, they can be made available from the corresponding author upon reasonable request.

Conflict of interest

All authors declare that there are no conflicts of interest.

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We sincerely thank all the military hospitals and military nurses who participated in the study.

Appendix A Supplementary data

The following is the Supplementary data to this article:**Multimedia component 1**Multimedia component 1

Appendix A Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.anr.2022.05.006.

Characteristic	n	%	Mean (SD)
Gender			
Men	71	23.4	
Women	232	76.6	
Age			29.46 (± 5.91)
≤ 25	85	28.1	
26–< 30	111	36.6	
≥ 30	107	35.3	
Education level			
College degree	29	9.6	
Bachelor's degree	254	83.8	
≥ Master's degree	20	6.6	

Clinical experience in the current department (years)			1.79 (± 1.69)
< 1	80	26.4	
1–< 3	189	62.4	
3–< 5	21	6.9	
≥ 5	13	4.3	
Clinical career (years)			6.08 (± 5.22)
< 1	13	4.3	
1–< 3	85	28.1	
3–< 5	65	21.5	
≥ 5	140	46.2	
Patient safety education experience (in the previous year)			
0	44	14.5	
1	156	51.5	
2	77	25.4	
≥ 3	26	8.6	

Variables	Mean ± SD	Range	Skewness	Kurtosis	Factor loading (p)	CR	AVE
Just culture	3.70 ± .50	2–5	−.25	.06		.87	.52
Trust	3.44 ± .63	1–5	−.09	.35	.72 (< .001)		
Continuous improvement	3.83 ± .65	1–5	−.52	.99	.78 (< .001)		
Quality of event reporting process	3.92 ± .52	2–5	−.08	0.00	.73 (< .001)		
Balance	3.53 ± .65	1–5	−.22	.18	.68 (< .001)		

Openness of communication	3.67 ± .70	1–5	−.75	1.19	.79 (< .001)		
Feedback and communication	3.89 ± .68	1–5	−.60	.57	.62 (< .001)		
Authentic leadership	3.64 ± .50	1–5	−.36	.54		.93	.76
Self-awareness	3.55 ± .82	1–5	−.30	−.09	.91 (< .001)		
Transparency	3.73 ± .67	1–5	−.27	.60	.88 (< .001)		
Balanced processing	3.56 ± .86	1–5	−.55	.18	.90 (< .001)		
Moral/Ethical	3.67 ± .67	1–5	−.58	1.39	.78 (< .001)		
Safety climate	3.61 ± .47	2–5	.04	.10		.89	.62
Teamwork climate	3.59 ± .57	2–5	−.22	.27	.79 (< .001)		
Safety climate	3.80 ± .57	2–5	−.08	−.03	.89 (< .001)		
Job satisfaction	3.68 ± .73	1–5	−.38	.05	.80 (< .001)		
Perception of management	3.44 ± .68	1–5	.01	−.19	.70 (< .001)		
Working condition	3.48 ± .66	1–5	−.12	.50	.76 (< .001)		
Patient safety knowledge	3.71 ± .68	1–5	−.18	.16		.87	.53
Safety motivation	4.59 ± .51	3–5	−1.02	.22		.94	.75
Patient safety event reporting						.75	.51
Near miss	3.84 ± .84	1–5	−.63	.33	.55 (< .001)		
No-harm event	4.11 ± .87	1–5	−1.06	1.29	.92 (< .001)		
Adverse event	4.50 ± .80	1–5	−1.86	3.60	.62 (< .001)		

Variables	1 r (p)	2 r (p)	3 r (p)	4 r (p)	5 r (p)	6 r (p)
1. Just culture	1					

2. Authentic leadership	.60 (< .001)	1				
3. Safety climate	.69 (< .001)	.57 (< .001)	1			
4. Patient safety knowledge	.36 (< .001)	.27 (< .001)	.48 (< .001)	1		
5. Safety motivation	.34 (< .001)	.17 (.003)	.35 (< .001)	.31 (< .001)	1	
6. Patient safety event reporting	.32 (< .001)	.18 (.002)	.40 (< .001)	.33 (< .001)	.19 (.001)	1

Endogenous variables	Exogenous variables	Direct effect (p)	Indirect effect (p)	Total effect (p)	SMC
Safety climate	Just culture	.71 (< .001)		.71 (< .001)	.633
Authentic leadership	.12 (.061)		.12 (.061)		Patient safety knowledge
Safety climate	.53 (< .001)		.53 (< .001)	.283	Safety motivation
Safety climate	.41 (< .001)		.41 (< .001)	.166	Patient safety event reporting
Just culture	.10 (.494)	.31 (.002)	.41 (.001)	.229	Authentic leadership
−.11 (.201)	.05 (.147)	−.06 (.472)		Safety climate	.35 (.009)

.08 (.089)	.43 (.002)		Patient safety knowledge	.17 (.025)	
.17 (.025)		Safety motivation	−.01 (.844)		−.01 (.844)

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A Comparison of Self-evaluated Survey and Work Sampling Approach for Estimating Patient-care Unit Cost Multiplier in Genetic Nursing Activities

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ProQuest document link

ABSTRACT (ENGLISH)

SummaryPurpose

To compare patient care multipliers estimated from subjective evaluation against work sampling (WS) techniques in genetic nursing activities.

Methods

An observational WS technique was conducted from November to December 2019 with nine genetic nurses in a tertiary referral center in Malaysia. The WS activity instrument was devised, validated, and pilot tested. All care- and non-care-related activities were sampled at 10-minute intervals within 8 hours of working over 14 days, followed by a subjective evaluation of activities survey over the same period. Bonferroni correction was undertaken for multiple testing with a *p value* of 0.0025.

Results

The two techniques produced significant differences in genetic nurses’ activities categorization. The WS showed that compared with subjective evaluation, direct care (19.3% vs. 45.0%; $p < .001$) was estimated to be significantly lower, and indirect care (40.4% vs. 25.6%; $p < .001$) and unit-related activity (28.5% vs. 16.9%; $p < .001$) were higher. Both techniques produced a similar proportion of time spent in other non-care activities (12.0%) but differed in genetic meetings and information-gathering activities. While the multipliers for patient face-to-face contact were significantly larger between WS (4.57) and the survey (1.94), the multipliers for patient care time were smaller between WS (1.47) and the survey (1.24), indicating that caution should be taken when multiplying for patient contact time compared to patient care activity to determine the cost of care provision.

Conclusion

A considerable proportion of time spent away from the patient needs to be allocated to patient-related care time. Thus, estimating the paid cost solely based on direct time with patients considerably underestimates the cost per hour of nurses' care. It is recommended to employ ‘patient-related activity’ instead of the ‘face-to-face contact’ multiplier because the former did not significantly differ from the one estimated using WS.

FULL TEXT

DETAILS

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Development and Psychometric Validation of the Perinatal Bereavement Care Competence Scale for Midwives

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ProQuest document link

ABSTRACT (ENGLISH)

SummaryPurpose

The aim of this paper is to develop a scale for measuring the perinatal bereavement care competence of midwives and assess its psychometric properties.

Methods

The Perinatal Bereavement Care Competence Scale was developed in four phases. (1) Item generation: 75 items were formulated based on a literature review and interviews with midwives. (2) Delphi expert consultation: 15 experts evaluated whether the items were clear/appropriate/relevant to the questionnaire dimensions, and the items were optimized. (3) Pilot test: The comprehensibility, acceptability, and time required to complete the questionnaire by midwives were assessed. (4) Evaluation of reliability and validity: The scale was validated by initial item analysis, exploratory and confirmatory factor analyses, and internal consistency reliability and test–retest reliability.

Results

The final scale consisted of six dimensions and 25 items: maintaining belief (three items), knowing (four items), being with (six items), preserving dignity (four items), enabling (five items), and self-adjustment (three items). Exploratory factor analysis yielded a six-factor structure that was consistent with the theoretical framework and explained 70.8% of the total variance. Confirmatory factor analysis indicated a good fit for the six-factor model. Cronbach's α for the scale was 0.931, and the test–retest reliability coefficient was 0.968.

Conclusion

The Perinatal Bereavement Care Competence Scale is a valid and reliable instrument for measuring the competence of midwives in caring for bereaved parents who have experienced perinatal loss.

FULL TEXT

Introduction

Perinatal loss is a highly painful event for parents and families [1]. Most bereaved parents suffer from devastating psychological and emotional symptoms including grief, depression, anxiety, self-blame, and post-traumatic stress, which even cause adverse effects for subsequent pregnancies [2,3]. Appropriate bereavement care provided by hospital staffs is essential for helping parents cope with perinatal loss and reducing its negative impact [4,5]. Specifically, healthcare professionals should use simple and appropriate language, provide adequate and personalized information, acknowledge grief and parenthood, offer the important choice to parents of seeing and holding their baby, and provide commemorative items such as photographs, footprints, or baby clothes to help parents create meaningful memories and support the grieving process [6].

In China, fetal death that occurs during the second or third trimester of pregnancy is attended by midwives who provide compassionate care and support to the women and are likely to be involved in the bereavement process to help parents make decisions that minimize regret (e.g., over the missed opportunity of seeing their baby) [7]. However, unlike routine nursing tasks, perinatal bereavement care is challenging for many midwives because of the lack of a standardized approach. Midwives often report that supporting bereaved parents is emotionally demanding and stressful, and in some situations, they may experience a sense of personal failure accompanied by guilt and helplessness if they feel that they are unable to provide adequate assistance [8]. This can have serious consequences such as emotional burnout, self-doubt, and even professional resignation [9,10]. Moreover, the emotional pain of grieving parents can be exacerbated when midwives cannot meet their needs for bereavement services [11]. Therefore, improving midwives' ability to provide perinatal bereavement care is important not only for the psychological well-being of the parents but also for midwives' career development.

Swanson's Caring Theory can serve as a guide for healthcare professionals offering care to parents who have experienced pregnancy loss [12]. The theory encompasses five processes: (1) ‘‘maintaining belief,’’ which refers to conveying confidence and faith that the bereaved parents can get through perinatal loss and face a meaningful future; (2) ‘‘knowing,’’ which is trying to understand the meaning of perinatal death for the women and assessing their partners' perspective and family support; (3) ‘‘being with,’’ which includes simply being there, sharing grief feelings, and conveying ongoing availability without burdening the bereaved parents; (4) “doing for,” which is anticipating and meeting bereaved parents' needs, with a focus on protecting them from harm and protecting their dignity; and (5) “enabling,” which is facilitating the bereaved parents' capacity to grow using professional knowledge and information and helping them focus on important issues and generating alternatives [13,14].

Up to now, there have been few studies examining Asian midwives' performance when caring for parents suffering pregnancy loss. A qualitative study in China has shown that most midwives experienced negative feelings when supporting bereaved parents, some were able to provide support through empathetic nursing, while others adopted negative coping strategies such as avoiding in-depth communication with the parents [15]. As we know, a cross-sectional survey can effectively identify midwives' shortcomings in perinatal bereavement care and may be useful for developing strategies to increase their competence, which is not addressed by existing instruments. For example, a self-report questionnaire on nurses' attitudes toward perinatal bereavement care was developed [16], but there was no confirmatory factor analysis (CFA) in different samples to validate the factor structure. Recently, an instrument that includes four independent subscales, i.e., bereavement support knowledge, skills, self-awareness, and organizational support, was developed [17]; however, the subscales are difficult to be synthesized to measure midwives' comprehensive competence of perinatal bereavement care due to duplication of some items.

In the present study, we developed Perinatal Bereavement Care Competence Scale (PBCCS) based on Swanson's Caring Theory and evaluated the validity and reliability of this scale in a cohort of midwives from different hospitals in China.

Methods

This study had four phases: (1) item generation and scale construction; (2) expert panel review; (3) small-scale pilot study; and (4) large-scale reliability and validity testing.

Phase 1: Item generation

Using Swanson's Caring Theory as a guide, the basic framework of the PBCCS was established through semi-structured interviews with midwives and a literature review. To explore the feelings and perceived competency status of midwives in China providing bereavement care for parents who have experienced perinatal loss, we interviewed 18 midwives from 11 grade 3A hospitals in Guangdong, China. We found that some midwives had maladaptive negative emotions that caused them to feel overwhelmed, so they distanced themselves from grieving parents [15]. Accordingly, we included “self-adjustment” as a dimension of the PBCCS. At the same time, we extracted specific items from five evidence-based guidelines for perinatal bereavement care through systematic quality appraisal [18]. We generated an initial pool of 75 items. Based on discussions among the authors, some items were removed because they were unclear, repetitive, or did not align with Chinese culture. The remaining 64 items were grouped into six dimensions including “maintaining belief” (four items), “knowing” (eight items), “being with” (13 items), “doing for” (18 items), “enabling” (15 items), and “self-adjustment” (six items).

Phase 2: Delphi expert consultation

A group of experts including nine midwifery experts, five clinical psychologists, and one hospice care expert was convened by email invitation; all had the title of senior deputy and over 10 years of professional experience. The experts were asked to rate the importance of each item on a 5-point scale ranging from 1 (extremely unimportant) to 5 (extremely important) after discussing whether the item was clear or appropriate and listing the specific reasons and suggestions for revision. After two rounds of expert consultation, items that met any of the following criteria were deleted [19]: (1) average importance score 0.2. We also optimized the dimensions and specific items of the scale based on the experts' opinions. For example, the items (“effectively evaluating parents' expectations of pregnancy and parenthood” and “effectively evaluating the level of family support received by bereaved mothers”) were added to the “knowing” dimension; and an item (“making bereavement care plans with the parents”) in the “doing for” dimension was deleted as recommended by the clinical midwifery experts because there are no specific bereavement care plans and no timeline for midwives to accomplish this work in clinical practice. Two items (“if requested, providing additional resources that are in line with the bereaved parents' religious beliefs” and “if requested, providing additional resources that are in line with the bereaved parents' customs and habits”) in the “doing for” dimension were merged into a single item (“if requested, providing additional resources that meet the bereaved parents' religious and social custom needs”). The experts suggested changing the expression of some items to improve their comprehensibility. Ultimately, two items were added, 16 were deleted, and four were merged, yielding 46 items for the questionnaire.

Phase 3: Pilot study

We invited 16 midwives from grade 3A hospitals to offer their perspectives regarding the ease of completion, comprehensibility, clarity, and acceptability of the questionnaire, with the items adjusted and revised accordingly. The midwives thought five items should be modified because they lacked clarity. For example, they thought that the item “keeping appropriate silence in due course” was ambiguous because it was unclear what was meant by “due course.” The item was therefore reworded as “keeping appropriate silence when communicating with bereaved parents.” The revised version of the questionnaire was further tested in different midwives until no further problems were identified. In general, the questionnaire was easy to complete and took about 5–10 min.

Phase 4: Validity and reliability testing

To assess the validity and reliability of the scale, midwives were recruited from different hospitals by convenience sampling from September to November 2020. Midwives who worked in delivery rooms and consented to participate in the study were included; those who had no experience in perinatal death were excluded. We used Wenjuanxing (www.wjx.cn), a reliable investigation website used in China, to design and publish our electronic questionnaire. Participants could click on relevant links to access and complete the questionnaire anonymously and could only do so once using their own electronic devices. To evaluate test–retest reliability, 15 of the participants were selected to complete the questionnaire again 2 weeks later. Some questionnaires with less than 3 minutes to complete or obvious irregularities were deleted. Based on the random splitting method, all valid questionnaires were divided into two equally sized groups: Sample 1 was used for exploratory factor analysis (EFA), and Sample 2 was used to confirm the factor structure of the scale by CFA. The internal consistency reliability and test–retest reliability were also evaluated. For factor analysis, the sample size should be least 5–10 times the number of all items [[20]]; because the PBCCS had 46 items, the minimum sample size for EFA and CFA was 542, considering that 15.0% of questionnaires would be invalid.

Ethics statement

This study was reviewed by the Institutional Review Board of Southern Medical University (Ethics Committee of Southern Medical University [2020] No. 17). The participants were also informed that completing the questionnaire was voluntary. The data were kept anonymous and were used only for study purposes.

Data analysis

Data were analyzed using SPSS v22.0 and AMOS v24.0 software (IBM, Armonk, NY, USA). Descriptive statistics were applied to the demographic characteristics of the participants, which are presented as mean ± standard deviations and numbers and percentages. Construct validity was assessed by item analysis, EFA, and CFA. In the item analysis phase, items that met any of the following criteria were deleted [[20]]: (1) no statistically significant items in a critical ratio; (2) item total correlation (Pearson's correlation coefficient) 20]. CFA with maximum likelihood estimation method was performed to verify the fit of the factor structure derived from the EFA based on the following indices: χ^2/df, goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), comparative fit index (CFI), Tacker–Lewis index (TLI), incremental fit index (IFI), root mean square error of approximation (RMSEA), and root mean square residual (RMR). The χ^2/df between 1 and 3, GFI, AGFI, CFI, TLI, and IFI values 0.90 or above, and RMSEA values less than 0.08 with RMR less than 0.05 suggested a good model fit [[21]]. After CFA, convergent validity was assessed based on the average variance extracted and composite reliability. Reliability analysis was performed by calculating the internal consistency reliability (Cronbach's α coefficient) and the test–retest reliability (intraclass correlation coefficient) for the total scale and its dimensions, respectively.

Results Sample characteristics

A total of 585 questionnaires were distributed, and 507 valid questionnaires were recovered, for a response rate of 86.6%. The 507 participants were from 142 different hospitals across China and ranged in age from 20 to 54 years. The participants had worked in the obstetrics department for a mean (±SD) of 10.63 (±7.61) years, and 43.4% had experience in providing care for perinatal death in the previous 3 months. The characteristics of the participants are shown in Table 1.

Construct validity Item analysis

Data from Sample 1 were used to analyze and select the items. Three items (Items 1, 20, and 21) were deleted according to the exclusion criteria of item analysis, and a trial scale containing 43 items was created (Table 2).

Exploratory factor analysis

To identify the common factors in the items, we conducted seven rounds of EFA. Items with a lower theoretical correlation and factor loading ≤0.4 were removed from item selection. In the final round of EFA, the KMO value was .903, and the result of Bartlett's test of sphericity was adequate (χ^2 = 4021.419, p 0.4 (Table 3).

Confirmatory factor analysis

After EFA, a CFA of Sample 2 was conducted based on the six-factor model, and the results confirmed a structure with a good model fit (χ^2/df = 1.848, RMSEA = 0.058, GFI = 0.868, AGFI = 0.835, TLI = 0.932, RMR = 0.035, IFI = 0.942, and CFI = 0.941). Each item loaded significantly on its corresponding factor, with standardized factor loadings ranging from 0.523 to 0.975; average variance extracted in the six domains ranged from 0.500 to 0.742 and composite reliability ranged from 0.799 to 0.895, indicating good convergent validity. The minimum square root of average variance extracted corresponding to the six factors (0.707) was greater than the maximum correlation coefficient between factors (0.633), indicating good discriminant validity. Figure 1 shows the CFA model of PBCCS.

Reliability

The Cronbach's α for the whole scale was 0.931, and the Cronbach's α of the subscales ranged from 0.771 to 0.881 (Table 4). The maximum value for test–retest reliability was 0.968.

Discussion

The aim of this study was to develop a new scale for assessing the perinatal bereavement care competence of midwives and confirm its validity and reliability. Based on Swanson's Caring Theory, we developed an item pool through semi-structured interviews with midwives [15] and a review of relevant guidelines [18]. Items from instruments that measure perinatal bereavement care knowledge [17], attitudes [16], and skills [17] were selected and adjusted according to specific clinical circumstances. Unexpectedly, some items could be categorized in more than one dimension of Swanson's Caring Theory in the initial phase of item generation, which was also the major problem encountered in other studies, given that the five caring processes are interrelated [22]. For example, the item “accepting different emotional displays by bereaved mothers (e.g., crying and anger)” could be classified under “being with” and “enabling.” Furthermore, some items in “enabling” such as “if necessary, informing parents of the possible cause of the baby's death” were found to be appropriate in the “doing for” dimension when reworded as “help grieving parents understand the cause of their baby's death.” Therefore, the definitions of the five caring processes were refined according to basic principles of perinatal bereavement care as follows: “maintaining belief,” which refers to having confidence and faith that the bereaved parents can get through perinatal loss; ‘‘knowing,’’ which is striving to understand the meaning of the perinatal loss experience for the couple and assessing the level of support provided by their family; ‘‘being with,’’ which includes sharing feelings of grief and conveying ongoing availability without burdening the bereaved parents; “preserving dignity,” which focuses on the recognition of parenthood; and “enabling,” which involves explaining important information and involving bereaved parents in communication and decision-making regarding nursing [13,14]. These changes were approved by experts through two rounds of consultation. The PBCCS required just 5–10 min to complete and can thus be easily adopted in clinical settings.

Although most items were highly sensitive and differentiated, three items (“believing that the bereaved parents can get through perinatal loss,” “supporting parents in creating memories through the collection of mementoes such as photographs, handprints, and footprints,” and “supporting parenting activities such as holding, bathing, and dressing the baby”) were deleted according to the exclusion criteria [20] during the item analysis phase. These changes may raise some professionals' worries about the comprehensiveness of the scale; however, they are more in line with the clinical reality under the Chinese cultural background and may improve the broad applicability of PBCCS. In order to identify meaningful variables, EFA was conducted with the principal component analysis method of extraction and varimax rotation [20]. On the one hand, this yielded a six-factor model were consistent with Swanson's theoretical framework and our previous findings, demonstrating that the PBCCS has good content validity [23]. On the other hand, our findings provide empirical validation of Swanson's five caring processes and further promote the development of caring theory in the field of perinatal loss [12]. The factor structure of the scale was evaluated by CFA using Sample 2 (*n* = 254). Most of the indices met the statistical requirements except for GFI (0.868) and AGFI (0.835) although these could be considered as acceptable (>0.80) [24]. The results of the convergent and discriminant validity tests also confirmed that the scale has good construct validity. It is worth noting that two of the dimensions, “maintaining belief” and “self-adjustment,” each had just three items. However, this is a sufficient number to test the characteristics of a specific factor [25]. The Cronbach's α and test–retest reliability of the whole scale were both >0.9, indicating that the scale has excellent reliability [26].

The results of our analyses demonstrate that the 25-item PBCCS is reliable and valid for assessing perinatal bereavement care competence among midwives. The PBCCS can provide guidance for midwives in their care of bereaved parents and a means for midwives to assess their own level of competence in this aspect of their work. The scale can also be used as a tool to evaluate the effectiveness of perinatal bereavement care education and training. The PBCCS should be validated for other medical professionals who engage in perinatal bereavement care such as obstetricians, neonatologists, perinatal psychiatrists, nurses, and community medical workers; it would be interesting to compare the level of competence among these groups and explore the possible reasons for any differences.

There are several limitations of our study. First, although we recruited participants from 142 hospitals in China, our study sample is not sufficiently representative via convenience sampling. Second, the sample size of 15 participants for test–retest reliability is relatively small. Therefore, a larger sample is recommended to further validate the stability reliability of the PBCCS. Third, the scale is a self-reported instrument, and social desirability bias may have influenced reporting of self-capability. In order to reduce the reporting bias, the midwives were asked to fill out questionnaires anonymously. Finally, the PBCCS was developed based on the Chinese culture, and its validity and reliability study was conducted in China. Accordingly, further testing of this scale is still needed with more diverse samples from other cultures and countries.

Conclusions

The 25-item PBCCS is a valid and reliable tool for measuring midwives' competence in providing bereavement care to parents who have experienced perinatal death. The scale can also serve as a practical framework for midwives to assess their own feelings when providing support to bereaved parents. Additional studies are needed to determine whether the PBCCS can be applied to other healthcare professionals who participate in bereavement care.

Declaration of interest

None.

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Acknowledgments

The authors thank all of the midwives who participated in the study.

Variable	n (%)
Age, years	
20–29	201 (39.6)
30–39	229 (45.2)
40–49	66 (13.0)
50–54	11 (2.2)
Gender	

Men	1 (0.2)
Women	506 (99.8)
Educational background	
Secondary specialized school	6 (1.2)
Junior college	93 (18.3)
Undergraduate	398 (78.5)
Master's	10 (2.0)
Professional title	
Nurse	86 (17.0)
Nurse practitioner	200 (39.4)
Nurse-in-charge	192 (37.9)
Associate director nurse	27 (5.3)
Director nurse	2 (0.4)
Certificate of competency in maternal and infant health care	
Yes	453 (89.3)
No	54 (10.7)
Years working in obstetrics department	
<1	12 (2.4)
1–5	141 (27.8)
6–10	149 (29.4)
11–15	78 (15.4)
16–20	75 (14.8)
>20	52 (10.3)

Experience of delivery care in perinatal death in the last 3 months	
Yes	220 (43.4)
No	287 (56.6)

Item	t value	Corrected item total correlation coefficient*	Cronbach's α if item deleted	Factor loading
1	−3.902	.243	↑	.209
2	−5.279	.421	Unchanged	.407
3	−4.422	.411	Unchanged	.405
4	−6.267	.465	↓	.470
5	−10.086	.586	↓	.594
6	−9.967	.592	↓	.603
7	−10.289	.577	↓	.589
8	−7.927	.521	↓	.520
9	−11.160	.665	↓	.686
10	−11.523	.666	↓	.690
11	−11.874	.657	↓	.683
12	−8.623	.645	↓	.686
13	−10.036	.666	↓	.688
14	−9.617	.679	↓	.723
15	−10.563	.687	↓	.723
16	−7.500	.618	↓	.627
17	−6.366	.562	↓	.575

18	−9.933	.656	↓	.686
19	−7.766	.558	↓	.551
20	−6.666	.446	Unchanged	.379
21	−6.334	.448	Unchanged	.392
22	−7.181	.489	Unchanged	.421
23	−6.866	.546	↓	.518
24	−8.770	.576	↓	.557
25	−8.186	.485	↓	.451
26	−8.483	.651	↓	.652
27	−10.468	.725	↓	.727
28	−10.513	.697	↓	.706
29	−10.681	.653	↓	.656
30	−10.642	.678	↓	.693
31	−10.041	.643	↓	.656
32	−8.364	.646	↓	.646
33	−11.310	.710	↓	.721
34	−8.067	.605	↓	.594
35	−9.704	.585	↓	.564
36	−7.953	.520	Unchanged	.488
37	−11.847	.731	↓	.738
38	−12.590	.706	↓	.708
39	−13.204	.766	↓	.787
40	−7.507	.571	↓	.565

41	−9.184	.683	↓	.701
42	−10.632	.696	↓	.711
43	−9.959	.700	↓	.710
44	−10.461	.595	↓	.585
45	−10.230	.594	↓	.585
46	−10.672	.584	↓	.579

Item	Factor loading					
Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Item 2: Believing that the grief response of each mother is unique

0.784	0.158	0.027	0.211	0.118	0.062	Item 3: Believing that the needs of each bereaved mother are different
0.841	−0.007	0.148	0.172	0.093	0.028	Item 4: Believing that bereaved mothers require support from midwives

0.692	0.236	0.231	−0.025	0.122	0.134	Item 5: Effectively evaluating parents' expectations of pregnancy and parenthood
0.138	0.766	0.250	0.035	0.280	0.100	Item 6: Effectively evaluating the mood changes of bereaved parents

0.180	0.777	0.276	0.039	0.240	0.090	Item 7: Identifying abnormal behavior in bereaved mothers
0.113	0.772	0.269	0.104	0.108	0.119	Item 8: Effectively evaluating the level of family support received by bereaved mothers

0.038	0.680	0.146	0.217	−0.030	0.311	Item 11: Easily empathizing with bereaved mothers
0.058	0.386	0.610	0.238	0.145	0.128	Item 12: Accepting different emotional displays by bereaved mothers (e.g., crying and anger)

0.143	0.172	0.797	0.156	0.092	0.221	Item 13: Patiently listening to bereaved mothers
0.143	0.228	0.835	0.141	0.151	0.075	Item 14: Effectively comforting bereaved mothers using appropriate language

0.079	0.241	0.816	0.170	0.252	0.068	Item 15: Effectively comforting bereaved mothers using appropriate body language (e.g., hugs and back pats)

0.087	0.268	0.812	0.184	0.176	0.105	Item 16: If necessary, leaving bereaved mothers alone under the precondition of guaranteed safety
0.238	−0.044	0.496	0.268	0.245	0.275	Item 23: Acknowledging parenthood

0.209	0.002	0.173	0.580	0.170	0.107	Item 27: Asking bereaved parents whether they wish to see their baby after birth
0.118	0.076	0.239	0.739	0.335	0.143	Item 24: Referring to the baby with the appropriate terms

0.007	0.414	0.076	0.651	0.055	0.167	Item 26: Treating dead babies with sufficient love and respect
0.108	0.068	0.268	0.773	0.231	0.041	Item 32: If necessary, informing parents of the possible cause of the baby's death

0.083	0.085	0.194	0.241	0.781	0.137	Item 34: If necessary, providing information about the autopsy to the parents
0.050	0.129	0.102	0.088	0.816	0.168	Item 33: If necessary, providing supportive suggestions about future pregnancies

0.166	0.207	0.234	0.282	0.722	0.140	Item 30: Providing information about maternal recovery (e.g., wound care and lactation suppression)

0.225	0.206	0.304	0.300	0.528	0.142	Item 39: Encouraging parents to be involved in communication and decision-making regarding nursing

0.212	0.207	0.348	0.390	0.461	0.212	Item 44: Acknowledging my own negative emotions in perinatal bereavement care work
0.085	0.091	0.201	0.093	0.168	0.841	Item 45: Understanding my own negative emotions in perinatal bereavement care work

0.094	0.168	0.146	0.128	0.139	0.784	Item 46: Effectively coping with my own negative emotions in perinatal bereavement care work

Dimension	Number of items	Cronbach's α	Test–retest reliability
Maintaining belief	3	0.771	0.954
Knowing	4	0.851	0.922
Being with	6	0.900	0.895
Preserving dignity	4	0.701	0.909
Enabling	5	0.865	0.953
Self-adjustment	3	0.881	0.906

DETAILS

Subject:	Parents &parenting; Families &family life; Pregnancy; Validity; Grief; Midwifery; Questionnaires
Location:	China
Identifier / keyword:	bereavement; perinatal death; midwifery; obstetric nursing
Publication title:	Asian Nursing Research; Seoul
Volume:	16
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Applying Mindfulness Techniques to the Management of Depressive Tendencies in Women in Taiwan in the Perinatal Period: A Qualitative Study

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ProQuest document link

ABSTRACT (ENGLISH)

SummaryPurpose

Perinatal distress, especially depression, commonly occurs during pregnancy and the first year postpartum, but this medical condition are often undiagnosed and untreated. The present study explored how women with depressive symptoms during the perinatal period who had participated in a mindfulness course applied the training and perceived its effects.

Methods

This descriptive qualitative study included 16 women with probable perinatal depression who had participated in an 8-week mindfulness-based childbirth and parenting program during their pregnancy and agreed to be interviewed. One-to-one in-depth interviews were conducted and recorded following the completion of the mindfulness course, approximately 1 month after childbirth. Verbatim transcripts were analyzed using content analysis.

Results

We proposed three themes and six subthemes relating to first-time mothers' experiences during and after the group mindfulness-based intervention: learning to be aware of the body and mind (confronting awareness of physical change, managing negative feelings differently), building positive family relationships (strengthening the mother–baby bond, developing a satisfactory marital partnership), and overcoming ongoing challenges (conquering childbirth pain with confidence, accepting unexpected situations). Three main themes were generated to demonstrate how women experience the effects of mindfulness training.

Conclusions

Mindfulness-based interventions helped the participants develop insight into their mood and physical changes and accept their childbirth process. Therefore, mindfulness education programs can be incorporated into prenatal care to enhance the management of the depressive symptoms of perinatal women.

FULL TEXT

Introduction

Women are particularly susceptible to psychological distress, especially depression, during pregnancy and the postpartum period [1,2]. Depression is a leading cause of disability worldwide and is a major contributor to the overall global burden of disease [3]. Roomruangwong and Epperson [4] revealed that the overall prevalence rate of depression in Asian women was significantly higher than that of women in Western countries. Studies have estimated that 13.2%–20.0% of Taiwanese women experience depression during the prenatal period [5–7].

The need to address perinatal depression is clear; however, few women with mental health disorders are diagnosed in the perinatal period, and they rarely receive treatment [8]. Even when pharmacological interventions are suggested, women are reluctant to accept such treatment because of concerns for their infant's safety [9]. If perinatal depression is not adequately managed, women with strong depressive symptoms experience disturbed sleep, changes in appetite, and general unhappiness [10]. Increased marital conflict, impaired infant attachment, and infanticide have been reported [11–14]. Moreover, for Chinese women, cultural factors can increase the risk of depression; examples include conflicts with their mother-in-law [4] and a lack of support from the husband [15]. Because perinatal women prefer to undergo psychosocial therapy, the US Preventive Services Task Force recommended that all women at risk of depressive disorders during this period be referred to behavioral or psychotherapeutic interventions [16]. Mindfulness is defined as the process of focusing on the present in a nonjudgmental manner [17,18]. In recent years, research has demonstrated that mindfulness practice can improve a wide range of mental and physical health conditions because participants learn how to disengage from negative thinking [19–21]. The mindfulness-based childbirth and parenting (MBCP) approach is informed by mindfulness theory. This approach is specifically tailored to the needs of expectant parents and is producing promising results regarding perinatal mental health [22–24]. Because pregnancy triggers psychological distress in women with a depressive tendencies, identifying the extent to which MBCP programs can help such women is essential.

Peng et al [25] reported that 33.5% of Chinese women lived with their parents-in-law, and such women were more likely to experience postpartum depression. Recent evidence has demonstrated that women with postpartum depression symptoms may differ compared with women without such symptoms in help-seeking and preferences for treatment [26]. Although studies have indicated that mindfulness is effective for healthy Chinese perinatal women with mental health [27], few studies have focused on the effects of mindfulness on perinatal women with depressive symptoms. Additionally, in Chinese societies, a woman's life as an expectant mother is deeply influenced by traditional Chinese culture; therefore, we must understand how these women use mindfulness to adjust to postpartum life and clarify the underlying mechanisms of mindfulness in related scenarios. This study investigated how women with depressive tendencies during the perinatal period who participated in our mindfulness program applied mindfulness training and perceived its effects on their perinatal life.

Methods Study design

A descriptive qualitative method [28] was used in this study. This method enables researchers to obtain information directly from participants, conduct inquiries with the minimum disruption to the natural context of the phenomenon being studied, and engage deeply with data in the analysis and presentation process.

Qualitative researchers in the health sciences have diverse backgrounds; thus, their approach to various phenomena is based on their preexisting knowledge and an rich, straightforward descriptions of an experience or event [29,30]. This method focuses on various phenomena instead of the theory and thus produces novel results that can provide a rich and direct description of an experience or event. The final product is a description of the experience in language that is similar to the participant's own language [31].

Setting and participants

This study is part of a large prenatal mindfulness intervention study. The 8-week MBCP program took place in Taiwan and was targeted at pregnant women who were nulliparous, were aged >20 years, were at 13–28 weeks' gestation with a singleton pregnancy, were able to understand and write Chinese, had no medical or obstetric complications, had Edinburgh Postnatal Depression Scale scores >9 (score range from 0 to 30, and >9 is possible depression) [32,33], planned to give birth vaginally, and agreed to attend the MBCP program. Women were excluded if they had a diagnosed psychosis or if they or their fetuses had any medical complications.

The intervention consisted of eight 3-hour weekly sessions and was based on Bardacke's [24] original MBCP program adopted by Pan et al. [34]. This program is tailored for expectant couples, and the teaching of mindfulness is fully integrated with current knowledge on the psychological processes of pregnancy, childbirth, breastfeeding, postnatal adjustment, and the psychological needs of newborns. This knowledge is combined with the mindful attitudes of nonstriving, kindness and compassion, beginner's mind, patience, trust, nonjudging, acknowledging or accepting, and letting go. In addition, partner support, a self-regulation tool for coping with labor pain, and awareness skills to reduce or prevent stress, anxiety, and depression symptoms in perinatal life are included [23,35]. This mindfulness program was taught by the first author, and it included learning about mindfulness meditation techniques for the perinatal period. The learning content included formal and informal training. The course was run with 8–12 participants and their partners in a group. The participants were required to listen to audio recordings of formal and informal mindfulness practices that they could perform at home for 30 minutes six times a week and to additionally complete a homework assignment after the practice. We allowed the participants the necessary time to practice mindfulness outside the class with the goal and expectation that they would undertake this additional practice.

In this study, 16 participants from three groups within the MBCP program who agreed to attend the interviews and who gave birth in 2020 and 2021 were included. The interviews were held approximately 1 month after childbirth.

Ethical considerations

This study was approved by the Taiwan Adventist Hospital Institutional Review Board (Reference No. 108-E−14). Before starting each interview, the researcher informed the participant about the purpose of the study, the interview process, and plans for using the collected data. They were provided with information relating to this study in written and verbal form. All the participants were informed of the voluntary nature of their participation. Their interview records were kept confidential. Furthermore, the participants were informed that they could withdraw from this study at any time without affecting their rights to health care. All identifying information was removed from the interview records and the participants' personal data; only codes were used in the final analysis.

Data collection

The interviews were held either in a postpartum nursing center or at the participant's home. An interview guide was used, and questions such as “Please describe your experience of participating in the mindfulness program,” “Please share how you have applied the mindfulness program to perinatal life,” and “Tell me how you have adapted to your current life” were included. To elicit the most comprehensive descriptions, the participants were asked to answer these questions and were then prompted to clarify or expand on their answers with follow-up prompts, such as “What do you mean …?” Upon completion of the interviews, the participants completed a short demographic survey questionnaire.

Data analysis

Braun and Clarke's method was used to conduct a thematic analysis of the data. This is a qualitative method that allows for the identification, analysis, organization, and report of patterns or themes revealed within the data [36]. Two female researchers read the transcripts and onsite notes of each participant's interview several times to immerse themselves in the data and fully understand the participant's responses and experience. Subsequently, they discussed and compared the coding of each transcript until a consensus on the codes and coding definitions was reached. The themes were discussed and finalized with the consensus of all the authors to ensure that the units of code identified were related to the themes and that the finalized themes truly represented the entire dataset [37].

Trustworthiness of the study

Several principles guided the strategies that were used to maintain the reliability of this study, namely credibility, transferability, dependability, and confirmability. This was achieved through (1) an intensive interview that lasted 50–90 min, (2) continuous observation and data analysis, and (3) data generated through recordings and verbatim records of the interviews. Credibility was supported through meetings between research teams and with colleagues and participants to discuss research findings. To facilitate transferability, diversity with regard to age, educational level, and the method of childbirth used was valuable. The interview guide was developed from a review of the literature and input from mindfulness experts. In addition, multiple collaborative sessions were held by the research team to ensure the accuracy of the data collection and analytical procedures and increase the dependability of the data. Furthermore, two interviewees were invited back to conduct further checks and describe their experiences as accurately as possible; hence, in this manner, we could establish research confirmability [38].

Results

The ages of the 16 women ranged from 23 to 38 years. Most held a bachelor's degree or above (87.5%) and were married (93.8%); 87.5% were employed during their pregnancy. Fifteen participants experienced a normal vaginal birth, and one underwent a cesarean section because the baby was in a breech position (Table 1).

At the time of their interview, all participants reported that they still practiced formal and/or informal mindfulness in their daily lives. The data were organized into three major themes to demonstrate how women experience the effects of mindfulness training: (1) learning to be aware of the body and mind, (2) building positive family relationships, and (3) overcoming ongoing challenges. Each theme contained two subthemes.

Theme 1: Learning to be aware of the body and mind

All the women described being aware of their physical and mental changes during the mindfulness practice after their participation in the mindfulness program.

Confronting awareness of physical change

Participants reported that the practice of mindful breathing and the body scan technique helped them focus on their body more and relax their muscles, resulting in fewer backaches and headaches: *"I got sore shoulders easily and suffered from headaches for many years …Since learning these techniques, I am able to focus on the moment and on my breathing. I noticed that I didn't have any headaches before or after childbirth." (participant 13)*

Participants also described feeling uncomfortable and tired in their pregnancy, but mindfulness practices improved the quality of their sleep, improved their circulation, and increased their energy levels. One participant said, *"I found the body scan pretty useful. At the very beginning of my pregnancy, I often found it difficult to fall asleep. I would listen to the 'body scan' [tape] before bedtime. I started to sleep better and felt energetic the next day." (participant 5)*

Managing negative feelings differently

Overall, participants reported that they felt calmer, less anxious, and less as though they were on "autopilot," meaning that their brains wandered less after practice. One participant explained how the class and the practice helped her become aware of sensations of inner peace, making her feel calmer and allowing her to think more clearly: "*I think mindfulness calms my emotions and changes my thinking. I used to worry about a lot of things, such as the fear of a difficult birth and having a cesarean. But the mindfulness practice and childbirth knowledge in this course helped me stop worrying because what I see, think, or feel may not be the actual situation, so I don't need to worry about it, and I have slowly begun to believe that I am capable of giving birth." (participant 8)*

Disappointment often occurs in life. Participants discovered that mindfulness techniques taught them to recognize their feelings and stop for a moment. They tried to consider life events from a different perspective, which helped them to avoid feeling that they were letting themselves down: *"I was told by the doctor that I had to have a cesarean because my baby was in a breech position. This was different from my original plan, but it happened …I was very worried at the time. Then I took a deep breath and stayed focused on the present moment. I was able to think that this was just my baby's choice. I told myself that it was no big deal. And that's been really helpful for me." (participant 9)*

Theme 2: Building positive family relationships

The women incorporated mindful techniques into relationships with their baby and husband. They exercised nonjudgment and ever-unfolding compassion for each and every moment, which enhanced their relationship.

Strengthening the mother–baby bond

This program helped the participants feel and interact with their baby during pregnancy. Participants reported that they used fetal movements as a reminder of mindfulness and that these movements elicited positive feelings. This maternal–fetal interaction continued until birth. Most participants experienced joy during the prenatal period: *"I felt my baby and wondered what my baby was doing. This also reminded me to be mindful with my baby. It was really fun. Sometimes she (my fetus) was very calm; sometimes she was making trouble and moving a lot. I could always feel her, and it was interesting."(participant 7)*

Several months after participating in the class, several women mentioned that practicing mindfulness became easier when they let the babies be their teachers. They learned to focus completely on the baby to view their present-moment parenting experience with their baby. One participant used this technique to bond with her baby despite the baby's gender not meeting the expectations of her mother-in-law:*"I could feel my mother-in-law's disappointment, but I was engrossed in being with her. I really felt that she was my angel …I think she understands me [looking at her baby]. She probably knows what I want to do. She keeps looking at me. People say you shouldn't praise this behavior in front of the baby, but my baby doesn't cry when she's hungry. She just gently pats me. Really! My husband also notices it. She pats me on my face like this [demonstrates the movement with her hands]." (participant 11)*

Developing a satisfactory marital partnership

All the participants mentioned that when they deliberately practiced maintaining awareness of their attitudes, they began to accept their own limitations and those of their partners. They also realized their husbands had changed. These husbands understood more about their wives' changes during pregnancy and birth and their attentiveness toward their wives increased after participating in the program. One participant said,*"I found that it was good to participate in this program with my husband. In the past, he couldn't easily sense when I was experiencing discomfort. However, I think he has become more considerate after attending this program …he has started carrying things, minding my walking pace, and helping me focus on the road. He even joins me in practicing mindful breathing in the evenings." (participant 1)*

Participants believed that techniques such as loving kindness and acceptance were helpful to their marital relationship. It made them more tolerant of each other and therefore reduced friction at home. One participant, who was shy but anxious to express herself, opined,*"Speaking in class put pressure on me, but I had the motivation to continue because he [my husband] accompanied me to every class. I learned to look at myself with acceptance and found that speaking in class was not very hard [smile] …I think it was very important to have him here, he is my greatest support.*" *(participant 12)*

Theme 3: Overcoming ongoing challenges

The majority of the participating women thought that the program helped them to cope with life's challenges. In addition to facing the pain of childbirth, they faced other major changes in life, such as caring for the baby, their husband's sudden unemployment, and returning to work. This theme reflected the women's perception of the training as effective because it enabled them to develop their strategies for dealing with threatening situations.

Conquering childbirth pain with confidence

Many participants reported a change in attitude with every session they attended. They gradually felt more confident about their pregnancy and birth. When they went into labor, mindful breathing allowed them to experience the physical sensations as pain arose, peaked, and disappeared. Using meditation to stay focused during childbirth enabled them to achieve successful labor outcomes:*"Before giving birth, I was really afraid of birth pain. I heard that it was really scary. After taking the mindfulness class, I learned not to worry about things that had not happened yet. I was able to face the birth and used breathing when each new contraction came …I felt very happy that I could get through the labor on my own." (participant 2)*

Three of the participants did not plan to use epidural analgesia for pain relief in labor but later chose to do so. They felt well informed of their choices, and thus, they were able to make the decision with confidence:*"I found that the childbirth pain was more painful than when we were holding the ice with our hands in mindful class. I really can't describe it. Later, I chose pain relief to help me manage the pain. Although this was different from what I had thought at the beginning, I don't judge myself. That's what my body needed at the time."(participant 12)*

Accepting unexpected situations

Having a child results in a number of unexpected life changes, such as less sleep, no alone time, and being constantly busy. Participants noted that mindfulness helped them take a step back from the situation and take a more objective view without making emotional judgments about the situation:*"Because we are both new parents, we sometimes forget to prepare extra clothes for our baby when we go out. One time he had a bowel movement, and* *we had to go home immediately. Mindfulness helps us to accept what's happening right now, so we don't blame each other for not remembering." (participant 2).*

Two participants mentioned their husbands losing their jobs because of the COVID-19 pandemic. Instead of reacting immediately and feeling depressed, they observed and actively noticed what was happening around them and then looked at the event from a different perspective. One participant commented,*"My husband was unemployed. Although I was mentally prepared before, I was worried at the time. I try to focus my attention on what is happening in the present moment, and I find that he has more time to be with us …It reminds me that we shouldn't focus on the negative things in life. So, I'm not as anxious as before. I will face the future with courage." (participant 10)*

Discussion

This qualitative study adds to the literature supporting the effectiveness of mindfulness learned in MBCP and specifically highlights the benefits of mindfulness techniques to these women to manage their stress.

The first theme of our study "learning to be aware of the body and mind" was similar to previous case–control studies, indicating that mindfulness interventions can reduce perinatal depression, anxiety, and stress [23,39]. Women face many changes after childbirth and must adjust to new difficulties and unexpected situations. This program can help women apply mindfulness techniques to increase their situational awareness and promote calmness and relaxation. The findings are congruent with those of quantitative studies, suggesting that higher levels of mindfulness are aid psychological adjustments and help individuals accept challenges [40]. By contrast, if they are unable to cope with disappointment and the homeostasis is disrupted, physical and mental functions may be reduced [41,42].

The women in our study considered that their positive family relationships were associated with our mindfulness interventions. The mothers became aware of the value of their attachment to their babies and felt happy that they and their babies could respond to each other. This is consistent with research revealing that mindfulness interventions are essential for improving parents' ability to be responsive, warm, and calm, helping them to develop a more attuned mother–infant interaction [43]. These programs also give women the opportunity to strengthen their relationships with their partners, with mindfulness techniques being used to manage difficult emotions and create greater flexibility in dealing with stressful situations [44,45].

Mindfulness childbirth classes for pregnant women help them prepare for the labor and birth and increase the levels of maternal attachment and competence in motherhood [46]. The results from this study reveal that the MBCP curriculum helps women strengthen their inner processes of attention, awareness, nonreaction, and nonjudgment toward their children through their daily parenting interactions. In addition to improving the mother's mental health, mindfulness also helps the mother to be competent in her parenting role.

Notably, through qualitative content analysis, we revealed that some participants used mindfulness practices to address the challenge of conflict with their elders during the perinatal period. Traditionally, after a Chinese woman marries, she becomes part of the husband's family and lives with them. Therefore, she cannot express herself as freely as when living with her own family, which may result in her suppressing her emotional expression [47]. Furthermore, discrimination against baby girls and a lack of support from husbands are problems that still exist in Chinese society and can aggravate the symptoms of maternal depression, particularly when new mothers live with their parents-in-law [48]. Therefore, future mindfulness interventions should incorporate cultural factors, share the perinatal experiences of other women in the course, and make adjustments that cater specifically to the needs of Taiwanese women.

Three themes from this study can help women manage depression clinically. First, awareness of the body and mind allows women to be open to all experiences and live in the moment, even in unexpected or unwelcome situations [44]. Second, MBCP can improve the parent–child relationship if the parent adopts a mindful parenting attitude, including listening attentively, accepting oneself and the child nonjudgmentally, being emotionally aware of oneself and the child, adopting self-regulation, and having compassion for oneself and the child [44]. Third, the women perceived the core mindfulness practices, such as mindful breathing, the body scan, and mindful walking, as helpful. These techniques empower women both physically and emotionally during childbirth and in the postpartum period [49].

Despite the adequate sample size and data saturation, the present study has several limitations. All participants were volunteers and members of three MBCP program groups; furthermore, they were homogenous in terms of sociodemographic characteristics and geographic location. Another limitation is that the participants of this study were women with depressive tendencies; as such, the results cannot be generalized to all individuals with depression. Furthermore, most of the participants were accompanied by a male partner, although the perspectives of the partners were not explored. Future qualitative research may explore the experience of the male partners participating in the program. In addition, women with positive experiences might be more willing to share their experiences than those with negative experiences, which could affect the results.

Conclusion

This study was conducted using in-depth interviews to investigate the experience of women with perinatal depression tendencies during and after a mindfulness program. The study revealed that MBCP could be a novel means to help women raise awareness of issues that affect them, strengthen relationships with others, and overcome challenges, thus enhancing depressive symptom management. This mindfulness program also provides another option for childbirth educators to help perinatal women improve their mental health.

Conflict of interest

The authors have no conflicts of interest to disclose.

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No	Age (years)	Education	Employment status	Mode of birth	Course attendance (no. of times)	Mindfulness training status	EPDS (Pretest)	EPDS (posttest)
1	36	University	Yes	Vaginal birth	8/8	Informal training	12	3
2	29	University	Yes	Vaginal birth	7/8	Informal training	10	6
3	23	University	No	Vaginal birth	6/8	Both, formal training (60 minutes)	19	19
4	32	Graduate school	Yes	Vaginal birth	8/8	Both, formal training (30 minutes)	15	16
5	36	Graduate school	Yes	Vaginal birth	6/8	Informal training	11	11
6	32	University	Yes	Vaginal birth	8/8	Informal training	10	7

7	28	Junior college	Yes	Vaginal birth	6/8	Informal training	15	12
8	34	University	Yes	Vaginal birth	7/8	Informal training	14	6
9	27	University	No	Cesarean section	8/8	Both, formal training (15 minutes)	12	6
10	33	Graduate school	Yes	Vaginal birth	8/8	Informal training	18	3
11	33	University	Yes	Vaginal birth	8/8	Informal training	11	7
12	32	University	Yes	Vaginal birth	8/8	Informal training	15	15
13	33	University	Yes	Vaginal birth	8/8	Informal training	12	9
14	38	Junior college	Yes	Vaginal birth	6/8	Informal training	11	8
15	32	Graduate school	Yes	Vaginal birth	7/8	Both, formal training (20 minutes)	16	11
16	37	Junior college	No	Vaginal birth	8/8	Both, formal training (30 minutes)	13	9

DETAILS

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“Life is Bitter and Sweet” : The Lived Experience of Ethnic Minority Elders with Type 2 Diabetes Mellitus in Rural, Thailand

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ProQuest document link

ABSTRACT (ENGLISH)

SummaryPurpose

The purpose of this study was to describe the lived experience of ethnic minority elders (EME) with type 2 diabetes mellitus (T2DM) to understand an individual's experience, perception, and behaviors connected to T2DM in rural areas where support is limited.

Method

The hermeneutic phenomenological methodology was used to explore the lived experience of EME with T2DM by using conversational interviews. Twenty EME were interviewed. The data analysis and interpretation followed the thematic analysis by van Manen.

Results

Analysis highlighted an overarching theme of "*Life is Bitter and Sweet*" and three main themes: (1) the struggle of living with diabetes, (2) living with inequalities, and (3) dealing with diabetes that reflects the experiences of EME with T2DM living in underserved areas based on the cultures, beliefs, and spirits.

Conclusions

The finding led to recommendations to strengthen interventions by family members, improve supportive systems and services to improve knowledge, self-management, and maintain physical well-being in order to increase the quality of life for the EME with T2DM.

FULL TEXT

Introduction

Diabetes mellitus (DM) is a common chronic disease and a major public health problem worldwide. The proportion of people with type 2 diabetes is increasing in most countries and it is expected that the number will rise to 700 million by 2045 [1]. Approximately 90% of people with diabetes have type 2 diabetes mellitus (T2DM) [2]. The increasing prevalence of T2DM is usually attributable to factors such as aging populations and an increasing level of sedentary lifestyles that seem to accompany economic development. According to a current study in the United States, 22% to 33% of people over 65 years of age diagnosed with T2DM experience a higher risk of lower extremity amputation, myocardial infarction, visual impairment, and end-stage renal disease than the rest of the population [3,4]. In Thailand, the prevalence of T2DM in people over 65 was 10.1% in 2014 and is already at 19.6% in 2020. Over half (52.4%) of the elderly with T2DM failed to control their blood sugar level (HbA1c >7%), and approximately 200 people die of the consequences of T2DM every day [5,6]. Moreover, this situation may be worsening due to poor access to healthcare, low levels of disease management, and poverty, especially among vulnerable people who live in poorer communities and rural or mountainous areas [7–10].

In Thailand, an estimated 6.1 million ethnic minorities comprise 9% of the total population and live mostly in Chiang Rai Province [9]. The identities of ethnic minorities are displayed in multiple ways, such as lifestyle, language, beliefs, culture, attitudes, values, and economic status. Ethnic minorities have long been stigmatized as alien, uncivilized, and dangerous [11,12]. Ethnic minority elders (EMEs) are a clear example of a vulnerable group who suffer inequalities in the healthcare systems of all countries due to language barriers, health literacy, or self-care management [13]. Apidechkul et al. (2018) reported that over 30.0% of EMEs were not granted a Thai identification

(ID) card, which is used to access public services, including free medical services [14,15].

Most of the previous studies focused on the prevalence or incidence of T2DM, factors related to hospitalization, and other comorbidities in the elderly. These studies were used to amplify treatment regimens but did not provide a deep understanding of their experiences [11,14–18]. To date, there is little available information with respect to the EME with T2DM. There is a need to gain a deeper understanding of their perspectives and about their understanding and management of their disease in rural and underserved areas [19]. The purpose of this study is to describe the lived experience of EME with T2DM and to understand individual experiences, perceptions, and behaviors related to T2DM in rural areas.

Methods Study design

For this study, Max van Manen's hermeneutic approach was chosen as a methodology that offers researchers a way to explore and understand the complexity of a phenomenon or interest by empathetically capturing and transmitting the sense and feeling of living through different experiences. Van Manen's approach, which is explicitly hermeneutic, recognizes the role of the researcher as an interpreter and even as an inventor of meaning and provides researchers with space to identify and understand various perspectives on human experiences. The use of hermeneutics phenomenology enables the exploration of participants’ voices, feelings, emotions, attitudes, and nuances of EME when living with T2DM in rural areas [20].

Van Manen's approach goal is to attempt to describe a lived experience in a way that retains and communicates the essential meaning of that experience [20]. Van Manen's approach offers a strong philosophical concept grounded and built upon the works of early phenomenological philosophers. This approach is appropriate for this study as little is known about the investigated phenomena, and relevant information in the current literature is scarce [21,22]. Van Manen portrays the methodical composition of phenomenology as a dynamic interplay among six research activities: (1) identifying the phenomenon of interest; (2) exploring evidence as it is lived and not as it is preconceived; (3) reflecting on themes; (4) writing and rewriting; (5) maintaining a strong and oriented relationship with the phenomenon; (6) considering the parts as a whole of the phenomenon in question [20]. Following this methodology, the transcripts and textual data of the participants' stories were examined, and the spoken accounts of their experiences were interpreted to discover what was telling, meaningful, and thematic. From the participants' life stories, a rich textual description was produced and interpreted for meaning. The aim of phenomenology is to transform lived experience into a written format in a way that challenges normative assumptions, making the text a reflective appropriation of something meaningful and offering a crucial paradigm, solutions, and relevance to nursing as a research methodology [23].

Setting and sample

Twenty EMEs with T2DM who met the inclusion criteria were invited to participate in the study by a nurse at a subdistrict health promotion hospital (SDHPH) during their monthly medical appointment. Participants were recruited from two disadvantaged villages in the Mae Chan district and were approximately 60 km, or about 2 hours away, from the provincial capital. The following criteria were used to recruit participants into the study: 60 years of age or older, able to speak the Thai language, and diagnosed with T2DM over a 5-year period with no cognitive disorders, as indicated by a Mini-Mental Status Examination (MMSE) below 24.

Data collection

Descriptions of EME with T2DM were obtained through in-depth interviews and open-ended questions. Interviews took place from September 2019 to January 2020 and were conducted in Thai. They were held in locations preferred by each EME, including their home, an SDHPH meeting room, and community centers. These meetings were conducted face-to-face, and the questions asked were based on the study objectives.

The researchers on this project worked at a university and came from various backgrounds. Two held doctorates in nursing and were qualitative experts, two were advanced nurse practitioners in chronic care elderly, and one was a community nurse professional with extensive experience with the ethnic minority population in these areas and qualitative method expertize. The primary investigator set up a three-day research workshop for team members to mentor and train junior qualitative researchers in critical and reflexive engagement with the data and other team members, such as trained research assistants, in overcoming language problems during interviews.

During the first meeting, the researchers established a rapport with the participants by introducing the research members, asking the participants questions, and giving them information about the study objectives. This step was important as it allowed the participants to feel comfortable, thereby encouraging them to provide more detailed information. The interviews were carried out by KP and KM, who were qualitative experts with 10 years of experience, and initiated with a broad, open-ended question that prompted the participants to talk freely about their experiences of living with T2DM in rural areas. Typical questions were: (1) “What do you know about T2DM? What was it like when you were diagnosed with T2DM?” (2) “Can you describe a typical daily activity in your life?” and (3) “What kind of support do you have when experiencing T2DM?”

Narrative data collection can provide access to ethnic elders' experiences of facing inequity in healthcare services by listening to their voices and understanding their circumstances [20]. It may also add to a continuing care model, instead of focusing on pathology and disease. As participants narrated their stories, the researchers prompted them to explain their particular situations with probing questions, such as, “Could you please tell me a bit more about that?” or “What did you think or feel about it?” For two participants who could not speak Thai fluently, trained research assistants who were fluent in Thai and could speak the same languages as the participants helped explain and clarify particular questions. All interviews lasted between 55 and 90 minutes, were audio-recorded, and were subsequently transcribed with the participants' permission. In addition, the participants’ diabetes personal health booklets were reviewed after the interviews to gather treatment history and blood sugar level.

Most participants were interviewed once at the appropriate places, and the interviewing continued until we deemed data saturation to have been reached. For three participants, more than one interview was carried out to help the researcher probe exactly what was most important by returning to ask participants to validate their responses to certain questions. No more participants were recruited after 20 interviews as, at this point, no new data, themes, or ideas emerged from the interviews, and a good phenomenological gestalt was reached. All taped interviews were transcribed and checked for errors by a bilingual research assistant as well as the primary investigator before being returned to the participants for confirmation and/or corrections. Coding trees of the main findings were developed, key findings were extracted, and data saturation was discussed among the researchers.

Data analysis

In this study, the data analysis and interpretation followed the thematic analysis by van Manen. Initially, the interview texts were transcribed and then reviewed by the research team several times to gather a general understanding. Next, the main concept of the texts was written up in two to three paragraphs (a holistic approach), which helped the researcher immerse in the data, and think more deeply about the phenomenon. In this approach, we used the NVivo software package to organize the data. Each interview text was read, re-read, reflected transcription, and moved back and forth between the elements of the text and the whole text to reveal the essence and meaning of the phenomenon.

Van Manen suggests that using a team approach can strengthen the identification of themes by enabling the research to see beyond the text and interpret meaning [20]. Next, the research team members exchanged views and discussed the preliminary themes. The agreement was reached between researchers by moving ideas around and re-visiting the original interpretation until the resulting contents and themes were aggregated in the best possible way. Each theme was supported by direct quotations from the participants and captured the lived experience of EME with T2DM in rural areas.

Trustworthiness

The trustworthiness of the study was enhanced by several strategies establishing credibility, prolonged engagement with participants, non-participant observation, member checking, and establishing an audit trail. Prolonged engagements ensured constant interaction with put on hold the prior knowledge about the phenomenon of interest and abandoning ideas that were not supported by the data. We read the transcripts multiple times and compared the coding systems results, which led to the emergence of themes and subthemes as a measure of ensuring the trustworthiness of the data. In the course of writing the manuscript, the emergent themes were compared with the transcripts individually and as a whole. Sharing research findings with five participants, three were Thai speakers and two were not fluent in Thai, to conduct a member check in order to confirm its accuracy and enhance the trustworthiness of the research. These include reflecting on what participants narrated, discussed as well as issues they did not narrate or discuss in the interviews. Finding from the observation notes were used to validate the in-depth interview along with a discussion of each other's interpretations which helped to identify implicit biases toward the data. Finally, contextual information about the research findings was described in as much detail as possible so that readers could assess whether or not the findings were transferable. [[24]].

Ethics approval and consent to participate

All research protocols were performed in accordance with relevant guidelines and regulations. All instruments and methods were approved by the Committee (CRPPH No. 6/2562). The participants who met the inclusion criteria were informed about the purposes, risks, confidentiality, and benefits before they voluntarily decided to participate. Informed consent was obtained on a voluntary basis. Those who could not write were asked to provide a fingerprint representing informed consent on a voluntary basis.

Results

Twenty EMEs with T2DM participated in the study (17 females and three males) consisting of nine Lahu, six Lisu, three Mien, and two Akha living with T2DM for an average of 10.40 years. The ages of the participants varied (ranging from 63 to 92 years old), and none of the participants had attended school. The participants’ characteristics are provided in [Table 1].

“Life is Bitter and Sweet”

The analysis of participant narratives revealed the overarching theme, *life is bitter and sweet,* and captured the meaning of the lived experience of the EME living with T2DM in rural areas. There were three main subthemes. The first, *the struggle of living with diabetes*, reveals the mixed emotions of illiterate ethnic elders diagnosed with T2DM. The second, *living with inequalities*, illustrates the suffering of participants who tried to access healthcare services and faced discrimination regardless of ethnicity. The third subtheme, *dealing with diabetes*, highlighted the importance of disease management by using traditional medicine and facilitating support from family members and the community. These three subthemes were not disparate but intertwined; the researchers interpreted them as weaving together a phenomenological interpretation of the experience of living as an EME with T2DM in rural areas.

The struggle of living with diabetes

According to the participants’ narratives, their understanding of T2DM depended on their level of literacy. When participants diagnosed with T2DM were considered illiterate, most considered themselves a burden on the family because they could not care for themselves. Most felt overwhelmed trying to do the right thing without a proper understanding of what they were supposed to do.

Illiterate elders

All the participants in this study had no formal education, which affected their ability to understand the nature of the disease, seek information, and manage their disease. Some participants perceived that diabetes was not a serious disease because there was a high number of diabetes patients in the community. They did not realize that risk factors such as hypertension, obesity, and low physical activity were linked to diabetes.*It was too bad …that we could not understand what was in the diabetes handbook …. I never attended school …so the people my age could not read or write, and some people cannot even speak Thai. I knew I had diabetes when a nurse told me that I had very high blood sugar and that it could lead to brain coma or damage to my feet. Then she gave me a handbook, which was useless.* (PF10)*I can speak Thai, but sometimes I could not continue the conversation because I cannot understand, especially the medical terms in Thai, and no one could speak my language …most of the time, so I just said yes, no, and, okay.* *(PF3)*

Emotional difficulties

The experience of illiteracy created other problems for the EME when experiencing a disease as profound as T2DM. The problems began when the participants were unable to gain a clear understanding of the trajectory of their disease, the treatment plan, and self-management. This caused them to feel as if they had lost their previously normal lives. Many participants also described feeling frustrated, confused, overwhelmed in response to recommendations, and cognitively paralyzed, all of which caused chaos in the lives of EME with T2DM who live in rural areas.*I cannot follow the guidelines. I cook what I have, and I decided just live with DM …. Everything is hard …visiting the hospital back and forth …not my life. (PF11)The nurse said I have to exercise regularly, but I hardly do… because I work in the fields—it is better than exercise .... But my sugar level remains high …. It means exercise did not help me, and I don't think it is a problem since I can work every day (PF2).*

Living with Inequalities

It was evident from participants' narratives that their complex living situations compounded the difficulties they experienced with T2DM in rural areas. Inequalities associated with health insecurity, geographic distances, lack of healthcare providers and disease expertize, and poor housing conditions created barriers to accessing better healthcare services. Another difficulty was that the participants sensed that healthcare providers were condescending or unwilling to listen, which created mistrust, active social avoidance, and degradation in the quality of their lives.

Living in isolated areas

The participants discussed a series of inequities that they experienced as minority people. Living with T2DM in a rural area means accepting that death is possible and that the risk of complications remains present, regardless of disease management. Some participants mentioned that there were no diabetes specialists to care for EME with T2DM in rural areas. Their narratives revealed a sense of despair in having T2DM while living on top of a mountain. Some participants related their stories as follows:*There are only nurses and health officers …no more doctor …. If you have serious symptoms, you have to visit the doctor in the hospital in the city …too far and I do not have money* . *(PF9)I spent 300 baht ($10) to travel to the hospital when I was receiving a subsistence allowance of 600 baht ($20) monthly …. This is half of my income …. And when I reached the hospital, I waited for 3–4 hours but talked with the doctor for only 10 minutes, and then I went back to my place. It was very hard for my children, who said that they were waiting for me for a long time.* (PF3)

Experiencing discrimination toward ethnic minority populations

Participants perceived alienation and differences in how they were regarded in comparison to majority populations when visiting the hospital. These differences led them to feel left out, which affected their conversations, the transfer of information, and adherence to the treatment plan. Some participants indicated feeling frightened and intimidated when outside their community, which affected their communication. They stated that the healthcare providers were also not proactive in providing assistance and had not adapted to ethnic minority populations.*The problem I had with the healthcare professionals was that they did not pay much attention to me. I could feel it …. Perhaps they don't understand what I am saying, or maybe I am too rural, or maybe both …. I am different from them. (PF4)Because we are a minority, we are very intimidated in the urban community, so I don't want to visit it …. It's so painful when I speak to them in my language .... I will be seen as an alien and recognized as a minority.* (PF18)

Dealing with diabetes

Regardless of the EMEs' age, family caregivers are important for helping them manage their disease by, for example, preparing food and medication, observing the signs and symptoms of complications, and encouraging them to use herbs based on the cultures, beliefs, and spirits. Many participants stated emphatically that support from the community, especially village health volunteers (VHVs)—that is, lay workers who took a basic health training course developed by healthcare providers—benefitted the ethnic minority population.

Using tribal medicines and home remedies

The EME with T2DM claimed that following professional healthcare guidance was difficult. Instead of depending on modern medicine, many participants preferred to use their cultural practices and manage disease by themselves without adverse complications, giving them a sense of freedom. Moreover, most participants said that they believed in ancestral spirits that live alongside them in their homes. For them, the home serves as the most powerful place for expelling bad spirits and diseases.*Like other people, no matter what race we are. I know modern medicine is the best …drugs are important for diabetes patients. But for me, I used herbs, such as lady's finger tea or* *chrysanthemum tea, to reduce my sugar level. My parents suggested it and I was okay with that (PF15).My wife said diabetes is a chronic illness and cannot be cured. I tried to use other methods, such as ingesting bitter leaf or getting a gua sa massage, eating black chicken soup or offering sacrifices to the ancestors. It really helps me to control my sugar no need to see a doctor and no more medicines (PF9).*

Support from family members and the community

The EME with T2DM recognized that family caregivers are the mainstay of their physical and emotional support when enduring difficulties and trying to manage diabetes. They also believed that they would have a better life when living with their family, described as “sweet blood family.” The EME with T2DM were also generally satisfied with the support they received from VHVs, who were willing to help elders living in remote areas.*The VHVs visit me every month to check my blood sugar, follow-up on my health conditions, and we speak in the same language. It really helps to prevent complications. By the way, I say thank you to VHVs for the services provided (PF6).Even though my son, my daughters, and I live in different places, when I need help, they come to see me immediately. It is not only a tribal cultural mandate to care for their parents, but I know that they are willing to do everything for me, such as bringing me to the hospital and giving me money. I am always happy to have my entire family together again. Even the VHVs called us sweet blood family (PF19).My daughter-in-law prepared food for me. She is a VHV, and she knows about diabetes, so she cooks food for me separately from the others, and sometimes she has brought me to the hospital too. She said she was taught to care for her husband's family like her family or better. I feel it really warms my heart (PF18).*

Discussion

This study aimed to understand the lived experiences of EME with T2DM. The results reflect van Manen's four lifeworld existentials—lived space, lived body, lived time, and lived other—and offer an understanding of EME living with T2DM in rural Thailand. In this study, the participants indicated that home was a fundamental space for managing their disease and providing a sense of security and spirituality, which relates to van Manen's concept of lived space [[20]]. The EME with T2DM expressed that home was not only a familiar environment but also a safe place to use complementary herbal medicines as home remedies, such as a bitter leaf, lady's finger, and chrysanthemum, to reduce sugar levels. Similar to this study, other research conducted in low-resource countries, such as Sri Lanka and Nepal, has demonstrated that patients with diabetes in rural communities were willing to take herbal medicine at home, mainly due to availability and easy accessibility [[25]]. Therefore, nurse practitioners or clinicians should not underestimate the role of complementary medicines or herbs in diabetes care as evidence suggests that they are commonly used in many low-to-middle-income countries. However, when discussing the location in other ethnic minority contexts, 12 participants in this study mentioned that they did not receive appropriate care because they lived in rural areas that lacked resources, as has been shown in other studies [[26],[27]].

Another significant finding from this study concerns participants' low resources and limited understanding of T2DM, which were related to disease complications. In this study, participants also expressed feelings about their disease trajectory as well as self-care abilities. This relates to van Manen's concept of the lived body [[20]]. Understanding the lived body existential provided the participants with insight into their disease when living with T2DM in rural areas. In this study, most participants considered themselves illiterate, underserved, and different from the general Thai population. This vulnerable condition increases the risk of diabetes complications and mortality rates while decreasing quality of life and emotional well-being. These findings support the arguments of Adhikari et al. (2021) and Omodara et al. (2021) on barriers to and factors limiting healthcare services for diabetes management among elderly ethnic populations in the United Kingdom and Nepal [[28],[29]]. The findings also clearly illustrate the need to develop inclusive knowledge and culturally appropriate information to improve how self-care behaviors are communicated by healthcare providers and the participants' families.

In the current study, the participants reported that having T2DM affected them throughout their lifespan, beginning with their diagnosis and continuing through the trajectory of their disease [[30],[31]]. This relates to van Manen's concept of lived time [[20]]. Routine activities for managing and controlling T2DM are required, and some participants reported that when they experienced high blood sugar levels, their children had to leave their jobs to take care of them and watch over them for complications at home or in hospital. As the literature shows, diabetes is a chronic disease, and patients may experience difficulty managing their disease as a lifelong journey and require long-term services appropriate for ethnic minority cultures and practices from healthcare providers [32,33].

In the interviews, the participants spoke about the strong support they received from their family members, which relates to van Manen's concept of lived other [20]. Family members can generate a positive environment for EME with T2DM by providing information as well as physical and emotional support. Losing abilities or being ill led participants to initially react with anxiety, fear, and frustration. However, previous studies have reported that support from spouses, children, and other family members is critical in allowing them to develop a sense of security, empathetic understanding, and compassion [34–36]. Although the participants mentioned language barriers, healthcare shortages, and experiences with discrimination, they also valued and were satisfied with help from VHVs in bridging communication gaps and sharing information directly with the participants and families using a specific language. This strategy is related to the lifeworld existential that van Manen terms the lived relationship [20].

The findings from this study have multiple implications for healthcare professionals who provide direct physical care and psychological support for EME with T2DM in remote areas. A regular home visit program by culturally competent and linguistically appropriate visitors should be provided to care for EME with T2DM at the village level [32]. This could help control their blood sugar levels, reduce the risk of complications, and reduce the cost of transportation. A future study on the level of support, as well as the development of family-based intervention programs, for EME with T2DM in rural areas would also be beneficial [37].

Limitations

The study findings must be considered within the context of ethnic elder minority interpretation when having T2DM. There is the potential for bias in the study findings since most of the participants were women and had no education, which may affect their experiences living with diabetes. Two participants could not speak Thai fluently, important details may not have been captured which might affect the amount and accuracy of the information obtained. Few questions were also translated from local languages into Thai, opening the possibility of translation discrepancies and loss of language-specific nuances. Another limitation was that many of the participants were interviewed for approximately an hour, and it could be argued that this limited amount of time may be an inadequate reflection of a whole lifetime of living with T2DM in rural areas.

Conclusion

This study is a comprehensive examination of the experiences of EME with T2DM in rural and underserved areas of Thailand. A phenomenological inquiry developed by van Manen [20] was used to explore the essence of the phenomenon and gain an understanding of the lifeworld of the elderly with T2DM in an ethnic minority context. "*Life is Bitter and Sweet*" emerged, which highlights how EME with T2DM experience their lives. "Bitter" refers to the difficulties they faced, such as geographical problems, language barriers, and discrimination from healthcare. On the other hand, "Sweet" refers to the feelings they experience when having high blood sugar levels while receiving care from the family members and the community. This study also demonstrates how EME with T2DM seeks support from the healthcare system, which provides recommendations for living with T2DM. It also shows the strategies they use to maintain their everyday lives. Finally, when reading and analyzing the narrative texts, the researchers were somewhat surprised when EME with T2DM explained the strategies they employed when dealing with their complicated situations, such as using herbal medicine and receiving visits by VHVs when living in isolated areas.

Available of data and materials

All relevant data are within the manuscript and its Supporting Information file. However, these data will be available upon request, by contacting katemanee.moot@mfu.ac.th.

Consent for publication

Not applicable.

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Conflict of interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Characteristics	N (= 20)	%
Gender		
Men (mean age = 74.33 years, S.D. = +15.50)	3	15.0
Women (mean age = 68.05 years, S.D. = +4.93)	17	85.0
Marital status		
Married	16	80.0
Separated	2	10.0
Widowed	2	10.0
Education		
No formal education	20	100
Ethnicity		
Lahu	9	45.0
Lisu	6	30.0
Mien	3	15.0
Akha	2	10.0
Number of living with T2DM		
5-10 years	9	45.0
>10 years	11	55.0

(mean = 10.40 years, S.D. + 4.28)		
Blood sugar level within 3 months (mg%)		
<110 (mean = 100.67 mg%, S.D. = +3.32)	6	30.0
111-125 (mean = 120.67 mg%, S.D. = +4.17)	6	30.0
>125 (mean = 146.75 mg%, S.D. = +20.47)	8	40.0
*data from a diabetes personal health booklet		
Body mass index (Kg/m^2)		
<18.50	-	0
18.50-22.99 (mean = 22.22 kg/m2, S.D. = +0.11)	2	10.0
23.00-24.99 (mean = 23.94 kg/m2, S.D. = +0.49)	6	30.0
>25.00 (mean = 27.18 kg/m2, S.D. = +1.93)	12	60.0

DETAILS

Subject:	Researchers; Diabetes; Data collection; Data analysis; Research methodology; Personal health; Phenomenology; Exegesis &hermeneutics; Rural areas; Minority &ethnic groups; Interviews; Medical research; Qualitative research
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The Lived Experience of First-time Mothers with Congenital Heart Disease

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ABSTRACT (ENGLISH)

SummaryPurpose

Nowadays most children with congenital heart disease (CHD) are expected to survive to adulthood. The healthcare focus needs to pay close attention to the important developmental tasks during their growth process. The women with CHD face some challenges in their critically developmental stages during pregnancy, delivery, and even motherhood. The lived experience of being a mother needs to be further concerned. This study aimed to explore the lived experience of first-time mothers with CHD.

Methods

Descriptive phenomenological design was adopted. Semi-structured interviews were conducted from April to August 2018 with 11 primiparous women with CHD, who were recruited from the pediatric and adult cardiology outpatient departments at a medical center and who had a child aged between 6 months and 3 years. Giorgi's phenomenological analysis method was employed.

Results

Six main themes arose from the analysis: (1) recognizing pregnancy risks, (2) performing self-care for health, (3) building self-worth from my baby, (4) adapting to postpartum life and adjusting priorities, (5) enjoying being a first-time mother, and (6) the factors contributing to success in high-risk childbirth.

Conclusions

The experiences that occurred prior to and after labor that were identified in this study can assist women with CHD to more capably prepare for and understand the process of becoming a mother, including recognition of the importance of a prepregnancy evaluation. The findings of this study can help women with CHD to better understand the path to becoming a mother and prepare themselves for the challenges that lie ahead.

FULL TEXT

Introduction

Congenital heart disease (CHD) is the most common congenital circulatory malformation in newborns. Depending on its severity, it affects normal life functions. The prevalence of CHD in screened children by year from 2002 to 2018 ranged from 5.1/1,000 to 7.3/1,000 in Taiwan [1]. However, due to the development of medical technology, more than 90.0% of patients can survive into adulthood, but long-term follow-up is required [2]. The needs of these patients with respect to the physical, mental, social, and spiritual aspects of life are a worthy object of study. One of the major life events that women with CHD are likely to experience is becoming pregnant and being a mother.

Men with CHD are concerned about their performance during sexual intercourse, whereas women with CHD are concerned about problems related to pregnancy and childbearing [3,4]. Upon reaching childbearing age, women with CHD must prepare for pregnancy if they desire it. Women with differing heart disease severity face different levels of pregnancy risk. Studies examining the hemodynamic changes in women with CHD during their pregnancy have indicated that the cardiac output of these women is 30–50.0% higher than that of themselves when they are not pregnant, and this higher cardiac output can lead to elevated risk of cardiovascular diseases [5]. Additionally, compared with their counterparts without CHD, women with CHD are more likely to experience pregnancy complications and have their children inheriting CHD [6]. When the mother has chronic diseases or delayed childbirth, the child's risk of CHD will also increase [7]. In summary, CHD is a medical condition that can threaten the health of both mother and baby. According to the aforementioned difficulties faced by women with CHD during their pregnancy and during labor, their physical discomfort and more importantly their psychological stress during pregnancy should both not be overlooked [4]. However, the conviction resulting from the wish to become a mother can be a strong force, and this force can sustain the mother-to-be in their long battle against various preconception and postconception challenges not faced by women without CHD [8]. In an effort to pursue higher quality of life and prepare for the hazardous events that may occur during pregnancy, women with CHD pay great attention to their health during pregnancy [9]. Nevertheless, women with CHD remain uncertain whether they will be able to maintain their health with regard to the high risks they face.

The maternal role theories of Rubin [10] and Mercer [11] state that being a mother is an important step in women's personal development. After the child is born, the woman inhabits the role of mother. The mother–infant relationship and attachment are typically established between the primary caretaker and infant within their first year of interaction. The unconscious behaviors of a mother originate from her exploration of the attachment relationship between herself and her child. A healthy attachment relationship involves a reciprocal process between a mother and her child, and the mother–child attachment relationship affects the mother's emotions, the child's temperament, and the child's future development [12]. Nevertheless, chronic diseases can threaten the functioning of a woman in her socialized role. When a mother cannot take care of her child in the way she wants, she may experience negative emotions such as anxiety, depression, or guilt. Many women diagnosed with diseases wish to be become a good mother [9]. However, the physical and psychological burdens caused by their diseases may lessen their child-rearing ability. Women still expect to be able to raise children. Some women with CHD even think that being a mother is more important than properly caring for their condition. Being a mother can make women with CHD feel that they belong in society [8].

The label “disease” sometimes causes people to overemphasize the pathological characteristics of an individual and to ignore that individual's unique personal traits and advantages. Understanding and analyzing the processes that women with CHD go through to become a mother is crucial and necessary. Quality of life, health promotion, lifestyle, and pregnancy risk are some of the topics often discussed in relation to women with CHD in nursing studies. However, studies examining the lived experience of first-time mothers with CHD are relatively rare [4,8,9]. We conducted qualitative interviews to examine the upbringing of women with CHD, their life experiences after becoming a mother for the first time, their thoughts and feelings, and how these perceptions affected their execution of the maternal role. We hoped to explore the essence of lived experience of first-time mothers with CHD.

Methods Design

This study employed a descriptive phenomenological design applying Giorgi's (2009) phenomenological method with in-depth interviews to understand the lived experience of women with CHD on their first-time motherhood.

Participants and setting

Purposive sampling was used to select participants. The participants were recruited from the pediatric and adult CHD specialist outpatient clinic at a medical center in Northern Taiwan. Mercer's [11,13] maternal role theory states that the mother's experience of the childbirth process will affect her ability to perform the maternal role at 6 months postpartum, and parent–child attachment will begin to shift when the child is approximately 3 years old. The inclusion criteria were as follows: (1) primiparous women with CHD and a child aged between 6 months and 3 years; (2) women who lived with their biological child(ren) and were one of the primary caretakers of their child(ren); (3) women who were classified as having class II, III, or IV cardiovascular diseases according to the classification principles stated in the mWHO Classification of Maternal Cardiovascular Risk; (4) women with CHD not caused by chromosomal and genetic abnormalities (e.g., Marfan syndrome and Down syndrome) and with no other chronic disease or comorbidity; (5) women who could communicate in Taiwanese Mandarin could understand the theme of the interview.

The interview questions were developed based on the combination of literature review and the practical experiences of the researcher (the first author), and the suggestions provided by qualitative experts (the third, fourth and fifth authors) (Table 1). Before the study was begun, a pilot study with one participant interviewed was conducted to confirm the appropriateness and feasibility of the original interview guidelines met the aims of the study.

The formal data collection period with the original interview guidelines lasted from April to August 2018. The interviews with 11 women with CHD (coded A–K) provided detailed information on the individual's experience, views, and feelings of the first-time mothers with CHD. Characteristics of the study participants are shown in Table 2. The CHD conditions of the participants included both acyanotic and cyanotic heart diseases. Regarding their Modified World Health Organization (mWHO) severity, the majority of the participants (7/11, 63.6%) had class II cardiovascular diseases, with the others having class III (2/11, 18.2%), including diagnoses of transposition of the great arteries and total cavopulmonary connection or class IV (2/11, 18.2%) cardiovascular diseases, including diagnoses of atrial septal defect and tetralogy of Fallot. The participants were aged between 22 and 46 years, with an average age of 34.5 years. Among the participants, 81.8% was planned pregnancy and 72.7% was natural insemination. The participants had a total of 13 children, and two of the participants had twins. Regarding the demographic characteristics of their children, six (46.2%) of the children were male. The children weighed 1,176–2,954 g at birth, and their average age upon recruitment of their mother into the study was approximately 22.7 months.

Data collection

Before commencing data collection, the researcher (the first author) briefed women who met the inclusion criteria about the content, purposes, and procedures of the current study in person. After obtaining the women's informed consent, the researchers then negotiated with each participant to schedule a suitable time and place for a one-to-one interview. Each participant was to be interviewed once. At the beginning of each interview, the researcher engaged in nonstructured conversation with the participant, so that the participant could relax before the main part of the interview started. Each interview lasted 1–2 hours, and the interviews were conducted in the participants' home or the café nearby their home. The interviews were recorded using a voice recorder. Nonverbal behaviors during the interviews—such as participants' tone of voice, expressions, and movements—were observed and recorded. To add to the comprehensiveness of the interview data, the researcher also recorded the interactions that occurred during the interview sessions and their own reflections on the interviews. The voice-recording file of each interview was transcribed into text within 24 hours of the interview for data processing and analysis. The research groups (all authors) then sorted, coded, and categorized the collected data of individual participants separately. Data collection and analysis were repeated until the point of data saturation, and participant recruitment was halted when no additional themes could be generated from the data analysis and when there was overlap of themes.

Data analysis

The researchers used contrast, induction, and comparison methods to gradually develop the conceptions and themes of the interview content. For the data analysis, the five-step empirical phenomenological analysis method proposed by Giorgi [14] was employed. The analysis steps are as follows: (1) Phenological data were collected, and all transcripts were read to gain a global sense of the data. (2) The meaningful analysis units were identified. Then, by using trained sensitivity and an open attitude, a series of meaning units expressed in the words of the participants was identified. (3) The descriptive raw data were transformed into meaning units through the process of reflection and imaginative variation by using technical language in the field; these meaning units were then used as the basis for interpretation of the research question. (4) The themes were abstracted into key meanings; the basic features of each phenomenon were confirmed. (5) The specific structured descriptions of each participant were combined. In the general description of situated structure, the key meanings were compiled to form structured descriptions. The core concepts were captured by using phenomenological reduction and developed into the research results [14,15]. The process of data analysis from meaning units to theme is illustrated by an exemplar in Table 3.

Ethical considerations

Ethical approval for the study was obtained from the institutional review board of the medical center (Approval No. 201712164RINC). The ethical principles were met through oral and written information about the study to the participants. Potential participants were called by the first author to query their interest in participating in the study. Participants were informed that the study was voluntary, and they could refuse participation in the study or withdraw at any time without affecting their treatment. Written consent was obtained. In the transcribed material and reports, codes were allocated to each participant and identifying information was removed.

Rigor

To ensure the validity and reliability of the study, the researchers conducted the study in accordance with the research guidelines for qualitative studies proposed by Lincoln and Guba [16]. The phenomenological qualitative research method was used to collect data. The research questions were designed by an expert panel comprising a cardiologist, experts on CHD in children and adults, and experts on child developmental psychology. Interviews were conducted to investigate the first-time motherhood experiences of women with CHD, after which the voice-recording files were transcribed into text. The interview processes were properly recorded, and the records were ensured to reflect the actual interviews. Purposive sampling method was employed in the current study to ascertain the scope of participant selection. Understanding was obtained through listening; this understanding was used to identify problems; and assistance was provided accordingly. The following interview content was especially crucial: (1) the experiences of the participants regarding how they solved shared problems, and (2) the participants' expression of their needs and perceived processes. The results of the current study are applicable to the female population with CHD. The written records were cross-checked against the original records and revised accordingly. When conducting the research, we recorded our reflections in a daily diary. The purpose of this was to help us avoid bias by clarifying self-awareness and emphasizing the essences of phenomena. After objective analysis of the data, the results were cross-checked against the content of this reflection diary, ensuring the consistency and dependability of the data analysis.

Results

In the text analysis process, the researchers reduced the meaning phrases of women with CHD to a coherent text. The researchers then transformed the 251 meaning units into technical languages, after which the content was coded and classified into 33 categories. Subsequently, the researchers integrated the categories into 18 subthemes of the current study. Finally, the subthemes were abstracted into six core concepts—the themes of the study ([Table 4]).

Theme 1: Recognizing pregnancy risks

When women with CHD who participated in this study did not routinely seek relevant medical treatment, they did not have clear understanding of their own health status. Patients' poor understanding of their CHD also resulted in discrepancy between patient-perceived severity and professionally evaluated severity. Additionally, fear of pregnancy or unplanned pregnancies was observed among the women with CHD because of a lack of contraceptive and childbearing knowledge (D-26 in [Table 4]).

Once the participants had confirmed their pregnancy, they began to worry about the risk to their health and their child's health. The participants were scared that their CHD would hamper the development of their child. Because of uncertainties surrounding their own health and that of their child, they often experienced entangled thoughts, feelings of contradiction, and emotional conflict during their pregnancy. Most of the participants were concerned that their child would inherit their CHD; the next most common reflections were concerns about other uncertain risk factors and description of feelings of discomfort. In their reports, the women expressed negative emotions including worry and nervousness. If they could, most of the women with CHD acquired more detailed or additional and self-funded medical examinations; they only felt at ease if the examination results revealed that their child was healthy (I-12 in [Table 4]).

Theme 2: Performing self-care for health

When the participants were preparing themselves to be mothers, they began to pay more attention to their CHD-related health problems and better take care of themselves. They proactively visited hospital to seek help from physicians with the hope that they could obtain information relevant to pregnancy before conception. Additionally, they arranged for a preconception evaluation and other relevant medical examinations as well as discussing with physicians the possible symptoms and risks that could emerge during pregnancy. During pregnancy, they often worried about their future health and that of the unborn baby. They proactively sought to acquire knowledge and took precautions beneficial to the baby and themselves; they obtained disease information, took precautions for the pregnancy and labor, and acquired child-rearing knowledge. They aimed to optimize their body condition and eliminate risk factors with the aim of ensuring the safe and healthy delivery of their baby. In pursuit of these goals, they visited Chinese medicine clinics, sought advice from physicians and senior family members, adjusted their daily routine, and paid more attention to sleep and regular exercise (H-24, E-31, H-74, and A-37 in [Table 4]).

Additionally, the women with CHD believed that they played a crucial role in the growth process of their children and that they were closely connected to their children. Therefore, the women's consciousness over their health continued until they decided it was enough. After the first pregnancy of the participants, numerous factors affected their decision to get pregnant again, including the complications that occurred during the first pregnancy, physicians' evaluation of their health, and their self-evaluation of their health and the health condition of their children. The results revealed that after the participants experienced pregnancy, they understood the importance of regular follow-up visits and health maintenance (C-15 and G-27 in Table 4).

Theme 3: Building self-worth from my baby

The participants reported their perseverance and determination to achieve their goal. When physicians stated that pregnancy and childbirth were high-risk activities for them or recommended against pregnancy, the participants felt that if they took this advice, they would miss something in their lives. It was similar to having their rights deprived or being labeled as separate from ordinary people. Regardless of whether the participants perceived the effect of their CHD on their lives, they stated that they wanted to be indistinguishable from other mothers. Furthermore, they did not want their disease to affect their personal relationships and interactions with other family members. From the moment they confirmed their pregnancy, the participants prepared themselves for all types of challenges and did not want to give up, regardless of the number of adversities they would encounter. Regarding the risks of pregnancy and labor, the participants described the challenges and hazard level of their pregnancy.

The healthy birth of their child was critical for each participant. In addition to their feelings of concern for their child, the child's arrival served as a proof of their own value. As the participants saw it, when they understood and were willing to face the risks of pregnancy and childbirth, and when they finally became a mother, they proved to others that they could do what others thought they could not. The arrival of their child gave new value to their existence that allowed their life to remain meaningful. Other people may not be able to understand the goals and expectations that these women had during their suffering, but these women were able to enhance their self-value through the arrival of their child (H-20, B-16, and F-19 in Table 4).

Theme 4: Adapting to postpartum life and adjusting priorities

Most of the women with CHD focused on themselves before they became pregnant. After the conception, they began to imagine and construct a vision of how they would live and interact with their child in the future. However, their imagined life of being a mother was different from their actual life. Once a woman becomes a mother, she seldom has the time and space for her own life activities. Therefore, regardless of whether the participants were employed (i.e., full-time employment or full-time mother), they faced maternal role conflict. Poor quality of sleep and overfatigue affected their health, leading to cardiac discomfort and negative emotions. Nonetheless, the participants prioritized taking care of their child and ignored the discomfort caused by their disease (K-16 and B-8 in Table 4).

The parenting attitude or concepts of an individual can be influenced by the parenting attitude or concepts of his or her own mother. Participants described their own mothers' experiences of caring for them. Because of CHD, their mothers paid more attention to them than they would have to a child without CHD and tried hard to protect them. The participants wanted to protect and care for their own children in the same way. Their own upbringing had a certain importance in the memory of the women with CHD; they perhaps adopted their mothers' child-rearing concepts and experience and transformed them into something of their own. Nevertheless, each participant had unique opinions, feelings, and expectations regarding the way their children should handle things and express emotions. In the worlds of these mothers, their children were the most important things in their lives (K-18, B-29, and F-30 in Table 4).

Theme 5: Enjoying being a first-time mother

The women with CHD realized that they were becoming a mother; this realization usually arrived when their fetus started to move or when the baby was delivered. When the fetus began to move, the expectant mother started to feel that there was a little life growing inside them and that the life needed her protection. Additionally, an amazing interaction occurred between mother and child; when the child exhibited behaviors that indicated his or her need for the mother, the mother felt that she was the center of the child's life. Throughout this process, the participants felt that they were needed by their child and considered the child's need and desire for their mother to be a gift from the child to themselves. Therefore, a strong desire to protect her child was generated. Consequently, the mothers were willing to lavish unimaginable love and care on their children. They hoped that they could record every moment that they spent interacting with their child; the child's growth record would be representative of the work that the mother had performed. The birth of the child brought a great sense of achievement and fulfillment for the participants. They had great expectations for their healthy babies. Equally, they were grateful and appreciative for the arrival of their babies. The women with CHD were thankful that their child was willing to enter the world and their life, granting them novel experiences and feelings. Such a state of mind differentiated the mothers with CHD from other family members and resulted in a close relationship between mother and child, causing their emotional bond and interactions to be more intense and profound (H-73 and D-17 in Table 4).

Theme 6: Factors contributing to success in high-risk childbirth

The participants experienced the processes of pregnancy, delivery, and child caring, and they expressed the importance of coordination between internal and external resources. The primiparous women with CHD believed in the professional evaluation and suggestions provided by their CHD medical team. However, the method and attitude that medical personnel chose to adopt when conveying decisions and suggestions could strongly interfere the feelings and opinions of the participants, thereby leading to differing opinions of the women with CHD when they were considering getting pregnant and delivering a baby. Helpful medical personnel and a positive medical care environment could lead to a sense of stability in the women with CHD; by contrast, subpar medical care services and environment could lead to confusion, anxiety, and uncertainties in the participants during their decision-making process. Throughout the whole process, the women with CHD hoped that their spouse or family members would be by their side, somewhat relieving their anxiety and fear. After they gave birth, the primiparous women with CHD were faced with various unfamiliar tasks and even a sense of fatigue. The understanding and help offered by the women's employers at this time relieved them from the dilemma of having to juggle work and family. Additionally, the company and assistance in taking care of the newborn offered by family members partially lifted the physical and mental burdens on the mothers that were caused by fatigue and the hectic situation; these efforts helped the participants tremendously in both the mental and practical aspects. The women desired support and company from their spouse most of all, followed by that from, members from their family and lastly member of their spouse's family; this indicates the significance and influence of the spouse during the process of pregnancy and child caring. In addition to depending on family relationships and familiarity, the women's preference of company was dependent on the role the women played in their family, their status in their family, the personality of family members, and familial relationships (A-28, E-18, and I-69 in Table 4).

Discussion

The study results indicated that the themes could be divided into two categories: those related to chronology and resource utilization. The first five themes—namely recognizing pregnancy risks, performing self-care for health, building self-worth from my baby, adapting to postpartum life and adjusting priorities, and enjoying being a first-time mother—represent a dynamic and continuous process, whereas the theme factors contributing to success in high-risk childbirth link the preconception lives of the women with CHD to their postpartum lives and are considered representative of resource utilization. The lived experience of the new mothers appeared to embody the participants' personal traits and upbringing. The statements and behaviors of each participant revealed their distinct personality and demonstrated their uniqueness. Even though the life of the participants had been made different by their disease from that of their counterparts without diseases, the essence of the maternal role is the same for all. The processes of carrying and nurturing a child strengthened the maternal role in the primiparous women with CHD, resulting in apparently more intense mother–child interaction and expressions. The results of the current study are consistent with the maternal role theory proposed by Rubin [10] and Mercer [11].

The results related to recognizing pregnancy risks revealed the deficiency in the attention of the women with CHD toward their CHD. Clinical observation revealed that most of the women with CHD attended a follow-up session at the outpatient clinic before their conception or mid-gestation, which has been long since their last hospital visit for CHD. Similarly, Yeh et al. [17] reported that most patients with CHD overlooked the importance of long-term tracking after the age of 10 years. The leading causes of tracking cessation include personal factors, the lack of continuous care services, inconsistent in the professionalism of medical personnel, and the lack of a comprehensive referral program [17–19]. CHD requires long-term, regular, and consistent tracking. A systematically planned transition program for adolescents with CHD is needed to reduce the management risk of loss to follow-up and strengthen their self-care ability [3,17].

The age distribution of the participants in the present study was 22–46 years old. Furenäs et al. [20] conducted a survey of cardiac, obstetric, and neonatal complications with pregnancies in women with CHD and found that advanced maternal age did not seem to affect complication rate. In addition to the age above 35 years, higher mWHO class or other psychosocial factors influencing on the mothers may be taken into consideration. During pregnancy and labor, women with CHD are more likely than those without to sustain cardiovascular injury [7,21]. Despite their regular attendance of follow-up sessions, approximately 60% of young female patients with CHD did not discuss sex-related topics (e.g., pregnancy, labor, and contraception) with medical care personnel [22]. Aside from not realizing the importance of regular check-ups, women with CHD often overlook the possible impacts that CHD may have on pregnancy [19]. The lack of understanding regarding CHD as a medical condition and unplanned pregnancy can both increase the level of uncertainty and risk associated with the pregnancy of women with CHD. From the beginning of gestation to labor, negative emotions such as anxiety and uncertainty are consistently present. The possibility that any child would inherit CHD is one of the leading causes of negative emotions; stress and anxiety can affect the physical and mental health of women with CHD during the pregnancy [7,22–26]. This finding is consistent with that obtained in the present study.

The results regarding performing self-care for health revealed the desire of the women with CHD to become a mother as well as their worry and sadness caused by the possibility of not being able to do so. Such desire caused them to be unhesitant in trying to get pregnant [8]. Therefore, before their attempt to get pregnant, they visited hospitals to seek medical advice and used that advice as a basis for evaluating the health of any potential baby and whether they could overcome the risk associated with pregnancy [23]. At this stage, the women with CHD understood that an evaluation before conception was a crucial medical examination that could lower the risks of pregnancy and labor. Previous studies have also demonstrated that a comprehensive evaluation can predict the probability and potential severity of pregnancy complications to a relatively high degree of accuracy, and women with CHD can be given clear information on how to prepare for the pregnancy process and symptoms to monitor during the process [27,28]. In the present study, the participants proactively sought medical treatment and learned about CHD care, pregnancy, and health promotion behaviors, which was in stark contrast to their previously passive treatment-seeking behavior. This was consistent with the anticipatory stage in the maternal role theory proposed by of Rubin [10] and Mercer [29]. Additionally, Plutzer and Keirse [30] revealed that the focus of primiparous mothers mostly lies in the maintenance and enhancement of personal health. Preparations for the maternal role promote the abilities and protective mindset needed for maternal behaviors during pregnancy.

Traditional Chinese medicine is natural without the burden of chemical synthesis and mainly nourishes the body. Therefore, if patients use Western medicine with contraindications or strong side effects, Chinese medicine treatment may become an alternative to Western medicine treatment. Chinese medicine is more commonly used in Taiwan to nourish, invigorate, and adjust the body [31,32]. Some women who have experienced infertility, miscarriage, or want to have a smooth pregnancy may also turn to traditional Chinese medicine to recuperate their body. The participants in the present study are consistent with regulating the behavior of the body.

The maternal role requires a woman to protect her child from harm and from being threatened by her own medical condition [8]. In this study, this was exhibited in the attention the participants paid to their own health condition. Women with CHD do not wish to be seen differently by society but can feel differences between them and women without CHD. The limitations and differences experienced in their daily lives may have caused the participants to feel that their disease controlled their lives and caused them to crave recognition [33]. Pregnancy also poses a certain health risk for women. During this period, maternal resilience emerges. For the sake of their child, the participants had to stop their medications in certain circumstances, which is consistent with a qualitative synthesis of maternal resilience by Vallido et al. [9]. At this time, they identified themselves as a mother first and a CHD patient second.

The enjoying being a first-time mother theme indicated that emotional exchange is crucial to a healthy mother–child relationship [26]. The mother–child interactions that occurred after the child was born enriched the family life of the women with CHD. Compared with people from western countries, people from Asian countries express affection in more subtle and humble ways [34]. Asian mothers may not often verbally express their love and affection for their children, but they are responsive to the needs of their children. The participants with CHD in this study who gave birth considered their child a precious gift. To return the love that they received from their child, they devoted their affection, protection, and attention to their child without reservation; this was an exclusive relationship between a mother and baby.

Finally, the factors contributing to success in high-risk childbirth in the present study indicate the existence of three resources of social support: support from the family, employer, and medical care team. For women with CHD who are on their way to becoming a mother, apart from spousal financial and emotional support, spousal participation in the pregnancy and labor processes plays a critical role in providing the women with courage and confidence for the long journey [35]. Understanding from the employer can mitigate the time pressure problems faced by working women. As for medical personnel, they were providers of knowledge, suggestions, and guidance in the eyes of the participants. Suggestions from the medical care team affected the emotions of the patients. Excluding minor cases in which medical interventions and suggestions have resulted in stress, almost all relevant studies have indicated that the appropriate employment of medical resources improves the safety of patients and effectively reduces or prevents possible risk factors [28].

Limitations

The sample in the current study included only primiparous women with CHD who were recruited from a single medical center and whose children were aged 6 months to 3 years. Therefore, the present results cannot be generalized to the whole female population with CHD. Because the participants of this study came from various counties and cities of Taiwan, the researchers left the choice of interview venue to the participants. Some of the participant brought her children along because no one was available to babysit. The interviews were sometimes interrupted because the participants needed to attend emergencies related to their children. This can be considered an environmental limitation of the current study.

Conclusion

The findings of this study presented that the women with CHD reported a consistent set of core concepts regarding their process of becoming a mother for the first time. Six main themes related to the feelings and experiences of the women with CHD in becoming a mother for the first time were identified. These themes indicate that from the preparing for pregnancy stage, to the pregnancy and labor stage, and to the child-rearing stage, the women with CHD did not experience only a single emotion during the entire process. At every stage, they experienced the emotion cycle of worry, joy, fear, and ease. In other words, their emotions were complex and ever changing. Therefore, appropriate social support and intervention are necessary during this period. The findings provide relevant parties with better understanding of the emotional course in events experienced by women with CHD during their pregnancy. The results also indicate the importance and unique contribution of this study in the research area of women with CHD.

Author contributions

Study conception and design: YTL, CWL, PFM and CWC; data collection: YTL and YMS; data analysis: YTL, PFM, YMS and CWC; manuscript drafting: YTL and CWC; and funding: CWC. All authors approved the final version for submission.

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Conflict of interest

The authors declare that there is no conflict of interest.

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1. How did you feel when you discovered you were going to become a mother? What is the significance of becoming a mother to you?
2. This was the first time you became a mother. How did your actual feelings on becoming a mother differ from your expected feelings?
3. This is your first child. What feelings did the child give you? How did your life change after you become a mother?
4. The journey to becoming a mother is not an easy one. Can you share your experience of proactively seeking medical care and the types of medical resources that you accessed? Do you have any suggestions for women with CHD who are planning to have children?
5. Hospitals currently provide some relevant medical resources to aid women with CHD to fulfill their maternal role. What is your opinion of this? Do you have any suggestions?

Characteristics	N / Mean (SD, min-max)
Age (years)	34.2 (6.7, 22-46)
Education	
Master	4
College	4
Undergraduate	2
Vocational	1
Pregnancy intention	
Planned	9
Unplanned	2
Types of insemination	
Natural	8
Artificial	3

Numbers of children born	
Singleton	9
Twins	2
Diagnosis	
ASD	2
VSD	2
TOF	2
TGA	1
SV	1
DORV	1
COA	1
PDA	1
mWHO class	
II	7
III	2
IV	2

Meaning unit	Category	Subtheme	Theme
"… Every time the doctor said that I had to exercise several times a week and go to the dentist to prevent tooth decay. The doctor would remind me every time I went back to the clinic, but I did not do it once …"(J-12)	Overlooking the influence of CHD on personal health	Lack of regard to CHD	Recognizing pregnancy risks

“Actually, I had not tracked my heart. I would not know how serious my heart condition was but that I was pregnant …Until I was pregnant and giving birth, the doctor explained my heart to me. He gave me a handbook with detailed information on it, so I really understood my heart condition.” (D-26)	Incomplete knowledge of CHD	Lack of regard to CHD	Recognizing pregnancy risks
“Yes, I was not worried about my danger. I have been thinking about what to do with my child. I was afraid that my child would be hypoxic just like the doctor said. It would cause many major diseases in the brain. I have been thinking about this problem …”(G-17)	Worried about the baby's health	Uncertainties surrounding safety during pregnancy	Recognizing pregnancy risks
“We didn't particularly want to challenge. It's just that we would be disappointed at that time …It's not that we chose not have a child, but because we have been told that we can't have a child. We still have been disappointed …”(H-9)	Scared of losing the baby	Uncertainties surrounding safety during pregnancy	Recognizing pregnancy risks
“I felt that my physical health was unstable …I was not sure if I could bear the risks of pregnancy and childbirth. The degree of this risk was beyond my prediction, so I felt that pregnancy was dangerous for my life.” (D-6)	Uneasy about unpredictable events during pregnancy	Uncertainties surrounding safety during pregnancy	Recognizing pregnancy risks

Theme/subtheme	Quotes from the interviews
Recognizing pregnancy risks	
Lack of regard to CHD	“That's right! That's why I said it wasn't planned. I didn't know how severe my condition was? Yes! Actually, it was really severe. I had the surgery at a really young age, when I was 6 years old. I didn't really understand my medical condition until I recently gave birth …I feel that I have better understanding of it now. I was given a booklet, which had a detailed explanation of the condition, including the classification levels you just mentioned …”(D-26)

Uncertainties surrounding safety during pregnancy	“I was quite worried during that time; I was worried that my baby would have the same medical condition as I do. Because my heart is slightly …slightly positioned to the right. That's right! I was worried he would have the same medical condition as me, and whether he would have a genetic disease. Dr. A told me that my child would be prone to genetic diseases and that my medical condition is likely to cause genetic diseases in my children, so I was quite worried. After I gave birth to my baby, I did send him for some medical examinations; he was examined by Dr. A and Dr. B …Of course I was worried; no parent wants their children to suffer.” (I-12)
Performing self-care for health	
Desire to become a mother	“We have been discussing whether to be pregnant …. Anyway, I might have been too happy at that time, Just tell him yes, I'm OK, I'm fine. At that time my physical condition was really good, and I didn't know why I believed in my situation, so I told him, just try it! Anyway, I think I would return to the clinic regularly.” (H-24)
Proactive medical-care-seeking behaviors	“I did visit Chinese physicians for health promotion treatment. I still think that Chinese medicine and Western medicine are very different.” (E-31) “Because I wasn't sure exactly what kind of influence this medical condition has …like on pregnancy and overall health, and I was thinking, “Right, I just have to give birth first. About my condition …we'll see what happens.” But after I gave birth, I realized that I wanted to be with him as he grew up! [chokes up]” (H-74)
The importance of an evaluation before conceiving	“I think the first priority is still consulting the doctor. If the doctor gives me the green light after an evaluation, I would ask the doctor if there're any precautions I should take …things like that. And you also need to be cautious during your pregnancy. You need to take extra precautions in everything you do. For example, when I was pregnant, my mother reminded me not to ride a motorcycle, because the roads in Taiwan are uneven, and riding a motorcycle on an uneven road would not do the baby any good. You must be careful in everything when you are on the way to becoming a mother.” (A-37)

Reflecting on health during pregnancy and labor	“It's better not to get pregnant that I take the medicine. But doctor tells me to eat every day. If I want to get pregnant, I have to stop for at least half a year. Quitting the medication is also risky for me, but I really want to have a second child. I have talked to the doctor three times, and the nurse thinks I am too anxious …”(G-27)
Building self-worth from my baby	
The hope of not being treated differently	“Actually, I was just asking the question out of boredom. I asked if there was anything I could still do. And then I asked about more important things, and then I was asked about …I asked the doctor about the possibility of getting pregnant, and then …I was a bit regretful when I heard that, because I felt like I was already different from normal people.” (H-20)
The most important decision in my life	“I just felt that I wanted to have children, and everything I did was because I wanted to have children, so I need to move in that direction! Frankly, sometimes I did feel that …I should just give up the idea of having children. But then again, I thought that was the only time I could work toward having children. If I waited until I was 40 or 50 years old, it would be impossible for me to have a child. That's why I felt I should work as hard as possible and see what happens. If my efforts were unfruitful in the end, I could at least say that I had no regrets. That's why I didn't give up throughout the whole process, and I ended up having two children (twins), one boy and one girl.” (B-16)
The need to prove to myself that I can do it	“After I gave birth to my child, I felt like I had achieved something impossible. Because 8th months after I was born, I was diagnosed with double outlet right ventricle with transposition of the great arteries. Given the medical technology in the 1980s, this medical condition was basically incurable. At that time, the doctor told my mother that I could only wait for a heart transplant. That's why giving birth was like achieving something that others didn't think I was capable of. And I was the first person in my family to get married and have children, my family members were quite shocked by that. People in the older generation think that giving birth to an abnormal child means that the mother did something wrong in her previous life. Therefore, this is like a sort of vengeance for me.” (F-19)
Adapting to postpartum life and adjusting priorities	

The meaning of freedom and responsibility	“Maybe mothers are …maybe you are biologically wired to wake up once you hear your baby cry. That's a maternal instinct. The father doesn't have it. He just sleeps so deeply. So I don't wake him up unless I have to attend to two babies (twins). Of course, he would help if I woke him up. But the truth is that I am the main caregiver, while he plays a passive assistant role.” (K-18)
The inheritance and transformation of child-rearing experience	“I did think about what is most important to me. I thought about work, but then I thought, no, that's not mine, that belongs to the country. In the end, I feel that being a mother is the most important task for me right now.” (B-29) “For example, my classmates invited me to go hiking. Actually, I knew I shouldn't hike, but my mom made me go. During the hike I cried and vomited, but my mom followed behind me and said: “It's okay! Let's take it slow.” I think the parents of children with CHD are very pitiful. They have a hard time, but I don't think it is necessary for them to be so negative. Your child will be happy because you have to [pretend to] be happy, but in fact you are unhappy and your heart is not happy. (laugh)” (F-30)
The priorities of becoming a mother	“I was definitely swamped by my workload for a while …just taking care of the baby. Before giving birth, I just focused on carrying the baby; throughout the whole pregnancy, I just hoped to deliver the baby safely. So I didn't actually realize that there is a lot of caring work to be done after the baby is delivered and that I need to prioritize the baby all the time …Midnight was especially terrible, because the babies had an inverted day–night rhythm. Right, and I was really overwhelmed when both babies cried at the same time.” (K-16) “Because both of going to work and taking care of my baby are so tiring, arrhythmia becomes the last consideration.” (B-8)
Enjoying being a first-time mother	
The joy and affection of welcoming a child	“I felt that I had formed some sort of comradeship with the baby in my tummy, right from the beginning. It wasn't easy …so I think that my feelings toward my baby …they're kind of exceptional and special.” (H-73)
Strengthening the sense of commitment to being a mother	“You would really …there was an invisible force that made you …you actually gave love to the child selflessly! This was quite unexpected.” (D-17)
Factors contributing to success in high-risk childbirth	

Understanding and help from the employer	“My boss would let me take children to work. If my work is really over, I'll stay keep doing it, I won't insist that I have to walk on time. I am very grateful to the boss for his tolerance.” (A-28)
Support and encouragement from family	“Without help from my family, it would have been hard for us to handle everything well. Help from parents made a big difference. When I was waiting for my delivery at around the 34th or 36th week, I was afraid that I'd deliver prematurely, so I went and stayed at a hotel in Taipei. If my sister hadn't kept me company, I would've been scared to go to Taipei alone.” (E-18)
The overall professionalism of medical care	“The examination by Dr. A really eased my mind. That's why I said that sometimes the doctors' words really make you feel confident, more confident. Otherwise, you feel so frightened and scared, because you don't know what will happen in the future.” (I-69)

DETAILS

Subject:	Quality of life; Womens health; Congenital diseases; Medical research; Chronic illnesses; Cardiovascular disease; Pregnancy; Data collection; Data analysis; Children &youth; Heart; Mothers; Interviews; Qualitative research; Pediatrics
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Yu, J. S., Ham, O. K., & Kwon, M. S. (2022). Effects of on-campus and off-campus smartphone overdependence prevention programs among university students. Asian Nursing Research, 16(4), 215-223. doi:https://doi.org/10.1016/j.anr.2022.07.004

SUMMARYPurposeThe purpose of this article is to evaluate effects of self-determination theory-based on-campus and off-campus prevention programs on smartphone overdependence among university students.MethodsThis was a pre-posttest quasi-experimental study with a nonequivalent control group (CG). Seventy-eight students were recruited as participants. They were allowed to choose either an experiment group (EG) or a CG. On-campus smartphone overdependence prevention program was provided to participants in experimental group 1 (EG1), while on-campus program combined with off-campus prevention camp was provided to those in experimental group 2 (EG2). Instruments used in this study included a smartphone overdependence self-diagnosis scale, a basic psychological needs scale, and a self-regulation ability scale. Data collection was performed at baseline, immediately after intervention, at 1 month and 3 months after intervention. Data were analyzed using mixed analysis of covariance. Focus group interview was performed for qualitative evaluation.ResultsAfter the intervention, smartphone overdependence and basic psychological needs exhibited significant interactions between group and time. Smartphone overdependence scores decreased in EG1 and EG2 but increased in CG ($F = 4.56$, $p = .001$). Basic psychological needs improved in EG1 and EG2 but deteriorated in CG ($F = 5.04$, $p = .009$). Focus group interviews revealed that participants strived to control their smartphone usage through individual efforts and by interacting with new friends in college even after completing the program.ConclusionIn this study, on-campus only program and combined intervention of on- and off-campus programs were both effective in maintaining and managing smartphone use. However, participants perceived that the off-campus program provided an opportunity to apply the theory learned in on-campus to the real world.

Choi, H., Lim, A., & Song, Y. (2022). Adaptive behavior in stroke survivors: A concept analysis. Asian Nursing Research, 16(4), 231-240. doi:https://doi.org/10.1016/j.anr.2022.07.002

SUMMARYPurposeThis study aims to explore a clear and evidence-based definition of adaptive behavior in stroke survivors and establish the antecedents, attributes, consequences, and empirical referents of the concept.MethodsThe concept analysis was performed using the Walker and Avant method as a framework. Data from 90 publications were collected using various databases (PubMed, EMBASE, CINAHL, RISS, and KISS) and applied in the analysis.ResultsAdaptive behavior in stroke survivors was defined according to four attributes: realizing change, taking an optimistic view, restructuring daily activities to suit oneself, and carrying out one's own daily life. The conceptual structure of their adaptive behavior comprised stroke onset, functional changes, and emotional liability as antecedents and autonomy, family equilibrium, and quality of life as consequences.ConclusionsClarifying the concept of adaptive behavior in stroke survivors provides an understanding of the underlying attributes of this concept. Furthermore, it will facilitate the development of scales to measure the concept and the application of a theory-based intervention program that can improve adaptive behavior.

Ju-Hee Nho, & Eun, J. K. (2022). Relationships among type-D personality, fatigue, and quality of life in infertile women. Asian Nursing Research, 16(4), 208-214. doi:https://doi.org/10.1016/j.anr.2022.08.001

SummaryPurposeThe objective of the present study was to investigate the prevalence of the type-D personality and identify the relationship between type-D personality, fatigue, and quality of life (QoL) in infertile women.MethodsA total of 149 infertile women were recruited between October 2020 and January 2021. The participants were assessed through self-administered questionnaires using the type- D personality scale-14, fatigue severity scale, and fertility QoL instrumental questionnaire. Data were analyzed using the independent t-test, chi-square test, Pearson's correlation coefficients, and multiple regression analysis using the SPSS/WIN 25.0 program for Windows.ResultsApproximately 40.9% of infertile women were classified into the type-D personality group, which showed significantly higher fatigue and lower QoL than the non-type-D personality group. Fatigue was the most influential factor on the QoL of infertile women ($\beta = -.23$, $p = .003$), followed by the duration of infertility treatment (β = −.22, p = .003), type-D personality (β = −.18, p = .025), and relationship with spouse (β = −.17, p = .024). These variables account for approximately 22% of the variance.ConclusionsIntervention programs that consider fatigue, type-D personality, relationship with spouses, and treatment duration may be useful for improving QoL in infertile women.

Suwanno, J., Phonphet, C., Thiamwong, L., Mayurapak, C., & Ninla-aesong, P. (2022). Evaluating the dimensionality and reliability of the thai self-care of hypertension inventory version 2.0. Asian Nursing Research, 16(4), 197-207. doi:https://doi.org/10.1016/j.anr.2022.08.002

SummaryPurposeSelf-care is essential for hypertensive individuals to promote optimal health and illness treatment. We developed the Thai Self-Care of Hypertension Inventory (SC-HI) version 2.0 from the original US version using a multi-stage approach for cross-cultural adaptation. Scales previously studied outside a US context had different dimensions and factor solutions. Therefore, we examined the Thai SC-HI's factorial validity, construct validity, and internal reliability within a Thai context.MethodsWe administered a cross-sectional survey with hypertensive patients in 10 primary care settings, and conducted exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) on two sets of separate samples from each of five sites to examine the model's factorial validity and construct validity. We estimated scale reliability with Cronbach's alpha and McDonald's omega coefficients.ResultsParticipants were predominantly female, older adults, with mean age 66 years (SD = 11.94; range 36–97 years). The self-care maintenance scale had three factors and demonstrated good fit when the error covariances were respecified. The two-factor self-care management scale had different factorial solutions compared to previous models. The CFA result showed good fit indices for the Thai, original US, and Brazilian models. The self-care confidence scale was unidimensional, with partially supported fit indices that improved after we respecified the error covariances. Reliability coefficients estimated by difference methods were nearly equal: slightly lower than desired for self-care maintenance (.68–.70) and inadequate for self-care management (.62–.65); self-care confidence reliability was adequate (.89–.90).ConclusionThe Thai SC-HI has good psychometric characteristics and reflects the original instrument's theoretical basis.

Choi, M., Park, C. G., & Hong, S. (2022). Psychometric evaluation of the korean version of PROMIS self-efficacy for managing symptoms item bank: Item response theory. Asian Nursing Research, 16(4), 187-196. doi:https://doi.org/10.1016/j.anr.2022.08.003

SummaryPurposeTo evaluate the psychometric properties of the Patient-Reported Outcomes Measurement Information System (PROMIS) self-efficacy for managing symptoms of the version 1.0 item bank in Korea.MethodsThis study consisted of two phases: first, developing the Korean version of the item bank following the translation guidelines; and second, performing a cross-sectional study to evaluate its psychometric properties using the item response theory. This study enrolled 323 patients with type 2 diabetes mellitus between July and August 2020. Cronbach's α was used to assess the reliability of this item bank. Confirmatory factor analysis, using diagonally weighted least squares, was used to identify the assumptions of item response theory. Item parameter estimates including discrimination and thresholds were derived using the graded response model of the item response theory to reflect patient-reported outcomes as individualized responses.ResultsThe Korean version of the item bank demonstrated good reliability (Cronbach's α = .98) and its discrimination ranged from 1.82 to 4.93. The thresholds resulted in the establishment of a category response curve for each item. However, no overlap was observed among the category curves. Moreover, the differential item functioning was not significant for age, gender, and income variables.ConclusionThe graded response model and differential item functioning provided qualitative evidence that demonstrated acceptable psychometric properties of symptom management self-efficacy among patients. This item bank is expected to provide adequate assessments of self-efficacy of symptom management for patients with a chronic disease, which can contribute to nursing research and intervention.

Kim, J., Heo, N., & Kang, H. (2022). Sex-based differences in outcomes of coronavirus disease 2019 (COVID-19) in korea. Asian Nursing Research, 16(4), 224-230. doi:https://doi.org/10.1016/j.anr.2022.07.003

S U M M A R YPurposeThis study examined the factors affecting mortality and clinical severity score (CSS) of male and female patients with Coronavirus Disease 2019 (COVID-19) using clinical epidemiological information provided by the Korea Disease Control and Prevention Agency.MethodsThis is a retrospective, observational cohort study. From January 21 to April 30, 2020, a total of 5624 patients who were released from quarantine or died were analyzed.ResultsThe factors influencing release or death that differed by sex were high heart rate and malignancy in males and chronic kidney disease in females. In addition, the factors influencing progression to severe CSS were high BMI (severe obesity) and rheumatic disease in males and high temperature, sputum production, absence of sore throat and headache, chronic kidney disease, malignancy, and chronic liver disease in females. Older age, low lymphocyte count and platelets, dyspnea, diabetes mellitus, dementia, and intensive care unit (ICU) admission affected mortality in all the patients, and older age, low lymphocyte count and platelets, fever, dyspnea, diabetes mellitus, dementia, and ICU admission affected progression to severe stage of CSS.ConclusionsThis study is expected to contribute to the general results by analyzing nationally representative data. The results of this study present an important basis for development of differentiated nursing and medical management strategies in consideration of factors that influence treatment effects and outcomes according to sex of patients with COVID-19.

Kayaroganam, R., Sarkar, S., Satheesh, S., Tamilmani, S., Sivanantham, P., & Kar, S. S. (2022). Profile of non-communicable disease risk factors among nurses in a tertiary care hospital in south india. Asian Nursing Research, 16(4), 241-248. doi:https://doi.org/10.1016/j.anr.2022.07.001

SummaryPurposeThe work nature of nurses and the associated lifestyle changes put them at high risk of developing noncommunicable diseases (NCDs). This study was conducted to estimate the prevalence of NCD risk factors among nurses working in a tertiary care hospital in Puducherry and to determine the associated factors among nurses.MethodsWe conducted a cross-sectional study among all nurses (N = 1217) in the tertiary care hospital aged between 21 and 60 from May 2019 to April 2020. We assessed NCDs behavioral, physical, and biochemical risk factors using a self-administered questionnaire. The adjusted prevalence ratio was calculated using a generalized linear regression model to determine factors associated with NCD risk factors.ResultsThe response rate was 99.0% (1217/1229), and 77.5% of the participants were women. Current tobacco use and alcohol consumption were 1.5% (95% CI: 0.8–2.2) and 2.9% (95% CI: 2–3.9), respectively, with significantly higher prevalence among men. Overweight or obesity (body mass index ≥ 23 kg/m2) was 77.7%, with a significantly higher prevalence among those aged ≥30 and married. Prevalence of hypertension was 14.4% (95% CI: 12.5–16.4), and diabetes mellitus was 11.5% (95% CI: 9.7–13.6). Both were significantly higher among those aged ≥50 years. One-third of nurses, 34.3% (95% CI: 31.6–37.1), had hypercholesterolemia, significantly higher among men.ConclusionWe found a high prevalence of various NCD risk factors among the nurses. We highlight the urgent need for initiating health promotion interventions, especially to improve intake of healthy diet and physical activity among nurses aged ≥30 years.

Jeong, I. S., & Song, J. Y. (2022). Epidemiological characteristics of carbapenemase producing carbapenem-resistant enterobacteriaceae colonization. Asian Nursing Research, 16(3), 134-139. doi:https://doi.org/10.1016/j.anr.2022.05.002