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Acupressure intervention for children: A scoping review

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Abstract

Background: Acupressure is a popular form of complementary nursing among adults. It stimulates the body's self-healing processes by enhancing energy flow, or "chi," along meridian channels. Acupressure can address many health issues and is also used on children because it is painless and straightforward. Although acupressure has existed for centuries, research on its applications for children remains limited.

Objective: This review aimed to categorize and synthesize the research conducted over 30 years on acupressure in children.

Design: A scoping review

Data Source: The databases searched were PubMed, ProQuest, Scopus, ScienceDirect, Wiley, Medline EBSCO, and Google Scholar. The inclusion criteria were original peer-reviewed articles in English or Indonesian that used acupressure as an intervention for children in any setting from 1991 until March 2022 and were updated until March 2024.

Review Methods: This review followed the Joanna Briggs Institute Manual Methodologies. Subsequently, the retrieved articles were imported into the EndNote program version 20. Based on the identification results, 2924 articles were obtained, and 76 articles were retained. The review decision process was depicted in a PRISMA flow diagram.

Results: Of the 76 articles, 72% came from the Asian continent, 66% were published within the past ten years, and 59% were randomized controlled trials. Acupressure was most used (48%) by school-age children (7-12 years), with commonly targeted points being Neiguan (P6), Zusanli (ST36), Hegu (LI4), Yintang (Extra1), and auricular acupoints. Acupressure on children can be administered by acupuncturists, nurses, doctors, caregivers, and parents, offering six main benefits: alleviating nausea and vomiting, relieving pain, decreasing anxiety, relieving fatigue, increasing visual function, and increasing weight and height.

Conclusion: Acupressure offers numerous advantages for children with various conditions. Healthcare and nursing professionals should consider using it as a complementary intervention to address issues and problems in healthy and sick children. However, further studies are needed to evaluate its effectiveness.

Keywords

acupressure; children; scoping review; vomiting; nausea; pain; fatigue; anxiety

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Background

Acupressure, a traditional Chinese medicinal practice employed for centuries, involves applying pressure to specific acupoints using fingers instead of acupuncture needles (Chen et al., 2020). It falls under the umbrella of complementary medicine, alongside acupuncture, herbal remedies, massage, reiki, and other modalities (Sawni-Sikand et al., 2002). The National Center for Complementary and Alternative Medicine at the National Institutes of Health defines complementary and alternative medicine (CAM) as a collection of diverse medical systems, practices, and products group of diverse medical and healthcare systems, practices, and products that currently lie outside the realm of conventional medicine (Koithan, 2009).

Acupressure is a non-invasive therapy that focuses on the harmony of yin and yang and maintains the function of key organs through blood and energy (chi) circulation in the body. The mechanism of acupressure was based on the principle of activating acupoints along meridians to restore chi imbalances (Chen & Wang, 2014; Mehta et al., 2017). There are 14 meridians in human bodies that link acupoints, and each meridian relates to and nourishes a distinct organ (World Health Organization, 1991). Meridians are the pathways within the human body that sustain chi and, consequently, the individual's wellness (Mehta et al., 2017). The meridians are classified as Yin or Yang. The Yin meridians connect to critical organs such as the lung, heart, spleen, kidney, and liver (World Health Organization, 1991). The Yang meridians correlate to the gallbladder, intestines, stomach, and bladder. Acutherapy's exact action method is unknown, although it is assumed to activate the central nervous system by releasing particular neurotransmitters and hormones. It is thought that different symptoms and illness states require different routes, neurotransmitters, and hormones (Harris et al., 2020; Li et al., 2013).

Acupressure is a non-invasive therapeutic option that is well-suited for pediatric patients. This therapy has several advantages, highlighting its affordability, absence of side effects, and the fact that it does not require specialized skills to administer (Abbasoglu et al., 2015). Nurses incorporate acupressure into their holistic approach to patient care, using it to enhance comfort, alleviate pain, and manage symptoms. This study suggests that acupressure may be a feasible nursing intervention. From a practical standpoint, acupressure offers several advantages: it is non-invasive, free, and simple to learn. Most significantly, because acupressure is non-traumatic, there is no need for special equipment, making it simple to apply (Maa, 2005).

Research on acupressure in children has been widely conducted. It has been shown to reduce nausea and vomiting in children with cancer (Jones et al., 2008), alleviate adverse reactions to chemotherapy and fatigue (Bastani et al., 2015), alleviate postoperative symptoms (Pouy et al., 2022), and alleviate interventional pain (Yildirim & Yildiz, 2021). In addition, a review demonstrates the substantial significance of acupressure in lowering nausea and vomiting in adolescents (Khakpour et al., 2019).

Healthcare professionals have also frequently employed acupressure to treat various adult problems. Several previous reviews have stated that acupressure has several advantages, such as effectively enhancing the quality of sleep (Waits et al., 2018) and quality of life in the elderly (Chen et al., 2020), lowering constipation and pain (He et al., 2020; Jiang et al., 2023), and alleviating pre-operative anxiety among adults (Xie et al., 2023). In addition, other reviews also show that acupressure is useful for reducing pain and lowering blood sugar levels in diabetic patients and can lower blood pressure in adults (Komariah et al., 2021).

Although numerous reviews on acupressure have been conducted in various populations, reviews focusing specifically on pediatric populations remain limited. Research exploring the benefits, acupressure points, service providers, and conditions in children is still lacking, highlighting the need for further investigation. Thus, this scoping review aims to organize and synthesize the body of research on pediatric acupressure from the past 30 years.

Methods

Study Design

The scoping review methodology established in the Joanna Briggs Institute Manual for Evidence Synthesis (Peters et al., 2020) guided this review, which is based on the scoping review frameworks (Arksey & O'Malley, 2005). This framework has five stages: identifying the research question, identifying relevant studies, selecting the study, charting the data, and collating, summarizing, and reporting the results. This technique allows for greater flexibility in studying and combining different sorts of research information.

Search Strategy and Selection Criteria

The search approach used the main keywords "acupressure" AND "child" to search the online database. The six databases utilized are PubMed, ProQuest, Scopus, ScienceDirect, Wiley, and Medline EBSCO. In addition, we searched Google Scholar for articles written particularly in Indonesian. The keywords for each database are described in **Table 1**.

Table 1 Searching strategy

Database	**Search Term Used**	**Filters Applied**	**Initial Search**			**Update Search**		
			Searching Date	**Range of Year of the Articles Retrieved**	**Articles Retrieved**	**Searching Date**	**Range of Year of the Articles Retrieved**	**Articles Retrieved**
PubMed	"acupressure" [MeSH Terms] OR "acupressure" [All Fields] AND "child* [All Fields]	Full text, clinical trial, RCT	March 14th 2022	1984-2022	202	Sept 23rd 2024	2022-2024	5
ProQuest	Acupressure AND Children	Full text, English	March 14th 2022	1983-2022	998	Sept 23rd 2024	2022-2024	11
Scopus	Tittle-Abs-Key (Acupressure AND Children)	Article, English.	March 15th 2022	1991-2022	540	Sept 23rd 2024	2022-2024	63
Science Direct	acupressure AND children	Research article	March 16th 2022	1989-2022	398	Sept 23rd 2024	2022-2024	99
Wiley	"acupressure AND children" anywhere and "children" in Tittle	-	March 15th 2022	1986-2022	40	Sept 23rd 2024	2022-2024	5
Medline EBSCO	acupressure [All TexT] AND children [Abstract]	Full text, peer review, all child, English language	March 14th 2022	1998-2022	550	Sept 23rd 2024	2023-2024	4
Google Scholar	Akupresur pada anak	-	March 16th 2022	2014-2022	5	Sept 24th 2024	2022-2024	4

The research question addressed was "What are the benefits, acupoint, provider, and child condition of acupressure in children?" The search approach involved tweaking the keywords in each database to achieve thorough coverage of the relevant literature.

This review selects articles that have passed peer review in their respective journals. The inclusion criteria for this article were using acupressure as an intervention given to children aged 0-18 years, published in English and Indonesia, available in full text, original research, the research was an intervention study (not an observation study), and published until March 2022. Furthermore, we have updated the search until March 31, 2024, and received an additional 191 papers for review. Gray literature, such as dissertations/theses, conference reports and proceedings, and white papers, were eliminated due to the project's breadth and the necessity for practicality. Furthermore, editorials, opinion articles, and letters to the editor were omitted since they provided little support for the study topic. Reviews and meta-analyses were also disqualified. Several studies used long life spans, so in this case, the researchers used all these age ranges in the analysis stage.

The retrieved articles are subsequently imported into the EndNote program version 20 to remove duplicates. Two independent reviewers (SR and ATI) screened titles and abstracts, we removed studies, and the final eligibility was determined through a full-text review.

Data Extraction

Two reviewers (SR and ATI) incorporated data retrieved from papers in the scoping review using a data extraction tool built by a reviewer for data charting. According to the domains of the extraction tool, the data collected consisted of details from the included studies on the country of publishing, year of publication, number of participants, age group of participants, health condition of participants, study design, the provider of acupressure and significant results related to the review aims. The data extraction tool was adapted and revised as needed during the data extraction process for each included publication. The data extraction tool was customized and altered as needed during the data extraction process for each included article. We used Microsoft Excel as our primary data extraction tool. Excel was used to capture and arrange the pertinent information gleaned from the selected articles. We created an organized table in Excel and inserted critical data elements such as article titles, authors, publication years, study aims, techniques, findings, and other relevant information.

Data Analysis

More specifically, based on the extracted data, SR and ATI identified the advantages of acupressure for children with different diseases, the acupressure point used, and the provider that performs the acupressure. It is envisaged that information concerning numerous child health issues that can be treated with acupressure will be discovered because of this identification. As part of the critical appraisal process, optional in the scoping methodology, we compiled and summarized essential factors such as study design, randomization methods, sample size, and the comparator group to provide a comprehensive overview of potential biases.

We thoroughly analyzed and extracted important details from each article, grouped the data into proper categories, and presented the results without the need of specialist tools. This technique allowed us to interact thoroughly with the subject, ensuring that every significant component of our research was meticulously recorded and investigated.

Results

Based on the identification results from the first search and update search until March 2024, 2924 articles were obtained, and 955 duplicate articles were excluded. Next, SR and ATI independently screened 1969 by title and abstract. In the event of disagreement, FH was consulted. 179 full-text articles were reviewed to determine inclusion criteria, and 76 articles were retained. A PRISMA flow diagram depicts the review decision process (**Figure 1**).

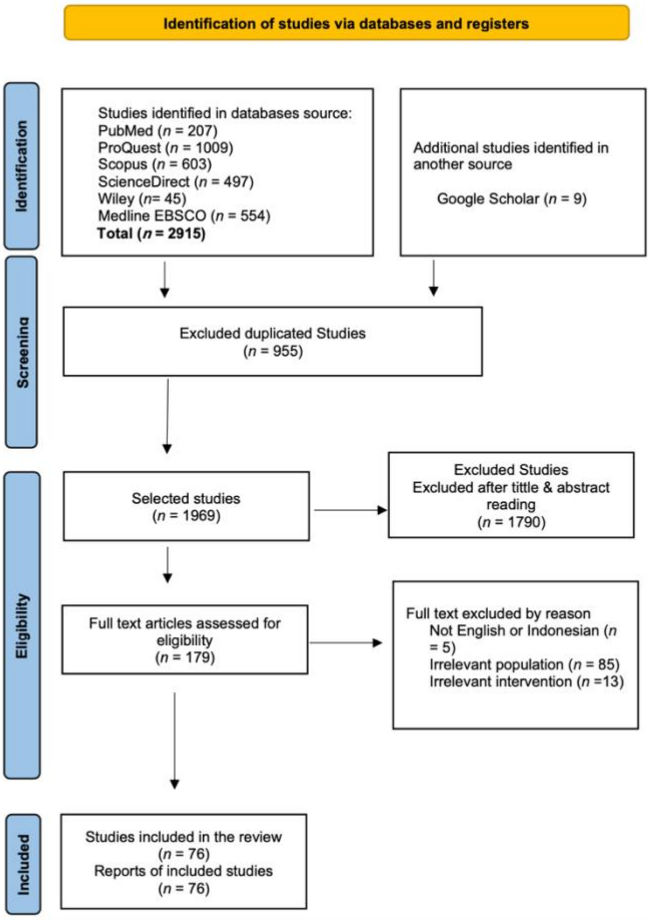

Figure 1 PRISMA Flow Chart (Page et al., 2021)

Based on the country of publication, most of the articles came from countries on the Asian continent (Iran, China, Taiwan, Indonesia, India, South Korea), followed by the Americas (USA, Canada, Brazil), Europe (Turkey, United Kingdom, Norway, Italy, Austria, Ukraine) and Africa (Egypt) (**Figure 2A**). This is relevant to the origins of acupressure, which is in China on the Asian continent, though it later spread to other continents worldwide. Acupressure research in children has been conducted at all ages, from infants to adolescents, but most studies were conducted on children aged 7 to 12 (**Figure 2B**). Based on the year of publication, publications on acupressure in children started in 1991 and will continue until 2024. Most of the research will be conducted in 2023 (**Figure 2C**). The figure shows that researchers have been studying acupressure extensively since 2000. Detailed characteristics of each study can be seen in the **Supplementary File**.

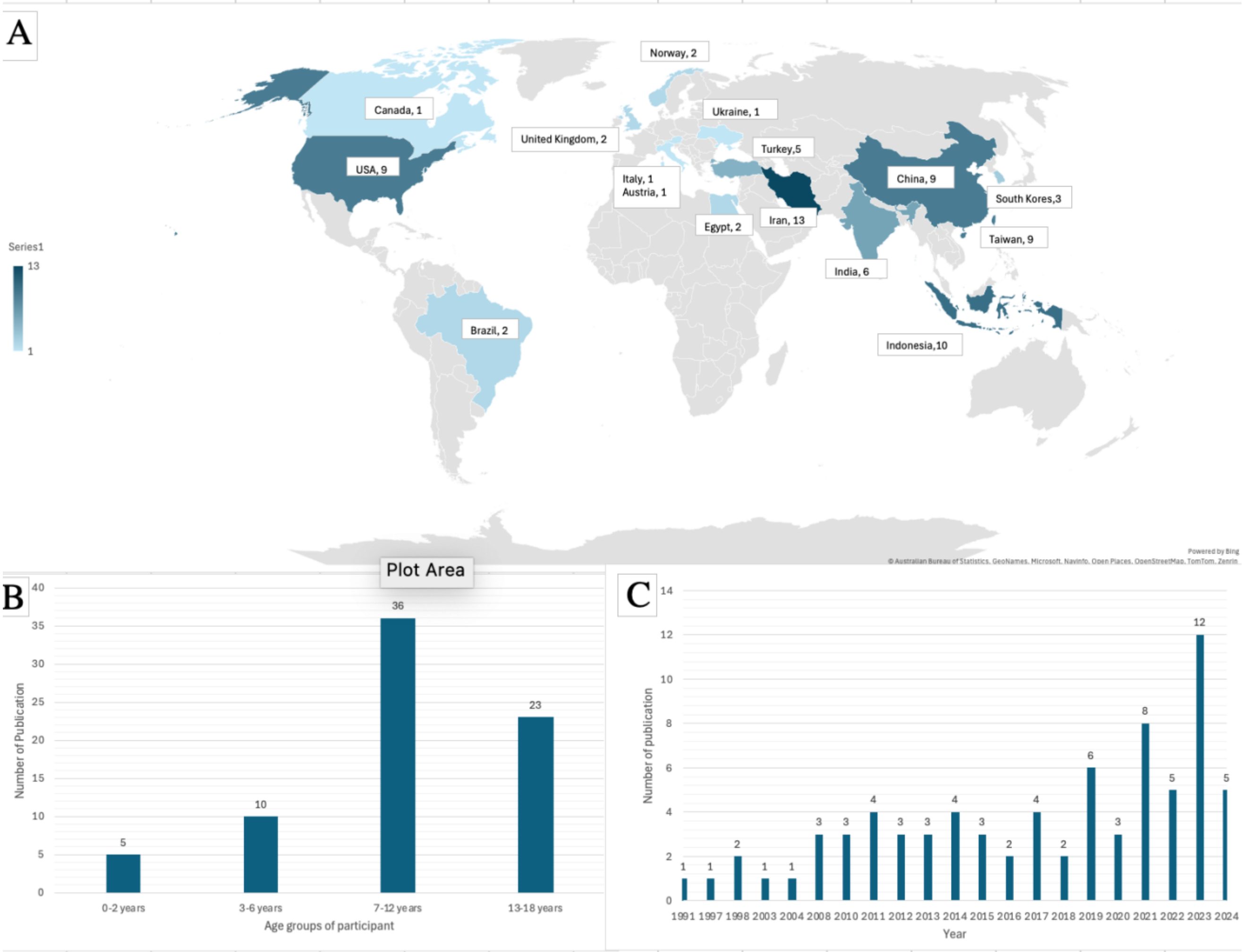

Figure 2 Summary characteristics of included studies. (A) Number of publications by country, (B) Number of publications by age group of participants, (C) Number of publications per year

Acupressure in children is performed in various conditions, including both sick and healthy children (**Table 2**), and performed not only by the clinical staff or acupuncturist but also by parents and patients themselves (**Table 3**). Besides that, as part of the scoping review, where critical appraisal is optional, we provided a summary of important characteristics such as research design, randomization procedures, number of participating sites, sample size, and comparison groups to provide a general knowledge of potential bias concerns (see **Table 4**).

The Benefits of Acupressure in Children

According to this review, acupressure has six significant benefits in children: pain relief, nausea and vomiting alleviation, anxiety relief, improved visual abilities, increased weight and height, and reduced fatigue. In addition, some minor benefits include improved sleep quality, respiratory function, reduced severity of attention deficit hyperactivity disorder (ADHD), and bed-wetting incidents (**Figure 3**). We created the map with the help of the X Mind application, which is a highly professional and popular tool for creating mind maps. The map illustrates the benefits of acupressure in children and the acupressure points used.

Nausea and Vomiting Alleviation

Most of the studies indicate that acupressure is frequently used to treat nausea and vomiting in children. Various causes, such as chemotherapy (10 articles), surgery (8 articles), maxillary dental impressions (2 articles), and dysmenorrhea (1 article), can lead to nausea and vomiting. Ten studies measure nausea and vomiting in children with chronic conditions such as cancer and leukemia (Dupuis et al., 2016; Ghezelbash & Khosravi, 2017; Iriani & Vestabilivy, 2017; Jones et al., 2008; Rahmah & Alfiyanti, 2021; Rukayah et al., 2014; Srinatania & Carlina, 2023; Yuliar et al., 2019). Eight of the ten studies that measured nausea and vomiting produced significant results with a *p*-value of 0.001.

The neiguan point or pericardium 6 is the most commonly used acupressure point in children to relieve nausea and vomiting (Chate, 1997, 1998; Dupuis et al., 2016; Lewis et al., 1991) (Ali Reza Ebrahim et al., 2011; Altuntas & Dalgic, 2022; Basuony et al., 2022; Liodden et al., 2011; Norheim et al., 2010; Pouy et al., 2022; Srinatania & Carlina, 2023; Yuliar et al., 2019). This Pericardium 6 or P6 point is located three fingers above the patient's wrist, between the two muscular protuberances visible when the hand is tightly gripped. Researchers manually pressed this point, and three studies using acupressure bracelets were conducted (Jones et al., 2008; Lewis et al., 1991; Liodden et al., 2011). This is an elastic bracelet that is worn around the wrist. A plastic bulge inside the bracelet will press on point P6. This bracelet is worn during chemotherapy or after surgery. Four of the 14 studies that used acupressure at point P6 failed to significantly reduce nausea and vomiting, specifically in children with maxillary dental impressions (Chate, 1998) and leukemic children (Dupuis et al., 2016; Yuliar et al., 2019).

In addition to point P6, several articles on nausea and vomiting in leukemia patients emphasize point ST 36 or point Zusanli (Iriani & Vestabilivy, 2017; Rukayah et al., 2014; Srinatania & Carlina, 2023) or use point ST 36 only (Ghezelbash & Khosravi, 2017). The ST 36 point is on the foot, or more precisely on the anterior side of the lower leg, near the lower lateral edge of the patella. This point is emphasized for 3 minutes every 6 hours after chemotherapy for 24 hours. The findings of this study show that it can help reduce nausea and vomiting.

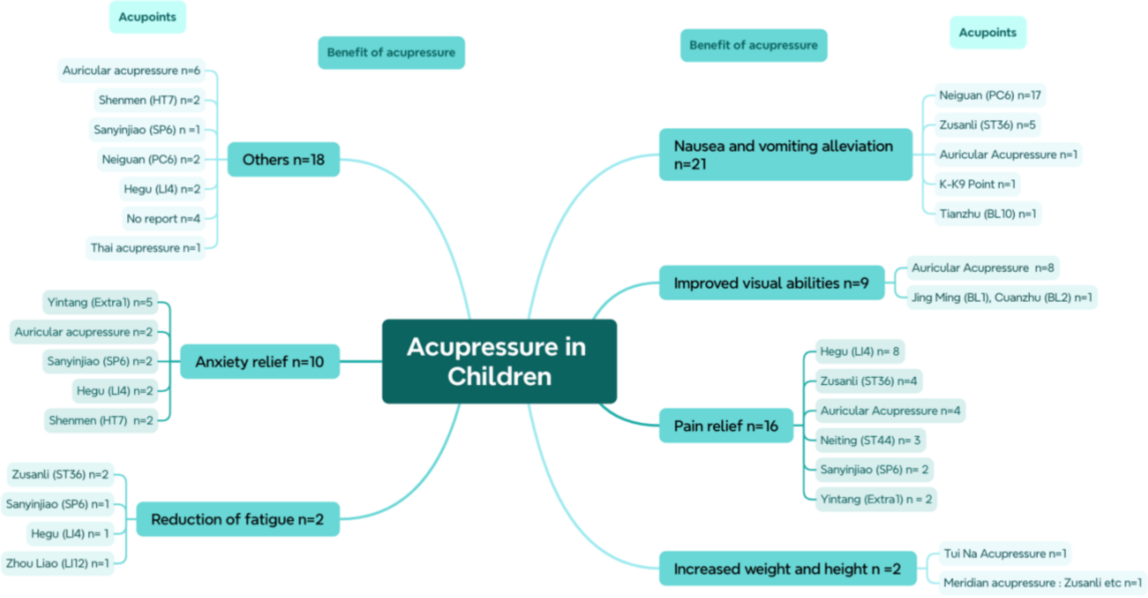

Figure 3 Mapping of acupressure in children by benefit and acupoint

This review also discovered the use of K-K9 points in children undergoing strabismus surgery. This point is precisely in the middle of the middle knuckles on each ring finger on both hands. In their study, the researchers used a small disc to press that firmly adhered to the K-K9 points with adhesive. This effort was carried out 30 minutes before anesthesia was administered and continued for the next 24 hours, and the results showed that acupressure at points K-K9 could reduce nausea and vomiting in children after strabismus surgery (Schlager et al., 2000). Besides K-K9, acupressure on BL 10 (Tianzhu), BL 11(Dazu) and GB 34 (Yanliquan) also significantly reduces vomiting after strabismus correction (Chu et al., 1998). Another study on patients with strabismus focused on reducing nausea and vomiting by emphasizing PC 6 points. The findings indicated it reduced patient nausea and vomiting (Nasrabadi et al., 2011) .

Nausea and vomiting are also common in children undergoing or recently completed chemotherapy. Based on this, Yeh et al. (2013a) attempted to identify the use of auricular acupressure (ear acupressure) to reduce nausea and vomiting. Shenmen, sympathetic, cardia, stomach, and digestive subcortex points are pressed on the auricle. During the research, all children were instructed to press each acupoint for 3 minutes, three times per day for seven days (Yeh et al., 2013a). The research findings revealed that there was no notable distinction in the occurrence of nausea and vomiting among the treatment and control groups of children.

Pain Relief

In this review, pain in children that can be treated with acupressure includes pain associated with dysmenorrhea (5 articles), tonsillectomy (3 articles), venipunctures (4 articles), injection (2 articles), abdominal pain (1 article) and heel lancing on premature babies (1 article). Dysmenorrhea, or menstrual pain, is a common problem in adolescents and young adults (Yeh et al., 2013b). Reducing pain in adolescents who experience dysmenorrhea is done by doing auricular acupressure (Cha & Sok, 2016) and auricular acupressure combined with internet intervention (Yeh et al., 2013a). Six points are pressed in this auricular acupressure: shen men, kidney, liver, internal genitals, central rim, and endocrine. For the first two days of pain, pressure is applied for at least one minute, four times per day (Yeh et al., 2013a), whereas Cha and Sok (2016) use Jagung, Sinmun, Gyogam, and Naebunbi as acupoint for three days main period of dysmenorrhea.

Aside from ear acupressure, two studies on dysmenorrheal adolescents have used various acupressure points. The acupoint used is sanyijiao or SP6 (Chen & Chen, 2004) and zusanli (ST 36), hegu, and also hegu sanyaijiao (Chen & Chen, 2010). Sanjiyijao point or SP 6 point is located on the tibia bone 4 fingers above the ankle. Meanwhile, he (LI 4) is located between the base of the thumb and forefinger, right in the muscle area. Pressure is done in 2 cycles for each leg; each cycle has a duration of 5 minutes, so the total time is 20 minutes. The thumb is used to apply pressure on SP6 for 6 seconds, followed by a release of pressure for 2 seconds. This cycle is repeated for 5 minutes on each leg, and the entire activity is repeated four times, resulting in a total activity time of 20 minutes.

Acupressure is also used to relieve pain in children undergoing tonsillectomy. The acupressure points used are LI 4 (Hegu), ST 44 (Neiting), and ST 36 (Zusanli). Neiting's point is located between the second and 3rd toes, in the distal indentation of the second metatarsophalangeal joint on skin color differences. The pressure is applied to each point for 2 minutes, each with a circular massage, so the total massage time is 12 minutes for the left and right legs. Time of pressure is 1 hour after surgery, 2-4 hours after surgery, and 6-8 hours after surgery (Pouy et al., 2022). Acupressure at these points can also reduce pain indicators such as reduced heart rate, respiratory rate, and oxygen saturation (Yaghobi & Pouy, 2019). Another article mentions the use of acupressure at point P6 for 1 minute at a time 1 hour after the tonsillectomy procedure (Pouy et al., 2018).

Table 2 The health condition of children in 76 included articles

Health Condition	*N (%)*	
Dental Problem	8 (10.5)	
Undergoing scaling		1 (12.5)
Maxillary dental impression		2 (25.0)
Dental procedures		5 (62.5)
Oncology Diseases	13 (17.1)	
Acute lymphoblastic leukemia		6 (46.2)
Cancer		6 (46.2)
Medulloblastoma		1 (7.6)
Visual Problem	13 (17.1)	
Myopia and pseudo myopia		4 (30.8)
Strabismus		4 (30.8)
Amblyopia		1 (7.7)
Visual Impairment		3 (23.0)
Computer vision syndrome		1 (7.7)
Psychological Problem	9 (11.8)	
ADHD		3 (33.3)
Insomnia		1 (11.1)
Autism		1 (11.1)
Obesity		1 (11.1)
Nocturnal Enuresis		2 (22.3)
Children with nail-biter		1 (11.1)
Children in Medical Procedures	14 (18.4)	
Tonsillectomy		7 (50.0)
Children with vein punctures		3 (21.6)
Children in endoscopic procedures		1 (7.1)
Post-surgery gastrointestinal		1 (7.1)
Pre inguinal hernia surgery		1 (7.1)
Injection of inferior alveolar nerve block		1 (7.1)
Neonates	4 (5.4)	
Premature		1 (25.0)
Neonates opioid withdrawal syndrome		2 (50.0)
Narcotic abstinent syndrome		1 (25.0)
Others	15 (19.7)	
Healthy children		3 (20.0)
Respiratory problem		2 (13.3)
Dysmenorrhea		6 (40.0)
Functional abdominal pain		1 (6.7)
Autonomic dysfunction syndrome		1 (6.7)
Appetite problem & weight issues		2 (13.3)
Total	**76 (100)**	

Apart from postoperative pain and dysmenorrhea, pain during venipuncture in children can also be reduced by acupressure (Daihimfar et al., 2024; Koç Özkan & Balcı, 2020; Saeidi et al., 2023). Daihimfar et al. (2024) compared acupressure at the LI4 point or Hugo point for 5 minutes with music and the results showed that both were able to reduce pain intensity compared to the control group. Meanwhile, Koç Özkan and Balcı (2020) conducted research on 90 children aged 9-12 years who would receive an infusion. Acupressure was applied to three points, LI 4, LI 11, and HT 7, for 30-40 seconds each for ten minutes. This action was carried out 10 minutes before inserting the needle. The Yintang (extra 1) and laogong (P 8) points are also used to relieve pain during needle insertion. Laogong is located on the surface of the palms, while Yintang is located between the brows on the bridge of the nose. The pressure is applied for 20 seconds for 1 press and is repeated for 5 minutes. Following the completion of the acupressure, the needle is immediately inserted (Pour et al., 2017). In this article, the researchers compared acupressure with local anesthetics and a control group that did not receive any intervention. The results showed that the pain level in children who received local anesthesia and acupressure was lower than in children in the control group. The other study explains that acupressure at LI4 for 5 minutes before intravenous canullation compared with virtual reality (VR) has the same significant effect in reducing pain (Saeidi et al., 2023).

Pain reduction due to acupressure also occurs in premature babies who will be taken for peripheral blood (heel lancing). Acupressure was performed at BL 60 (Kunlun) and K

3 points. Kunlun is in a depressed area between the midpoint of the lateral malleolus (external ankle bone) and the outer edge of the Achilles tendon. On the other hand, the K3 point (Taixi) is positioned just behind (posterior to) the inner ankle bone. In the group receiving acupressure, before the heel prick, a three-minute acupressure was administered at UB 60 and K 3 points. The findings indicate that the average duration of the procedure and the average duration of crying were reduced in the acupressure group (with a P-value of 0.001) administer (Abbasoglu et al., 2015). Not different from this research, children who experience pain when injecting drugs for dental problems can also be reduced with acupressure at the hugo point (Pushpasanthy et al., 2023) and yintang point (Gurharikar et al., 2023).

Table 3 The acupressure provider* in the intervention

Acupressure Provider	*N (%)*	
Clinical Staff	40 (44.4)	
Nurses		15 (37.5)
Medical doctors (including surgeons and anesthesiologists)		5 (12.5)
Pediatric Dentist		2 (5.0)
Unspecified health care professional (including researcher)		17 (42.5)
Physiotherapist		1 (2.5)
Training Profession	13 (14.4)	
Auricular therapist		2 (15.4)
Acupuncturist/acupressurist		10 (76.9)
Traditional Chinese medicine (TCM) trainer		1 (7.7)
Other Profession	1 (1.2)	
Teacher		
Family Member	30 (33.3)	
Parents		16 (53.3)
Children (patient themselves)		14 (46.7)
Not Reported	6 (6.7)	
Total	90 (100)	

*More than one provider can be involved in one intervention

Anxiety Relief

Ten articles contain research that chooses anxiety as an outcome, specifically anxiety caused by dental procedure (Avisa et al., 2018; Sisodia et al., 2024; Wang et al., 2022), pre-tonsillectomy procedures (Borji et al., 2021), pre inguinal hernia surgery (Ebrahimsoltani et al., 2024), secondary dysmenorrhea (Chen & Chen, 2010), endoscopic (S.-M. Wang et al., 2008) and children who habitually bite their nails (Sun et al., 2019).

Anxiety is common in children who will be undergoing dental and surgical procedures. This article applies acupressure to children undergoing tonsillectomy and inguinal surgery at the yintang point (extra 1), which is located directly between the two brows. The thumb and forefinger apply deep pressure (deep massage) in a circular motion. The level of anxiety was measured after 15 minutes of action (Borji et al., 2021; Ebrahimsoltani et al., 2024). Acupressure to reduce anxiety also uses the yintang point, and shen men point, which are located at the apex of the triangular fossa of the ear (Wang et al., 2022).

Studies have explored the potential of acupressure in alleviating menstrual anxiety and distress along with its pain-relieving effects. The acupoint used in this article is the sanjiyiao or SP6 point, and pressure is applied for 5 minutes on each leg for 20 minutes. The findings indicate that acupressure can reduce anxiety in adolescents suffering from dysmenorrhea (Chen & Chen, 2004). One article uses the same points but with minor changes in other studies that measure anxiety. Hegu, Zusanli, and Hegu sanjiyao are the points used. The findings indicate that emphasizing that point can reduce anxiety and distress in children with dysmenorrhea (Chen & Chen, 2010).

Reduced anxiety is also observed in children who bite their nails (Sun et al., 2019). Nail biting is a bad habit that frequently occurs when children are anxious. These habits can lead to malocclusion, tooth abrasion, and nail bed loss. The magnetic seeds used in the study (manufactured by Suzhou Gusu Acupuncture & Moxibustion Appliance Co) were equipped with an adhesive backing. A highly experienced acupuncturist/acupressurist with over ten years of expertise applied these seeds by attaching them to the ears of the individuals who habitually bit their nails. After 7 days, the seeds were removed from one ear and replaced with five new seeds positioned on the same acupressure point on the opposite ear were stuck on the same points of the opposite ear. Under parental supervision, the participants pressed these acupressure points with the seeds three times a day, each time for 20 seconds.

Acupressure can also help children cope with anxiety during endoscopy procedures (Wang et al., 2008). The yintang or extra I point between the left and proper eyebrows is the acupressure point that is pressed. In this study, acupressure interventions were administered utilizing an acupressure bead called Acu-pellet, manufactured by Helio in San Jose, CA. The Accu-pellet was affixed to a self-adhesive tape to ensure its stability and provide a consistent pressure of 1.3 psi, as measured by a tonometer. This method uses a self-adhesive pressure bead to maintain continuous acupressure without requiring additional adjustment once the beads are in place.

Improved Visual Abilities

Several researchers attempted to use acupressure to treat problems that arise in children with visual impairments, such as myopia, pseudo myopia and amblyopia. Myopia is the inability of a person to see distant objects. This condition typically begins in elementary school and stabilizes in adolescence. Acupressure applied to the ear (ear acupressure) for 15 weeks can significantly improve visual acuity compared to children in the control group who received no intervention (Yeh et al., 2008). Furthermore, acupressure was used in children with myopia, but only for one year, and the results for visual acuity were still significant (Yeh et al., 2012). The same happened in other studies using auricular acupressure in children with myopia. However, this study added 0.125% topical atropine, which showed reduced myopia development (Cheng & Hsieh, 2014). The researchers choose five acupoints for this study: Shen men, Xin, Mu1, Mu2, and Yan. In studies using auricular acupressure at seven acupoints combined with a 0.01% atropine drop, myopia development in children was also significantly reduced (Kong et al., 2021). Auricular acupressure can also be combined with several interventions that have proven useful for improving visual abilities, such as acupuncture (Zhu et al., 2023) or electroacupuncture (Han et al., 2022).

Amblyopia is a developmental brain condition characterized by aberrant visual input early in life, resulting in reduced vision in an otherwise physically normal eye. Amblyopia is the most common cause of monocular vision impairment in children and adults, accounting for 2-3% of cases (Wu et al., 2023). Auricular acupressure was performed at seven points in this study: Yan (Eye), Gan (Liver), Shen (Kidney), Xin (Heart), Mu 1 (Eye-1), Mu 2 (Eye-2), and Pi (Spleen) for six months and was shown to improve visual acuity compared to control patients who only used herbs (Han & Qiu, 2015).

Other researchers used acupressure at points BL2, EXHN-4, EXHN-5, BL1, SJ 3, and ST1 to reduce computer vision syndrome symptoms such as dry eyes, eye stiffness, and blurred vision (Harahap et al., 2023).

Table 4 Characteristics of study design and comparator group according to the benefit of acupressure

Study Characteristics	**Benefits**						
	Nausea & Vomiting Alleviation	**Pain Relief**	**Anxiety Relief**	**Improved Visual Abilities**	**Reduction of Fatigue**	**Increasing Weight & Height**	**Other**
Sample Size	1297	1519	796	831	136	269	893
Number of Studies, *N* (%)	21 (100%)	16 (100%)	10 (100%)	9 (100%)	2 (100%)	2 (100%)	18 (100%)
Study Design							
Randomized controlled trial, *n* (%)	13 (61.9%)	12(75.0%)	8(80.0%)	5 (55.5%)	1 (50.0%)	0 (0.0%)	8 (44.4%)
Quasi-randomized clinical studies, *n* (%)	3 (14.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Quasi-non randomized clinical studies, *n* (%)	2 (9.5%)	4(25.0%)	2 (20%)	3 (33.3%)	0 (0.0%)	2 (100%)	3 (16.7%)
Quasi with no comparator, *n* (%)	2 (9.5%)	0 (0.0%)	0 (0.0%)	1 (11.2%)	1 (50.0%)	0 (0.0%)	4 (22.2%)
Other study designs, *n* (%)*	1 (4.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (16.7%)
Comparator Group							
Standard care, *n* (%)	6 (28.6%)	3 (18.7%)	1 (10.0%)	0 (0.0%)	0 (0.0%)	1 (50.0%)	4 (22.2%)
Sham acupressure, *n* (%)	9 (42.8%)	5 (31.3%)	6 (60.0%)	3 (33.3%)	1 (50.0%)	0 (0.0%)	3 (16.7%)
Non- acupressure, *n* (%)	2 (9.5%)	4 (25.0%)	0 (0.0%)	2 (22.2%)	0 (0.0%)	0 (0.0%)	3 (16.7%)
No intervention, *n* (%)	1 (4.8%)	3 (18.7%)	3 (30.0%)	3 (33.3%)	0 (0.0%)	1 (50.0%)	1 (5.6%)
No comparator, *n* (%)	3 (14.3%)	0 (0.0%)	0 (0.0%)	1 (11.2%)	1 (50.0%)	0 (0.0%)	7 (38.8%)
Healthy control, *n* (%)	0(0.0%)	1 (6.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

*Case study and case report

Reduction of Fatigue

Fatigue is a common issue in children with cancer. According to the findings of this review, two research articles show that acupressure in children can be used to reduce fatigue with a p-value of 0.001 (Bastani et al., 2015; Oktaghina, 2022). The ST 36 point was used as the acupoint in both studies' acupressure interventions. On the second day of chemotherapy, emphasis was applied for 3 minutes (Bastani et al., 2015), while in Oktaghina (2022), in addition to the ST 36 point, the LI 4 and SP 6 points are emphasized, and this is done twice a day for five days. Stimulation at these points can increase the flow of "chi" and release neurotransmitters and neurohormones, reducing children's perception of fatigue (Bastani et al., 2015)

Improving the Weight and Height

The last benefit of acupressure for children is its ability to increase body weight and height, especially in babies aged 6 weeks (Chou et al., 2022) and children aged between 24 months and 59 months with Tui na massage (Suharsanto et al., 2023). The acupressure points used in the research were points on the main meridian line, namely 28 acupoints (K-1, B-40, B-57, SP-10, Neaslan, S-36, B-2, L-20, GV -20, G-20, CV-22, CV-17, CV-12, S-25, CV-4, G-21, L-15, TE-14, H-3, L-11, P-6, TE-5, L-4, P-8, P-7, SI-3 and G-30) which are done for 15 minutes 2 times a day for 6 weeks. Meanwhile, Tui na acupressure is a type of acupressure that is also done on the line with certain meridians; it is carried out once a day for 1 month by the parents who have been given training.

Others

Despite the few articles in this review, some discuss acupressure in children to alleviate other problems. The result is that it improves respiratory function (Alsac & Polat, 2019), decreases bed-wetting incidents and enuresis (Lestariningsih & Wijayanti, 2022), increases mouth opening in triskus patients (Ferreira et al., 2014), decreases the severity of ADHD (Mahdavi et al., 2024), and increases the tolerance of autistic children (Warren et al., 2017). However, acupressure was not significantly able to reduce the length of stay in neonates with narcotic abstinence syndrome (NAS) (Schwartz et al., 2011).

Discussion

Acupressure developed in ancient China. It demonstrated superior therapeutic potential against a wide range of disease conditions. According to traditional Chinese medicine (TCM), Acupressure uses pressure to stimulate specific acupoints for therapeutic purposes. Stimulating these points can correct chi imbalances through channels and thus treat diseases field (Mehta et al., 2017). As previously stated, acupressure is especially beneficial in children for reducing pain, nausea, vomiting, and fatigue, improving visual abilities, and reducing anxiety. In this case, acupressure is beneficial not only for physical problems but also for overcoming psychological problems.

The first advantage of acupressure in children is that it relieves nausea and vomiting. According to the findings of this search, the neiguan point (P6), when combined with the zusanli point (ST36), is intended to reduce nausea and vomiting in children with cancer or leukemia. In more detail, the pressure area at point P6 is three fingers above the patient's wrist, between the two muscular protuberances visible when gripping the hand tightly. In contrast, the pressure area at point ST 36 is three B-cun inferior to point ST35 (lower edge of the patella laterally) and is in the gastric tract. The stomach meridian begins at the end of the large intestine meridian, which has several branches, one of which enters the spleen and stomach. Because they improve the flow of energy originating from the spleen and stomach, points P6 and ST36 can reduce nausea and vomiting in pediatric patients undergoing chemotherapy (Shiro et al., 2014). This will strengthen the digestive tract cells against chemotherapy, reducing the stimulation of nausea and vomiting to the vomiting center. Emphasis on points P6 and ST36 can also stimulate pituitary beta-endorphin release. Endorphin beta cells are natural antiemetics that can reduce nausea and vomiting impulses in the Chemoreceptor Trigger Zone (CTZ) and vomiting center (Khakpour et al., 2019). Dibble et al. (2007) also stated that putting pressure on points P6 and ST36 can help improve the flow of “chi” energy in the stomach, reducing nausea and vomiting.

Aside from nausea and vomiting, the second advantage of acupressure in children is pain relief. This is also consistent with the findings of another acupressure review, which explains that acupressure can be used to reduce pain, particularly pain caused by dysmenorrhea, labor pain, low back pain, chronic headache, and other traumatic pain (Chen & Wang, 2014). The mechanism of pain relief caused by acupressure is consistent with the gateway theory. Based on Melzack and Wall’s Gate Control Theory, applying acupressure on specific points triggers pleasurable signals to the brain, which are transmitted four times faster than painful stimuli. The Continuous transmission of these signals effectively closes the neural ‘GATES,’ blocking slower pain messages from reaching the brain, thereby improving or strengthening the body’s pain perception threshold (Mehta et al., 2017).

Concerning the third benefit of acupressure, namely fatigue reduction, the findings of this review show that acupressure can alleviate most of the fatigue experienced by pediatric cancer patients receiving chemotherapy. This is consistent with a review of 15 research articles on fatigue in cancer patients conducted in China (cancer-related fatigue). Based on the results of this systematic review, the application of acupressure on specific body acupoints such as Hegu (LI4), Zusanli (ST36), and Sanyinjiao (SP6) for 1-3 minutes per acupoint, as well as on auricular acupoints shenmen and subcortex, for 3 minutes each, has been shown to reduce cancer-related fatigue effectively (Chou et al., 2022). Stimulation at these points can increase the flow of “chi” and release neurotransmitters and neurohormones, reducing children’s perception of fatigue (Bastani et al., 2015). Pediatric cancer patients frequently experience cancer-related fatigue (CRF), which is recognized as the most prevalent symptom in this population, affecting 36% to 93% of cases, with a higher level of fatigue among chemotherapy patients, affecting 70% to 100% of cases (Silva et al., 2016). CRF pathogenesis is not fully understood, and multiple mechanisms can play a role in its development. Among these mechanisms, certain factors emerge prominently. These include the dysregulation of pro-inflammatory and anti-inflammatory cytokine levels, activity in the hypothalami axis, monoamine system functioning, circadian rhythm disturbances, and changes in adenosine triphosphate levels and muscle energy metabolism (Saligan et al., 2015).

The fourth advantage of acupressure in children is that it can improve visual abilities, particularly in children with myopia. Previous reviews have provided additional support for this review by highlighting that auricular acupressure alone demonstrated superior effectiveness compared to eye drops, eye exercises, and needle acupuncture. These reviews also concluded that auricular acupressure might be beneficial in slowing down the progression of myopia in children and adolescents (Gao et al., 2020). According to the theory of TCM, myopia is primarily attributed to an imbalance in the functioning of the heart, liver, spleen, and kidney. This imbalance leads to a deficiency in the transformation of source energy into essence and chi, resulting in insufficient nourishment reaching the eyes and compromising their physiological function. TCM theory suggests that since the liver and kidney share a common origin, the acupoints corresponding to the liver (CO12) and kidney (CO10) can regulate and strengthen these organs. This approach helps nourish yin, supplement essence, maintain healthy blood circulation, and enhance visual clarity.

Similarly, the heart (CO15) acupoint can be used to adjust heart chi and promote mental tranquility, complementing the effect of other acupoints in regulating and reinforcing the organs, nourishing yin, supplementing essence, and benefiting the eyes. Additionally, the shenmen (TF4) acupoint functions to calm the mind, making it suitable with the liver (CO12), kidney (CO10), heart (CO15), and spleen (CO13) acupoint to strengthen the mental aspect further. Collectively, these acupoints work in synergy to regulate the internal organs, promote blood circulation, and clear obstructions in the meridians, facilitating the optimal nourishment of chi and blood to improve vision (Han et al., 2021).

Another advantage of acupressure in children is that it reduces anxiety. According to this review, acupressure can reduce anxiety in children undergoing tonsillectomy and endoscopy, scaling procedures, dysmenorrhea, veinpuncture and nail biting. Several recent studies have reached the same conclusion as this review. A pilot study for RCT was conducted on 14 children aged 7 to 10 years who experienced anxiety during dental procedures. The findings indicate that children's anxiety levels have decreased following the procedure (Kumar et al., 2021). Anxiety is common in children as they prepare to perform the treatment. The fundamental principle of traditional Chinese medicine revolves around vital energy (chi) circulating unidirectionally through a complex network of channels called meridians, which are located beneath the skin and within blood vessels. It permeates organs and tissues and is the foundation for all physiological processes. Optimal health is achieved through the harmonious and uninterrupted flow of chi, while disease arises when this flow is disrupted. Various factors, including emotional states (such as anxiety, stress, anger, fear, or grief), inadequate nutrition, weather conditions, hereditary factors, infections, and trauma, can all influence the flow of chi. Acupuncturists employ needle insertion to restore balance, balancing Yin and Yang's opposing and dynamic qualities in an individual's physical, emotional, and spiritual aspects and enhancing energy flow and balance. The primary mechanisms behind the effects of acupuncture and acupressure involve stimulating the nervous system, altering the processing of pain signals, and triggering the release of natural pain-relieving substances like serotonin and endorphins (Kumar et al., 2021).

Our review also revealed evidence of other benefits of acupressure, such as boosting body weight and height in children under five. Acupressure meridian massage and Tui na are the acupressure techniques employed. Tui Na Acupressure is a massage technique in which the hands apply pressure to meridian points to relieve symptoms, cure disease, or restore the patient's health. Tui Na acupressure is a completely hand-based therapeutic method that does not involve sedation or anesthesia. The acupressure spots will be pushed with more power to relieve blockages and promote blood flow so that it flows easily (Ikhsan, 2019). The findings of one study on the efficiency of Tui Na Acupressure revealed that by focusing on meridian sites, the acupressure technique can help children with feeding issues by boosting blood circulation in the spleen and digestive tract (Munjidah, 2018). Physiologically, tactile stimulation by massage can impact brain wave systems, particularly the hypothalamus, which is the key and core of the response to hunger and appetite. The hypothalamus will also generate hormones, including the hormone that regulates hunger, called ghrelin (Barakat et al., 2024). In addition to this explanation, acupressure performed on the stomach meridian, such as Zusanli (ST 36), will stimulate gastric emptying, which is responsible for serotonergic pathways. Serotonin pathways are thought to be involved in the regulation of mood, feeding behavior, sleep/wakefulness, control of sensory pathways including nociception, control of body temperature, vomiting, and emotional behaviors such as aggression (Cho et al., 2012).

This review's findings underline that acupressure has multiple advantages and may be used on various acupoints. It can be carried out by healthcare workers such as nurses and physicians, trained people, family members, and even professionals from other professions, such as teachers. Acupressure may be used on children with a variety of problems, whether they are well or sick, making it a versatile, non-invasive alternative for dealing with both physical and psychological concerns. In pediatric nursing, nurses might use acupressure as a supplemental solution when children arrive with various diseases. This study adds new information by identifying particular acupoints and the range of acupressure therapists to deliver this therapy. Unlike traditional needle-based acupuncture, acupressure involves applying pressure to certain areas with fingers or a hard-pointed device, which provides similar benefits but is easier to administer and does not require specialist training (Kumar et al., 2021). Furthermore, this review expands the understanding of acupressure beyond pain management, showing its efficacy in treating nausea, vomiting, fatigue, and anxiety. Previous studies primarily focused on its use for pain relief (Chen & Wang, 2014) and managing myopia (Gao et al., 2020). Based on these findings, nurses can incorporate acupressure into their care plans for children with specific health issues.

Limitations

We only reviewed articles in English and Indonesian and did not include gray literature or review references. We might exclude important studies from the review.

Conclusion

Finally, acupressure can help children with pain, nausea, vomiting, fatigue, and anxiety, improve visual function, and increase the weight and height of children under five years. Acupressure has several advantages over acupuncture, including the fact that it does not cause pain or trauma to children and does not require special training to perform. As a result, acupressure has many benefits for children with various conditions, so nurses can use acupressure as a complementary nursing intervention for sick children.

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Authors' Contributions

SR and ATI conducted the literature search, screening, and data synthesis. MNS and FH supervised the project. SR prepared the initial draft. ATI conceived and wrote the review. All authors reviewed and substantially contributed to the final version of the manuscript.

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Data Availability

The data that support the findings of this study on acupressure for children are available from the corresponding author upon reasonable request.

Declaration of Use of AI in Scientific Writing

There is nothing to declare.

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Development of a novel instrument to measure Japanese psychiatric nurses' technological competency as caring in nursing

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Abstract

Background: To effectively advance person-centered care (PCC) practice, it is important to equip healthcare providers with person-centered values and beliefs while simultaneously transforming their work environment to align with PCC. Thus, instruments to measure caring practice status in nursing competency for psychiatric-specific behavioral limitations, ethico-moral behavior, technology use, and PCC need to be developed.

Objective: This study developed the Technological Competency as Caring in Psychiatric Nursing Instrument (TCCNPNI) to measure practice status and test its content and construct validity.

Methods: Five different phases were followed: 1) Literature Review; 2) Operational definition of the construct and development of items; 3) Two-round Delphi method; 4) Validity measure; and 5) Reliability measure. The online survey was conducted in 2024.

Results: The developed instrument comprises 22 items with a 4-factor structure: competency to practice caring and person-centered care (Factor 1); competency to recognize and respond to ethical issues in psychiatry (Factor 2); competency to utilize technology in psychiatry (Factor 3); and competence to practice care for the preservation of human dignity and shared decision making (Factor 4). Cronbach's alpha for the entire scale was 0.864, while that for factors 1-4 was 0.911, 0.814, 0.773, and 0.64, respectively. Cumulatively, these four factors contributed 49.6% and explained nearly 50% of the total data. Item-total correlation values were 0.6 or higher among factors 1-3. However, factor 4, for which items were Q30, Q33, Q34, and Q35 (r = 0.03, 0.04, 0.21, 0.11, respectively), were inverted items and had low I-T correlation values. These low correlations suggest that these items capture different concepts. The developed TCCNPNI allows for the measurement of the practice of nursing as caring in psychiatry, the state of ethico-moral behavior, and the practice status of technological competency as caring in psychiatric nursing.

Conclusion: This study demonstrated satisfactorily and efficiently evaluated the practice status of technological competency in psychiatric nurses' caring. Measuring technological competency as caring in psychiatric nursing can be an important adjunct for in-service education in psychiatric hospitals or formalized nursing education in nursing universities.

Keywords

Delphi method; psychiatric nursing; shared decision making; person-centered care; ethics; reliability; instrument development; Japan

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Background

According to the Making Mental Health Count report from the Organization for Economic Co-operation and Development (OECD), Japan's mental healthcare system lags behind other OECD countries in terms of deinstitutionalization. The OECD average number of psychiatric beds is 68 per 100,000 people, while Japan has the highest number, with 269 beds per 100,000 people (Hewlett & Moran, 2014). In 2021, the average length of stay (LOS) in psychiatric hospitals in Japan was 275.1 days, compared to an average LOS of 27.5 days for all beds (Ministry of Health Labour and Welfare, 2023a). This is significantly longer than in other countries (Ministry of Health Labour and Welfare, 2018).

It has been reported that the long LOS in Japan is related to the country's involuntary hospitalization system and various hospital characteristics, including whether the hospital is public or private, the number of inpatients, the aging of patients, the density of local psychiatric hospitals, and the availability of medical personnel (Imai et al., 2005; Shinjo et al., 2017). For financial reasons, Japan did not establish enough public hospitals, leading to the proliferation of private psychiatric hospitals to fill the gap. In 1958, a special exception was issued for psychiatric hospitals, allowing them to operate with fewer doctors and nurses than general hospitals (Setoya, 2012). As a result, the number of psychiatric hospitals and inpatients increased.

Japan's aging population and declining workforce are expected to lead to a shortage of nurses (Ministry of Health Labour and Welfare, 2023b). This shortage, combined with long-term hospitalization, contributes to difficulties in patient discharge, reduced opportunities for social participation, and increasing care needs due to the aging of patients (Ministry of Health Labour and Welfare, 2021). Consequently, challenges such as the need for increased physical treatment and decision-making for end-of-life care are anticipated to grow as patients who have been hospitalized for extended periods continue to age (Imaizumi, 2022).

To address these challenges, healthcare technology is gaining attention as a means to improve the quality of psychiatric care and mitigate the effects of the shortage of healthcare professionals (Dang et al., 2023; Mahara et al., 2023). Advances in medical technology have led to the development of various tools for clinical use (Hosseini et al., 2021; Pailaha, 2023; Zhang et al., 2024). When used appropriately, these technologies can reduce the effort required by healthcare providers and enhance the quality of patient care.

Medical technology is particularly helpful in psychiatry, supporting nurses in delivering higher-quality care (Zwijsen et al., 2012). However, some technologies, such as cameras used to monitor patients who are secluded or restrained as part of their treatment, can restrict patient behavior and raise concerns about privacy violations (Appenzeller et al., 2020). In light of these concerns, the World Psychiatric Association has issued a statement calling for the development of alternatives to restrictive practices to improve mental healthcare (Rodrigues et al., 2020).

Coercive measures in psychiatry are widely used despite a lack of clear evidence supporting their practicality, clinical benefits, or effectiveness (Huber et al., 2016; Kalisova et al., 2014). In Japan's psychiatric hospitals, unethical incidents, such as abuse by nurses, have occurred repeatedly (Imaizumi & Katsuki, 2023). In response, Japan's Mental Health Welfare Law was revised in April 2024. The updated law requires all personnel, not just medical staff such as doctors and nurses, working in psychiatric hospitals to report any suspected abuse of individuals with mental disabilities to the prefectural government (Ministry of Health Labour and Welfare, 2024a). Eren (2014) emphasized the need for additional training on psychiatric ethics for nurses, noting that factors such as inadequate staffing, excessive workloads, poor working environments, lack of supervision, and insufficient on-the-job training can contribute to unethical behavior. Starfield (2011) argued that both patients and healthcare providers must recognize health issues to support meaningful lives.

Patient-centered care (PCC) involves considering the characteristics of clinicians, clinician-patient relationships, and communication. It views the patient as a unique individual, adopting a biopsychosocial perspective, sharing patient information, involving patients and their families in care, empowering patients, and providing both physical and emotional support. It also integrates medical and non-medical care, promotes teamwork, ensures access to care, and emphasizes care coordination and continuity (Scholl et al., 2014). PCC focuses on respecting patients' dignity, values, and psychosocial context when making diagnostic and treatment decisions. However, PCC goes further by considering a patient's history, strengths, values, and beliefs not only for diagnosis and treatment decisions but to help patients live the life they desire. This emphasis on "personhood" has significant clinical implications (Dave & Boardman, 2018).

To advance PCC, healthcare providers must adopt person-centered values and beliefs and transform the work culture to reflect this approach (Balqis-Ali et al., 2022). While PCC is valued and operationalized through outcomes, it remains conceptual, leading to disparities in its interpretation and implementation across different healthcare systems (Byrne et al., 2020).

Given the above, instruments are needed to measure nursing competency in areas such as psychiatric-specific behavioral limitations, ethical and moral behavior, the use of technology, and patient- and person-centered care.

This study is significant because it aims to develop an instrument to measure technological competency in psychiatric nursing care in Japan. By assessing nurses' competence, the instrument can help provide more effective support for patients in psychiatric hospitals, where discharge is often complicated by various factors.

This study aimed to develop the Technological Competency in Caring in Psychiatric Nursing Instrument (TCCNPNI) to measure practice status and evaluate its content and construct validity.

Literature Review

Philosopher Mayeroff's (1971) caring theory, which focused on how caring affects others, influenced the development of the caring theory in nursing. Additionally, Roach (1987) concentrated on the caring practiced by nurses, emphasizing that caring is an intrinsic part of human life and that nursing involves a comprehensive understanding of the individual. Roach further identified the attributes of professional care as compassion, competence, confidence (trustworthiness), conscience (adherence to ethical standards), commitment, and comportment (thoughtful involvement and responsible action).

Mayeroff's (1971) ideas also influenced Boykin and Schoenhofer's (2001) Nursing As Caring theory, which emphasizes that nursing knowledge is embedded in specific nursing contexts and that significant experiences shared between nurses and recipients of care are integral to nursing practice. Carper's (1978) concepts support both the Nursing As Caring theory and the Technological Competency as Caring in Nursing (TCCN) theory. Carper identified four fundamental patterns of knowledge in nursing: (1) empirical, (2) aesthetic, (3) personal, and (4) moral and ethical.

Locsin (2005) developed the TCCN theory, also referred to as a "middle-range theory," building upon Boykin and Schoenhofer's foundational work. Locsin highlighted the importance of preserving humanity in technology-intensive healthcare environments to prevent the dehumanization of care recipients. Furthermore, Locsin and Purnell (2015) argued that competent nurses uphold personhood by thoroughly assessing and engaging patients as active participants rather than passive recipients of care.

According to Locsin's (2005) Technological Competency as Caring in Nursing (TCCN) theory, technological competence is regarded as a critical skill for providing care. Therefore, it is essential to assess whether expert nurses demonstrate competence when utilizing care technologies. The five assumptions of Locsin's theory (Locsin & Purnell, 2015) are as follows: (1) persons are caring by virtue of their humanness (Boykin & Schoenhofer, 2001); (2) the ideal of wholeness represents a perspective of unity (Locsin, 2005); (3) knowing persons as caring is a multidimensional process (Locsin, 2005); (4) health and nursing technologies are vital components of caring (Locsin, 2005); and (5) nursing is both a discipline and a professional practice (Boykin & Schoenhofer, 2001).

Locsin and Purnell (2015) also emphasize the importance of a technology-based empirical scientific understanding. They introduced the concept of the Universal Technological Domain, which situates nursing encounters within the context of nursing processes. These nursing encounters and caring processes create new environments for nurses and patients, fostering shared experiences where caring takes place. Such processes can promote environments conducive to person-centered care (PCC). Practicing person-centeredness is essential for building therapeutic relationships among professionals, patients, and significant others (McCormack & McCance, 2006). This concept aligns with established nursing literature that places the "person" at the core of therapeutic care.

Nurses' competency in supporting patient self-determination is particularly important in psychiatric care. For example, shared decision-making enhances self-determination. Achieving shared decision-making requires effective information-sharing and establishing a strong therapeutic relationship in clinical settings. This enables patients to consider and articulate their preferences and opinions during the decision-making process (Elwyn et al., 2012).

A positive organizational climate enhances employee productivity and job satisfaction, leading to a culture of effective communication (Hardjana, 2006). Conversely, organizational abuse is a serious issue with significant repercussions for both individuals and organizations (Salter & Richters, 2012). In psychiatric units, behavioral restrictions are often necessary to ensure the safety of patients and staff when patients pose a risk of harm to themselves or others. However, inappropriate or excessive behavioral restrictions can lead to human rights violations and are associated with psychological burdens and conflicts for nurses working in psychiatric settings (Bigwood & Crowe, 2008).

Madhiwalla et al. (2018), in their study on contempt and abuse during childbirth, described how healthcare providers in public hospitals may exercise power over vulnerable patients who are susceptible to violence and external influences. Similar structural patterns of abuse have been observed historically in psychiatric care (Driever et al., 2022; Jenkin et al., 2022). This underlines the importance of both individual ethics and organizational culture in preventing abuse.

This discussion shifts to the status of existing scales informed by the Technological Competency as Caring in Nursing (TCCN) theory. Locsin's Technological Caring Instrument (TCI), published in 1999, contains two factors with eight and two items, respectively. The Technological Competency as Caring in Nursing Instrument (TCCNI), consisting of 25 statements reflecting the theory's five assumptions, was translated into Japanese and revised by Tanioka (2018), resulting in the TCCNI-Revised.

Kato and colleagues (Kato et al., 2017a; Kato et al., 2017b) developed the Perceived Inventory of Technological Competency as Caring in Nursing (PITCCN) for intensive care unit nurses. Ito et al. (2019) confirmed that the instrument was reliable and valid for a sample of Japanese nurses who provided acute care. The PITCCN consists of four factors: training nurses to provide optimal care (Factor 1); intentional and ethical nursing of a person (Factor 2); utilization of information obtained from technology and continuously developing knowledge (Factor 3); and empirical knowledge and knowing the wholeness of patients (Factor 4).

The Japanese version of the TCCNI-R, developed by Yokotani et al. (2021b), includes four factors: nursing expressions as caring (Factor 1), technological competency as caring (Factor 2), technology and caring (Factor 3), and technological knowledge (Factor 4). In addition, Yokotani et al. (2021a) confirmed the construct validity and reliability of its English version and are developing the TCCNI Revised with Practice (TCCNI-RePract), which consists of four factors: (1) knowing the person (8 items); (2) technological competency as caring (6 items); (3) technology and caring (4 items); and (4) expression of nursing as caring (3 items).

Methods

In order to create a new instrument to assess the TCCN theory-based practice status of psychiatric nurses, we followed a procedure adapted from Spector (1992) and DeVellis (2017): (1) defining the construct, (2) generating an item pool, (3) designing the instrument, and (4) conducting a psychometric evaluation.

Phase 1: Construct Definition

After comparing and analyzing the structures, four significant constructs that overlapped with many instruments were found to be relevant for further investigation. Consequently, these were defined operationally and were employed in the study.

The operational definitions of these constructs are as follows:

Competency to Practice Caring and Person-Centered Care: Psychiatric nurses must provide consistent care based on individuals' needs, preferences, and values. This competency entails particular actions and procedures that guarantee the patient takes an active role in their care and that every step of the care process considers their unique situation.

Competency to Recognize and Respond to Ethical Issues in Psychiatry: The ability of a psychiatric nurse to carefully recognize, evaluate, and handle moral dilemmas that come up in clinical settings. This skill entails using ethical concepts consistently to ensure that decisions about patient care respect patient autonomy, promote justice, and put the patient's welfare first while also taking professional and regulatory standards into account.

Competency to Use Technology in Psychiatry: The ability of a psychiatric nurse to effectively incorporate technology into healthcare settings to improve clinical outcomes and patient care and guarantee the safe and ethical handling of patient data. Adequate use of digital assessment tools and other pertinent technology in the psychiatric field is a component of this competency.

Competence to Practice Care for the Preservation of Human Dignity and Shared Decision-Making: This is the ability of a psychiatric nurse to integrate a collaborative, patient-centered decision-making process with ethically sound and compassionate care that preserves the patient's inherent dignity. This policy also guarantees that a psychiatric nurse actively engages the patient in treatment decisions while simultaneously respecting their autonomy, uniqueness, and rights.

After establishing and defining each construct operationally, items were developed for each construct. Some items were adapted from the previous instruments (Kato et al., 2017a; Miyamoto et al., 2017; Parcells & Locsin, 2011; Yokotani et al., 2021a; Yokotani et al., 2021b), while the rest of the items were created by the researchers based on the operational definition of the constructs.

Phase 2: Generating an Item Pool

A comprehensive literature review was conducted to develop an item pool for the instrument. The review revealed that there are many components or constructs. It is crucial for this study to assess the TCCN among psychiatric nurses; hence, open-ended items might not be appropriate for use in this context. Similarly, it was decided that the tools intended to be completed by an external observer to assess the competencies of psychiatric nurses were inappropriate. This is because an instrument requiring psychiatric nurses to evaluate their TCCN is being sought. However, no instrument was found to measure practice status based on the TCCN theory, including the perspectives of PCC, shared decision-making, ethical and moral aspects, and organizational climate in psychiatry; thus, the researchers decided to develop one.

Phase 3: Designing the Scale

The initial 67 items were subjected to a two-round Delphi method to assess the suitability of the items. Five experts were employed, including three researchers with previous experience in scale development and doctoral degrees, one nursing administrator with a master's degree, and one graduate student engaged in research on the TCCN theory in a master's program, were requested to review the questionnaire items and provide their opinions on the questions and their content. The wording was modified based on the aforementioned researchers' opinions, and additional questions were added. The wording of the 67-item questionnaire was reviewed and reduced to 61 items. The purpose of inserting the inverted items into the survey questions was to exclude those who answered dishonestly and provide better coverage of the measured construct. In particular, we included the use of the inverted questions (of the 67 items, 7 were inverted items) for "competency to practice care for the preservation of human dignity and shared decision making" to determine whether or not respondents were acting ethically and morally in this survey.

Phase 4: Psychometric Evaluation

Psychometric evaluation was performed by conducting validity measures, such as content and construct validity, and reliability measures, using Cronbach's alpha and item-total correlations. For content validity, the questionnaire contents were examined by 13 individuals, including five researchers with doctoral degrees, three specialized psychiatric nurses, and five certified nurses working in psychiatric departments. In addition, the item-level content validity index (I-CVI), which indicates the validity of individual questions in the instrument, and the scale-level content validity index (S-CVI), which suggests the content validity of the entire instrument, were measured to verify content validity. Validity was evaluated on a 4-point Likert-type scale (1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, and 4 = very relevant) (Yusoff, 2019). The evaluation was conducted twice by the 13 experts.

Exploratory factor analysis (EFA) was conducted to assess construct validity. The maximum likelihood method was used for factor extraction, and the Promax method with Kaiser normalization was used as the rotation method.

After factor analysis, Cronbach's alpha coefficients were calculated for the factors and the scale as a whole to assess its internal consistency. In item analysis, an item-total correlation was calculated for each item of a scale or test to diagnose the degree to which assessment items indicated the underlying trait.

Data Collection Procedure

Convenience sampling was used to conduct a cross-sectional survey. We selected 63 psychiatric hospitals in Osaka Prefecture from the Japan Psychiatric Hospitals Association website and asked them to participate in this study. Of these, 21 hospitals cooperated.

A survey subject request form was distributed by a head nurse to psychiatric nurses at facilities that cooperated in the study. The candidates for survey cooperation read the text and considered research cooperation. The participants accessed the web-based survey system using a QR code on the provided request form and provided consent by checking the appropriate box.

The survey instrument was divided into two parts: The first part is the face sheet, which includes questions regarding age, sex, highest education in nursing, position, years of nursing experience and experience in psychiatric nursing, and current department (psychiatric emergency ward, psychiatric acute care ward, psychiatric treatment ward, dementia treatment ward, and special disease treatment ward).

The second part involves the evaluation of TCCNPNI, wherein the practice status (37 items) regarding technological competency, such as caring in psychiatric nursing, was evaluated by the practice status using the following Likert scale (1: not at all, 2: almost not 3: not very much, 4: undecided

5: somewhat 6: fairly much, 7: always) (Tabachnick & Fidell, 2007). Statements (Q30, Q34, Q35, Q36) were negatively worded. The online survey was conducted from May 8 to June 30, 2024.

Data Analysis

IBM SPSS version 29 was used to analyze the data. Mean and standard deviations for each item were calculated to confirm ceiling effects (mean + SD >7) and floor effects (mean - SD <1), and 95% confidence intervals were calculated. The modification criteria for the preliminary question items were set as I-CVI > 0.70 (Lynn, 1986) and S-CVI > 0.90 (Polit & Beck, 2006). An I-CVI and S-CVI exceeding 90% indicated that 90% of the expert panel judged each question or all as valid.

Sampling adequacy was assessed using the Kaiser-Meyer-Olkin (KMO) test, with values less than 0.06 considered good (Li & Lopez, 2007). Bartlett's sphericity test was used to examine the null hypothesis that the variables were uncorrelated in the population (p <0.05) (Tabachnick & Fidell, 2007). EFA with the maximum likelihood method was applied for factor extraction, and the Promax method with Kaiser normalization was used as the rotation method. Factor loading coefficients of 0.40 and higher were recognized as the criterion for retention.

Ethical Considerations

The research's aim was explained to the respondents, and their cooperation was voluntary. Those who consented by checking a box on the web-based questionnaire tool were considered research subjects. This study was approved by the Research Ethics Review Committee of the Baika Women's University (Approval No. 2023-0253). All responses were kept confidential, and the data collected were used solely for the purposes of this research.

Results

Demographic Characteristics of the Participants

Of the data obtained from 502 respondents (25.2% response rate), missing values were excluded, and 425 responses (84.6% valid response rate) were analyzed. The participants' demographics were: 282 (66.4%) women, 139 (32.7%) men, 339 (79.8%) staff nurses, and 338 (79.5%) vocational school graduates. The mean age was 41.1 years, with an average of 14.7 years in nursing and 11.5 years in psychiatric nursing. **Table 1** shows the descriptive statistics.

Table 1 Demographic characteristics of the participants (*N* = 425)

Demographic characteristics		***n***	***%***
Gender	Male	139	32.7
	Female	282	66.4
	No response	4	0.9
Assigned department	Psychiatric Emergency Inpatient Unit (Super Emergency Unit)	27	6.4
	Psychiatric Acute Care Unit	89	20.9
	Psychiatric Care Unit	80	18.8
	Dementia Care Unit	66	15.5
	Special Disease Unit	13	3.1
	General Psychiatric Unit	150	35.3
Position	Staff nurse	339	79.8
	Nurse Manager	36	8.5
	Chief Nurse	40	9.4
	Director of Nursing	4	0.9
	Other	6	1.4
Educational levels	Vocational school (Nursing)	338	79.5
	Junior college (Nursing)	22	5.2
	University (Nursing)	43	10.1
	Master of science of nursing	1	0.2
	High school nursing advanced	21	4.9
Experiences of the participants		***Mean***	***SD***
	Age (Years old)	41.1	11.5
	Number of years of nursing employment	14.7	11.0
	Number of years of psychiatric nursing experience	11.5	9.0

Validity Measure Results

Content Validity Results

Content validity was evaluated in two rounds. In the first round, 21 out of 61 items were removed due to an item-level content validity index (I-CVI) below 0.70. Additionally, four items were discarded because their mean difficulty and readability scores were below 3. In the second round, 36 items achieved an I-CVI of 0.70 or higher. However, one item with an I-CVI of 0.70 or lower was retained, as it was considered important for the assessment. As a result, 37 items were selected for inclusion.

Construct Validity Results

The KMO was 0.913, and Bartlett's test showed p <0.001. No ceiling and floor effects were found. EFA revealed four factors in the 22-item TCCNPNI (**Table 2**). After sequentially excluding factors with factor loadings of 0.4 or higher, 15 items (Q3, Q9, Q10, Q11, Q12, Q14, Q17, Q22, Q24, Q25, Q26, Q27, Q28, Q29 and Q37) were excluded, resulting in 22 items. Factor 1 was the competency to practice caring and person-centered care (10 items), Factor 2 was the competency to recognize and respond to ethical issues in psychiatry (5 items), Factor 3 was the competency to utilize technology in psychiatry (3 items), and Factor 4 was the competence to practice care for the preservation of human dignity and shared decision making (4 items). Factor 4 statements were worded negatively.

Reliability Measure Results

The Cronbach's alpha for the entire scale was 0.864, while that for Factors 1-4 was 0.911, 0.814, 0.773, and 0.64, respectively.

Table 2 Means, standard deviations, 95% confidence intervals, and factor loadings of the 22-item TCCNPNI (*N* = 425)

Item No.	Item Statement	Mean	SD	95% CI		Factor Loadings
				LL	UL	
Factor 1: Competency to practice caring and person-centered care						
4	I care for the person who needs care, not just the disability or illness.	5.46	0.93	5.38	5.56	0.857
6	I encourage patients who are suffering to express their thoughts and feelings.	5.42	0.94	5.33	5.51	0.781
1	I always care for patients with compassion, regardless of whether they are conscious or not.	5.85	0.91	5.77	5.94	0.773
5	I engage with the patient to build a deep relationship of trust.	5.26	1.07	5.16	5.35	0.755
7	I listen to the patient's complaints in nursing situations of behavioral restrictions.	5.42	0.97	5.32	5.50	0.641
23	I give the utmost consideration to the patient's human rights even in situations where the patient has difficulty making self-decisions due to psychiatric symptoms.	5.40	1.02	5.30	5.49	0.612
36	I carefully provide explanations to enable patients to make self-decisions.	5.50	0.96	5.40	5.59	0.595
8	I deal with my feelings toward the patient appropriately.	5.14	1.01	5.05	5.24	0.592
16	I pay attention to the patient's life problems as well as their psychiatric symptoms.	5.49	0.97	5.39	5.58	0.568
32	I represent the wishes of patients who cannot say what they want to say.	4.89	1.03	4.80	4.99	0.490
	Cronbach's alpha coefficient = 0.911					
Factor 2: Competency to recognize and respond to ethical issues in psychiatry						
19	I encourage my colleagues in the workplace to speak their minds freely.	5.09	1.31	4.96	5.22	0.821
20	I prevent any kind of abuse in my organization and workplace.	5.17	1.22	5.06	5.29	0.780
18	I understand the ward's workplace culture against behavioral restrictions and works to improve it.	4.96	1.30	4.83	5.08	0.713
21	I warn my colleagues when they use abusive language toward patients.	4.44	1.48	4.30	4.58	0.673
31	I always report abuse when I see it.	4.28	1.60	4.14	4.44	0.417
	Cronbach's alpha coefficient = 0.814					
Factor 3: Competency to utilize technology in psychiatry						
13	I use technology to correctly assess the patient's condition.	4.76	1.28	4.62	4.88	1.011
2	I use technology in nursing care to know my patients.	4.88	1.16	4.76	4.99	0.653
15	I adopt new technology into my nursing practice.	3.80	1.39	3.66	3.92	0.509
	Cronbach's alpha coefficient = 0.773					
Factor 4: Competence to practice care for the preservation of human dignity and shared decision making						
∗33	I intervene, even if I have to forcefully inject, with patients who refuse to take their medication.	4.87	1.44	4.73	5.02	0.589
∗35	I prioritize the safety of nurses and limit the behavior of violent patients.	3.94	1.42	3.80	4.08	0.559
∗34	I intervene with patients who refuse to take their medication to administer it by adding it to their food or drink in an unannounced manner.	4.76	1.66	4.61	4.92	0.550
∗30	I encourage patients who are at high risk for falls to be physically restrained to ensure their safety and prevent recurrence.	4.75	1.58	4.61	4.91	0.527
	Cronbach's alpha coefficient = 0.64					

Cronbach's alpha for the entire scale = 0.864.

*Negatively worded statements.

SD = Standard Deviation, CI = confidence interval; LL= lower limit; UL = upper limit.

Item-total correlation values of 0.6 or higher were used, but Q30 (*r* = 0.03), Q33 (*r* = 0.04), Q34 (*r* = 0.21), and Q35 (*r* = 0.11) were inverted items and had low item-total correlation values.

The questionnaire is a 7-point Likert scale value (1: not at all, 2: almost not 3: not very much, 4: undecided 5: somewhat 6: fairly much, 7: always).

Factor extraction method: Maximum likelihood method.

Rotation method: Promax with Kaiser normalization.

Promax rotation is an oblique rotation. This allows factors to be correlated. Factors 1, 2, and 3 show correlations. However, Factor 4 was not correlated with the other factors. The contribution rates for factors 1 to 4 were 31.7%, 7.2%, 5.3%, and 5.5%, respectively, with a cumulative contribution rate of 49.6% (Table 3).

Table 3 Factor correlation matrix and summary of factor statistics

Factor Correlation Matrix	F1	F2	F3	F4	% of Variance	Cumulative Contribution Rate %
1. Competency to practice caring and person-centered care	1	0.657	0.587	0.049	31.674	31.674
2. Competency to recognize and respond to ethical issues in psychiatry	0.657	1	0.481	-0.027	7.212	38.885
3. Competency to utilize technology in psychiatry	0.587	0.481	1	-0.029	5.271	44.156
4. Competence to practice care for the preservation of human dignity and shared decision making	0.049	-0.027	-0.029	1	5.477	49.633

Discussion

The sample size was sufficient to perform EFA based on KMO and Bartlett's results. For Item 13, the third factor's loading was greater than 1. This may be due to the Promax method (Finch, 2011).

The developed TCCNPNI comprised 22 items across four factors. The cumulative contribution of these four factors was 49.6%, explaining almost 50% of the total data. Item-total correlation is the correlation between an item and the item total. A high correlation for each item indicates good alignment with the overall scale (WorldSupporter, n.d.). I-T correlation values were 0.6 or higher among Factors 1-3. However, Factor 4, for which items were Q30 ($r = 0.03$), Q33 ($r = 0.04$), Q34 ($r = 0.21$), and Q35 ($r = 0.11$), were inverted items and had low I-T correlation values.

The first factor is "competency to practice caring and person-centered care." Psychiatric nurses are responsible for providing consistent care specific to individuals' needs, preferences, and values. This competency entails particular actions and procedures that guarantee the patient takes an active role in their care and that every step of the care process considers their unique situation.

PCC is an approach that focuses on treating individuals holistically and respecting their values, preferences, and needs (American Geriatrics Society Expert Panel on Person Centered Care et al., 2016). Byrne et al. (2020) describe its components, such as values, respect, compassion, empathy, communication, and non-judgmental behavior. In addition, holistic caring includes elements such as compassion, faith, hope, trust, relationships, teaching, learning, and listening. The connection between the concept of PCC and caring in nursing has been reported (McCormack & McCance, 2006), and it is essential for improving mental health care.

PCC reduces agitation, depression, and neuropsychiatric symptoms and improves the quality of life for patients with dementia (Kim & Park, 2017). The number of patients who are hospitalized with psychiatric disorders has decreased compared with 15 years ago (from approximately 345,000 in 2002 to 302,000 in 2017 (Ministry of Health Labour and Welfare, 2024b); in contrast, dementia (such as Alzheimer's disease) has increased approximately 2.6 times across the same period. Competency to practice PCC is critical for patients with dementia as well as for those with other psychiatric disorders. The second factor, "competency to recognize and respond to ethical issues in psychiatry," includes items that carefully recognize, evaluate, and handle moral dilemmas that arise in clinical settings.

The current psychiatry situation in Japan needs to address ethical issues (Sato & Takimoto, 2023), improve organizational culture, provide caregiving through shared decision-making rather than forced treatment, and enhance PCC. This competence entails consistently using ethical concepts to ensure that decisions about patient care respect patient autonomy, promote justice, and prioritize patient welfare while also considering professional and regulatory standards. Nurses working in psychiatric wards should have a deep understanding of the technology used in psychiatric hospitals and high ethical sensitivity and moral sensibility (Chieze et al., 2021). The ethical dimension governs the moral rationality from which care actions are chosen and performed in nursing practice. Moral rationality is based on holistic understanding, truthfulness, and compassion as normative principles that address nurses' obligations to serve human vulnerability and the global population (Kim, 2012). Ethical standards provide a sense of what is good, desirable, and right and what must be done to preserve life, mitigate suffering, and promote health based on the professional's personal, institutional, and humanistic values of the profession (Varkey, 2021).

Current approaches to nursing knowledge will inevitably continue to change over time as society's values and resources change (Chinn & Kramer, 2014). In modern society, the role of nurses is complex and challenging. Limited resources, regulations, technology, and professional and personal integrity frequently lead to ethical dilemmas and difficult decisions. As a result of developments in healthcare, the nursing profession is facing more significant challenges, and the changes in societal values that have influenced it are evident (Mazuecos et al., 2023; Scanlon & Fleming, 1987).

The third factor, "competency to utilize technology in psychiatry," pertains to effectively incorporating technology into healthcare settings to improve clinical outcomes and patient care and guarantee the safe and ethical handling of patient data. The content validity reviews by the psychiatric experts excluded technology-related items. Although a great deal of technology is used in healthcare, professionals have little awareness regarding its definition. Therefore, awareness about the benefits of nursing technology and its usefulness needs to be raised.

Adequate use of digital assessment tools and other pertinent technology is a component of this competency. Using technology enables nurses to improve care and make patients feel more comfortable (Altmiller & Pepe, 2022). It is also essential to improve the quality of nursing care and the quality of life of patients. Several studies on technology in nursing have investigated Information and Communication Technology, robotics, sensor technology, and e-learning (Krick et al., 2019). However, in technology-intensive environments, a risk of dehumanizing care recipients exists (Byrne et al., 2020). Therefore, the results of the responses to the scale may provide insights into the effective use of technology. The TCCN theory (Locsin, 2005) addresses three phenomena: "being cared for," "caring for," and "technology." Being cared for refers to the patient's experience. Caring is based on the nurse's experience. Technology can bring the patient closer to the nurse, which allows the nurse to know the patient as a whole and compete as a person living caring uniquely and capable of growing in caring.

Nurses need to focus on caring as a shared lived experience between nurses and the person being cared for rather than fixing the person or filling in missing parts of the person (Locsin & Kongsuwan, 2013). The universal domain of what it means to be human is influenced by the existence of technology as a significant aspect of the domain (Locsin & Purnell, 2015). In addition, nurses can come to know the person by knowing indicators of physical status by using technologies such as blood pressure monitors, thermometers, electrocardiograms, x-rays, computed tomography, blood test results, and infusion pumps (Petiprin, 2023). Those indicators help us understand how the person is in relation to the environment. Additionally, technology in psychiatry, such as cameras to monitor seclusion and restraints, is used by providers to improve the in-depth understanding of patients and ensure patient safety (Dewa et al., 2023; Shetty et al., 2024).

Factor 4, "competence to practice care for the preservation of human dignity and shared decision making," includes items that refer to the ability to actively involve patients in decision-making while providing care informed by a thorough understanding of moral and ethical concepts. This competency guarantees that decisions about patient care conform to the patient's beliefs and preferences as well as the ethical norms of the professional.

Participation is defined as the degree to which the healthcare team respects and facilitates the involvement of patients and those close to them in their healthcare. These interpersonal behaviors include providing the person with understandable information and exploring expectations and concerns for health and well-being. It includes sharing decisions, agreeing, and implementing a care plan together to meet patients' health status and care needs (Strachan et al., 2020). Achieving shared decision-making depends on building rapport in the clinical encounter to facilitate information sharing; in this process, patients are supported to consider and express their preferences and views (Elwyn et al., 2012). When psychiatric nurses prioritize the emotional aspects of decision-making alongside mental health conditions, patients are empowered in their recovery journey (Okumura & Katsuki, 2024).

Moral responsibility and the values that guide moral responsibility and professional behavior promote the well-being of patients with psychiatric illness through indicators that measure, contribute to, and ensure warmth and humanized quality of care (Suazo et al., 2020). The developed TCCNPNI was used to measure items intended by the conceptual framework. Based on the above, it was considered that the developed TCCNPNI could measure psychiatry-specific practice situations, which is not possible with the existing TCCN theory-based scale.

The high correlation between the factors of Factor 1 (Competency to practice caring and person-centered care), Factor 2 (Competency to recognize and respond to ethical issues in psychiatry), and Factor 3 (Competency to utilize technology in psychiatry) can be interpreted as the commonality of these factors in terms of content. Only Factor 4 (competence to practice care for the preservation of human dignity and shared decision-making) was interpreted as a factor with a completely different concept because no correlation was observed

A previous study by Kato and colleagues (Kato et al., 2017a; Kato et al., 2017b) reported that the PITCCN aimed to measure intensive care unit nurses' perceptions of TCCN, and its fourth factor (Q12, Q13, Q14, Q15, and Q22) were all inverted scales (Miyamoto et al., 2017). Miyamoto et al. (2017) analyzed the PITCCN in ICUs, where many patients have lost part of their bodily functions or are unconscious. Kato et al. (2017a) focused on developing and validating the perceptions and behaviors status of TCCN among acute care nurses using the PITCCN.

For this reason, the content of the TCCNPNI was prepared in such a way that it can confirm whether patients are understood as irreducible and unforeseen persons and whether their dignity is protected and ethically valued.

The fourth factor of the TCCNPNI in this study is the ability to avoid impersonal interactions with subjects who have difficulty in self-determination due to psychiatric symptoms and to practice human rights protection by recognizing them as irreplaceable persons. As a basic idea of the TCCN theory (Locsin, 2005; Locsin & Purnell, 2015), knowing persons as caring is appreciated as a process of caring in nursing, and human beings are complete and integrated beings at every moment. The PITCCN and TCCNPI, which were developed based on Locsin (2005) theory of TCCN, were found to have some similarities.

It is particularly important to note that Factor 4 is an essential technical skill in psychiatric nursing. We included inverted items in this factor to better understand whether psychiatric nurses practice these skills. Although Factor 4 showed low contribution rates and Cronbach's alpha coefficient, we considered retaining it to gain insights into psychiatric nurses' actual practice.

The reason for this is that reverse-worded (RW) items are very common in Likert scales, but they have a serious drawback: RW items may contaminate the factor structure of the instrument. When both negative RW items are included, some participants may give inconsistent responses owing to the ambiguity of the reversal of positive items, while others may provide inconsistent responses because of judgment difficulties or careless responses to negative items (Kam, 2023; Zhang et al., 2016). Therefore, it will be necessary to repeat the survey in the future using a questionnaire that does not include RW items to assess its impact. Future research is necessary to validate the theoretical framework further using confirmatory factor analysis.

Limitations of the Study

This study included nurses from psychiatric hospitals in Osaka Prefecture, Japan. It is necessary to increase the population size further and conduct confirmatory factor analyses in the future. Additionally, this study successfully developed an instrument, but the problems with reverse wording items and the relatively low Cronbach's alpha for Factor 4 may reduce the reliability of the instrument.

Implications

TCCN in psychiatry involves knowing the person, knowing the person as caring and practicing caring in nursing. The importance of this study is to increase the number of nurses who can practice psychiatric nursing as caring based on ethical and moral understanding and judgment through the development of the TCCNPNI. Developed TCCNPNI could contribute to the design and testing of contents of a person-centered in-service education program that incorporates the understanding of technological competence as an expression of caring in nursing. In in-service education, incorporating TCCPNI items into educational content allows the testing and development of education based on TCCN theory. The developed TCCNPNI enables us to examine the contents of in-service education and evaluate its effectiveness. Increasing the number of nurses who act ethically and morally and minimize behavioral restrictions can lead to more effective psychiatric nursing care. This will lead to the development of psychiatric nurses' skills, making them capable of advanced nursing practices based on high ethical standards; as a whole, this will contribute to the improvement of the quality of patient care services.

Conclusion

The developed TCCNPNI comprises 22 items with a 4-factor structure. This study demonstrated satisfactory validity and efficiently evaluated the state of practice of technological competency in psychiatric nurses' caring. Nurses must have the expertise to use innovative technology. Simultaneously, nurses must develop the competency to manage technology and to know persons as caring. Without a proper understanding of technology in psychiatry, there is a risk of dehumanizing patients. In this sense, it is important to foster the ability to feel empathy with the patient, respect the patient's experience, and provide care that helps to fulfill the patient's hopes and dreams. The developed TCCNPNI allows for the measurement of the practice of nursing as caring in psychiatry, the state of ethical and moral behavior, and the practice of technological competency as caring in psychiatric nursing. The measured technological competency in psychiatric nursing may be useful for in-service education in general and psychiatric hospitals and formal education in nursing universities.

Declaration of Conflicting Interest

All authors have declared no actual or potential conflict of interest.

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Authors' Contributions

All authors made substantial contributions to conceptualization, data collection, and data interpretation. They read and approved the final version of the manuscript, agreeing to be accountable for all aspects of the work and ensuring that any concerns about the accuracy or integrity of any part of the work are appropriately addressed. All authors drafted the manuscript and critically revised it for intellectual content.

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Data Availability

The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy and ethical restrictions.

Declaration of Use of AI in Scientific Writing

Nothing to disclose.

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Honduran nursing care to pressure injuries in patients with invasive mechanical ventilation: A qualitative study

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Abstract

Background: Although substantial evidence exists regarding the treatment of pressure ulcers, there is a lack of studies demonstrating a comprehensive nursing approach for managing pressure ulcers in the ICU, particularly among patients with invasive mechanical ventilation from developing countries like Honduras. This gap in research is significant as the risk and impact of pressure ulcers on health recovery cannot be disregarded.

Objective: This study aimed to analyze Honduran nursing care for pressure ulcers in patients with invasive mechanical ventilation admitted to Intensive Care Units.

Methods: A qualitative study approach was used, with in-depth interviews conducted with 12 critical care nurses from July to September 2022. The interviews were recorded, and data analysis was performed using the participants' narratives following Colaizzi's steps.

Results: Three themes were obtained, which provide insight into the phenomenon: "The strengths in Honduran nursing interventions," "Negligence in the Honduran nursing care processes," and "Vulnerabilities in the organizational structures."

Conclusion: Nurses' experiences highlighted their timely reports and comprehensive, holistic care. However, they undergo negligence in their caring processes, such as low frequency of repositioning, lack of caring plans, and absence of self-training, leading to interdisciplinary work codependency for decision-making. Allocating resources toward nursing care and their professional growth is an investment in providing humane treatment and ensuring the prevention and management of pressure injuries in critical care patients. This study highlights the importance of comprehensive training and standardized protocols for intensive care nurses to improve pressure injury prevention and management in mechanically ventilated patients, emphasizing the need for regular patient repositioning, effective communication, and adequate resources to enhance patient care quality.

Keywords

Honduras; intensive care units; respiration, artificial; pressure ulcer; critical care nursing; decision making; moving and lifting patients; policy making

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Background

The National Pressure Ulcer Advisory Panel (NPUAP) describes a pressure ulcer as skin that is intact or non-intact, exhibiting a concentrated region of enduring, non-blanchable discoloration in deep red, maroon, or purple tones or showing separation of the epidermis, revealing a dark wound bed or a blister filled with blood (Sumarno, 2019; The Joint Comission, 2022). Pressure ulcers significantly affect health, affecting quality of life, social interaction, pain, discomfort, and lengthening hospital stays. When infected, they can trigger sepsis, potentially leading to cardiac arrest, and in severe cases, they can result in death (Spear, 2013).

Research indicates pressure injuries frequently occur in the Intensive Care Unit (ICU) (Hahnel et al., 2020). Moreover, risk factors such as bowel incontinence and immobility exacerbate the likelihood of pressure ulcer development. Pressure ulcers continue to pose a substantial health challenge in the ICU, necessitating thorough care (Shanley et al., 2022; Zhao et al., 2021). Nurses play a crucial role in both managing and preventing it. Nevertheless, there is a scarcity of research that specifically examines the application of nursing theory to the care of pressure ulcers (Sumarno, 2019; Tervo-Heikkinen et al., 2023).

Although there exists substantial evidence regarding the treatment of pressure ulcers, a synthesis of qualitative studies showed the unavailability of studies demonstrating a comprehensive nursing approach for managing pressure ulcers in the ICU, particularly among patients with invasive mechanical ventilation from developing countries like Honduras (Al-Qudimat et al., 2024; Floyd et al., 2021). Studies have addressed nursing care for pressure ulcers, highlighting its importance, challenges, and outcomes. Common interventions include risk assessment, the use of prophylactic devices, and comprehensive prevention strategies, but there remain areas for improvement, especially in critical care (Asiri, 2023; Darvall et al., 2018; Mendonça et al., 2018; Yilmazer & Bulut, 2019).

A study reviewing the effectiveness of nursing interventions in preventing pressure injuries reported reduced pressure ulcer incidences across several institutions, particularly in patients with medical device-related pressure ulcers (MDRPUs) (Al-Qudimat et al., 2024; Mendonça et al., 2018). Nurses in critical care units were trained to assess and manage pressure ulcers, leading to improved outcomes (Mendonça et al., 2018). However, the limitations included a lack of reporting methods, such as differences in assessment time intervals (Al-Qudimat et al., 2024; Rodríguez-Núñez et al., 2019; Turmell et al., 2022). Another challenge is the inconsistent application of pressure ulcer prevention bundles across different hospitals, as some studies failed to analyze their prevention measures statistically (Al-Qudimat et al., 2024; Gaspar et al., 2019). This gap in research is significant as the risk and impact of pressure ulcers on health recovery cannot be disregarded. Furthermore, there is a deficiency in integrating nursing theory to inform appropriate decisions regarding pressure injury care, representing an under-explored area.

While these studies underscore the significance of nursing care for preventing pressure ulcers in critically ill patients, there is still a need to explore the subjective experiences of nurses and the nuanced factors influencing care in different settings, such as resource-limited hospitals. Moreover, previous research often lacks qualitative insights into how nurses perceive challenges related to pressure ulcer care under IMV, especially in developing countries like Honduras, where healthcare resources may differ. Thus, conducting a qualitative study is justified to understand the contextual factors, barriers, and facilitators that influence nursing care. A qualitative approach provides deeper insights into how systemic, cultural, and logistical challenges shape nursing practices in this environment, ultimately leading to more targeted interventions and improved patient outcomes.

To develop intervention projects for pressure ulcers involving nurses, it is essential to initially explore the knowledge, attitudes, and perceptions of pressure ulcer prevention (Kara et al., 2021; Tesfa Mengist et al., 2022). Therefore, further qualitative research is warranted to guide advanced nursing care of pressure injuries. Considering the above points, this study aimed to analyze Honduran nursing care for pressure ulcers in patients with invasive mechanical ventilation admitted to the ICU.

Methods

Study Design

It is a qualitative study with a descriptive phenomenological approach since it allowed us to explore the Honduran nurses' experiences among pressure ulcer patients with mechanical ventilation admitted to the ICU of the Honduran teaching hospital based on the participants' narratives. Moreover, this approach assumes that the lived experiences of people can provide deep insights into the realities of their work or personal lives. By choosing this method, the subjective experiences of the ICU nurses are prioritized, and the aim is to capture the nuances of their roles, particularly concerning pressure ulcers in mechanically ventilated patients. The underlying philosophy assumes that truth and understanding arise from human experiences rather than external, objective observations (Colaizzi, 1978; Speziale et al., 2011).

Participants

Through intentional sampling and following the objective of the study, 12 nurses were selected. According to Morse (1994), a minimum of six and a maximum of 20 participants are typically recommended for phenomenological studies. The inclusion criteria were being a nursing staff at the ICU, Hospital Escuela, Honduras; Having at least one year of experience in managing users with mechanical ventilation; Having been responsible for the care of users with pressure injuries within the period from 2020 to 2022; and having been available to participate in the interviews, that is, not having been incapacitated or on vacation during data collection. No exclusion criteria were included due to the type of sampling used, where each participant is chosen objectively by fitting the inclusion criteria.

Data Collection

The data were collected from July to September 2022 through in-depth interviews that lasted 20 to 30 minutes. This instrument was composed of four open questions, with the supervision of a specialist in qualitative studies, for the proper conduct of the interviews. The instrument was validated by a committee of experts to review the agreement of the content with the objectives of the study. The interviews were carried out in person in a private space within the hospital, which was assigned by the head of nursing to guarantee the comfort and privacy of the participants. Similarly, they agreed to record the interviews to maintain the integrity of the participants' narratives. Those responsible for data collection were nurses with a prior approach to the participants, which favored the creation of an environment of trust for the authentic expression of their perceptions.

Data Analysis

The data analysis was through the participants' narratives, following the (Colaizzi, 1978) seven steps: familiarization, identification of the main narratives, formulating meanings, grouping of themes, development of an exhaustive description, producing the fundamental structure, and seeking verification of the structure. Both the collection and analysis of the data were carried out by the authors of the study, nursing professionals with qualifications and experience with qualitative approaches.

For the interpretation and implications of the theoretical framework, triangulation steps (Speziale et al., 2011) were followed, which consisted of reflecting on the combined findings to conclude the quality of care for stroke patients and its impact on participants' experiences and outcomes, Identifying opportunities for quality improvement based on the insights gained from both phenomenological research and the Longest's Model of Policy Making (Beaufort B. Longest, 2010); Considering the implications of the findings for healthcare policy, practice, education, and research. Following Longest's Model of Policy Making and this study's findings, it was planned to design a model for Policymaking in Honduran nursing care for pressure ulcers on patients with Invasive Mechanical Ventilation.

Thus, the overall strength of the methodology lies in the inductive depth provided by Colaizzi's phenomenological approach (Colaizzi, 1978), complemented by the deductive application of Longest's Model (Beaufort B. Longest, 2010) for policy implications. This ensures that the study not only captures the lived experiences of nurses but also translates those findings into actionable recommendations for improving pressure injury care in mechanically ventilated patients in a culturally specific context. This triangulation strengthens the validity of the findings and enhances the relevance of the research for both nursing practice and policy development.

Trustworthiness

The criteria of Sandelowski (1993) and Beck (1993) were followed, which consist of the credibility, adequacy, and auditability of the study. To establish these criteria, the peer review technique was used with specialists in qualitative studies to review the thematic groups according to the narratives of the participants; the negative case technique, where all narratives were compared for contradictions; and finally, the review of the groups and narratives by the members, which consisted of showing the transcripts to each of the participants to verify if the narratives agree with what the participants were trying to propose.

Ethical Considerations

The study was approved by the biomedical research ethics committee of the Faculty of Medical Sciences, National Autonomous University from Honduras (IRB: 00003070), with approval code 037-2022. The latter gave written authorization to carry out the data collection, and then the participants signed the informed consent after the interviewer explained to them the aim of the study and that their participation in the study would not put their integrity at risk. Therefore, the identities of the participants were coded as a protective method, using the letter P (participant) followed by the number of the interview.

Results

Several thematic groups emerged to elucidate the meaning of nurses' experiences in the care provided for preventing and managing pressure injuries in patients with invasive mechanical ventilation. The participants, aged between 27 and 31 years, included one male and 11 females. Four participants held a bachelor's degree in nursing, while eight had a technical diploma. Their ICU work experience ranged from one to 13 years. The study identified three central themes, 12 subthemes, and 14 concepts. **Table 1** presents a summary of these thematic groups, and definitions of themes and subthemes are available in **Table 2**. The thematic groups are described in detail, along with relevant quotations.

Table 1 Summary of thematic groups on Honduran nursing care to pressure ulcers with invasive mechanical ventilation

Themes	Subthemes	Concepts
1. Having strengths in Honduran nursing interventions to pressure ulcers	1.1 Timely detection and registration of pressure ulcer	1.1.1 Risk assessment 1.1.2 Verbal report 1.1.3 Nursing Notes 1.1.4 Physical Assessment
	1.2 Knowledge regarding repositioning practice of bedridden patients	1.2.1 Butterfly repositioning technique 1.2.2 Lower limb elevation 1.2.3 Block mobilization 1.2.4 donut-shaped pillow 1.2.5 Inflatable mattress 1.2.6 Water mattress
	1.3 Carrying out comprehensive holistic nursing care	1.3.1 Skin hydration 1.3.2 Nutritional condition 1.3.3 Bed bath
	1.4 Periodic wound management	
2. Undergoing negligence in the Honduran nursing care processes	2.1 Low frequency of repositioning 2.2 Lack of nursing care plan 2.3 Absence of self-training 2.4 Interdisciplinary work codependency for decision making	
3. Facing vulnerabilities in the organizational structure	3.1 Unavailability of institutional protocols	
	3.2 Paucity of professional commitment	3.2.1 Dehumanized care
	3.3 Nursing role overload	
	3.4 Shortage of medical-surgical supplies	

Having Strengths in Honduran Nursing Interventions for Pressure Ulcers

Actions performed by nurses in the immediate contact with the patient when they are admitted to the ICU and during daily integrated care: *"At the time of admission, the patients are checked, and it is identified if they come with ulcers, then it is also reported if they come with ulcers from other wards or from the emergency room"* (P1). As stated by the participant, the main purpose is to discover the presence of pressure injuries by employing an exhaustive physical examination.

The diagnoses, size, and characteristics of the lesion are recorded in the nursing notes, and the physician in charge of the shift is notified verbally. A participant mentioned: *"The professional with a nursing degree are the ones responsible for writing nursing notes and reporting in the ICU"* (P2). Another participant also said: *"The doctors on duty are called and reported to them. It is recorded in the nursing notes indicating whether the patient has ulcers, their size, and a photograph is also taken"* (P1). That assessment is also developed in another moment as the participant stated: *"If the* *patient has to be mobilized for any reason, we take advantage of the opportunity to assess pressure injury risks"* (P5). Similarly, another participant mentioned: *"It is assessed when bathing or when* repositioning *is performed"* (P6).

To measure the risk of pressure ulcers, the nurses consider factors such as age, nutritional status, health condition, base pathology, length of stay, and the kind of unit to which the patient is assigned. *"The patient's age, nutritional status, and length of stay are considered. Accordingly, we measure the risk of pressure injuries sustained by the patient ... We consider the number of days bedridden. And most importantly, the level of risk presented by patients on invasive mechanical ventilation is considered"* (P3). Pressure injuries are usually diagnosed when they are in the first and second degree. *"It is detected when it is lacerated, or with erythema in the area"* (P4).

Table 2 Definitions of thematic groups regarding Honduran nursing care for pressure ulcers in patients with invasive mechanical ventilation

Thematic Groups	Definitions
Having strengths in Honduran nursing interventions to pressure ulcers	These are the inherent skills possessed by Honduran nurses, which uniquely enhance their capacity to excel in particular types of tasks or roles in a scenario of deficiency and deficiencies.
Butterfly repositioning technique	The lower extremities are positioned in a butterfly shape by bringing the soles of the feet together while ensuring that the knees do not rub against each other. Additionally, pillows are strategically placed to prevent friction and potential injury to vulnerable areas such as the ankles and elbows, but not at the level of the back and coccyx.
Lower limb elevation	Sitting or lying down with legs elevated, a practice known as leg elevation, offers several potential health benefits, including improved blood flow support and decreased pressure on certain body areas.
Block mobilization	A rapid mobilization system involves lifting a bedridden patient using a block lifting technique. Health workers position themselves between the patient's legs, placing their hands on both sides of the patient to provide minimal lifting support. Meanwhile, another health worker slides a spinal board or stretcher beneath the patient to facilitate movement.
Donut-shaped pillow	Consists in positioning donut-shaped cushions either directly over existing lesions or in areas susceptible to developing lesions to prevent pressure and promote healing.
Inflatable mattress	These are lightweight, compact air mattresses designed to minimize skin pressure and enhance blood circulation.
Water mattress	These are beds or mattresses filled with water, commonly known as waterbeds, designed specifically for medical therapy purposes, as minimizing skin pressure, and enhancing blood circulation.
Skin hydration	Nursing interventions implemented proactively to prevent dry skin and concurrently serve as an assessment tool for nutritional status.
Nutritional condition	Nutrient-related diseases and conditions that result in weight gain can make it challenging for nurses to reposition patients due to increased body weight and potential mobility limitations.
Bed bath	Assisting with bathing for a bedridden patient who lacks the physical and mental capacity to bathe independently.
Undergoing negligence in the Honduran nursing care processes	Neglect refers to the failure or omission to provide care that a reasonable and prudent nurse, faced with similar circumstances, would have administered.
Facing vulnerabilities in the organizational structure	Inability on the part of the health institution to train and care for intervention teams, as a means to manage and prevent risks. Resulting in the inability of health personnel to manage and prevent complications related to pressure ulcers.
Dehumanized care	Nursing care that becomes depersonalized and focused on being efficient but not comprehensive and holistic. Nurses, due to the negative impact of their work environment, are stripped of human, and ethical characteristics.

The knowledge of mobilization of bedridden patients according to specific needs is the understanding of repositioning techniques applied to mechanically ventilated patients whose mobility is limited in order to examine the skin and prevent pressure ulcers. *"Repositioning helps a lot, as pressure points are checked, and gives the skin a chance to heal"* (P7). Similarly, another participant mentioned, *"Depending on the patient's condition and diagnosis, the frequency of postural changes and position are decided in order to reduce the risk of a pressure injury"* (P3).

The postural changes of the mechanically ventilated bedridden patients consist of lower extremities mobilization and placement of comfort devices on the coccyx, as the patient cannot be fully mobilized due to the life support therapeutic resource. *"We are only able to move the lower extremities"* (P1). Furthermore, the repositioning for bedridden patients with mechanical ventilation performed by Honduran nurses in the ICU is block mobilization, which consists of a set of manual mobilization actions with the use of donut-shaped pillows that allow them to change the patient's position with minimal effort and risk for the nurses. *"If the patient has an ulcer, the repositioning is performed. A donut is placed on the coccyx, but only on the patient who already has an ulcer"* (P2). These actions may be performed only at the time of bed bathing. *"The postural change is done by block technique once a day during the bathing"* (P2).

Another strategy used is the elevation of the lower limbs and placing them in a butterfly shape to avoid skin lacerations with the support of donut-shaped pillows or comfort devices. A participant explained, *"The lower extremities are placed in the shape of a butterfly. Put the two soles of the feet together, then avoid rubbing the knees ... place pillows or something that avoids rubbing the parts that are easy to injure. Like the ankles and elbows, but not at the level of the back and coccyx"* (P1).

Another participant also mentioned, *“Donut-shaped are placed where you have the lesion or in the areas where the lesion may occur”* (P3).

To facilitate the patient repositioning, at the time of admission, the nurses assign the patients with mechanical ventilation to a unit according to their physical characteristics. *“Depending on the patient's condition, we choose the bed type”* (P3). In addition, water and inflatable mattresses allow easier repositioning, decrease pressure on the skin, and improve blood flow. That previous point was stated by a participant, *“We have beds with inflatable mattresses that help in terms of skin pressure and blood irrigation. If we have a patient with obesity, we choose to put them on a water mattress”* (P3).

Comprehensive, holistic nursing care is the execution of techniques that encompass care in all aspects of the patients as a complement to the clinical needs for the protection of the skin from pressure ulcers. A participant mentioned, *“Hygiene and hydration of the skin are important to prevent ulcers”* (P3). Therefore, those actions include hygiene activities such as bed bathing, *“Bed bathing is beneficial in hydrating”* (P7). Likewise, hydration of the skin with Vaseline dressings, *“the skin is moisturized with Vaseline, and we assist in the patient’s daily bath. The Vaseline dressing prevents the lesion from increasing in size”* (E4). Finally, caring for the patient’s nutritional status, as one participant stated, *“especially if the patient is overweight, nutritional status is also prioritized”* (P3).

Periodic nursing wound management promotes tissue healing or prevents the pressure injury from progressing. *“To prevent them from progressing, wound cure is performed twice a day. In the morning and in the evening”* (P1). For its execution, nurses use saline solution and chlorhexidine for initial disinfection. *“Wound management consists in using chlorhexidine, saline solution and if required topical medication after treatment”* (P1).

Subsequently, if the lesion is superficial without exposed muscle tissue, sufrexal is applied to promote healing, and sulfadiazine is used to prevent infection. *“When the pressure ulcers are superficial, and there is no exposed muscle tissue, we use sufrexal and sulfadiazine* (P3); also, another participant stated, *Application of hydrocolloid patches by medical doctor's orders”* (P1). In special cases, if the lesion warrants it, fusidin, silver sulfadiazine, and microdacyn are applied with medical indication. If the lesion is only on the epidermis, Vaseline dressings are used.

Undergoing Negligence in the Honduran Nursing Care Processes

Repositioning of the mechanically ventilated bedridden patient with a frequency of every eight hours or even daily during bed bathing. *“Twice per shift. During bathing, and before the end of duties”* (E5). One participant said, *“We seldom reposition the patients”* (P2). Likewise, Honduran nurses only perform repositioning when receiving a medical doctor's order or when the patients have high-pressure injuries. *“Only if it is a medical doctor's order, or the ulcer is in very advanced stages”* (P1). Similarly, another participant mentioned, *“Repositioning is made when the patient spends a long time bedridden, and the doctor orders it ... sometimes there is no time left to mobilize the patients”* (P4). However, this action may be omitted when the nurses are overloaded with tasks during the shift; as a participant mentioned, *“sometimes there is no time left to reposition the patients”* (P4).

Besides the work overload, the omission or low frequency of repositioning is due to the lack of personal motivation and the absence of teamwork since the participants stated that they need the integration of the personnel on duty for the performance of the repositioning of bedridden patients since it is not a task that can be carried out individually. *“That's due to a lack of willingness on the part of the team. If your partner doesn't help you, you're not going to move the patient alone”* (P2).

Lack of protocolization of nursing care according to the patient’s needs in the ICU. Hence, there is no nursing diagnosis and no monitoring of the patient's condition to consolidate the evaluations as the axis of improvements in interventions, resulting in basic care, as well as empirical practice based on personal experiences instead of autonomous and evidence-based practice. *“We do not have an established care plan”* (P7). One participant noted, *“We do not make care plans. We act according to what we know about the pathology. We already know what we must do, and if it doesn't work, I ask the head nurse for advice”* (P1). Lastly, another one also stated, *“There is no plan; it depends mostly on the creativity of the nurses to see what they may do for the patients … the most they can do is basic care”* (P5).

Lack of application of learning processes to overcome the challenges related to pressure injury specialized management in high complexity units by nurses. Instead of using strategies to search for scientific evidence, professionals decide to rely on the recommendations of other professionals with more work experience or even turn to professionals from different disciplines to comply with their advice. One participant mentioned, *“When I don't know what to do, or I feel care is not working, I seek guidance from my supervisor. Because I have basic knowledge, but she has more knowledge that she has acquired through work experience. If she doesn't know what to do, I ask the physicians, but I don't go to study or do research”* (P1).

The participants recognized the need to update their knowledge in pressure ulcer nursing care since these professionals do not know how to intervene when in contact with patients who require advanced care. However, these professionals show a negative and arrogant attitude when the authorities of their institutions organize educational refresher days. *“As nurses, we need to be updated in ulcer care. I feel that our knowledge about ulcer patient care is deficient. The health managers try to do educational workshops on the subject, but sometimes people respond that they already know enough, but it is a lie, and they do not know. Because when it comes to acting with a patient with ulcers, they don't know what to do”* (P1).

The lack of motivation arises from the working conditions of the Honduran public health system, where, due to several limitations, nurses are unable to innovate their practices. *“There is no point in continuing to study pressure injury management because it cannot be put into practice. In the end, we all end up doing the same thing”* (P1). Likewise, participants recognize that by seeking to update their scientific knowledge, their care activities would meet the clinical needs of critical patients. *“The more updated we are, the better the quality of care we can provide to the patient”* (P3).

Workplace behavior affects the nurses' ability to independently rationalize and make decisions regarding the prevention and advanced management of pressure injuries in mechanically ventilated patients admitted to the ICU. *"First, I report the ulcer risk to the nurse manager on duty, and then it is presented to the physician to see what care the medical doctor may order"* (P4).

Facing Vulnerabilities in the Organizational Structure

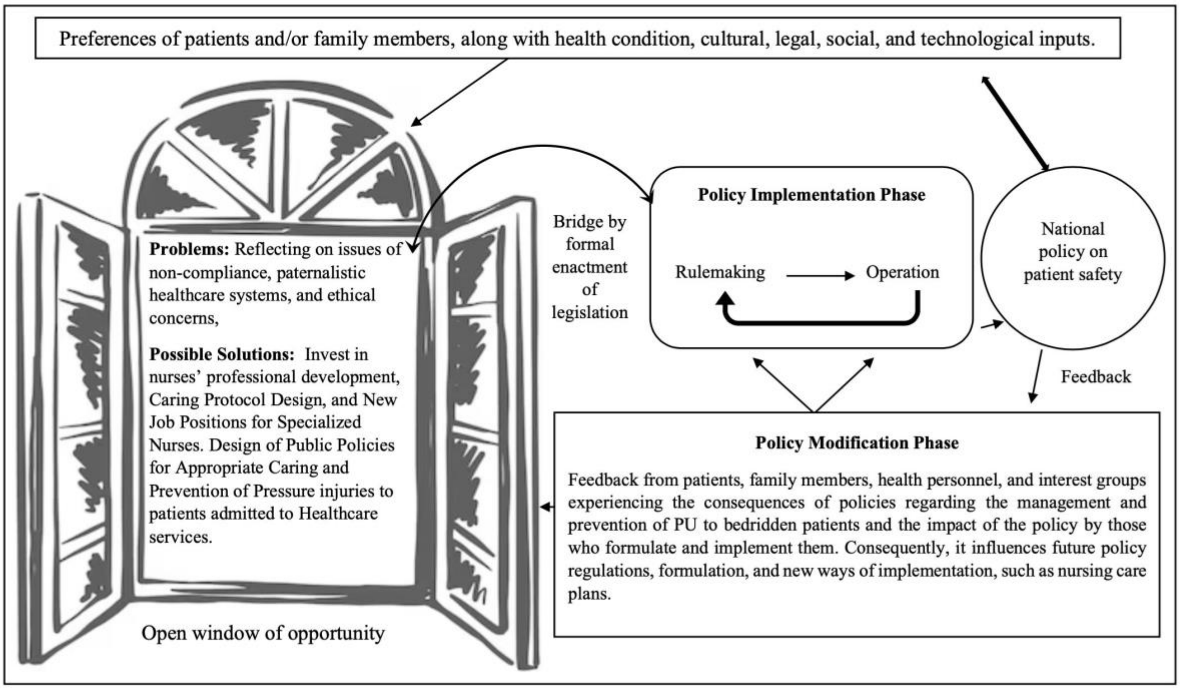
The lack of standardization of actions to avoid the incidence or complications related to pressure injuries in admitted patients in Honduran high-complexity health services. In other words, the nurses do not have the motivation, resources and an organizational guide that promotes the structuring of strategies focused on preventing pressure injuries, as well as that regulates their advanced, autonomous, and efficient practice in adequately managing injuries. *"Our interventions are focused on preventing the wound from progressing, not on preventing their incidence ... There is no protocol here ... But as nurses, we could do more to prevent. It is so easy because when the ulcer is already there, it is difficult to manage it, especially with our public health system where we do not have the necessary supplies"* (P1).

Consequently, there is no way to oblige the health services authorities to guarantee decent conditions of stay for users hospitalized in ICU with mechanical ventilation; thus, there is no public policy that encourages public and private organizations to invest in public health in the country. *"There is really no protocol or validated guideline where the measurements can be taken and compared ... there is none in the ward, nor at the national level"* (P7).

There was a lack of effort and purpose in advanced nursing care. Specifically, prevention and specialized pressure injury management. *"Not all nurses have the commitment to check the patient, to take care of ulcers. There are nurses who sometimes do not even report the presence of ulcers when they detect them"* (P1). The lack of such commitment reflects a dehumanized nursing practice that ignores the clinical needs of inpatients. *"It may be limiting factors, but more than anything else, it is a lack of willingness ... we need to be more humanitarian, to try to help the patient"* (P2).

Nursing overload is a situation in the ICU where the nurses are forced to face many responsibilities or demands of inpatients that exceed their ability to manage effectively during their workday. This limitation occurs due to the limited availability of nurses in each shift, which is not commensurate with the influx of patients in critical condition who come to the ward for specialized nursing care. *"Not enough staff on duty for patient demand"* (P4). This situation is worsened by situations that prevent regular personnel from working, such as medical incapacity. *"Also, there is an overload of work due to staff incapacities"* (P4).

Limited availability of medical-surgical material for preventing and properly managing pressure injuries. This problem is presented as a barrier to advanced nursing practice. *"There are limitations in terms of supplies for pressure injuries prevention and management"* (P5).



Problems: Reflecting on issues of non-compliance, paternalistic healthcare systems, and ethical concerns,

Possible Solutions: Invest in nurses' professional development, Caring Protocol Design, and New Job Positions for Specialized Nurses. Design of Public Policies for Appropriate Caring and Prevention of Pressure injuries to patients admitted to Healthcare services.

Feedback from patients, family members, health personnel, and interest groups experiencing the consequences of policies regarding the management and prevention of PU to bedridden patients and the impact of the policy by those who formulate and implement them. Consequently, it influences future policy regulations, formulation, and new ways of implementation, such as nursing care plans.

Figure 1 Model for Policymaking on Honduran Nursing Care to Pressure Ulcers on Patients with Invasive Mechanical Ventilation [Designed following the USA Model of Policy Making by applying the study's main findings]

By synthesizing the findings from this phenomenological research with Longest's Model of Policy Making, we developed a model to advance the prevention and management of pressure ulcers among patients undergoing invasive mechanical ventilation (see **Figure 1**). Although the implementation of such a model in developing countries may not immediately yield equitable outcomes across the global health workforce, it has the potential to enhance nurses' accountability for their professional performance and development. Consequently, this approach may foster a more patient-centered care protocol design and elevate patient satisfaction, particularly when applied within a patient-centered framework.

Discussion

This study explored the experiences of nurses in the prevention and management of pressure ulcers in patients with invasive mechanical ventilation in the ICU. The findings highlight strengths and areas of negligence within nursing practices in Honduras, emphasizing the need for systemic improvements in healthcare protocols and nurse education.

The study revealed that Honduran nurses exhibit commendable diligence in the initial assessment and ongoing monitoring of patients at risk for pressure ulcers. Conducting thorough physical examinations upon ICU admission and during routine care, as well as detailed documentation of diagnoses and characteristics of pressure injuries, demonstrates a strong foundation in clinical vigilance (E1, E2). This aligns with current best practices in nursing, which advocate for early identification and continuous monitoring as critical steps in pressure ulcer prevention and management (Osuagwu et al., 2023; Zuniga et al., 2024).

Furthermore, strategically using repositioning techniques and comfort devices underscores the nurses' understanding of pressure ulcer prevention principles. Regular repositioning and the application of donut-shaped pillows to alleviate pressure points are effective interventions supported by other studies (Heo et al., 2022; Iblasi et al., 2022). However, donut-shaped pillows may also increase the risk of developing occipital pressure ulcers, which is not pointed out by the Honduran nurses (Katz & Gefen, 2023). Customizing care, such as selecting appropriate beds and mattresses based on patient characteristics, also reflects an adherence to evidence-based practices designed to mitigate pressure ulcer risks (Andayani et al., 2020; Hahnel et al., 2020; Huang et al., 2023). Similarly, there is a pressing need to conduct more high-quality research on prevention strategies, such as repositioning, to validate their effectiveness and provide solid justification for their implementation (Cortés & Vásquez, 2024).

Despite these strengths, the study identified significant gaps in the frequency and consistency of repositioning practices. The infrequent repositioning of patients, often limited to once or twice per shift or only upon a physician's order, indicates a deviation from recommended protocols, which suggest repositioning every two to four hours (Padula et al., 2024). This inconsistency can be attributed to several factors, including heavy workloads, lack of teamwork, insufficient personal motivation among nurses, and the need for protocol updating (E2, E4). These findings are consistent with other studies highlighting the impact of nurse staffing levels and workplace culture on the quality of patient care (Ghazanfari et al., 2022).

An experimental study in Colombia shows that it is necessary to reposition bedridden patients in critical conditions every two hours to prevent pressure ulcers and highlights the importance of standardizing the repositioning techniques in the ICU (Cortés et al., 2021). The repositioning positions are not established in the scientific publications, an innovation from the current study, which defines certain positions realized by Honduran nurses in critical care units (Gillespie et al., 2021), and on the other hand, Asiri (2023) pointed out that the frequency and type of repositioning will be according to patients' special needs. The absence of standardized nursing care plans and the reliance on empirical practices rather than evidence-based interventions further exacerbate the issue. Participants reported acting based on personal experience and improvisation, which can lead to variability in care quality and outcomes (E1, E5). The literature emphasizes the importance of standardized protocols and continuous education to ensure consistent and high-quality care (Yilmazer & Tuzer, 2022; Yilmazer et al., 2020).

The study also highlighted challenges related to the continuing education and professional development of nurses. The reluctance of some nurses to engage in educational workshops and the reliance on hierarchical guidance rather than independent learning points to a need for a cultural shift towards lifelong learning and professional accountability (E1). This is crucial, as ongoing education and monitoring systems have been shown to significantly improve clinical skills and patient outcomes (Renganathan et al., 2019). Likewise, consider improving the nurses' and students' attitudes and commitment regarding pressure ulcer prevention in critical care patients, a phenomenon found in the participants (Rostamvand et al., 2022).

Moreover, the working conditions within the Honduran public health system, including inadequate resources and organizational support, contribute to the challenges faced by nurses. The lack of necessary supplies and an organizational framework to support advanced pressure ulcer prevention and management practices hinder the ability of nurses to implement effective care strategies (E1, E7). Addressing these systemic issues requires concerted efforts from healthcare policymakers to invest resources and infrastructure supporting best practices in nursing care (Gour-Provencal et al., 2021).

For practice and policy, several recommendations can be derived from this study to enhance the prevention and management of pressure ulcers in ICU patients. First, the implementation of standardized protocols and care plans tailored to the specific needs of mechanically ventilated patients is essential (Yilmazer et al., 2020). These protocols should be based on the latest evidence and integrated into the daily routines of nursing staff to ensure consistency and efficacy (European Pressure Ulcer Advisory Panel et al., 2019; Yilmazer & Tuzer, 2022; Yilmazer et al., 2020). Second, there is a need for ongoing education and training programs focused on pressure ulcer prevention and management. These programs should be designed to encourage active participation and address the specific knowledge gaps identified among health personnel (Alfadhalah et al., 2024; Dagnachew et al., 2023; Ghazanfari et al., 2022). Institutions should foster a culture of continuous learning and professional development to keep pace with evolving best practices (Alfadhalah et al., 2024).

Third, improving the working conditions and resource availability in ICUs is critical (Ghazanfari et al., 2022). Adequate staffing levels, access to specialized beds and mattresses, and the availability of necessary medical-surgical supplies are fundamental to the effective prevention and management of pressure ulcers. Policymakers should prioritize investments in these areas to support the delivery of high-quality care (Ghazanfari et al., 2022; McGraw, 2019).

Finally, fostering a collaborative and supportive work environment is vital. Encouraging teamwork and enhancing communication among healthcare providers can mitigate the challenges associated with workload and improve patient outcomes (Ghazanfari et al., 2022; Zhang et al., 2022). Leadership within healthcare institutions should promote policies and practices that facilitate collaboration and mutual support among staff (Duran et al., 2021; Zhang et al., 2022).

Allocating resources toward nursing care and their professional growth is an investment in providing humane treatment and ensuring the prevention and management of pressure ulcers in hospitalized patients. This investment may lead to a decrease in complications and hospitalization stays. Additionally, it has the potential to enhance nurses' ability to integrate innovative care plans, thereby promoting patient recovery. Thus, nurses ought to be involved in the formulation of public policies, ensuring the development of theoretical frameworks that enable their autonomy and critical decision-making skills.

This study explored the experiences of nurses in the prevention and management of pressure ulcers in patients with invasive mechanical ventilation in the ICU. The findings highlight strengths and areas of negligence within nursing practices in Honduras, emphasizing the need for systemic improvements in healthcare protocols and nurse education. Honduran nurses demonstrated commendable diligence in the initial assessment and ongoing monitoring of ICU patients at risk for pressure ulcers, conducting thorough physical exams and documenting their findings, aligning with global best practices (Osuagwu et al., 2023; Zuniga et al., 2024). However, gaps were identified in the consistency of repositioning practices, often limited by high workloads and inadequate resources (Padula et al., 2024).

Globally, the study's findings have significant implications, as they echo challenges faced in other resource-limited healthcare settings. The variation in the implementation of evidence-based practices, such as repositioning frequency and the use of comfort devices, emphasizes the need for standardized care plans adaptable to the realities of ICU settings (Cortés & Vásquez, 2024). Additionally, the study stresses the importance of continuous education and training for nursing staff to ensure the integration of up-to-date knowledge into daily practice, a need reflected in both developed and developing healthcare systems (Alfadhalah et al., 2024; Ghazanfari et al., 2022).

This research contributes to the global body of knowledge on pressure ulcer prevention, highlighting the essential role of tailored interventions and systemic support to improve patient outcomes. The insights gained from Honduran nurses' experiences underscore the urgency of investing in human and material resources, a challenge echoed in international efforts to enhance ICU care (McGraw, 2019; Zhang et al., 2022). Hence, the study advocates for a collaborative approach, where healthcare institutions, policymakers, and nursing professionals work together to improve care standards for critically ill patients worldwide.

Limitations

The study promotes a broad understanding of the nurses' experiences with the care provided in preventing and managing pressure ulcers in patients with invasive mechanical ventilation from a developing country. Likewise, it offers a comprehensive framework for understanding the phenomenon, strategies for health management, and a model for policymaking to improve the quality and autonomy of nursing care by considering the latest evidence. Even though a small sample of participants was taken, adopting a qualitative approach in this study offered nuanced insights centered on the participants' experiences. However, the phenomenon in a study is a dynamic issue. Therefore, some of the insights shared by our participants may not reflect the current realities in multiple Latin American contexts.

Further studies considering a qualitative approach regarding other health personnel perceptions, patients, and their family members are also needed to understand the phenomenon in-depth. Likewise, to understand how developing countries' governance, human rights norms (and other societal norms), and public health systems are linked to the lack of a humanized approach from health personnel and compliance with the prevention and management of pressure ulcers. Therefore, a quantitative approach to designing an appropriate intervention that considers the development of nurses' competencies as an approach that measures their quality of caring.

Contributions to Practice

This study offers a model that contributes to nursing and health sciences practice by providing a structured approach to improving the prevention and management of pressure ulcers among patients on invasive mechanical ventilation. By following Longest's Model of Policy Making, this study also provides a practical framework that, while particularly relevant to developing countries, has the potential to foster greater accountability among nurses for their performance and professional development. This, in turn, could lead to more compassionate and humanized healthcare practices and enhanced patient satisfaction, especially when integrated into a patient-centered and holistic care model.

Conclusion

This study underscores the dual nature of nursing care in preventing and managing pressure ulcers in mechanically ventilated ICU patients in Honduras, highlighting exemplary practices and areas needing improvement. By addressing the identified gaps through standardized protocols, continuous education, improved working conditions, and fostering a collaborative environment, healthcare providers can enhance the quality of care and outcomes for patients at risk of pressure injuries. Future research should continue to explore these areas, focusing on the implementation and impact of targeted interventions to support nurses in their critical role in pressure ulcer prevention and management.

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Authors' Contributions

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Data collection: YIVB.
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Data Availability

Supporting data for this study are available on request from the corresponding author.

Declaration of Use of AI in Scientific Writing

The authors partly used LLM to improve the readability of the writing of this article.

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Challenges and support factors in managing type 2 diabetes among pregnant women in Thailand: A convergent mixed-methods study

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Abstract

Background: Sociocultural and behavioral factors have a multifaceted impact on maternal health. In Thailand, cultural influences significantly shape behaviors of diabetes self-management in women. However, the experience of self-managing diabetes in pregnant women with preexisting Type 2 Diabetes Mellitus (T2DM) remains unclear.

Objectives: The study aimed to explore challenges and support factors of diabetes self-management among pregnant women with preexisting T2DM in Thailand, and to compare these factors between women in two groups (optimal and suboptimal maternal health outcomes).

Methods: A convergent mixed-methods study was conducted at a tertiary hospital (March to October 2022). Eligible participants were Thai pregnant women, aged 20-44, diagnosed with T2DM. Participants first completed a questionnaire and then were interviewed about diabetes self-management. Maternal health outcomes (i.e., gestational weight gain and glycated hemoglobin [HbA1c]) were reviewed and extracted. Descriptive statistics were used for quantitative analysis, while directed content analysis was used for qualitative data. Side-by-side matrices were used to describe the qualitative subthemes with quantitative results.

Results: Twelve Thai pregnant women participated in the study, aged 27 to 40 years, with gestational ages ranging from 7 to 38 weeks and T2DM diagnoses spanning from 3 weeks to 10 years. Half of the participants were obese before pregnancy. Weight gain patterns revealed that 41.67% had inadequate gain, 33.33% had optimal gain, and 25% had excessive gain. HbA1C levels indicated that 75% had good glycemic control. Three women achieved optimal weight gain and glycemic control, while nine exhibited suboptimal health outcomes. We identified six main themes: 1) challenges at the individual level in managing diabetes, 2) support factors at the individual level for diabetes management, 3) challenges at the interpersonal level in controlling diet, 4) interpersonal support factors for managing diabetes, 5) challenges at the societal level in accessing healthcare, and 6) societal support factors for healthcare access.

Conclusion: The findings suggest that managing diabetes during pregnancy necessitates dynamic, patient-centered care throughout the pregnancy journey. Regarding the clinical implication, it is important to tailor approaches to the Thai context and to prioritize education and boost women's confidence in managing diabetes throughout pregnancy.

Keywords

Diabetes mellitus; self-management; pregnancy; pregnant women; glycemic control; gestational weight gain; maternal health; Thailand

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Background

In Thailand, compared to men (8.9%), diabetes prevalence is higher among women (10.8%) (Aekplakorn et al., 2018). The incidence of preexisting type 2 diabetes mellitus (T2DM) among women of reproductive age has been rising. Compared to women with gestational diabetes mellitus (GDM), women with T2DM experience higher rates in developing maternal complications such as pre-eclampsia (Persson et al., 2016) and miscarriage (Mukerji et al., 2020). In women with T2DM, inadequate glycemic control (i.e., HbA1C > 6.5%) raises the risk of preterm labor (Buhary et al., 2016). Infants born to women with inadequate glycemic control often have heavier birth weights, experience more frequent hypoglycemic episodes, and are more likely to be admitted to the Neonatal Intensive Care Unit (Bellg et al., 2004) compared to infants of women with well-managed glycemic levels (Buhary et al., 2016). Therefore, pregnant women with T2DM need to manage their blood sugar levels to reduce the risk of complications (Alexopoulos et al., 2019). The nurse's role is to educate, guide, and support pregnant women in adhering to and coordinating care to ensure optimal outcomes for both mother and baby.

The sociocultural environment and behavioral factors influence maternal health in intricate and multi-dimensional ways (Alvidrez et al., 2019). Thai culture frequently influences women's diabetes self-management behaviors, acting as either a supportive element or a potential obstacle (Auemaneekul et al., 2016; Sowattanangoon et al., 2009). For instance, a typical challenge is that Thai meals traditionally include rice, which makes it difficult to restrict carbohydrates for effective diabetes management (Auemaneekul et al., 2016; Sowattanangoon et al., 2009). Cultural traditions have called for pregnant women to take various precautions, such as refraining from vigorous activities, to protect the health and well-being of their unborn babies (Liamputtong & Kitisriworapan, 2014). Maintaining optimal glycemic control requires balancing these traditional precautions with effective diabetes self-care practices (American Diabetes Association, 2023).

A recent review on the challenges and support factors in managing T2DM during pregnancy revealed that most prior studies were conducted in Western countries (Phonyiam, 2022). Moreover, many studies reported a mix of experiences among pregnant women with T1DM, T2DM, and GDM, which limited the applicability of the findings specifically to the T2DM group (Phonyiam, 2022). Recognizing that experiences of diabetes self-management may differ for pregnant women with preexisting T2DM compared to those with T1DM and GDM will help us understand how the nurse can intervene to provide best quality of education for this population. We aimed to address this knowledge gap by exploring challenges and support factors specific to Thai pregnant women with preexisting T2DM.

Methods

Study Design

A convergent parallel, qualitatively oriented, mixed-methods design was used (Creswell & Creswell, 2018). Qualitative and quantitative data were gathered and analyzed both independently and simultaneously. This mixed-methods approach aimed to comprehensively capture different aspects of diabetes self-management during pregnancy, enhancing understanding by comparing and integrating both types of findings. This research is part of the first author's dissertation (Phonyiam, 2024).

In this study, qualitative methods were primarily used to answer the research questions, with quantitative data providing supplementary information to enrich the qualitative findings (Phonyiam et al., 2023). The specific aims were to: 1) qualitatively investigate challenges and support factors faced by Thai pregnant women with preexisting T2DM, 2) quantitatively categorize optimal and suboptimal maternal health outcomes among these participants, and 3) integrate both quantitative and qualitative data to determine if women with optimal and suboptimal outcomes experienced different challenges and support factors.

Following the National Institute on Minority Health and Health Disparities (NIMHD) Framework, this study systematically provided insights into the individual, interpersonal, community, and societal levels across multiple domains of influence, including biological, behavioral, physical/built environment, sociocultural environment, and health care system (Alvidrez et al., 2019). The integration of the theoretical framework was evident throughout the study design, data collection, data analysis processes, and presentation of results.

Samples/Participants

This study was conducted at a hospital in Bangkok, Thailand, from March 2022 to October 2022. The first author and Research Assistant (RA) collaborated with registered nurses at antenatal clinics to identify potential participants from electronic health records based on the eligibility criteria.

The inclusion criteria for the study were pregnant women with preexisting T2DM, either primigravida or multigravida, aged 20 to 44 years, who could speak Thai and provide informed consent. Participants were excluded if they had significant complications, such as blindness, or life-threatening illnesses, such as myocardial infarction, as these conditions would necessitate advanced diabetes treatments. Recruitment was conducted through face-to-face outreach at the clinic or via phone. Women who met the eligibility criteria were scheduled for a semi-structured interview at a time that was convenient for them (see **Figure 1**).

As this study was a qualitative-oriented mixed-methods study (Creswell & Creswell, 2018), the sample size was determined based on the principle of data saturation in the qualitative component, where data collection continued until no new themes emerged (Lincoln & Guba, 1985). For example, when participants repeatedly discussed similar topics, such as individual-level challenges to diabetes management, as mentioned by others, the data were deemed sufficient to reach saturation (Lincoln & Guba, 1985). Since the quantitative data aimed to complement the qualitative findings, the same participant pool was utilized, allowing researchers to integrate the data from both components (Creswell & Creswell, 2018).

To enable cross-case comparison, the participants were divided into two groups: those with optimal health outcomes and those with suboptimal health outcomes (Guetterman et al., 2015), guided by predefined health indicators, including gestational weight gain and glycemic control (American Diabetes Association, 2023).

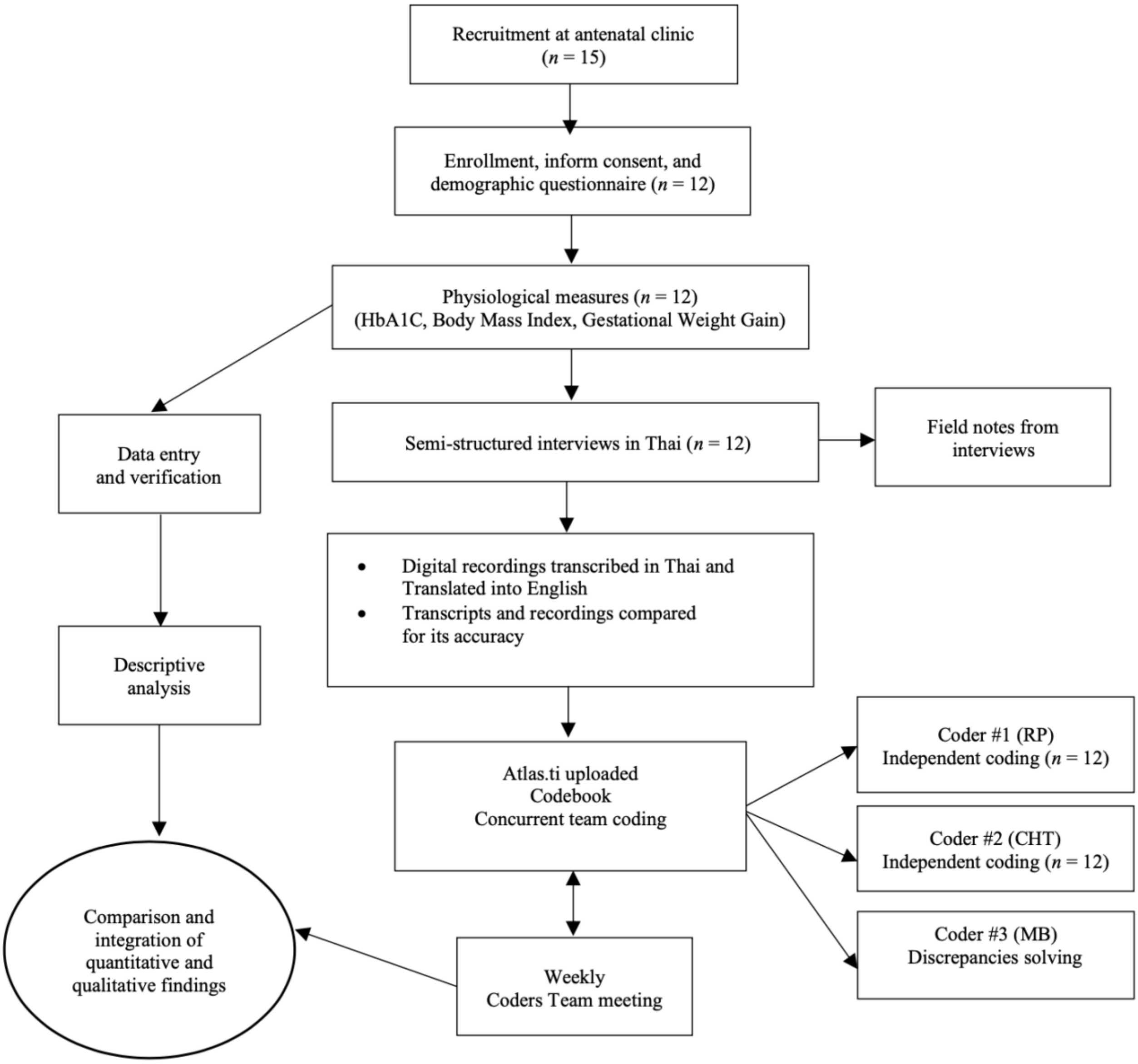


Figure 1 Data collection and analysis procedure

Data Collection

Participants completed a demographic questionnaire via the Research Electronic Data Capture (REDCap) mobile link. We collected maternal health outcomes from the women's electronic health records (EHR) at each antenatal care (ANC) visit, both retrospectively and prospectively, based on their gestational age on the enrollment day (Phonyiam et al., 2023). Thai women were advised and encouraged to attend at least four visits as part of the focused ANC (FANC) model at 8–12 weeks, 24–26 weeks, 32 weeks, and 36–38 weeks of gestation.

Maternal health outcomes included women's weight (in kilograms; kg), height (in meters; m), body mass index (BMI), gestational weight gain (GWG; kg), and HbA1C levels (%). To calculate GWG, we subtracted the baseline body weight from the immediate pre-delivery body weight. We then categorized pregnant women's GWG according to their pre-pregnancy BMI, following the guidelines from the Diabetes Association of Thailand (see **Table 1**). Pregnant women with lower GWG were classified as having inadequate GWG, while those with higher GWG were classified as having excessive GWG (Diabetes Association of Thailand, 2017). Women's HbA1C levels were obtained from their medical records at two time points: prior to pregnancy and during the antenatal care visit at 24 to 26 weeks.

Table 1 Recommendations for gestational weight gain

BMI Category	Pre-pregnancy BMI (Kg/m^2)	Optimal GWG (Kg)
Underweight	<18.5	12.5-18
Normal	18.5-24.9	11.5-16
Overweight	25.0-29.9	7-11.5
Obesity	≥30	5-9

Source: (Diabetes Association of Thailand, 2017)

To minimize the risk of COVID-19 infection, women had the option to complete the interview via phone, a Zoom call without video, or in person. The first author conducted these semi-structured interviews, with questions guided by the NIMHD framework (Alvidrez et al., 2019) which focused on challenges and support factors for diabetes self-management at the individual, interpersonal, community, and societal levels.

Data Analysis

Qualitative data. Using an iterative process, data analysis occurred concurrently with data collection. The interview translation process was as follows: first, the first author transcribed the audiotape verbatim in Thai. De-identified interviews were then sent to a bilingual professional translation service for translation into English. The first author re-read both the Thai and English versions to ensure consistency and accuracy in the transcripts. English transcripts were analyzed since our coding team included both Thai-speaking and non-Thai-speaking researchers. To maintain the rigor of cross-language data analysis, the first author documented "atypical words," such as jargon and slang, encountered in each transcript (Al-Amer et al., 2015). English transcripts were analyzed using Atlas.ti version 9 (Atlas.ti Scientific Software GmbH, Berlin, Germany). We used direct content analysis (Hsieh & Shannon, 2005). We used the NIMHD framework's components as the initial codes (e.g., sociocultural environment) (Alvidrez et al., 2019). Salient data that could not be coded with these initial codes from the NIMHD's components were created into new codes (Hsieh & Shannon, 2005). Themes were categorized as challenges and support factors for diabetes management across various levels of influence, including individual, interpersonal, community, and societal. Subthemes were guided by different domains of influence, such as biological, behavioral, physical/built environment, sociocultural environment, and health care system. A codebook containing code names, definitions, and examples was created, revised, and updated as necessary throughout the coding process.

Three coders participated in the data analysis, with two coders independently coding each interview transcript. We aimed to code one interview transcript per week, and the two coders held weekly meetings to discuss their coding and update the codebook as necessary. The analysis involved a constant back-and-forth process between the entire dataset and individual transcript coding. Throughout the data analysis, coders maintained a log with memos and ideas for discussion in their meetings. A senior researcher acted as the third coder to resolve any discrepancies. The three coders met regularly to discuss findings and assess the amount of new information from subsequent interviews to confirm when data saturation had been reached. The final interview was conducted at the 12th interview, which indicated that an appropriate sample size had been achieved (Lincoln & Guba, 1985).

Quantitative data. Data from the questionnaire and physiological measures were analyzed using IBM SPSS version 25.0 software (IBM Corp, Released 2017). We calculated the means, standard deviations, and ranges for each continuous variable, while frequencies and percentages were tabulated for each categorical variable (e.g., maternal health outcomes). Missing data were addressed using imputation, which involved substituting values for any missing data points (Wirtz et al., 2021). For HbA1C, we used item mean imputation. This method of imputing glycemic indicators like HbA1C has been commonly applied in previous studies, demonstrating that the means of the imputed data were consistent with the observed data (Buhary et al., 2016). For example, if a participant had missing data, it was substituted with the mean value derived from all the other respondents' data (Wirtz et al., 2021).

Mixed methods. We employed a cross-case comparison joint display to present the qualitative themes and subthemes alongside the quantitative results related to maternal health outcomes, effectively illustrating the findings from both approaches and highlighting their integration (Guetterman et al., 2015). We categorized women into two groups: those with optimal health outcomes and those with suboptimal health outcomes. Women who maintained good glycemic control (HbA1C less than 6.5%) and achieved optimal gestational weight gain (GWG) based on their pre-pregnancy BMI were classified as having "optimal health outcomes." The remaining women were designated as having "suboptimal health outcomes." We compared each subtheme, supported by quotations from both groups, to provide a comprehensive summary of challenges and support factors affecting diabetes management during pregnancy. Our findings included both convergent and divergent results, depending on whether the subthemes aligned with or contradicted women's health outcomes. When divergent findings occur, the researchers are suggested to discuss the potential discrepancies between their quantitative and qualitative results and how the divergence provides additional insight into the problem being studied (Creswell & Creswell, 2018).

Ethical Consideration

The Institutional Review Boards from two universities approved all procedures, study materials, and personnel prior to the study's implementation (IRB 21-1477 from the University of North Carolina at Chapel Hill, United States, and IRB 3428 from Mahidol University, Thailand). The study methods were carried out in accordance with the approved study protocol (Phonyiam et al., 2023). Written informed consent forms were obtained from all participants.

Results

Participant Characteristics

Twelve Thai pregnant women with preexisting T2DM participated in this study. Their ages ranged from 27 to 40 years, and all were married. Half of the participants had a bachelor's degree or higher, and approximately 42% were employed in government or state enterprises. Monthly household incomes varied from 10,000 to 70,000 Baht. At the time of enrollment, the participants' gestational ages ranged from 7 to 38 weeks, and their diagnoses of T2DM were between 3 weeks and 10 years.

Maternal Health Outcomes

Of the 12 participants, half were classified as obese based on their pre-pregnancy BMI. In terms of weight gain up to the time of delivery, 41.67% experienced inadequate gain, 33.33% had optimal gain, and 25% gained excessively. For glycemic control, 75% of participants achieved good control, with HbA1C levels below 6.5% (see **Table 2**).

Among all participants, 3 women achieved both optimal weight gain and good glycemic control, reflecting optimal health outcomes. The remaining 9 women were classified as having suboptimal health outcomes, attributed to either inadequate or excessive weight gain and/or poor glycemic control.

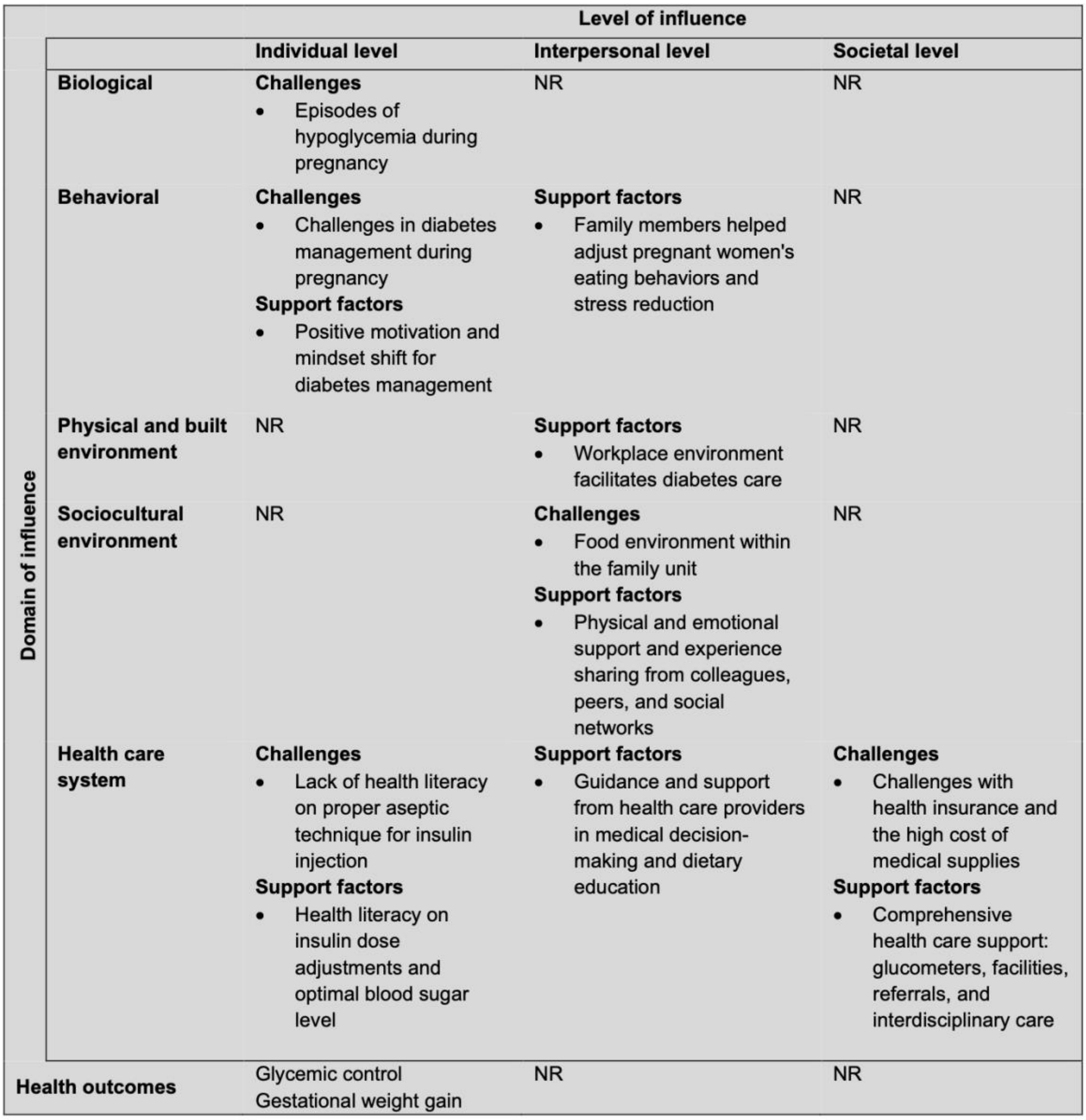
Table 2 Maternal health outcomes (*N* = 12)

Variable	% (*n*)
Pre-Pregnancy Body Mass Index	
Normal	8.33 (1)
Overweight	41.67 (5)
Obese	50.00 (6)
Gestational Weight Gain	
Inadequate	41.67 (5)
Optimal	33.33 (4)
Excessive	25.00 (3)
HbA1C	
Good glycemic control: less than 6.5%	75.00 (9)

Qualitative Findings

Six main themes were found: 1) challenges at the individual level in managing diabetes, 2) support factors at the individual level for diabetes management, 3) challenges at the interpersonal level in controlling diet, 4) interpersonal support factors for managing diabetes, 5) challenges at the societal level in accessing healthcare, and 6) societal support factors for healthcare access.

Using the NIMHD framework (Alvidrez et al., 2019), our findings presented a matrix illustrating three levels of influence (individual, interpersonal, and societal) across five domains of influence (biological, behavioral, physical/built environment, sociocultural environment, and health care system) (see **Figure 2**). The subthemes identified as challenges (-) and support factors (+) were indicated. Notably, no participants shared experiences related to the community level. We found that the subthemes were more frequently reported at the individual level, particularly within the biological, behavioral, and health care system domains. Additionally, subthemes emerged at the interpersonal level across four domains, as well as at the societal level specifically within the health care system domain.



		Level of influence		
		Individual level	**Interpersonal level**	**Societal level**
Domain of influence	**Biological**	**Challenges** • Episodes of hypoglycemia during pregnancy	NR	NR
	Behavioral	**Challenges** • Challenges in diabetes management during pregnancy **Support factors** • Positive motivation and mindset shift for diabetes management	**Support factors** • Family members helped adjust pregnant women's eating behaviors and stress reduction	NR
	Physical and built environment	NR	**Support factors** • Workplace environment facilitates diabetes care	NR
	Sociocultural environment	NR	**Challenges** • Food environment within the family unit **Support factors** • Physical and emotional support and experience sharing from colleagues, peers, and social networks	NR
	Health care system	**Challenges** • Lack of health literacy on proper aseptic technique for insulin injection **Support factors** • Health literacy on insulin dose adjustments and optimal blood sugar level	**Support factors** • Guidance and support from health care providers in medical decision-making and dietary education	**Challenges** • Challenges with health insurance and the high cost of medical supplies **Support factors** • Comprehensive health care support: glucometers, facilities, referrals, and interdisciplinary care
Health outcomes		Glycemic control Gestational weight gain	NR	NR

Figure 2 Using the NIMHD domains and levels of influence across qualitative subthemes

Note: NR: not reported

Theme 1: Challenges at the individual level in managing diabetes

There were three subthemes across three domains of influence: biological, behavioral, and health care system. In the biological domain, one subtheme is glucose regulation during pregnancy. Specifically, those women during pregnancy experienced hypoglycemic episodes (i.e., blood sugar levels ranging from 60 to 86 mg/dL). They reported symptoms including light-headedness, dizziness, and shaky hands during these episodes.

In the behavioral domain, women reported facing challenges in managing their diabetes during pregnancy. They found it difficult to limit certain foods because of pregnancy cravings, particularly for items like fruits, ice cream, and rice. Additionally, they experienced reduced physical activity due to fatigue and concerns about the risk of miscarriage. Managing blood sugar testing and insulin injections around mealtimes also posed significant challenges for them. An example was that a participant described she tended to be hungrier especially as they approached the later stages of pregnancy. Second, feelings of tiredness, fatigue, and heaviness, coupled with fears of miscarriage, made pregnant women less inclined to participate in physical activity. None of the participants reported doing any rigorous exercise; instead, their physical activity primarily consisted of light walking while shopping, climbing stairs, and performing regular household chores. For example, ID014 shared that she walked lightly during 12-week pregnancy. She was afraid to walk fast. Third, participants faced challenges in managing the timing of blood sugar tests and insulin injections around mealtimes. Despite feeling hungry, they had to wait 15 minutes after administering their insulin before they could eat. ID006 shared that she had to keep track of the time to incorporate the mealtime and insulin injection.

In the healthcare system domain, a few women raised questions during the interview, suggesting a possible lack of health literacy regarding proper aseptic techniques for insulin injection. For example, one question was whether they needed to replace the needle each time.

Theme 2: Support factors at the individual level for diabetes management

Two subthemes were identified. The domains of influence include the behavioral and health care system. In the behavioral domain, women reported a positive shift in motivation and mindset regarding their diabetes management. Many participants expressed a strong desire to control their T2DM when they thought about their babies' health. They feared that elevated blood sugar levels could negatively impact their babies, which fueled their commitment to maintaining better glycemic control. For instance, ID007 described that she must control diabetes for her baby. Women shifted their mindset by engaging in positive self-talk, adjusting their thoughts to steer clear of potential risks from diabetes during pregnancy. For example, ID009 expressed that people with T2DM must take their disease seriously. Gaining control over the disease will lead to a healthier body in the future.

In the health care system domain, one support factor was health literacy about insulin dose adjustments and optimal blood sugar levels. The women reported that they tried to adjust the insulin dosage, such as by increasing it by two units if they consumed more food than their usual diet. They also specified their target blood sugar level ranges, indicating that their blood sugar should not exceed 90 mg/dL before meals and 140 mg/dL after meals.

Theme 3 Challenges at interpersonal level for managing diabetes

A subtheme identified within Thai sociocultural context was the influence of the family food environment, which often posed challenges for pregnant women. Living in extended family households with parents, siblings, and other relatives is common, and this cultural norm frequently led to regular gatherings focused on food, such as grilled meat, shabu (a hotpot dish with sliced meat and vegetables), or restaurant visits, typically held weekly or bi-weekly. For instance, ID009, who struggled with blood sugar control, reported that she could not stop eating snacks, which led to her weight reaching 100 kilograms.

Theme 4 Support factors at the interpersonal level for diabetes management

Four subthemes were identified; each subtheme represents a distinct domain of influence including behavioral, physical and built environment, sociocultural environment, and health care system. Within the behavioral domain, family members, such as spouses, parents, and children, supported the women in modifying their eating habits. Many women had meals together with their families; the families attempted to adjust their own meals to match the doctor-recommended foods suggested for the participants. ID014 shared that her husband and children avoid buying soft drinks, desserts, and fruits to accommodate her dietary needs. With this encouragement and support, the women felt less stressed. The women also retained strong food preferences for dishes from their family's regions of origin, incorporating these preferences into their households. For example, ID011 reported that the whole family came from Isan (the northeastern region of Thailand) so they made Isan dishes such as om curry, steam dishes, and jaew (sauce).

The physical and built environment domain included settings constructed or modified through human activity, such as schools and workplaces. Women noted that their workplace environments supported diabetes care in various ways, such as offering flexibility with leave days and providing benefits like cooked rice for employees, annual health checkups, and a private room for blood glucose monitoring. As ID013 shared that there was a room at the office where she could take the blood test.

In the sociocultural environment domain, encompassing social networks and family or peer norms, women emphasized that social interactions and support networks were essential. Physical and emotional support, along with experience-sharing from colleagues, peers, and social networks, proved especially valuable. For instance, Thai women received both types of support from colleagues and peers. One woman shared how a colleague regularly checked in with her, provided mental support, and brought her various foods. Another example, ID009 expressed that her friend who was pregnant and gave the participant some unused blood test kits. In addition, the women shared experiences with other expectant mothers through social networks like online forums. Many looked up health information on the internet and posted questions on discussion boards to connect with other mothers. ID011 described her approach, explaining that she read through various comments. She found one question from an expectant mother who inquired about the maximum acceptable blood sugar level after an insulin injection. The participant tried to keep her blood sugar within this recommended range.

In the health care system domain, support factors included the guidance and support provided by healthcare providers in medical decision-making and dietary education. For example, dieticians offered recommendations using handbooks or charts detailing dietary allocations. The dietary guidelines provided to the pregnant women were divided into two stages: the initial phase (0 – 6 months) and the later phase (6 months until birth). During this time, women were encouraged to carefully monitor their diet by limiting desserts and serving themselves controlled portions of rice, vegetables, and fruits at each meal. ID007 explained that she was advised to have three main meals a day, supplemented with milk in between. She was also instructed to check her carbohydrate content on nutrition labels to manage her intake. For the third trimester, she could take a little bit more calories. Advice from healthcare providers helped alleviate concerns. After consultations with doctors and dieticians, many women felt less anxious about their condition. For example, ID007 expressed that doctor eased her worries by telling her that insulin injection does not have affect the child.

Theme 5 Challenges at the societal level in accessing healthcare

A key subtheme within health care system domain was the complexity surrounding health insurance coverage. Women often encountered challenges related to coverage limitations. Those with the Civil Servant Medical Benefit Scheme (CSMBS), a direct reimbursement plan, still needed to pay for certain medical equipment and doctor's fees. Many women were uncertain about the differences between the 30-baht universal coverage scheme and their existing social security insurance, questioning whether they could hold both types of coverage simultaneously. ID015, for example, wondered if she could still access the 30-baht scheme despite her social security coverage at a different hospital and whether this coverage could be transferred to another facility. In another instance, ID005 explained that she was registered under the 30-baht scheme in one province but planned to give birth in another, where her current insurance wouldn't be valid, leaving her responsible for covering childbirth expenses.

Women expressed concern over out-of-pocket costs for essential diabetes supplies, such as test strips, alcohol swabs, syringes, and lancets, which are costly. For example, ID009 expressed that she had to purchase the test strips out of her own pocket, which she found problematic.

Theme 6 Support factors at the societal level for healthcare access

A subtheme in the health care system domain highlighted the hospital's role in supporting diabetes management. As per hospital policy, glucometers were provided to allow women to monitor their blood glucose at home. Healthcare facilities and referral systems played a significant role in diabetes care. For instance, ID005, who intended to give birth at a different hospital, explained that she was advised to notify the healthcare providers if she planned to deliver elsewhere. They would then issue the necessary referral document and provide her with the Maternal and Child Health Book. Interdisciplinary care was also crucial for managing diabetes and preventing pregnancy complications. Pregnant women collaborated with various specialists, including internists from medical schools, nurses, endocrinologists, gynecologists, ophthalmologists, and podiatrists. They underwent screenings for diabetes-related complications. For instance, ID009 shared that the doctor examined all parts of her body, including eyes and feet. Women were also prescribed calcium supplements, folic acid, and thrombolytic medications to prevent miscarriage, as ID013 noted that diabetes comes with many risks.

Member Checking on Qualitative Findings

After translating themes and subthemes from the 12 interviews into Thai, we reached out to one participant who had recently given birth, as her pregnancy experiences would likely be fresh in her memory. The first author arranged a meeting with this participant to explain the study's objectives and review the Thai version of **Figure 2**, which depicts the NIMHD domains and levels of influence corresponding to the qualitative subthemes. The participant provided feedback, expressing that the description resonated with her experience. She noted that managing diabetes for the sake of the baby is a personal motivation that guides a mother's decisions.

Mixed-Methods Findings

To facilitate cross-case comparison, we divided participants into two groups: Optimal health outcome (n = 3) and suboptimal health outcome (n = 9). According to the NIMHD framework (Alvidrez et al., 2019), we integrated the individual-level subthemes with maternal health outcomes. This is because the framework itself assumes that maternal health outcomes are influenced by factors at the individual level (Alvidrez et al., 2019) (**Table 3**).

Each individual-level subtheme revealed both converging and diverging results from comparison and integration. In the biological domain, we found that women in both groups experienced hypoglycemia; however, little information was known about the frequency of hypoglycemia episodes in the two groups. Regarding the behavioral domain, both groups faced challenges in managing diabetes, including diet control and a sedentary lifestyle. For example, women with optimal health mentioned their intention to *"reduce the amount" (ID009)*, while women with suboptimal health described their cravings and awareness that not controlling their diet *"led to high blood sugar" (ID003)*. In the health care system domain, we observed a divergent result in the group with optimal health. Although this group achieved good glycemic control (HbA1C less than 6.5%) and optimal GWG, they still lacked health literacy on proper aseptic technique for insulin injection, which is considered a barrier. This was evident in their practices, such as only replacing the needle every three days. This underscores the necessity for clearer guidance and education on correct insulin injection techniques.

Furthermore, as a support factor, both groups expressed the importance of diabetes management. However, the group with suboptimal health reported that they needed to manage diabetes for their babies to prevent *"risky consequences" (ID007).* In contrast, the group with optimal health focused on their bodies, believing they *"may become healthier in the future" (ID009).* Finally, regarding the support factor of the health care system domain, the group with optimal health participants knew the normal range of blood sugar levels. In the group with suboptimal health, women described how they adjusted the dose of insulin depending on the amount of food they consumed. This may imply that women in this group adjust their doses frequently, possibly due to difficulty in controlling their diet. This could be an area for further investigation, particularly regarding dose adjustments and the fluctuation of blood sugar levels during pregnancy.

Table 3 Joint display to compare and integrate findings (*N* = 12)

Domain of influence	**Individual level challenges and support factors**	**Comparison** **Optimal health (*n* = 3)**	 **Suboptimal health (*n* = 9)**	**Integration (Convergence/Divergence)**
Biological	**Episodes of hypoglycemia during pregnancy (-)**	"Some days. But mostly, I would feel light-headed when the blood sugar level is around 78 or 86. No, I don't have heart palpitations. But I do get shaky hands sometimes. (ID013)"	"So, I woke up feeling dizzy. I tested my blood sugar level then, and it was over 60. I felt dizzy. (ID006)"	**Convergence:** Women had suboptimal health outcome and experienced the symptom of hypoglycemic. **Divergence:** Although women had optimal health outcome, they also reported experiencing episodes of hypoglycemia during pregnancy. **Summary:** We found that in both groups, women experienced hypoglycemia. However, little information was known about the frequency of hypoglycemia episodes in the two groups.
Behavioral	**Challenges in diabetes management during pregnancy (-)**	"I couldn't stop having white rice, but I tried to reduce the amount…It still didn't sink in… But I ate plenty of rice: one plate, two plates, even three plates of rice at a time. I ate it without restraint (ID009)" "It's only been 12 weeks. So, I walk lightly. I dare not walk a lot. I'm afraid to walk quickly. I do things lightly. I didn't go anywhere (ID014)"	"It's like when I'm pregnant, I feel tired; so I want food. Especially during the first month, the first two months, it was like I only wanted to have fruits, fruit juice, and ice cream. This led to high blood sugar (ID003)" "I seldom exercise. At most, I might take a short walk after a meal. When I work, I would be sedentary for a long time. It's not quite feeling tired. What's it called? Like, if I were to stand for a long time, I would feel fatigued and weighed down. (ID006)"	**Convergence:** Women had suboptimal health outcome and expressed facing difficulties in controlling diet and had sedentary lifestyle. **Divergence:** Women who experienced optimal health outcomes expressed challenges in managing their diet and having a physically active lifestyle. **Summary:** Regarding the behavioral domain, both groups faced challenges in managing diabetes, including diet control and a sedentary lifestyle. For example, women with optimal health mentioned their intention to *"reduce the amount" (ID009)*, while women with suboptimal health described their cravings and awareness that not controlling their diet *"led to high blood sugar" (ID003)*.
	Positive motivation and mindset shift for diabetes management (+)	Diabetes patients must examine this seriously and look after themselves in earnest. This will make things better for us. Our bodies may become healthier in the future (ID009)"	"I had to force myself to do it. But I must do it for my baby. I must do it… It's about the mindset as well. I had to change my thoughts. I had to be able to do what the doctor recommended. Because if I couldn't do it, there would be risky consequences (ID007)"	**Convergence:** Women with optimal health, as they reported using positive self-talk to reinforce the benefits of taking care of themselves during pregnancy. **Divergence:** Women with suboptimal health outcomes reported changing their mindset and expressed a desire to manage their diabetes during pregnancy to benefit their baby's health. This indicates that concern for their baby's well-being served as a motivator to adopt better diabetes management practices. **Summary:** Both groups expressed the importance of diabetes management. However, the group with suboptimal health reported that they needed to manage diabetes for their babies to prevent *"risky consequences" (ID007).* In contrast, the group with optimal health focused on their bodies, believing they *"may become healthier in the future" (ID009).*

Table 3 *(Cont.)*

Health care system	**Lack of health literacy on proper aseptic technique for insulin injection (-)**	"The needle for the insulin injection can be replaced every three days. If I don't replace it, then it would be painful because the needle would become dull. Replacing the needle helps to reduce the pain. I'm the only person using these supplies anyway... I don't need to clean the needle because there's a silicone scabbard. The doctor didn't tell me to clean the needle. But before injection, I would use the alcohol swab to wipe the skin at the injection site. (ID013)"	NR	**Divergence:** Only women with optimal health outcomes reported a lack of health literacy regarding insulin injection. This was evident in their understanding and practices, such as one woman stating she replaces the needle every three days to avoid pain from a dull needle, believes cleaning the needle isn't necessary due to the silicone scabbard, and uses an alcohol swab to clean the injection site, despite not receiving specific instructions from her doctor. **Summary:** This highlights the need for clearer guidance and education on proper insulin injection techniques.
	Health literacy on insulin dose adjustments and optimal blood sugar level (+)	"Before a meal, the blood sugar level should not exceed 90. It should not exceed 95 for lunch and dinner. But after a meal, it should not exceed 140 (ID013)"	"If I felt that I ate too much, I would increase the insulin dosage. I could increase the dosage myself by around two units. Not more than that. Yes. When I ate very little, the blood sugar level fell (ID015)"	**Convergence:** Women with optimal health reported having knowledge about normal blood sugar levels during pregnancy. **Divergence:** Women with suboptimal health shared their understanding of how to adjust their insulin doses based on their current blood sugar levels. **Summary:** The optimal health group knew the normal blood sugar range. Those with suboptimal health adjusted their insulin based on food intake.

Notes: (-) is challenge; (+) is support factor

Furthermore, as a support factor, both groups expressed the importance of diabetes management. However, the group with suboptimal health reported that they needed to manage diabetes for their babies to prevent *"risky consequences" (ID007).* In contrast, the group with optimal health focused on their bodies, believing they *"may become healthier in the future" (ID009).* Finally, regarding the support factor of the health care system domain, the group with optimal health participants knew the normal range of blood sugar levels. In the group with suboptimal health, women described how they adjusted the dose of insulin depending on the amount of food they consumed. This may imply that women in this group adjust their doses frequently, possibly due to difficulty in controlling their diet. This could be an area for further investigation, particularly regarding dose adjustments and the fluctuation of blood sugar levels during pregnancy.

Discussion

Principal Findings

The study is based on the NIMHD framework (Alvidrez et al., 2019) to identify the challenges and support factors of managing T2DM in pregnant women living in Bangkok, Thailand. Qualitative findings indicated both similarities and differences with the quantitative results concerning diabetes management among pregnant women.

Challenges and support factors at individual level

Pregnant women with T2DM have faced several challenges in managing their condition. One key finding was the difficulty of controlling diet because, for Thai people, food was seen as an vital part of lives. This perspective created a challenge to following healthy and balanced dietary guidelines during pregnancy, aligning with findings from previous studies (Dennison et al., 2019; Lawrence et al., 2021). Often, pregnant women craved sweet foods, such as fruits and ice cream, as well as starchy foods like rice. Cravings for sweets were linked to increased intake of sucrose and overall fat, while cravings for starchy foods were associated with higher carbohydrate consumption and an elevated glycemic load (Farland et al., 2015). Future studies could benefit from exploring relationships between pregnancy cravings and dietary control, as well as their impact on pregnancy outcomes.

Pregnant women with T2DM preferred low-impact walks as a form of light physical activity. Regular walking has been shown to reduce blood sugar levels (Hayashi et al., 2018). A study examining an exercise program for pregnant women with T2DM found that 30 minutes of moderate-intensity stationary cycling over 10 weeks effectively reduced average blood glucose levels compared to those receiving standard prenatal care (E-Mekawy et al., 2016). Further research is needed to examine which specific exercises and its duration could be most effective for pregnant women with T2DM.

Interestingly, one divergent finding showed that only pregnant women with good health outcomes (optimal glycemic control and gestational weight gain) were not adhering to proper aseptic techniques for insulin injection. Prior research has indicated that proper insulin pen selection and education help improve insulin injection techniques, enhance patient satisfaction with diabetes management, and result in better glycemic control (Gorska-Ciebiada et al., 2020). This underscores potential benefits of providing support for women during pregnancy.

Pregnant women reported challenges in coordinating blood sugar testing and insulin injections with their mealtimes, a difficulty also observed in a study on insulin-meal mismatches among hospitalized patients with T2DM (Lim et al., 2020). Coordinated insulin-meal administration was associated with reduced glycemic fluctuations in individuals hospitalized with T2DM (Lim et al., 2020). This emphasizes the need to customize diabetes management tasks to align with women's daily routines. One study suggested that using patches instead of pens and syringes may be beneficial for adults with T1DM and T2DM (Peyrot et al., 2018). The patch is user-friendly and offers a discreet method for delivering insulin, which could improve patient adherence to mealtime insulin regimens for those currently using injection devices (Peyrot et al., 2018). Our suggestion is that health care providers may consider using patches for pregnant women who struggle to coordinate their mealtimes with insulin injections.

At the individual-level support factors, pregnant women's motivations to manage their diabetes for the sake of their baby, along with positive self-talk, influenced their behavior changes. Women with suboptimal health outcomes noted that one of their motivations for improving diabetes control during pregnancy was the health of their baby. Consistent with our findings, a study by Youngwanichsetha and Phumdoung (2017) revealed that Thai women understood the importance of better controlling their T2DM to benefit their baby's health. Since understanding the motivations that drive pregnant women to better manage their diabetes is essential, future studies could explore the maternal-fetal relationship and how this motivation can be leveraged in diabetes management. Most pregnant women practiced positive self-talk during their pregnancy. These findings align with a previous study showing that individuals with T2DM often employ self-enhancement techniques, fostering positive thoughts as part of their diabetes management strategy (Swarna Nantha et al., 2021). The positive thoughts boosted women's self-esteem and overall well-being (Swarna Nantha et al., 2021). The findings highlight the significance of maintaining a positive mindset in managing diabetes during pregnancy. Furthermore, improving health literacy regarding insulin dose adjustments is crucial for maintaining optimal blood sugar levels. Personalized insulin adjustments can be implemented using a titration algorithm, such as increasing the dose by 2 units every three days, to achieve glycemic targets while minimizing the risk of hypoglycemia (American Diabetes Association Professional Practice Committee, 2022). This information is especially important for women who need to adjust their insulin doses, particularly during pregnancy when hormone and blood sugar levels are subject to fluctuations (American Diabetes Association Professional Practice Committee, 2022).

Our study's mixed-method findings had significant insights. Regardless of health outcomes, women faced common challenges throughout their pregnancy journey. Effectively managing diabetes during pregnancy necessitates dynamic, patient-centered care, aligning with previous research emphasizing the importance of individualized care to enhance maternal outcomes for women with diabetes (Sushko et al., 2023). Future studies may design patient-centered interventions that provide ongoing care for pregnant women with diabetes.

Challenges and support factors at interpersonal level

At the interpersonal level, women noted challenges in managing diabetes due to their family's food environment. Factors such as the presence of snacks in the household and frequent family gatherings centered around foods were identified as challenges. In Thai culture, there is a strong emphasis on kinship and family relationships, which can complicate dietary adherence for those managing diabetes (Lundberg & Thrakul, 2013). Consistent with our findings, another Thai study revealed that family members can play a crucial role in an individual's ability to self-manage diabetes, particularly by providing support in planning healthy meals (Lundberg & Thrakul, 2013). For pregnant women living in extended families, home visits and modifications to the household food environment may be essential to support effective diabetes management during pregnancy.

Support factors at the interpersonal level were identified across the behavioral, physical and built environment, sociocultural environment, and health care system domains. In the behavioral domain, pregnant women with T2DM reported that their family members played a crucial role in modifying their eating behaviors and reducing stress. These findings are consistent with a systematic review emphasizing the significance of family support as a vital element in fostering healthy dietary habits (Pamungkas et al., 2017). Educating family members can empower them to support pregnant women in making healthy dietary choices and managing stress, both of which may contribute to improved glycemic control (Pamungkas et al., 2017).

Workplaces can significantly contribute to diabetes care during pregnancy by implementing measures such as flexible leave policies, conducting annual health checkups, and providing designated areas for women to monitor their blood glucose levels. These accommodations support pregnant women with T2DM in managing their daily responsibilities while also allowing them to fulfill their work obligations effectively (Park et al., 2022). Employer-based interventions, implemented in partnership with healthcare systems, could be particularly effective in enhancing maternal health.

Physical and emotional support from colleagues and peers can significantly aid in diabetes management. Peer support programs, designed to complement standard care, have been shown to enhance behaviors related to diabetes management (Aziz et al., 2018). Women sought health information from websites and actively posted their questions on discussion forums with other mothers. This aligns with a meta-analysis of 39 previous studies that identified a prevalent trend of information exchange related to pregnancy among mothers on online platforms (Xie et al., 2021). This trend is widespread and continues to grow, emphasizing the necessity for health care providers to acknowledge the potential of social networks and online platforms in supporting maternal health.

Challenges and support factors at societal level

A societal-level barrier identified in our study pertains to health care access, specifically the complexities surrounding Thai health insurance and the costs associated with medical supplies. Women often encounter difficulties navigating the intricacies of health insurance coverage, which is structured into three primary schemes based on an individual's employment status (Sumriddetchkajorn et al., 2019). The following schemes are in place: (i) the medical benefits scheme for civil servants managed by the Ministry of Finance; (ii) the social security scheme overseen by the Ministry of Labor; and (iii) the universal coverage scheme administered by the Ministry of Public Health. (Sumriddetchkajorn et al., 2019). Each scheme functions within its unique legal framework, leading to unavoidable differences in access to healthcare services, including medications and medical supplies (Sumriddetchkajorn et al., 2019). Therefore, providing a more comprehensive explanation of the benefits and limitations of each health insurance scheme, along with guidance on the most suitable option for individuals, would be advantageous. Additionally, women reported that medical supplies, such as test strips, are costly, a finding consistent with another Thai study (Sumriddetchkajorn et al., 2019). It implies that medical costs pose a significant obstacle to effective diabetes management (Somanawat et al., 2020). Diabetes is a complex condition that requires continuous management and care (Somanawat et al., 2020). Therefore, improving access to affordable medical supplies could be a crucial strategy for addressing these challenges.

A societal-level support factor identified within the health care system was the provision of free glucometers by hospitals, which empowered women to monitor their blood glucose levels at home, thereby enhancing their ability to manage their condition. This aspect, often overlooked in the literature, emphasizes the significance of practical support in improving diabetes management during pregnancy. Health care system can bolster this support by implementing interdisciplinary approaches. A previous study indicated that an interdisciplinary team can effectively establish and share management goals, continuously improving care for pregnant women with diabetes (Netgrajang, 2019). Our study highlighted the importance of a referral system. To enhance continuity of care, it would be beneficial to provide detailed information about Thailand's patient referral systems, particularly as they relate to women's health insurance schemes (Aumpanseang et al., 2022).

Implications of the Study for Nursing Practice

According to our findings, there are several implications for nursing practice as follows.

First, enhancing support systems: Nurses should recognize the importance of a robust support system for pregnant women with diabetes. They can facilitate connections among family members, co-workers, and peers to foster understanding and provide emotional and practical support. Incorporating family members into education sessions can empower them to assist women in managing their diabetes effectively.

Second, individualized care plans: Nursing practice should focus on creating individualized care plans that consider the unique challenges faced by pregnant women with diabetes. This includes recognizing the influence of cravings and the household food environment on dietary choices. Nurses should engage in open discussions with patients about their cravings and provide practical strategies for healthier eating.

Third, strengthening health systems: Nurses can advocate for improved health systems that enhance the availability of medical supplies and resources for managing diabetes during pregnancy. They should work towards implementing efficient referral systems to ensure continuity of care, particularly for those requiring specialized services.

Fourth, interdisciplinary collaboration: Promoting collaboration among interdisciplinary teams—including obstetricians, endocrinologists, and dietitians—is crucial. Nurses can lead efforts to establish communication channels among team members, ensuring that all healthcare providers are informed and aligned in their approach to managing diabetes during pregnancy.

Strengths and Limitations

Our study presents several strengths, notably a mixed-methods approach that integrates various aspects of women's experiences by collecting both subjective (interview) and objective (HbA1C levels and gestational weight gain) data. To enhance data accuracy and ensure confirmability, we employed a rigorous qualitative methodology involving three independent coders for data analysis, and we verified our findings by consulting a participant to confirm that our interpretations reflected her perspective accurately. Our quantitative approach was equally thorough, with a research assistant trained specifically to extract and review maternal health outcomes.

However, our study also has limitations. First, since we recruited pregnant women exclusively from one hospital in Bangkok, Thailand, our findings may have limited generalizability to other regions in the country with different sociocultural contexts. We compared our results with existing literature to enhance the transferability of our findings. Second, most participants were multigravida with a range of gestational ages, which may not fully capture the experiences of primigravida or the changes occurring across various trimesters. Future research could investigate these differences to provide a more complete perspective. Lastly, in this mixed-methods study with a qualitative focus, we maintained the same sample size for both the quantitative and qualitative components to facilitate data integration for each participant (Lincoln & Guba, 1985). We recognize that the small sample size in the "optimal" group ($n = 3$), compared to the "suboptimal" group ($n = 9$), may reduce the effectiveness of cross-case comparisons and potentially impact the reliability of our findings. This limitation may have affected the rigor of our quantitative results. Future studies should aim to recruit a larger sample to improve the robustness and generalizability of the mixed-methods findings and increase the sample size for both groups. Quantitative analysis relied solely on descriptive methods, which may restrict the strength of conclusions regarding the relationships between identified challenges and health outcomes. Future research could address this by increasing the sample size and employing more advanced analyses (e.g., regression or correlation) to strengthen the findings.

Conclusion

Using the NIMHD framework as a guide, this study identified multiple levels of challenges and supportive factors involved in managing T2DM among pregnant women in Thailand. Our findings highlight the key obstacles and possible strategies for effective diabetes management within this group. Future research should focus on creating and assessing the effectiveness of interventions aimed at individuals, family members, peers, colleagues, workplaces, and health care systems. This proposed model—a dynamic, comprehensive, patient-centered approach—offers a valuable foundation for developing supportive measures to help pregnant women with T2DM manage their condition and achieve positive health outcomes during pregnancy.

Declaration of Conflicting Interest

No conflicts of interest to declare.

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Authors' Contributions

RP contributed to the study's conception and design, data acquisition, data analysis, wrote the first draft of the manuscript. RP, CHT, and MB were involved in data analysis. CS, AP, EH, YC, and MB provided project supervision. All authors revised the final draft and gave final approval of the version to be published.

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Data Availability

The datasets generated during and analyzed for the current study results are available from the first and corresponding authors upon reasonable request.

Declaration of Use of AI in Scientific Writing

There is nothing to declare.

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Quality of life among Indonesian family caregivers caring for dependent older persons with type 2 diabetes mellitus in the community: A cross-sectional, correlational study

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Abstract

Background: The global prevalence of older adults with diabetes has increased, and family caregivers in Indonesia play a critical role in managing diabetes and providing personal care. However, caregiving can be complex and challenging, often negatively affecting caregivers' quality of life (QoL).

Objective: This study aimed to develop and test a hypothesized causal model of QoL among Indonesian family caregivers who care for dependent older persons with type 2 diabetes mellitus (T2DM) in 2024.

Methods: A cross-sectional, correlational study was conducted with 270 family caregivers recruited from five Community Health Centers. Data were collected using various scales: the Center for Epidemiologic Studies Depression Scale, the Zarit Burden Interview, the Duke University Religion Index, the Perceived Knowledge on T2DM Care Scale, the Family-Carer Diabetes Management Self-Efficacy Scale, the Multidimensional Scale of Perceived Social Support, and the Quality-of-Life Index. Descriptive statistics and Partial Least Squares Structural Equation Modeling (PLS-SEM) were used for analysis.

Results: The final model explained 89.1% of the variance in the quality of life (QoL) of family caregivers (R^2 = 0.893, *Adjusted* R^2 = 0.891), with 66% predictive relevance. Depression symptoms had the strongest negative direct effect on QoL, followed by caregiver burden. Self-efficacy and perceived knowledge had positive direct effects, while social support showed no significant direct effect. Indirect effects revealed that social support and self-efficacy positively influenced QoL through depression symptoms. The total effect (TE) analysis confirmed that depression symptoms had the strongest negative effect on QoL (TE = -0.744, p <0.001), while social support (TE = 0.443, p <0.001) and self-efficacy (TE = 0.413, p <0.001) had positive effects.

Conclusion: Reducing depression symptoms and caregiver burden, strengthening social support, and promoting self-efficacy could significantly improve the QoL of family caregivers who care for older persons with T2DM. Nursing practice should address caregivers' physical and emotional needs, provide education, foster social support, and support caregiver mental health.

Keywords

Indonesia; family caregivers; quality of life; type 2 diabetes mellitus; older persons

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Background

Type 2 Diabetes Mellitus (T2DM) is one of the most common chronic diseases in the world, primarily affecting older adults (Bigelow & Freeland, 2017). The prevalence of this disease continues to rise (Abdul Basith Khan et al., 2020). In 2021, there were 537 million cases globally. The number of diabetic cases is predicted to increase to 643 million by 2030 and 783 million by 2045 if no action is taken (IDF Diabetes Atlas, 2021). Indonesia ranks fifth globally in diabetes prevalence; in 2021, the number of cases reportedly reached 19.5 million and is predicted to rise to 28.6 million by 2045 (IDF Diabetes Atlas, 2021). According to Statistics Indonesia (2021), the prevalence of T2DM among individuals aged 60 years and older is estimated to be between 15% and 20%. Older adults with T2DM have a two- to three-fold higher risk of physical disability (Hill, 2019) and a 50-90% increased risk of other disabilities (Gregg & Menke, 2018). In Indonesia, the risk of disability for those with diabetes is 4.89 times higher than for healthy individuals (Isfandari & Mihardja, 2017). The level of dependence due to diabetes has increased by 44.1%, ranging from mild to complete dependency (Statistics Indonesia, 2021). These individuals need support in managing blood sugar, preparing meals, taking medication, preventing complications, and carrying out daily activities such as eating, dressing, or bathing (Sinclair & Dunning, 2014).

Family caregivers are crucial in supporting diabetes management and personal care for this population (American Diabetes Association Professional Practice Committee, 2020). However, caring for dependent older adults is complex and challenging (Bigelow & Freeland, 2017). Caregivers may feel vulnerable, experiencing psychological distress and a high risk of death (Ottaviani et al., 2019; Sambasivam et al., 2019; Schulz & Beach, 1999). Constantly worried about health complications associated with T2DM, such as hypoglycemia and other potential emergencies, they face a complex mix of emotions, physical demands, and lifestyle adjustments while providing care for dependent older adults with T2DM (Kolaric et al., 2023; Kovacs Burns et al., 2016; Ripoll et al., 2018).

Several studies have reported that family caregivers caring for dependent older adults with T2DM have lower self-reported quality of life (QoL) in Indonesia than other regions globally (Auryn & Diniari, 2016; Cendrasilvinia & Manus, 2020; Kristina & Perdamaian, 2021). Improving the QoL of these caregivers is crucial because their dedication, support, and advocacy are vital in ensuring the well-being and QoL of their loved ones living with T2DM (American Diabetes Association Professional Practice Committee, 2020; Kolaric et al., 2023). If healthcare providers do not address the QoL issues of family caregivers, these caregivers are at risk of developing health problems themselves, which could hinder their ability to support the patient's treatment program effectively (Ottaviani et al., 2019).

According to the regulation of the Ministry of Health Republic of Indonesia No. 75 of 2014, healthcare teams, including doctors, nurses, and social workers at Community Health Centers (CHCs), are responsible for conducting the Home Visits Home Care (HVHC) program (Suratri et al., 2019). Since 2018, several CHCs have implemented the HVHC program, particularly for families with older individuals suffering from chronic illnesses (Kadar et al., 2022). However, these services primarily focus on the patients, often neglecting the caregiver's needs despite their crucial role in the care process (Kadar et al., 2022). To improve the QoL of family caregivers, it is essential to understand the factors that influence QoL among those caring for dependent older adults with T2DM. Therefore, the study's findings are expected to provide valuable insights to guide the development of targeted interventions to support and improve caregivers' QoL, ultimately enhancing the effectiveness of home healthcare services in Indonesia.

The revised Wilson and Cleary Model of Health-Related Quality of Life (WCM HRQOL) was chosen as the framework for this study (Ferrans et al., 2005). This model identifies causal relationships among elements contributing to overall QoL, including biological and physiological variables, symptom status, functional status, and general health perceptions, where each domain directly influences the others. The revised WCM HRQOL explains how individual and environmental characteristics affect the HRQOL (Ferrans et al., 2005). The relationships among the factors influencing HRQOL in the model are complex (Bakas et al., 2012) and can be classified as direct and indirect effects (Khamchan et al., 2020). According to this model, QoL is affected by health-related factors and influenced by other individual and environmental factors.

Existing literature has revealed that individual and environmental factors, such as self-efficacy, religiosity, and perceived knowledge, significantly influence the QoL of family caregivers of individuals with chronic diseases. For example, self-efficacy is crucial in determining the QoL (Pothiban et al., 2020; Warapornmongkholkul et al., 2018). Religiosity also impacts QoL, as caregivers who engage in religious activities tend to have higher HRQOL (Nagpal et al., 2015; Tedrus et al., 2020). Moreover, greater knowledge about caring for chronic diseases among family caregivers is associated with better QoL (Seangpraw & Ong-Artborirak, 2020).

Environmental factors, such as social support, significantly predict the QoL of family caregivers. Previous studies have shown that higher levels of perceived social support are associated with better QoL among caregivers of older adults with chronic diseases (Pothiban et al., 2020; Yang et al., 2012; Yoon et al., 2018). In contrast, inadequate social support results in poorer QoL (Choi et al., 2016; Wang et al., 2020). Additionally, previous studies have shown that caring for older patients with T2DM often leads to severe burden, stress, frustration, and depression (Adianta & Wardianti, 2018; Badriah et al., 2014; Kovacs Burns et al., 2016; Ripoll et al., 2018), which are psychological symptoms that directly impact QoL (Geng et al., 2018; Peepratoom et al., 2020).

Although the factors influencing the QoL of family caregivers of older adults with chronic diseases have been well-documented, such as education levels (Putri et al., 2023), financial strain, physical health issues, disruption in daily routines, and increased caregiver burden (Kristina & Perdamaian, 2021), self-esteem, and family support (Cendrasilvinia & Manus, 2020), there is limited research specifically focusing on family caregivers caring for older adults with T2DM in the community in Indonesia. The existing knowledge of how these factors influence the QoL of family caregivers caring for dependent older adults with T2DM remains unclear. To understand the causal relationships, further studies are needed to explore how these factors interact. An understanding of these multiple factors and their pathways is crucial for developing effective interventions to enhance the QoL of family caregivers in this context.

Therefore, based on the revised WCM HRQOL, we selected factors from the individual (self-efficacy, perceived knowledge, and religiosity) and environmental characteristics (social support) as having direct and indirect effects on QoL. We also selected depression symptoms and perceived caregiver burden as psychological symptoms with a direct impact on family caregivers' QoL. These factors can be modified in response to intervention. Our study aimed to test the model of QoL among Indonesian family caregivers caring for dependent older adults with T2DM in the community and examine the direct and indirect effects of depression symptoms, caregiver burden, religiosity, perceived knowledge, self-efficacy, and social support on QoL, using the revised WCM HRQOL model (Ferrans et al., 2005). The hypothesized model is illustrated in **Figure 1**.

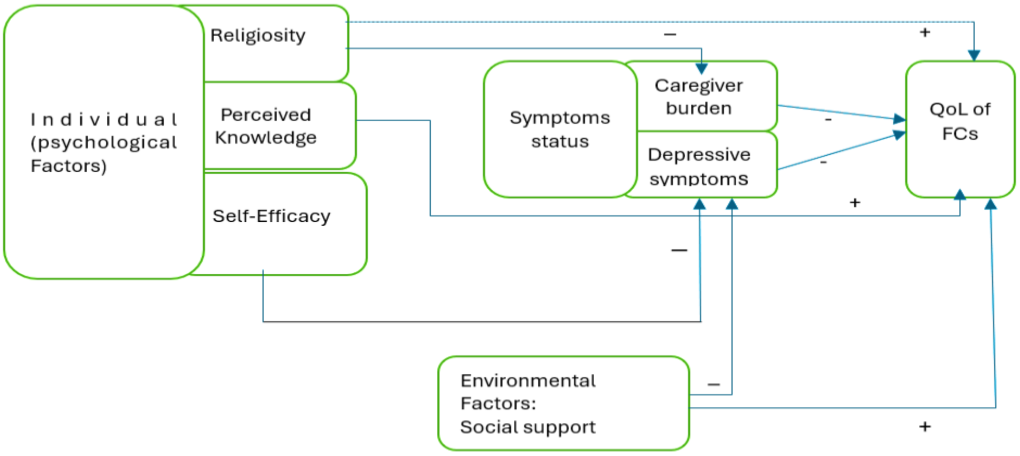

Figure 1 Hypothesized model of QoL of Indonesian family caregivers of dependent older persons with T2DM

Methods

Study Design

A cross-sectional, correlational study design.

Samples/Participants

This study used purposive sampling to maximize our recruitment prospects. The participants were recruited following the inclusion criteria: 1) being 18 years or older, 2) being the primary caregiver for at least three months, 3) living with dependent older persons with T2DM, 4) being able to speak Bahasa Indonesia, and 5) willingness to participate in the study. The inclusion criteria for the dependent older persons with T2DM were: 1) age 60 years and older, 2) being diagnosed with T2DM by a doctor, and 3) having an activity of daily living score between 5-11 as measured by the Barthel Index Modification (BIM). Family caregivers who could not complete the questionnaires during the study were excluded.

The sample size in this study was based on the rule-of-thumb approach for SEM, which suggests "200 cases minimum." Kline (2023) recommends 200 cases for a typical medium sample size in studies using SEM. A total of 274 family caregivers who met the study's criteria were initially recruited. However, four were excluded from the study: three declined to participate due to grief following the passing of their relatives during the data collection period, and one could not be reached because their relative was hospitalized. Thus, the final sample consisted of 270 family caregivers.

Instruments

Eight instruments were used for data collection as follows:

Data Demography Questionnaire (DDQ): This questionnaire was used to collect demographic data from both family caregivers and dependent older persons with T2DM. The DDQ for family caregivers included age, sex, marital status, educational level, monthly household income, duration of caregiving, use of a care assistant, and total duration of caregiving. It also collected demographic data on older persons with T2DM, including age, sex, duration of diabetes, comorbidities, chronic complications, and functional status.

The 10-item Center for Epidemiological Studies Depression-Revision (CES-D R 10) developed by Radloff (1977), originally comprising 20 items, was used to measure depression symptoms in family caregivers. The scale was previously translated into Indonesian (Tran et al., 2019), and permission was obtained to use it in this study. The scale consists of 10 items with a 4-point Likert scale ranging from "rarely or none of the time" (0) to "all of the time" (3). The total score ranges from 0 to 30, with any score equal to or above 10 considered depressed. In the actual study, Cronbach's alpha was 0.962.

The Zarit Burden Interview (ZBI) developed by Zarit et al. (1986) was used to measure caregiver burden. The ZBI consists of 22 items measuring five aspects: physical burden or caregiver's health, emotional or psychological burden, economic burden, social burden, and the relationship between family caregivers and their patients. Each item has a five-point Likert scale (never = 0, rarely = 1, sometimes = 2, quite frequently = 3, nearly always = 4) (Zarit et al., 2017). The score ranges from 0 to 88, with higher scores indicating greater burden (Zarit et al., 1986). The ZBI Indonesian version has a Cronbach's alpha of 0.878 (Tristiana et al., 2019). In the present study, Cronbach's alpha was 0.970.

The Duke University Religion Index (DUREL-I) developed by Koenig and Büssing (2010) was used to measure the religiosity of family caregivers. Permission was obtained to use this instrument, previously translated into Indonesian (Nurmansyah et al., 2020). This instrument consists of five items assessing three dimensions of religiosity: organizational religious activity (ORA), non-organizational religious activity (NORA), and intrinsic religiosity (IR). The items have various answer options, with a higher score indicating higher levels of religiosity. In this study, Cronbach's alpha was 0.814.

The Perceived Knowledge on T2DM Scale (PKS) developed by Nguyen et al. (2021) was used to measure the perceived knowledge of family caregivers about T2DM care. This instrument was translated into Indonesian using Brislin's guidelines (Brislin, 1970), and permission was obtained for translation and use. The PKS has seven items to measure common caregiving activities for persons with T2DM, including behavior change (diet, smoking, and physical activity), medication adherence, and complication care (e.g., foot ulceration, anxiety, and hypoglycemia control). The responses are based on a 5-point Likert scale ranging from 0 (definitely not) to 4 (definitely yes) (Nguyen et al., 2021). Total scores range from 0 to 28, with higher scores indicating greater perceived knowledge. The instrument has a

Cronbach's alpha of 0.888 in a pilot study. In the actual study, Cronbach's alpha was 0.965.

The Family-Carer Diabetes Management Self-Efficacy Scale (F-DMSES), modified by Wichit et al. (2018) from the Diabetes Self-Efficacy Scale (DMSES) (Bijl et al., 1999), was used to measure family caregivers' self-efficacy in diabetes management. It consists of 14 items assessing caregivers' confidence in performing various caregiving activities, including diet management, glucose monitoring, medication adherence, weight control, and physical activity. The scale uses a 5-point Likert scale (1 = definitely not to 5 = definitely yes). Total scores range from 5 to 70, with higher scores indicating greater self-efficacy. The instrument has a Cronbach's alpha of 0.897 in a pilot study of family caregivers of T2DM. In the actual study, Cronbach's alpha was 0.965.

The Multidimensional Scale of Perceived Social Support (MSPSS) developed by Zimet et al. (1988) was used to measure social support from family, friends, and significant others. This instrument was translated into Indonesian (Winahyu et al., 2015), and permission was obtained to use it in the study. The MSPSS has 12 items with a 1 to 6-point Likert scale, where 1 represents "very strongly disagree," and 6 represents "very strongly agree." The possible score ranges from 12 to 84, with higher scores indicating greater social support. The Indonesian version has shown good validity and reliability with a Cronbach's alpha of 0.85 (Winahyu et al., 2015). In the actual study, Cronbach's alpha was 0.939.

The Quality-of-Life Index (QLI) generic version III developed by Ferrans and Powers (1985) was used to measure quality of life. The instrument was translated into Indonesian using Brislin's guidelines (Brislin, 1970), and permission was obtained to translate and adopt it. The QLI consists of 33 items measuring satisfaction and importance across four domains: health/functioning (13 items), social/economic (8 items), psychological/spiritual (7 items), and family (5 items). Each item includes a 6-point rating scale, with satisfaction items rated from 1 (very dissatisfied) to 6 (very satisfied) and importance items rated from 1 (very unimportant) to 6 (very important). Satisfaction scores are weighted by corresponding importance scores. Total scores range from 0 to 30, with higher scores indicating better quality of life. The instrument has a Scale-Content Validity Index (S-CVI) of 1 and a Cronbach's alpha of 0.97. In the actual study, Cronbach's alpha was 0.965.

A pilot study was conducted at Pulo Brayan CHC, where the researcher administered the questionnaire to 30 family caregivers caring for dependent older persons with T2DM. The Cronbach's alpha coefficients for the QLI, DUREL-I, PKS, F-DMSES, MSPSS, ZBI, and CESD-R were 0.977, 0.814, 0.888, 0.897, 0.845, 0.926, and 0.854, respectively.

Data Collection

Data were collected from February 2023 to July 2023 at five Community Health Centers (CHCs) (Darussalam, Sering, Rantang, Lalang, and Bestari CHC) in Medan City, North Sumatra, Indonesia. Family caregivers who met the inclusion criteria were approached to participate in the study. Informed consent was obtained from all participants. Researchers administered the questionnaires and remained with the participants until they completed the answers. A Research Assistant (RA) was trained a day before data collection to help the participants care for their older persons with T2DM while completing the CHC questionnaires. If participants were unavailable to complete the questionnaire at the CHC, they were allowed to complete it at home, and an appointment was made for a convenient time.

Data Analysis

Descriptive statistics were used to analyze the data using IBM SPSS version 26. Partial Least Squares Structural Equation Modeling (PLS-SEM), which can estimate complex models, was used to evaluate the structure (Sarstedt et al., 2021). Hair et al. (2019) suggest that PLS-SEM offers solutions with small sample sizes when models include many constructs and items. The PLS-SEM analysis was conducted using SmartPLS 3.0, which offers numerous options for constructing outer and inner models, crucial for calculating latent variable scores in the research model.

In the outer model, an indicator is considered valid if its Average Variance Extracted (AVE) value is above 0.5 or if all the variables in its dimension have values greater than 0.5 (Hair et al., 2019). A Composite Reliability (CR) value of 0.6 – 0.7 is considered good reliability (Hair et al., 2019; Sarstedt et al., 2021). In addition, Cronbach's alpha measures the scale's reliability, with values closer to 1 indicating stronger internal consistency (Hair et al., 2019). The Fornell-Larcker Criterion measures discriminant validity. If the square root value of AVE for each construct is greater than the correlation value between the construct and other constructs in the model, the model has good discriminant validity (Hair et al., 2019). There was no multicollinearity problem (Variance Inflation Factor/VIF <10). It is suggested that values between 5 and 10 are considered the VIF threshold, while values above 10 indicate multicollinearity (Vittinghoff et al., 2005).

The second step assessed the inner model. This study used path analysis to test the hypothesized model. The hypotheses were analyzed using *t*-statistics or bootstrapping to determine their significance. The *t*-test was intended to test whether the independent variables partially have a significant effect on the dependent variable (the *t*-table for alpha = 0.05 is 1.96)—the path coefficients in a model range from -1 to +1. When the path coefficient is closer to +1, the two constructs (variables) (Hair et al., 2019; Sarstedt et al., 2021) have a strong positive relationship. In other words, as one variable increases, the other variable tends to increase as well. When the path coefficient is closer to -1, it indicates a strong negative relationship. This means that as one variable increases, the other variable tends to decrease (Hair et al., 2019; Sarstedt et al., 2021). R-square (R^2) was used to assess the variance explained in endogenous latent constructs by the exogenous latent constructs included in the model. Q-squared (Q^2) was used to evaluate the predictive relevance of our structural equation model (Hair et al., 2019). By assessing Q^2, we can determine how our model successfully predicts the outcome of interest. Model fit was evaluated by Root Mean Square Residual (SMSR). An SMSR <0.05 means the model is considered a good fit to the data (Hair et al., 2019; Sarstedt et al., 2021). By rigorously ensuring the reliability and validity of our measurement instrument, we can be confident that the data used in our SEM analysis accurately reflects the underlying construct, thereby bolstering the credibility and robustness of our study's findings.

Ethical Consideration

This study was approved by the Social and Behavioral Science Institutional Review Board, Prince of Songkla University, Thailand (Approval number: 2022-st-nurs-045), and by the Health Research Ethics Committee, Universitas Sari Mutiara Indonesia (Approval number: 1823/F/KRP/USM/XII/2022). The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Informed consent was obtained from all participants prior to their participation in the study. Participant confidentiality was strictly maintained, and data were anonymized to ensure privacy.

Results

Participants Characteristics

The mean age of family caregivers was 53.67 years (SD = 11.68), with the majority being female (79.3%) and married (85.9%). A significant portion had attained only an elementary level of education (39.3%), and more than half (67.0%) did not have assistance in caregiving. Most respondents (56.7%) reported a monthly household income of less than 3,000,000 Indonesian Rupiah (approximately 195.27 USD). On average, family caregivers spent 10.36 hours per day caregiving, with 48.5% providing care for 1–2 years. Regarding the characteristics of the older persons with T2DM, their mean age was 74.61 years (SD = 5.35), with an average diabetes history of 9.54 years (SD = 1.74). Over half (52.2%) were female, and 51.9% had three or more comorbidities, including hypertension, osteoarthritis, and stroke. Additionally, 67.8% had two chronic complications. Nearly half (45.9%) had experienced a stroke, and more than half (54.07%) had diabetic foot neuropathy. The mean score for the older persons' functional status, as measured by the Modified Barthel Index (MBI), was 9.20 (SD = 1.00) (see **Table 1**).

Table 1 Descriptive statistics of family caregivers' demographic and their older persons (*N* = 270)

Characteristics		***n (%)***	**Possible Score**	**Actual Score**		**Mean ± SD**
				Minimum	**Maximum**	
Age	Years (Mean ± SD)		≥18	27	71	53.67 ± 11.60
Gender	Male	56 (20.7)				
	Female	214 (79.3)				
Marital status	Married	232 (85.9)				
	Widowed	38 (4.1)				
Educational level	Elementary School	106 (39.3)				
	Junior High School	53 (19.6)				
	Senior High School	58 (21.5)				
	University	53 (19.6)				
Care Assistant	Yes	89 (33.0)				
	No	181 (67.0)				
Household Income (IRD) /month	IDR <3.000.000	153 (56.7)				
	IDR 3-5.000.000	99 (36.7)				
	IDR >5.000.000	18 (6.7)				
Duration of caregiving	Hour/day (Mean ± SD)			6	18	10.36 ± 2.68
Overall caregiving duration (Year)	<1	67 (24.8)				
	1-2	131 (48.5)				
	3-5	69 (25.6)				
	6-9	2 (7.0)				
	>10	1 (4.0)				
Age of Older Person	Year (Mean ± SD)		>60	62	90	74.61 ± 5.35
Gender	Male	129 (47.8)				
	Female	141 (52.2)				
Diabetes duration	Year (Mean ± SD)			6	15	9.54 ± 1.74
Comorbidities	1-Comorbid	57 (21.1)				
	2-Comorbids	73 (27.0)				
	3-Comorbids & more	140 (51.9)				
Type of Comorbidities	Hypertension	188 (69.6)				
	Osteoarthritis	147 (54.4)				
	Stroke	124 (45.9)				
	TBC Lung	28 (10.3)				
	Dyslipidemia	38 (14.0)				
	Coronary heart disease	29 (10.7)				
	Kidney disease	88 (32.5)				
No. of chronic complication	1	83 (30.7)				
	2	183 (67.8)				
	3	4 (1.5)				
Chronic complication type:	Diabetic foot	146 (54.0)				
	Visual impairment	140 (51.8)				
	Hearing impairment	91 (33.7)				
Functional status/MBI			5 - 11	6	11	9.20 ± 1.00

Note: SD = Standard Deviation

Correlation between Study Variables

Table 2 presents the correlation between the study variables. The mean score for QoL of family caregivers was 12.43 (SD = 5.01). The mean scores for depression symptoms and caregiver burden were 20.78 (SD = 3.91) and 62.17 (SD = 13.07), respectively. The scores for religiosity, perceived knowledge, self-efficacy, and social support ranged from low to moderate. Furthermore, depression symptoms and caregiver burden were significantly negatively correlated with the QoL of family caregivers. In contrast, religiosity, perceived knowledge, self-efficacy, and social support were significantly positively correlated with the QoL of family caregivers. Self-efficacy and social support were negatively correlated with depression symptoms. Additionally, religiosity was significantly negatively correlated with caregiver burden.

Table 2 Descriptive statistics of the study variables and correlation between study variables (*N* = 270)

Variables	**Possible Score**	**Actual Score**		**Mean (SD)**	**Caregiver Burden**	**Depression Symptoms**	**Qol**
		Minimum	**Maximum**				
Depression symptoms	0 - 33	12	26	20.78(3.90)			-0.951**
Caregiver Burden	0 - 88	43	87	62.17(13.07)			-0.909**
Religiosity	5 - 27	10	24	16.39(2.76)	-0.822**		0.735**
Perceived Knowledge	0 - 28	9	26	18.79(4.21)			0.769**
Self-Efficacy	5 - 70	19	61	44.24(10.48)		-0.785**	0.743**
Social Support	12 - 84	18	79	49.56(15.77)		-0.839**	0.814**
QoL	0 - 30	6.3	22.1	12.43(5.01)			

Note: Data were analyzed using Person Correlation Product Moment | SD = Standard Deviation | ** Correlations are significant at the level of 0.01

Outer Model Assessment Results

This study found that the indicator loading values of all items were >0.733, indicating they were valid. Cronbach's alpha and CR for all constructs were >0.80, demonstrating robust internal consistency. The AVE value for each construct was >0.50, suggesting that all constructs met the requirements for convergent validity. The VIF values were <10. According to Vittinghoff et al. (2005), values between 5 and 10 are considered the threshold for VIF, while values above 10 indicate multicollinearity. The Fornell-Larcker criterion for each construct was greater than its correlation with other variables, fulfilling the discriminant validity requirement. Thus, all items satisfied the criteria requirements for PLS-SEM analysis.

Inner Model Assessment Results

Bootstrapping Path Coefficient of Direct Effects (DE) of Study Variables

The results of the bootstrap calculation of the coefficient estimates revealed that depression symptoms had the strongest negative direct effect on the QoL of family caregivers (DE = -0.744, *t* = 15.874, *p* <0.001), followed by caregiver burden (DE = -0.269, *t* = 4.054, *p* <0.001) (Table 3).

Table 3 Bootstrapping Path Coefficient Direct Effects (DE) of Study Variables

Variables	**Original Sample (O)**	**Sample Mean (M)**	**SD**	***t*-statistics (|O/STDEV|)**	***p*-value**
Caregiver Burden → QoL of Family Caregivers	-0.269	-0.268	0.066	4.054	<0.001
Depression Symptom → QoL of Family Caregivers	-0.744	-0.747	0.047	15.874	<0.001
Religiosity → QoL of Family Caregivers	-0.055	-0.051	0.059	0.933	0.351
Perceived Knowledge on T2DM → QoL of Family Caregivers	0.138	0.134	0.061	2.264	0.024
Self-Efficacy → QoL of Family Caregivers	0.185	0.185	0.048	3.830	<0.001
Social Support → QoL of Family Caregivers	0.026	0.024	0.053	0.485	0.628
Religiosity → Caregiver Burden	-0.800	-0.801	0.019	42.919	<0.001
Self-Efficacy → Depression Symptom	-0.306	-0.303	0.061	5.036	<0.001
Social Support → Depression Symptom	-0.561	-0.564	0.054	10.375	<0.001

Note: The *t*-value for significance at alpha 0.05 is 1.96, and alpha 0.10 is 1.65.

Bootstrapping Path Coefficient of Indirect Effect (IE) of Study Variables

Table 4 shows that social support (IE = 0.417, *t* = 8.727, *p* <0.001) was the strongest positive indirect effect on the QoL of family caregivers, followed by self-efficacy (IE = 0.228, *t* = 4.651, *p* <0.001).

Table 4 Bootstrapping Path Coefficient Indirect Effect (IE) of the Study Variables

	Original Sample (O)	**Mean**	**SD**	***t*-statistics (|O/SD|)**	***p*-value**
Religiosity → Caregiver Burden → QoL of Family Caregivers	0.215	0.214	0.053	4.056	<0.001
Self-Efficacy → Depression Symptoms → QoL of Family Caregivers	0.228	0.227	0.049	4.651	<0.001
Social Support → Depression Symptoms → QoL of Family Caregivers	0.417	0.421	0.048	8.727	<0.001

Bootstrapping Path Coefficient of Total Effect (TE) in the Final Model

Based on calculations using bootstrapping, as presented in **Table 5**, the coefficient estimation for the direct effect of depression symptoms on QoL was -0.744, with a *t*-value of 14.598 and a *p*-value of <0.001. This indicates that the direct effect of depression symptoms on QoL is statistically significant. Depression symptoms had the strongest negative direct effect on the QoL of family caregivers, followed by caregiver burden (IE = -0.269, *p* = 0.05). In contrast, for the indirect effect, social support (IE = 0.417, *p* = 0.05) was the strongest positive indirect effect on the QoL of family caregivers, followed by self-efficacy (IE = 0.228, *p* = 0.05).

The final model, based on the total impact, shows that depression symptoms had the strongest negative direct effect on the QoL of family caregivers (TE = -0.744, *p* = 0.05), followed by social support and self-efficacy, which indirectly affected QoL through depression symptoms (TE = 0.443, *p* = 0.05 and TE = 0.413, *p* = 0.05, respectively) (**Figure 2**).

The coefficient of determination (R^2) value was 0.893, and the adjusted R^2 was 0.891. The Q^2 value was 0.660, indicating that approximately 66.0% of the variation in QoL is predicted or explained by the combined effects of the variables included in the model. The standardized root mean square residual (SRMR) value was 0.048, less than 0.05, confirming that the model fits the data well.

Table 5 Bootstrapping Path Coefficient of Total Effect in the Final Model

Variables	**Final Model**		
	Direct Effect (DE)	**Indirect Effect (IE)**	**Total Effect (TE)**
Depression symptom → Family Caregivers' QoL	-0.744*	-	-0.744*
Caregiver Burden → Family Caregivers' QoL	-0.269*	-	-0.269*
Religiosity → Family Caregivers' QoL	-0.055ns	0.215*	0.160*
Perceived Knowledge on T2DM → Family Caregivers' QoL	0.138*	-	0.138*
Self-Efficacy → Family Caregivers' QoL	0.185*	0.228*	0.413*
Social Support → Family Caregivers' QoL	0.026ns	0.417*	0.443*
Religiosity → Caregiver Burden	-0.800*	-	-0.800*
Self-Efficacy → Depression Symptoms	-0.306*	-	-0.306*
Social Support → Depression Symptoms	-0.561*	-	-0.561*

Note: *p <0.05 | ns = not significant | R^2 = 0.893 | Q^2 = 66.0% | *Adjusted* R^2: 89.1% | Root Mean Square Residual (SMSR) = 0.048

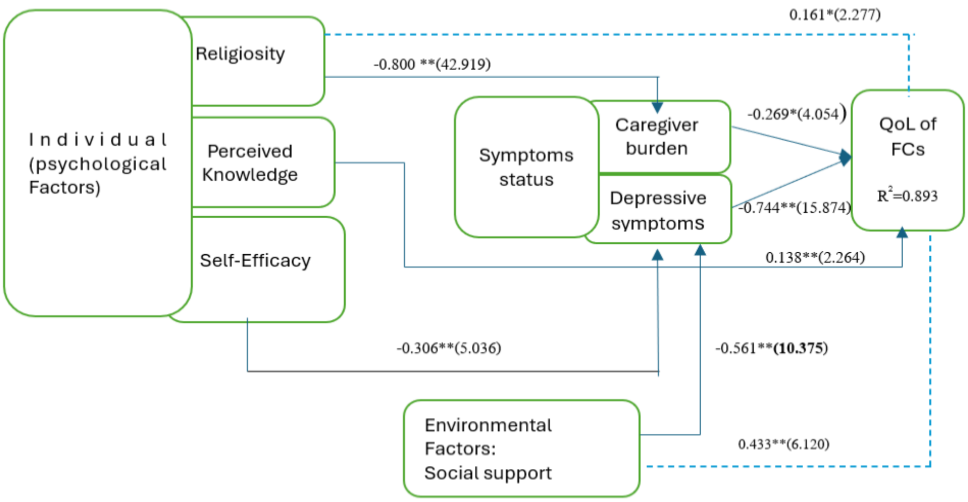

Figure 2 The final model of QoL of family caregivers (FCs) of dependent older persons with T2DM
Note: (*p <0.05, ** p <0.001)

Discussion

The SRMR value was 0.048, less than 0.05, confirming that the model fits the data well. The new model demonstrated that the QoL of family caregivers was simultaneously influenced by depression symptoms, caregiver burden, perceived knowledge, religiosity, self-efficacy, and social support. Depression symptoms had the strongest negative direct effect on the QoL of family caregivers, followed by caregiver burden. In contrast, social support and self-efficacy had the strongest positive indirect impact on the QoL of family caregivers through depression symptoms. Additionally, religiosity indirectly affected the QoL of family caregivers through caregiver burden, while perceived knowledge had a positive direct effect on their QoL.

Depression symptoms had a strongly negative direct effect on the QoL of family caregivers. Consistent with a prior study, depression was significantly more frequent among family caregivers of diabetic patients, who also had poorer QoL compared to the control group (Anaforoglu et al., 2012). Family caregivers in this study spent approximately 10.36 hours daily caring for dependent older persons with T2DM. Zhong et al. (2020) revealed that family caregivers who provided care for several hours throughout the day were more likely to be depressed. Additionally, the older persons, aged between 75 and 90, had moderate to severe dependency with comorbidities, the most common being hypertension, osteoarthritis, and stroke. They also suffered from complications such as diabetic foot, vision, and hearing problems. As a result, caregiving became increasingly complex and consumed significant energy, thought, and financial resources. Bigelow and Freeland (2017) reported that older persons with T2DM, along with complications and other chronic conditions, can increase the burden for both patients and caregivers. Due to these caregiving responsibilities, caregivers often lacked time to care for themselves, could not participate in social activities, felt lonely and bored, and had little free time. They experienced stress and depression, which ultimately affected their own QoL.

This finding aligns with the theoretical model of WCM HRQL, which posits that symptom status, including depression, influences QoL (Ferrans et al., 2005). Individuals with higher depression had poorer QoL (Peepratoom et al., 2020). Kovacs Burns et al. (2016) also found that family concerns about diabetes management, frustration from not knowing how to help, and increased responsibility for diabetes management were associated with a negative psychological impact (distress) and a perceived lower QoL.

The caregiver burden has a negative direct effect on the QoL of family caregivers. Our findings align with MirHosseini et al. (2020) reported that higher burden scores were associated with a decrease in the QoL of Iranian family caregivers of diabetic patients. Studies consistently agree that informal caregivers of older persons with diabetes mellitus tend to experience significant burdens and strain (Adianta & Wardianti, 2018; Kovacs Burns et al., 2016). Rezaei et al. (2020) found that diabetes is one of four chronic disorders most associated with the burden of care for Iranian caregivers, following dialysis, mental disorders, and Alzheimer's disease. Similarly, a study in Mexico revealed that 48.2% of informal caregivers of older adults with T2DM experienced intense overload (del Campo Navarro et al., 2019). Liu et al. (2020) further demonstrated that caregiver burden leads to a decline in QoL. In this study, caregiver burden was conceptualized as a psychological symptom within the WCM HRQOL framework. Caregiving is a challenging task that demands significant time, effort, attention, and dedication. Research has consistently acknowledged that informal caregivers of older persons with diabetes mellitus tend to be burdened (Kovacs Burns et al., 2016). Therefore, reducing the caregiver burden can directly enhance QoL.

Social support indirectly affects family caregivers' QoL through depression symptoms. When individuals receive higher social support, they can build resilience to stress, reducing the risk of elevated depressive symptoms (Zhong et al., 2020). Previous studies support this finding, showing that when individuals receive higher social support, they are better able to manage stress and lower their risk of depression (Aplizuddin et al., 2020; Wan et al., 2023). Caregivers with high social support report greater life satisfaction and are more likely to experience positive emotions (Liao et al., 2020). Additionally, caregivers who receive support from family, significant others, friends, and healthcare providers can provide better care and demonstrate greater understanding when caring for sick family members (Scarton et al., 2016). Furthermore, they are more likely to recover from stress and depression, while individuals without adequate social support may experience worsened psychosocial distress and depression (Zhong et al., 2020). Additionally, lower self-efficacy in family caregivers is associated with higher levels of depression symptoms, which, in turn, leads to lower QoL. This finding aligns with prior studies that also reported a relationship between lower self-efficacy and higher depression symptoms in caregivers of patients with chronic diseases (Warapornmongkholkul et al., 2018). Rabinowitz et al. (2011) revealed that caregivers with high self-efficacy in caregiving tend to have positive emotional responses to caregiving, which, over time, reduces their susceptibility to depression. Self-efficacy is associated with the ability to cope with challenging situations, such as managing disruptive behaviors and providing safe and competent care (Leow et al., 2015).

In the context of T2DM care, self-efficacy refers to the confidence of family caregivers in performing caregiving tasks for patients with T2DM (Wichit et al., 2018). An individual's ability to complete caregiving tasks can help reduce anxiety and stress, forming a positive cycle that improves QoL (Faronbi, 2018). Family caregivers of older adults with T2DM assist with daily activities, including meal preparation, blood sugar control, hypoglycemia management, diabetic complications, foot care, psychological support, exercise, weight management, medication administration, hospital visits, and financial, mental, and physical support (Wichit et al., 2018). These findings support previous research suggesting that increasing self-efficacy in caregivers provides numerous benefits to FCs of dependent older persons with T2DM.

Moreover, this study found that religiosity can enhance the QoL of family caregivers of dependent older persons with T2DM by reducing caregiver burden. Caregiving is a stressful responsibility, and caregivers may experience feelings of despair, anger, or even blame toward their God (Koenig, 2012; Salehi et al., 2020). Family caregivers participating in religious activities, such as praying, are more likely to experience a higher overall QoL (Netchang, 2012). A similar study by Tavares et al. (2020) on 139 family caregivers of care-dependent patients in Brazil and found that caregivers with stronger religious faith and practices had higher levels of QoL.

Knowledge about T2DM care—such as recognizing the signs and symptoms of hypoglycemia, preparing appropriate diets, providing foot care, and controlling blood sugar—is critical because it helps caregivers alleviate anxiety, worry, and hopelessness when assisting family members with diabetes in self-care at home (Kovacs Burns et al., 2016; Siregar et al., 2023; Thongduang et al., 2022). Inadequate knowledge among FCs about T2DM management contributes to an increased caregiving burden, leading to depression and, subsequently, reduced QoL (Yaslina et al., 2018). Therefore, increasing family caregivers' knowledge about T2DM care is essential for improving their QoL.

Implications for Nursing Practice

Given the significant negative relationship between depression symptoms and QoL, health policymakers and healthcare providers should prioritize enhancing mental health support services for family caregivers. This can be achieved by implementing accessible counseling programs, providing resources through healthcare providers, and fostering community-based support groups. To address the negative impact of caregiver burden on QoL, it is essential to establish caregiver support programs that reduce the burden by strengthening social support networks, offering respite care, and incorporating religious-based interventions. Recognizing the positive relationship between social support and QoL, particularly in reducing depressive symptoms, policies should build robust social support networks through community initiatives, healthcare collaboration, and family involvement, encompassing emotional, informational, material, and financial assistance. Additionally, to strengthen self-efficacy among family caregivers, policymakers should develop training programs focused on caregiving and diabetes management for older persons with moderate to severe functional dependency. Educational programs that increase health literacy and disease management knowledge are also crucial, as perceived knowledge positively impacts QoL.

Furthermore, given the significant effect of religiosity on QoL through its influence on caregiver burden, support for religious activities should be integrated into caregiver support programs. These programs should provide spaces for spiritual practices and offer spiritual support to help alleviate the burden of caregiving. Specifically, for community nurses, our study offers inputs for developing targeted interventions to support family caregivers who care for dependent older persons with T2DM at home. These interventions should focus on reducing depression symptoms and caregiver burden, enhancing social support, self-efficacy, perceived knowledge of T2DM care, and providing support for religious activities.

Limitations

This study has several limitations that should be considered. Firstly, it is a cross-sectional study, meaning causal relationships should be interpreted cautiously. Longitudinal data would be more appropriate for understanding how variables change over time and establishing causal connections. Secondly, the findings may be specific to the Indonesian population and cannot be generalized to other populations or settings, as cultural differences can significantly influence the relationships between variables. Despite these limitations, the study focuses on unpaid family caregivers responsible for older individuals with T2DM, associated comorbidities, and chronic complications.

Conclusion

Depression symptoms were the strongest factor negatively influencing the QoL of family caregivers caring for dependent older persons with T2DM. Social support and self-efficacy had positive indirect effects on the QoL of family caregivers through depression symptoms. The study findings highlight the importance of strengthening social support and self-efficacy in reducing depression symptoms and caregiver burden. These strategies could be valuable for promoting the QoL of family caregivers, in addition to improving the well-being of their dependents.

Declaration of Conflicting Interest

There is no conflict of interest to declare.

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Authors' Contributions

RS, CK, and TC contributed substantially to the study's conception, design, and data acquisition. RS, CK, TC, and JML were involved in the analysis and interpretation of the data. RS, CK, TC, and JML were involved in critically drafting or revising the manuscript for important intellectual content. RS, CK, TC, and JML agreed to be accountable for all aspects of the manuscript to ensure that questions related to the accuracy or integrity of any part of the manuscript are appropriately investigated and resolved. RS, CK, TC, and JML approved publishing the final version.

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Data Availability

Datasets analyzed for the current study results are available from the first and corresponding authors upon reasonable request.

Declaration of Use of AI in Scientific Writing

There is nothing to declare.

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Mediating role of self-efficacy in the relationship between family functioning and self-management behaviors in patients with coronary heart disease: A cross-sectional study in Jiangsu, China

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Abstract

Background: Self-management behaviors can prevent the negative consequences among patients with coronary heart disease (CHD). The reality of patients followed the self-management behaviors rate are unoptimistic.

Objective: This study aimed to examine whether self-efficacy serves as a mediating role between family functioning and self-management behaviors among coronary heart disease patients.

Methods: A cross-sectional approach was applied, and 140 patients with CHD were included using a cluster sampling strategy. Family functioning was assessed utilizing the Family APGAR Index, self-efficacy was evaluated using the Self-efficacy for Chronic Disease 6-item Scale, and self-management behaviors was examined utilizing the Coronary Artery Disease Self-Management Scale. Data were collected from July to October 2022 and analyzed using descriptive statistics and regression analyses to evaluate the mediating influence.

Results: The degree of self-management behaviors among patients with CHD was at a low level (Mean = 82.23, SD = 11.863). Self-efficacy had a direct and positive impact on self-management behaviors ($\beta = 0.39$, $p < 0.001$). Moreover, self-efficacy had a partially intermediary function in the relationship between family functioning and self-management behaviors (indirect effect = 0.14, 95% CI [0.04, 0.27]; direct effect = 0.39, $p < 0.001$).

Conclusion: Self-efficacy demonstrated an association with self-management behaviors and served as a mediation function in the relationship between self-management behaviors and family functioning. Therefore, the significance of family functioning and self-efficacy should be highlighted in nursing practice when developing methods to encourage patients with CHD to improve their self-management behaviors.

Keywords

China; coronary artery disease; family; self-efficacy; self-management

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Background

Coronary heart disease (CHD), additionally named as ischemic heart disease, is a significant global health burden that is increasing in terms of its high rates of morbidity and mortality. It has implications for individuals, families, society, and healthcare systems. CHD is the primary reason for cardiovascular mortality in both developed and developing countries (WHO, 2024), and its mortality has risen from 7.2 million in 2012 to 8.9 million in 2019 (WHO, 2021). Over 11.39 million people in China have been affected by CHD, which is still one of the principal reasons for fatalities in this country.

Because of improvements in the therapy and control of CHD, a growing number of individuals are living with CHD. As a result, efficient and easily accessible healthcare services are now crucial for the management of CHD. The development process of CHD is correlated with multiple risk factors, including low levels of high-density lipoprotein cholesterol, high levels of low-density lipoprotein cholesterol, tobacco use, a family history of the condition, hypertension, diabetes mellitus, postmenopausal status in women, and age over 45 in men. Moreover, obesity can potentially be a risk factor that contributes to CHD (American Heart Association [AHA], 2016). World Health Organization data shows that risk factor adjustment and good self-care practices can prevent nearly 80% of cardiac incidents (WHO, 2021).

"The individual's capacity to effectively manage the symptoms, treatments, physical and psychosocial consequences, as well as the lifestyle changes built-in living with a chronic condition" is the definition of self-management

(Barlow et al., 2009). For patients with CHD, self-management encompasses a range of behaviors that need to be adaptable to physical and psychological changes, and improved behaviors about secondary prevention must be considered, such as adherence to medications, respecting prescriptions, and maintaining a healthy lifestyle (Dorje et al., 2018). Even though self-management can improve patient health outcomes and prevent cardiac events, numerous investigations have stated that the self-management behaviors of individuals with CHD show a lack of optimism; it is at a lower or intermediate level (Zhu et al., 2023).

Effective self-management requires the availability of various supportive resources, especially families. A more in-depth comprehension of self-management (SM) is critical as managing one's health shifts from healthcare providers to individuals and families (Bauer et al., 2023). According to Ryan and Sawin (2009), SM is a complex phenomenon in which people manage chronic diseases and promote health using dyads, families, and individuals' behaviors across all developmental phases. The family is the cornerstone of society, providing necessary spiritual and emotional support in addition to practical support (Yuan et al., 2021). When a family is understood as a coherent unit, family functioning includes all of the physical, emotional, and psychological interactions between family members. The dynamic has a significant impact on a multitude of diverse aspects of family life. According to a previous study, patients with healthy families can considerably lessen the adverse effects of illness stress and other challenges on all family members (Song et al., 2019). The findings of Bennich et al. (2017) emphasized the significance of family participation in enhancing target patients' persistence to self-management practices and found that family functioning is correlated with self-management positively. In addition, a prior investigation has demonstrated that family functioning significantly influences patients who suffer from chronic illnesses (Yuan et al., 2021).

Self-efficacy is a person's conviction in their capabilities to plan and conduct particular tasks (Almeida et al., 2022). Self-efficacy is the principal predictor of self-management behaviors in patients with CHD. When self-efficacy levels were depressed, patients with CHD were found to exhibit diminished quality of life, insufficient self-care, and a decline in health status (Nuraeni et al., 2023). It was suggested that those with poor health habits are more likely than people with relatively high self-efficacy to experience decreased cardiac self-efficacy (Shrestha et al., 2020).

The prior research has demonstrated that family functioning is independently linked to self-efficacy and self-management. As is widely acknowledged, self-efficacy has been identified as a pivotal factor affecting how successfully CHD patients manage their condition on their own. The combined effect of these variables on self-management behaviors remains to be studied. Hence, for the purpose of filling in gaps in prior research in this field, whether self-efficacy has a major influence on the psychological mechanisms that underlie the connection between family functioning and self-management in CHD patients was explored.

By examining the interactions among these variables, nurses can gain valuable perspectives on the roles of family functioning and self-efficacy in promoting patient self-management behaviors. These findings are essential as they can inform nurses in developing targeted nursing interventions to promote positive health consequences and encourage self-management behaviors in individuals with CHD.

Our study examined the associations between family functioning, self-efficacy, and self-management behaviors in Chinese CHD patients. It was designed using the Individual and Family Self-management Theory (IFSMT) and research evidence as a conceptual framework. Additionally, our study sought to ascertain if self-efficacy intermediates the relationship between family functioning and self-management behaviors among CHD patients.

Conceptual Framework

This study complied with the principles expounded in the IFSMT (Ryan & Sawin, 2009), which conceptualized self-management as a dynamic progression wherein patients need to apply knowledge, beliefs, and social facilitation to achieve self-management goals. According to this framework, self-management can be viewed as an event founded on the individual and/or family condition integrated with factors that either promote or impede self-management behaviors. When formulating self-management plans, the detailed situation of CHD patients must be initially evaluated, encompassing the condition-specific factors, the physical and societal surroundings of the patient, and the personal and family aspects involved. In this study, family functioning is regarded as an individual and family factor, whereas self-efficacy is viewed as a knowledge and beliefs factor. The conceptual framework proposed for this research is shown in **Figure 1**.

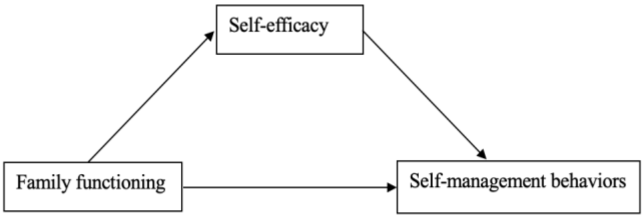

Figure 1 Conceptual framework of family functioning and self-efficacy on self-management behaviors of patients with CHD

Two hypotheses were proposed in this study. The first hypothesis posits that family functioning has a direct effect on self-management behaviors. The second hypothesis suggests that family functioning indirectly influences self-management behaviors through self-efficacy among patients with CHD.

Methods

Study Design

A descriptive correlational study proved advantageous in investigating the moderating role of self-efficacy in the connection between family functioning and self-management behaviors.

Samples/Participants

In a tertiary general hospital in Yancheng, Jiangsu, China, all patients diagnosed with CHD by cardiologists were recruited for this study using a cluster sampling approach. The Demographic Data Questionnaire, Family APGAR Index, Self-

Efficacy for Chronic Disease 6-item Scale, and Coronary Artery Disease Self-Management Scale were all included in the survey. Information was gathered within the timeframe spanning from July 2022 to October 2022. The criteria for inclusion were enumerated as below: (1) Aged more than 30 years; (2) Able to communicate, read, and write in Chinese; (3) No disabilities that may affect their ability to perform ADL; and (4) No cognitive impairment. Patients were excluded if they had severe complications such as heart failure, renal failure, advanced cancer, or other lung disease.

The dominant variables that affect the scale of a study sample should be effect size, statistical power, α, and β. An acceptable alpha level (α) of 5%, a beta level (β) of 20%, and a statistical power of 95% were determined for this study. This study's sample quantity was evaluated using a G*power (Faul et al., 2009). One hundred eleven individuals were required for the projected sample size after a.05. α level, a power of 0.95, and an effect size of 0.3 were established (Chuang et al., 2021). Considering the attrition rate of 20%, the total sample size of participants recruited in this research was 134 individuals.

Instruments

The present study utilized four questionnaires, detailed as follows:

Demographic Record Form. It includes two parts: the general information encompassed age, gender, educational level, marital status, types of insurance, and household income. Disease-related characteristics included cardiac function grading, disease duration, and other chronic illnesses.

Family APGAR Index. The Family APGAR Index is used to quantify family functioning. Smilkstein et al. (1982) authored the original English version, which was converted into Chinese by Lv and Gu (1995). On this scale, adaptability, cooperation, growth, affection, and resolution are the five components. There are three alternative responses for each item: hardly = 0, sometimes = 1, and always = 2. The overall score was between 0 and 10. When the score was higher, it indicated that the experience with family functioning was the most fulfilling. Regarding family dysfunction, a score between 0 and 3 indicates severe dysfunction, between 4 and 6 represents medium dysfunction, and between 7 and 10 stands for effective family functioning. In the research carried out by Kroplewski et al. (2019), the scale exhibited a substantial extent of internal consistency, as displayed by a Cronbach's α value of 0.879.

Self-Efficacy for Chronic Disease 6-item Scale (SECD6). The Center for Patient Education and Research at Stanford University developed the original English version, which measures a person's confidence in their ability to control the symptoms of chronic diseases (Lorig et al., 2001). The six components in the SECD6 are divided into two fields: (a) confidence in controlling symptoms (CCS), comprising four entries concerning self-assurance in averting fatigue, physical discomfort, psychological distress, and other associated symptoms; (b) confidence in maintaining function (CMF), comprising of two items concerning self-assurance in handling medical conditions and mitigating the consequences of illness. The overall mean score falls between 1 (no confidence) and 10 (perfect confidence). The degree of self-efficacy is represented by the average score across all items. The elevated scores signify a higher degree of self-efficacy. A score of ≥7 is considered a high degree of self-efficacy; A score of <7 is regarded as a low level of self-efficacy. Strong internal consistency of the Chinese form of SECD6 is demonstrated by a Cronbach's α of 0.91 in the previous study (Jiang et al., 2020).

Coronary Artery Disease Self-Management Scale (CSMS). The CSMS was created by Ren et al. (2009). To evaluate self-management behaviors in three different areas, the instrument is equipped with a Likert scale that comprises 27 entries and ranges from 1 (never) to 5 (always). The scale covers: (a) Daily Life Management: eight items cover various areas of lifestyle, such as the management of risky behaviors and the encouragement of a healthy lifestyle; (b) Disease Medical Management: fourteen items examine the capacity to manage their symptoms, such as disease knowledge acquisition, adherence to treatment protocols, and emergency response strategies; (c) Emotional Management: Four items are utilized to evaluate mood, leisure activities, and coping methods. Greater total scores are related to greater levels of self-management behaviors. The score falls within the range of 27 to 135 points. The Chinese edition of the CADSs boasts great intrinsic consistency, as shown by a Cronbach's α of 0.85 (Ren et al., 2009).

The Chinese version of the aforementioned three scales has been previously employed within the Chinese population, demonstrating strong validity and reliability. Permission to utilize the Family APGAR index, SECD6, and CSMS in this study was obtained from the original developers.

Data Collection

The Demographic Record Form, Family APGAR Index, Self-Efficacy for Chronic Disease 6-item Scale, and Coronary Artery Disease Self-Management Scale are among the forms that participants must fill out. Two experienced research assistants, registered nurses with no less than two years of work experience in treating patients with CHD, delivered all of the scales to the participants and then collected the completed forms. When participants had impaired vision or experienced difficulty reading the items, the researcher and study assistants read the items to them and recorded their answers.

During the data-collecting phase, participants were introduced to the researcher and research assistants and informed of the study's objectives, methodology, potential dangers, and advantages. Individuals who chose to participate in this survey signed an informed consent document. Participants were guaranteed that their participation in the trial would not harm the quality of their treatment or their ability to obtain hospital nursing services in the future. At any moment during the trial, participants were free to decline participation.

All data gathered for this research were handled in complete confidence. The researcher would be the only one with access to this data once the participants' names were revealed. To maintain patient confidentiality, code numbers were allocated to the questionnaires filled out by the patients. The reports were given in an aggregated style without mentioning any individual or organizational identities. The information would only be employed to further this research project. Once the research was completed, the data were erased. In a secluded room within the outpatient facility, patients completed the surveys alone or with researchers' assistance; the process took around ten to fifteen minutes.

Data Analysis

SPSS version 25.0 was employed for data analysis. To accurately define the kinds and prevalence seen, demographic data had to be supplied using frequency and percentage distributions. The average value and standard deviation were applied to display the overall scores for family functioning (FF), self-efficacy (SE), and self-management behaviors (SM). The Pearson correlation coefficient was applied to assess the nature of the connection between FF, SE, and SM. A significance level of p <0.05 was considered to be statistically significant. All multiple regression assumptions, including normal distribution, linearity, outliers, homoscedasticity, and multicollinearity, were met. The testing program was used for regression analysis.

In Equation 1, the regression coefficient between the independent variable (family functioning) and the dependent variable (self-efficacy) was analyzed. In Equation 2, the relationships between the independent variable (family functioning) and the dependent variable (self-management behaviors) were investigated. In Equation 3, the regression analysis treats self-management behaviors as the dependent variable, while self-efficacy and family functioning are considered independent variables.

Ethical Considerations

Before data collection, this study was approved by the Institutional Review Board, Burapha University, Thailand (Approval No. G-HS052/2565) and The Yancheng First People's Hospital's Institutional Review Board of Directors (Approval No. 2022-K-037) in accordance with the Declaration of Helsinki's guiding principles. Participants were informed that there would be no consequences if they refused or withdrew from participation at any point. Before being used, every sample was anonymous.

Results

Demographic and Disease Characteristics

This study included 140 patients with CHD; 77.1% (108 subjects) of the patients were men, and 22.9% (32 subjects) were women. The average age of the participants was 62.76 years (SD = 12.142), with 42 subjects (30%) completing primary school or less. The average duration of the CHD was 3.29 years (SD = 4.291). The mean of the number of stent implants was 1.76 (SD = 0.970).

Furthermore, 32 subjects (22.9%) had an AMI history; most subjects (112 subjects, 80%) had more than two chronic diseases combined with CHD; 20 subjects (28.6%) had a family history of CHD; the mean drug therapy condition for these subjects was 2.69 (SD = 1.638). Other information about the patients' demographics is shown in **Table 1**.

Table 1 Patients' demographics and medical conditions related to coronary heart disease (*N* = 140)

Variables	*n*	%	Minimum	Maximum	Mean	SD
Gender						
Male	108	77.1				
Female	32	22.9				
Educational Level						
Primary School or below	42	30				
Junior High School	38	27.1				
Senior High School	28	20				
College Degree or above	32	22.9				
Marital Status						
Unmarried	2	1.4				
Married	124	88.6				
Widowed/Divorced	14	10				
Age			30	86	62.76	12.142
Number of Stent Implants			1	4	1.76	0.970
Duration of CHD (Years)			1	30	3.29	4.291
Comorbidity	112	80	2	4	2.71	0.674
AMI History						
Yes	32	22.9				
No	108	77.1				
Family History Of CHD						
Have	20	28.6				
None	120	71.4				
Medication			1	8	2.69	1.638

Family Functioning, Self-Efficacy, and Self-Management Behaviors of Patients with CHD

The mean score of family functioning of the patients with CHD was 7.93 (± 2.073), indicating a relatively high level of family functioning among the patients. The mean score of self-efficacy was 6.08 (± 2.096). The mean score of self-management behaviors was 82.23 (± 11.863), showing a low level of self-management practice among the patients with CHD. The multivariate normality and multicollinearity between variables were tested. The absolute values of skewness (0.615, 0.073, and 0.006) were <3, and the absolute values of kurtosis of the three variables (1.018, 0.24, and 0.665) were <10, indicating multivariate normality. All VIFs (1.161) were <10; thus, multicollinearity was not problematic in this study. The specific descriptive statistics of these variables are shown in **Table 2**.

Table 2 Scores of family functioning, self-efficacy, and self-management behavior scales among participants (*N* = 140)

Scales	No. of items	Mean ± SD	Skewness	Kurtosis	VIF
Family Functioning	5	7.93 ± 2.073	-0.615	-1.018	1.161
Self-Efficacy	6	6.08 ± 2.096	-0.073	-0.240	1.161
Self-Management Behaviors	27	82.23 ± 11.863	-0.006	-0.665	

Correlation among Family Functioning, Self-Efficacy, and Self-Management Behaviors

Significant correlations between the subjects' family functioning, self-efficacy, and self-management behaviors were explored through correlation analysis. Family functioning exhibited a positive association with self-management behaviors ($r = 0.468$, $p < 0.001$) and self-efficacy ($r = 0.372$, $p < 0.001$). Meanwhile, self-management behaviors positively correlated ($r = 0.473$, $p < 0.001$) with self-efficacy. The correlations between family functioning, self-efficacy, and self-management behaviors are revealed in **Table 3**.

Table 3 Correlations between family functioning, self-efficacy, and self-management behaviors (*N* = 140)

Variables	Family Functioning	Self-Efficacy	Self-Management Behaviors
Family Functioning	1.00		
Self-Efficacy	0.372***	1.00	
Self-Management Behaviors	0.468***	0.473***	1.00

*** *p* <0.001

To evaluate the influence of self-efficacy on the correlation between family functioning and self-management practices, 2000 samples of the bootstrap sampling technique were utilized to examine the mediating impact while controlling for other pertinent factors. We selected self-efficacy as the mediating factor M, family functioning as variable X, and self-management as variable Y. The statistics are shown in **Table 4** and **Table 5**, together with **Figure 2**.

Based on the findings of the mediation effect test conducted using the distributed regression approach, it was indicated that the family functioning exerted a substantial influence on the self-efficacy of the mediating variable in the course of the initial phase (model 1) ($\beta = 0.46$, $p < 0.001$). Considering the results of the second model review, there is a substantial correlation between self-management behaviors and family functioning ($p < 0.001$, $\beta = 0.53$).

Table 4 Regression analysis examining the relationship between self-management and self-efficacy (*N* = 140)

Independent Variables	Dependent Variables	R^2	*Adjusted* R^2	*F*	*B*	*SE*	*β*	*t*	*p-value*
Family Functioning	Self-Efficacy	0.22	0.21	37.86	2.69	0.44	0.46	6.15	<0.001
Family Functioning	Self-Management Behaviors	0.28	0.27	52.99	2.86	0.39	0.53	7.28	<0.001
Family Functioning	Self-Management Behaviors	0.35	0.34	36.10	2.12	0.42	0.39	5.00	<0.001
Self-Efficacy					0.28	0.07	0.29	3.76	<0.001

Table 5 The bootstrap mediation effect test Results (*N* = 140)

Effect Relationship	Effect Size	LLCI	ULCI	Utility Percentage
Total Effect	0.53	2.09	3.63	
Direct Effects	0.39	1.29	2.95	74.11%
Indirect Effects	0.14	0.04	0.27	25.89%

Figure 2 The mediation effect model diagram

Note: ****p* <0.001

All of the above results indicated the validity of the overall impact. Moreover, self-efficacy ($\beta = 0.29$, $p < 0.001$) and family functioning ($\beta = 0.39$, $p < 0.001$) were revealed to substantially affect self-management behaviors in the third phase (model 3) analysis. Consequently, the established model suggests that self-efficacy has a partly mediating influence. The bootstrap approach used in the testing indicates that self-efficacy is a pivotal mediating factor inside the model. The 95% confidence interval [0.04, 0.27] and the indirect influence value of 0.14 indicate that the indirect impact is statistically significant and highlight the crucial role that self-efficacy plays in this model. Moreover, the statistical significance of the direct effect test is indicated by the fact that 0 is not included in the confidence range. Based on the proportion of causes, self-efficacy explains 25.89% of the variation.

Discussion

This study demonstrated that Chinese patients with CHD had a relatively high level of family functioning while manifesting a low degree of self-management behaviors. The family functioning score in the study sample was higher than that of patients with CHD in Lanzhou, China (Zhang et al., 2022). The observed discrepancies in the results might be explained by the economic and cultural disparity between these two disparate regions within China. The availability of medical resources among cities in addressing and managing health conditions shows variation. Specifically, the study involving patients from Lanzhou predominantly included individuals who had not completed their education beyond junior high school (67%), with only 12% attaining a college degree or higher, and they concentrated on inpatients (Zhang et al., 2022).

In this research, the majority of outpatients had family functioning that ranged from good (29.9%) to outstanding (53.1%). The impact of traditional Chinese family values is observed in the comparatively high level of FF found among CHD patients. Enhancing family functionality and improving the ability to offer assistance during illness management constitute two advantages of these principles. The FF score of the CHD outpatients in this study is similar to what was found in an older Chinese community-dwelling person with chronic illness (Yuan et al., 2021). The results of the observation of self-management practices among outpatient CHD patients were consistent with those of other investigations on Chinese CHD patients in community settings (Zhang et al., 2019). However, it was higher than that observed in patients following stent implantation at the long-term stage (Zhu et al., 2022). This suggests that self-management behaviors decline over time after discharge from the hospital. In addition, the self-efficacy scores among outpatients with CHD in this study were revealed to exhibit a low degree, indicating a necessity for improvement in the participants' self-efficacy. These findings are consistent with results from previous research (Yuan et al., 2021). Thus, the study's findings suggest that FF, self-efficacy, and self-management behaviors within Chinese patients with CHD need to be improved.

This study's correlation analysis indicated that FF and self-efficacy presented a positive association, which aligns with the results of other investigations, including older people with chronic illnesses (Yuan et al., 2021). Elderly individuals with one or several chronic diseases, for instance, diabetes, hypertension, or other ailments, were incorporated into the prior study. According to a study by Chen et al. (2020), those who have strong family functioning typically perceive getting professional psychiatric assistance more favorably. Thus, a healthy family dynamic can increase the likelihood of effective illness management (Chen et al., 2020). Furthermore, the literature indicates that family functioning significantly influences self-efficacy. It is recommended that nurses assist patients in establishing a structured support system within their families and social circles. In order to encourage family members' participation in the patient's condition care, it is equally essential to give specific attention to spouses and children. Physicians and nurses can supervise and offer complete emotional support to family members while educating them on providing patients with the appropriate care. In order to increase the self-efficacy of patients, prolong the steady phases of their diseases, and speed up their recovery, this involvement is paramount.

Self-efficacy can be regarded as an individual's confidence in their capacity to conduct particular tasks to achieve a desired result (Bandura, 2001). Based on Bandura's social cognitive theory, self-efficacy is a key factor influencing behaviors. The results of this investigation show a strong connection between self-efficacy and self-management behaviors, which is congruent with previous studies. Among patients diagnosed with liver cirrhosis, their self-efficacy was thought to have a connection with health behaviors, medication adherence, and life quality (Dong et al., 2020). Several cross-sectional research show a correlation between increased self-management behaviors and a greater level of self-efficacy (Liu et al., 2023; Zhang et al., 2023). One possible reason is that if therapy and care are provided over an extended period, higher levels of self-efficacy help cardiac patients become more adaptive to their disease, which in turn improves their psychological health (Banik et al., 2018). In fact, across a range of patient demographics, improved self-efficacy and successful self-management behaviors are connected with optimal medication adherence, pain management techniques, and physical exercise.

This study further demonstrated that FF was directly associated with self-management behaviors, which aligns with the results of related research on patients with hypertension in Tianjin, China (Zhang et al., 2020). Maintaining happy emotions and adopting a healthy lifestyle are made possible by good family functioning (Bennich et al., 2017). According to another study, patients' self-management improves when their unique behavioral talents are combined with a stable and effective family unit (Wensu et al., 2021). Based on Bandura's cognitive theory, self-management might be significantly impacted by psychosocial elements like family functioning. Therefore, improving family functioning offers an opportunity to enhance the methods by which CHD patients self-manage their condition. However, the study's factors include family functioning and self-efficacy, explaining only 35% of self-management behaviors variance, suggesting further investigation into other unmeasured factors.

According to IFSMT, individuals with good family functioning tend to be more confident and have strong beliefs that facilitate them to insist on self-management behaviors for a period of time after discharge (Ryan & Sawin, 2009). A study shows that only when family members fulfill their designated roles, effectively execute practical tasks, and sustain relationships both within the family unit and in broader social contexts can diabetes patients acquire effective family functioning (Bennich et al., 2020). The family functioning is important for supporting diabetes patients to maintain a positive mood and adopt a healthier lifestyle (Bennich et al., 2017). Another study indicated that patients with effective family functioning tend to have a positive attitude toward seeking professional psychological assistance. Consequently, robust family functioning can enhance the potential for successful disease management (Chen et al., 2020). The investigation revealed a correlation between family functioning and mental health in participants from both single- and dual-parent families, with improved mental health outcomes linked to better family functioning (Cheng et al., 2017).

This investigation demonstrated that family functioning exerts a direct influence on self-efficacy and, via the mediation of self-efficacy, an indirect impact on self-management behaviors, in accordance with the IFSMT and prior research. The connection between self-management behaviors and family functioning was moderated by self-efficacy. In particular, self-efficacy amplifies the beneficial effect of family functioning on CHD patients' self-management practices. Consequently, it is of utmost importance to emphasize the significance of patients' self-efficacy. Patients' good family functioning contributes to optimal self-efficacy, which subsequently fosters a higher degree of self-management behaviors. These findings correspond to other investigations showing that among Chinese patients with CHD, self-efficacy not only directly affects health-promoting behaviors but also functions as an intermediary in the interaction between psychological variables and health-promoting behaviors (Du et al., 2022). Because self-efficacy plays a mediating role, treatments focusing only on helping patients' families operate better may be insufficient to improve their self-management behaviors if self-efficacy isn't addressed. Therefore, future projects to enhance self-management in CHD patients should focus on boosting self-efficacy and improving family functioning.

Strengths and Limitations

The study's strengths included using accurate and trustworthy tools to measure the important variables and a very low non-response rate (0.08%). However, this study had certain limitations. The cross-sectional methodology made it impossible to determine the causal links between self-efficacy, self-management behaviors, and family functioning. The patients with CHD were chosen from a single hospital. As such, the family functioning, self-efficacy, and self-management behaviors shown could not accurately reflect the circumstances faced by all Chinese patients with CHD. Further longitudinal research and comparative studies in other contexts would be helpful to acquire a comprehension of the interactions between these factors.

Furthermore, the analysis conducted in this investigation mostly relied on the overall scores of the important factors without doing subgroup analyses because of the relatively small sample size. As a result, the outcomes might be inflated. Subgroup analysis facilitates the identification of differences between groups to better understand the characteristics or behaviors of particular groups. In certain circumstances, subgroup analysis enables researchers to control or adjust for the effect of confounding variables, resulting in more accurate results. Further research should involve a larger cohort of patients with CHD to facilitate a more comprehensive analysis.

Implications of this Study for Nursing Practice

This study provides insightful information on illness management for medical professionals, especially nurses who care for patients with CHD. In the health sector, self-efficacy exerts a mediating function that deserves consideration in future nursing practice. In actuality, nurses and other health professionals should assess the degree of self-efficacy among CHD patients and help them get the confidence to change their lifestyle. Because self-efficacy plays a mediating role, family functioning treatments may indirectly enhance self-management behaviors by improving self-efficacy levels and directly promoting self-management behaviors. Equipping CHD patients with the skills they need to improve their self-management requires providing them with the right information and training. The strategy is to improve their level of self-efficacy, thereby facilitating better family functioning.

Conclusion

The findings of this investigation demonstrated that among Chinese patients with CHD, self-efficacy mediated the association between self-management behaviors and family functioning. The findings provide insightful information for future studies aimed at creating efficient treatments to promote the self-management practices of CHD patients. Health professionals who engage with patients in this capacity, such as nurses, should emphasize the value of self-efficacy and implement plans to assist patients in boosting it. This approach is designed to strengthen family functioning, ultimately leading to improved self-management behaviors.

Declaration of Conflicting Interest

There are no conflicts of interest to declare.

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Authors' Contributions

The first author (YW) contributed to the research design, sample selection, data collection, data analysis, and initial manuscript writing. KM and WC contributed to the study's conceptualization, methodology, research, and critical analysis. All authors obtained responsibility for each research step and approved the publication of the final version.

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Data Availability

The datasets analyzed for the current study results are available from the first and corresponding authors upon reasonable request.

Declaration of Use of AI in Scientific Writing

There is nothing to declare.

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Self-management behavior and its influencing factors among adults with chronic obstructive pulmonary disease in Colombo, Sri Lanka: A cross-sectional study

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Abstract

Background: Self-management behaviors are essential to take care of chronic obstructive pulmonary disease (COPD). However, data on COPD self-management practices in Sri Lankan adults is limited. Therefore, identifying the level of COPD self-management and examining its influencing factors are essential for healthcare providers to manage COPD effectively.

Objectives: This research aimed to describe the level of self-management behaviors and determine whether dyspnea, perceived stress, COPD knowledge, and social support can predict self-management in adults with COPD in Colombo, Sri Lanka.

Methods: A predictive correlational study was conducted, and 108 adults with mild to moderate COPD were recruited from the central chest clinic in Colombo, Sri Lanka, from March to April 2024 using a simple random sampling technique. A self-administered questionnaire was used to gather data included demographic characteristics. The other instruments used were the COPD Self-Management Scale, the Perceived Stress Scale, the COPD Knowledge Questionnaire, and the Perceived Social Support Scale. Descriptive statistics and multiple regression were used for data analysis.

Results: The study showed a moderate self-management level with a mean of 3.04 ± 0.35. All variables could explain 41.7% of the variance in self-management among adults with mild to moderate COPD and COPD self-management behaviors significantly predicted by dyspnea ($\beta = 0.212$, $p = 0.006$), perceived stress ($\beta = -0.195$, $p = 0.018$), COPD knowledge ($\beta = 0.263$, $p = 0.001$), and perceived social support ($\beta = 0.366$, $p < 0.001$).

Conclusion: The study shows evidence that a program to intervene targeting COPD knowledge and perceived social support, in addition to reducing dyspnea and perceived stress, can be beneficial in promoting better self-management behaviors among adults with mild to moderate COPD.

Keywords

COPD knowledge; chronic obstructive pulmonary disease; self-management; dyspnea, perceived stress; social support

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Background

COPD is a progressive lifelong disease that needs long-term management with careful titration of therapy (Chen, 2022). COPD is now one of the top three causes of death worldwide, accounting for 3.3 million deaths in 2019, and the global prevalence is 11.7% (World Health Organization [WHO], 2023). The COPD prevalence in Sri Lanka is 10.5%, similar to the international (Amarasiri et al., 2017). The most common stages of COPD worldwide are mild to moderate (Varmaghani et al., 2019). In Sri Lanka, 90% of COPD patients belong to the mild and moderate levels (Amarasiri et al., 2017). Importantly, there is a rising trend of admissions in Sri Lanka due to COPD exacerbation (Medical Statistics Unit Ministry of Health, 2020).

Globally, exacerbation is the most common problem of persons with COPD, and between 30% to 50% of people suffer from exacerbations, and approximately 20% of moderate COPD patients may experience frequent exacerbations, which are defined as two or more exacerbations per year (Chen, 2022). Frequent exacerbations are associated with a decline in lung function, increased mortality, and disease progression (Chen, 2022; Korpershoek et al., 2016). Self-management is one of the key strategies to enhance health-related quality of life (QOL) by reducing dyspnea and preventing COPD exacerbations, reducing subsequent hospitalizations (Chen, 2022). However, literature shows that the COPD population with mild-moderate diagnosis labels tends not to seek hospital care unless they have an exacerbation or worsening of symptomatology, which in turn limits their access to information and resources with regard to self-management, which hinders their ability to practice better self-management (Korpershoek et al., 2016).

Importantly, work productivity can improve among adults with COPD through self-management behaviors (Lee et al., 2020). Adults are physically active, and mostly, they have a working lifestyle. Therefore, adults usually expose to environmental factors, occupational triggers, and long-term exposure to traffic air pollutants may have contributed to the increase in COPD (Varmaghani et al., 2019). When considering self-management behaviors, adults can be actively involved in managing their disease condition by taking responsibility and making decisions to manage their condition rather than elderly (Bringsvor et al., 2018). COPD in young people may have a substantial impact on health. There may be significant structural and functional lung abnormalities among young adults due to smoking, exposed occupational triggers, and environmental factors (Chen, 2022). Therefore, focusing on self-management behaviors among adults and the early stage of the disease (mild-to-moderate) is essential to delaying the disease progression.

COPD self-management behavior includes symptoms, daily life, emotions, and information management for symptomatic relief, reduces the risk of further deterioration, hinders disease progression, and ultimately enhances health-related QOL (Zhang et al., 2013). However, for an effective overall management of a chronic disease, the involvement of the patient's family is of paramount importance. Family support and care are associated with better control of symptoms and patient self-management (Ryan & Sawin, 2009). Self-management of patients with COPD may vary since many factors relate to self-management behaviors, including age, gender, disease severity, dyspnea, perceived stress, co-morbidities, monthly income, education level, COPD knowledge, and social support (Bringsvor et al., 2018; Lan et al., 2022; Yadav et al., 2020; Yang et al., 2019).

However, based on the Individual and Family Self-Management Theory (IFSMT), disease conditions may affect self-management (Ryan & Sawin, 2009). Dyspnea is the main symptom of patients with COPD; moderate-to-severe dyspnea was observed in patients with mild COPD, indicating that dyspnea is not limited to patients with more severe COPD (Lan et al., 2022). Moreover, the literature shows that dyspnea can influence self-management behaviors. A study done in Norway revealed that higher dyspnea levels can influence emotional distress ($p = 0.004$, $\beta = 0.15$) in COPD patients (Lee et al., 2020).

Perceived stress belongs to individual and family factors in IFSMT. Individual cognitive status, perspectives, and information processing can enhance or diminish self-management behaviors (Ryan & Sawin, 2009). Most studies stated that COPD is found to be more common in men than women (Chen, 2022; Chokhani et al., 2021), and men are working outside of their homes and take responsibility for their families. Further, more adults with perceived stress are also related to professional activity ($r = 0.32$, $p < 0.05$) (Wrzeciono et al., 2021). A study done in Spain revealed that there was a significant relationship between perceived stress and quitting smoking in adults ($\beta = -0.0164$, $p < 0.01$) (Barroso-Hurtado et al., 2023). However, in patients with COPD, perceived stress can also affect treatment compliance and outcome, as evidenced by perceived stress reducing the level of function in everyday life and can lead to poor self-management (Hansen et al., 2023). A study done in Denmark revealed that perceived stress was a statistically significant predictor for disease management ($R^2 = 0.256$, $p < 0.05$) (Hansen et al., 2023).

The person will be more likely to engage in the recommended health behaviors if they have adequate knowledge about their condition (Ryan & Sawin, 2009). Studies done in Sri Lanka revealed that awareness of pulmonary rehabilitation, indoor air quality, COPD risk factors, and safety measures for risk factors remains poor (Kumari et al., 2019; Yasaratne & Dharmage, 2020). A study done in Nepal stated that poor disease knowledge was associated with activation in disease management ($OR = 1.01$, 95% CI: 1.00-1.11, $p < 0.05$) (Yadav et al., 2020). Two studies done in China and Korea showed that knowledge of the disease itself positively correlated to self-management practices ($r = 0.369$, $p < 0.01$) (Yang et al., 2019) ($r = 0.295$, $p < 0.001$) (Lim et al., 2022).

Based on IFSMT, patients are more likely to practice the recommended health behaviors if they receive positive support and influence in their day-to-day lives (Ryan & Sawin, 2009). The studies done in China revealed that the availability of support significantly predicted COPD self-management behaviors ($\beta = 0.236$, $p = 0.02$) (Lan et al., 2022), and social support positively correlates with self-management behaviors ($r = 0.451$, $p < 0.01$) (Zhao et al., 2023). A Korean study also revealed consistent findings ($r = 0.347$, $p = 0.001$) (Lim et al., 2022).

COPD is considered to be an utterly irreversible disease but can slow down symptoms and the disease process and maintain normal life through effective treatment and adequate self-management behaviors. In Sri Lanka, 55-60% of air pollution was due to emissions from motor vehicles, while industries accounted for 20-25% and 20% was due to domestic sources (Ileperuma, 2020). This results in increasing cases of respiratory disease due to air pollution in urban areas. In Colombo, they reported high levels of ambient air pollution due to over 50% of vehicles, 70% of industries, and several thermal power plants. Indoor air pollution is a significant health hazard since most households use firewood for cooking, often in congested, poorly ventilated kitchens (Ileperuma, 2020). However, the situation of self-management behaviors among adults with mild-to-moderate COPD in Sri Lanka, including Colombo, is not a clear idea in general because there is limited data available regarding self-management behaviors among adults with mild-to-moderate COPD.

Therefore, it is urgent to identify the level of self-management behaviors among adults with mild to moderate COPD. Nurses are front-line workers in the healthcare system and are responsible for increasing the knowledge of the patients and their relatives. Suppose there is clear empirical evidence regarding the level of self-management among the COPD population. In that case, the nurses can focus on interventions that help to increase the level of self-management behaviors, which can help to reduce frequent exacerbation, recurrent hospitalization, and healthcare costs and improve their quality of life.

Therefore, guided by the IFSMT and literature, this study focused on describing the level of self-management behaviors and determining whether dyspnea, perceived stress, COPD knowledge, and perceived social support could influence self-management behaviors among adults with mild-to-moderate COPD in Colombo, Sri Lanka.

Methods

Study Design

A predictive correlational research design was used to explore the influence of the study variables on the self-management behavior of COPD persons. According to the literature, the direction and strength of the influence association among or between variables are established to predict the value of one variable based on another variable (Sutherland, 2017).

Samples/Participants

A simple random sampling technique was used to gather participants. Randomization was unbiased, and we ensured an equal chance for each unit to be selected. Inclusion criteria were patients aged 18-64 years, carrying a diagnosis of COPD for the last 6 months at least, oriented in time, place, and person, without any significant disability which physically hinders them, i.e. blindness, deafness, reduction in mobility needing assistance, void of unstable disease conditions (i.e. chronic kidney disease at end stage, decompensated congestive cardiac failure, diagnosis of advance carcinomas, no history of mental illness) and able to communicate in Sinhala in means of speaking and writing. During data collection, they were excluded if the participants had any symptoms of physical discomfort, such as exacerbation symptoms or breathing difficulties.

The sample size was calculated using G*power software. For linear multiple regression, Cohen suggested a medium effect size of 0.15, which is effective and more suitable for nursing research (Kang, 2021). The sample size was determined to be 108 adults with mild-to-moderate COPD, with an alpha of 0.05, an effect size of 0.15, and a power of 0.90. This calculation ensures that the study is adequately powered to detect significant effects, minimizing the risk of Type II errors. Moreover, choosing a medium effect size reflects a balance between practical significance and the feasibility of recruiting participants, making it particularly relevant in clinical settings where resources may be limited.

Instruments

Information was collected from the participants using self-reported questionnaires, including:

1. The researcher has developed a demographic questionnaire consisting of two parts. The first part targeted participant demographic characteristics, including age of the participant, gender, marital status, number of family members, main caregiver, smoking status, kind of fuel used for cooking and heating, adequate ventilation of the kitchen (open kitchen, windows, chimney), source of disease education. The second part aimed to collect health-related physical characteristics, i.e., height, weight, body mass index (BMI), the degree of airflow limitation/disease severity, dyspnea score (measured by the modified Medical Research Council dyspnea scale), history of exacerbation, COPD-related hospitalizations, respiratory symptoms, comorbidities, and COPD treatments.

2. The modified COPD Self-Management Scale (CSMS), which consists of 4 main domains, was used to gather data on individual self-management behaviors. Modified CSMS is derived from CSMS, which consists of five domains: symptom management, daily life management, emotional management, information management, and self-efficacy (Zhang et al., 2013). When deriving modified CSMS, the self-efficacy domain was omitted. Four domains in the modified CSMS contain 40 items, each using a 5-point grading system, where 1 equals never, and 5 is always. At the end of the questionnaire, the final mark ranged from 1-5, calculated by dividing 40 items by 40. The categorization of self-management according to score is as follows. The score of more than +1 SD of the mean was categorized as high, less than -1SD of the mean as low, and the ones equal or greater than minus 1SD of the mean and equal or lesser than +1SD of the mean were labeled as a medium score of disease self-management. This scale demonstrated excellent validity and reliability (Cronbach's α = 0.91) (Yang et al., 2019).

3. The Perceived Stress Scale (PSS-10) was used to measure perceived stress among adults with mild to moderate COPD. This scale was developed by Cohen et al. (1983), and the Sinhalese version of the perceived stress scale (S-PSS-10) was used in this study (Mendis et al., 2023). The scale consisted of 10 items, the score ranging from 0-never to 4-very often. Four items included reverse scoring; each of the 10 scores was summated to obtain a final score. The total score ranges from 0 to 40; a higher mean score indicates higher perceived stress. The described stress level is considered as 0-13 = low, 14-26 = moderate, and 27-40 = high levels of perceived stress (Cohen et al., 1983). This Sinhalese version scale demonstrated Cronbach's α = 0.85 (Mendis et al., 2023).

4. The COPD Knowledge Questionnaire (COPD-Q) was used to measure COPD Knowledge. This internationally validated questionnaire (Cronbach's alpha of 0.72) contained 13 questions covering patients' knowledge of disease prevention, clinical symptoms, management, and disease-associated risk factors (Maples et al., 2010). Out of 13 statements, eight were true, and five were false. The participant was given the option "yes/no/not sure." The correct answer carried one mark where the total was between 0 and 13, both scores inclusive. The higher the score, the better the participant's knowledge of the disease (Maples et al., 2010).

5. Perceived social support was measured using the Multidimensional Scale of Perceived Social Support (MSPSS), which contains 12 questions developed by Zimet et al. (1990). The 12 questions were targeted at support from family, support from peers, and others. Each question was given seven options ranging from strongly disagree to strongly agree, and marked 1 to 7, respectively. The sum was divided by 12 to grant the final score. The range of the score is from 1 to 7 points. The score indicated 1-2.9 = low, 3-5 = moderate, and 5.1-7 = high support. This scale showed good psychometric properties (Cronbach's α = 0.85) (Zimet et al., 1990).

6. The modified Medical Research Council (mMRC) dyspnea scale (Fletcher et al., 1960) was used to measure the level of dyspnea. This scale grades the disability caused by breathlessness on a scale of 0 to 4 (Fletcher et al., 1960). The

mMRC score was taken from medical records because doctors use it to assess the level of dyspnea and write it down in each patient's clinic book during every visit.

In this study, three questionnaires (CSMS, COPD-Q, and MSPSS) were translated into the Sinhalese language and back-translated according to WHO guidelines after obtaining the author's written permission via email (WHO, 2016). Secondly, the questionnaires were translated into Sinhala by two people who are bilingual (Sinhala/English), experienced healthcare professionals, and administrators. Thirdly, a bilingual expert (a person who is a member of the faculty of nursing involved in clinical and administrative nursing education) reviewed and corrected the draft version of the questionnaires. Next, as amended by the panel of experts, the Sinhalese version of the questionnaires was back-translated by a bilingual independent translator who has experience in Sinhalese to English translation yet was not aware of the original study instruments. Finally, the back-translated English version and original questionnaire were checked by the researcher, the principal advisor, an expert person, and a person whose native language is English.

Before starting the main study, the researcher conducted a pretest to check the questionnaire with 30 participants with the same characteristics. Cronbach's alpha of CSMS was 0.78, the PSS-10 was 0.82, the COPD-Q was 0.70, and the MSPSS was 0.91.

Data Collection

The data were collected at the central chest clinic in Colombo, Sri Lanka, from March to April 2024. The researcher asked for help from the nurse in the clinic to select COPD patients according to inclusion criteria. Invitations were extended to eligible people. Data collection was completed within a time frame of 20-30 minutes with self-reported questionnaires. Data collection was carried out by the researcher in a place that ensures participants' privacy near the pre-examination seating area of the clinic.

Throughout the data collection period, efforts were made to accommodate participants' schedules, providing flexibility in appointment times to maximize participation rates. The research team maintained close communication with clinic staff to monitor patient flow and optimize recruitment strategies, ensuring that a diverse sample was obtained that accurately represented the population of adults with COPD at the clinic.

Data Analysis

IBM SPSS version 26 is used for data analysis, and the significant level was set at .05. Frequencies, percentages, means, and SDs of demographic data and variables of the study population were taken as descriptive statistics. The standard multiple regression ENTER method was used because the literature review revealed that all independent variables had influenced COPD self-management. Therefore, it can examine the overall impact of all predictors on self-management without the bias of ordering or variable selection and helps understand each predictor's unique contribution to the explained variance in COPD self-management.

All assumptions of multiple regression were tested before the regression analysis. All variables conformed to a normal distribution. The assumptions of linearity, outliers, and homoscedasticity have been as per the scatter plot of residuals. The tolerance values were more than 0.2, and VIF values were less than 5, meaning the absence of multicollinearity and autocorrelation was determined by looking at the Durbin-Watson value, which ranged within 1.5-2.5, suggesting no significant autocorrelation in the residuals.

Ethical Considerations

This study obtained ethical approval from the Institutional Ethics Review Boards of Burapha University, Thailand (Protocol code G- HS 122/2566) and the University of Sri Jayewardenepura in Sri Lanka (Protocol code ERC 44/23). All participants were informed about the study's purpose, procedure, and their right to consent, decline, or withdraw from the study until data analysis was completed. Furthermore, all data were handled confidentially and stored securely to ensure participant privacy and comply with ethical standards.

Results

Characteristics and Health Information of the Participants

A total of 108 adults diagnosed with mild to moderate severity of COPD took part in the study. The participants ranged from 19 to 64 years old, with a mean age of 54.6 years (SD = 9.83). The sample comprised 53 males (49.1%) and 55 females (50.9%). The majority were married (62%), lived with family or relatives (97.2%), and the primary caregiver was the spouse (55.6%). Moreover, 31.5% had a smoking history, 46.3% used biomass fuel, and 23.1% had inadequate ventilation levels in the kitchen.

The sample consisted of 48.1% with mild and 51.9% with moderate levels of COPD. The majority had more breathlessness (mMRC value ≥2) (53.7%), an exacerbation history (80.6%), no co-morbidities (56.5%), and no participation in pulmonary rehabilitation (67.6%). Even though the majority had taken the COVID-19 vaccine, only 21.3% and 13.9% had taken the pneumococcal and Influenza vaccines, respectively (**Table 1**).

Description of the Dependent and Independent Variables

The overall COPD self-management mean score was 3.04 (SD = 0.35), which indicated a moderate level. For subscales, emotion management had the highest mean score of 3.19 (SD = 0.39), and information management had the lowest mean score of 2.79 (SD = 0.49). Dyspnea, perceived stress, COPD knowledge, and perceived social support were independent variables in this study. The participants showed that they had a high level of family support (see **Table 2**).

Factors Influencing COPD Self-Management Behaviors

The multiple regression test (ENTER method) revealed that all factors (dyspnea, perceived stress, COPD knowledge, and social support) were significantly predicted and explained 41.7% of the variance in self-management among adults with mild to moderate COPD in Colombo, Sri Lanka ($F_{(4,103)}$ = 20.169, p <0.01), as shown in **Table 3**. Variables were indicative of a small to medium effect size. However, demographic or clinical factors were not included in the regression analysis because they were not included in the objectives of this study.

Table 1 Health-related information (*N* = 108)

Health Information	*f*		%
Diagnosis duration			
(M = 5.85, SD = 4.59, Min = 1, Max = 20)			
1-5 years	70		64.8
6-10 years	24		22.2
More than 10 years	14		13
COPD severity			
Mild	52		48.1
Moderate	56		51.9
Dyspnea score (mMRC value)			
Less than 2 (less breathlessness)	50		46.3
More than 2 (more breathlessness)	58		53.7
History of exacerbation (past 12 months)			
No	21		19.4
Yes‡ (n =109)	87		80.6
Hospital admission		65	59.6
Emergency room visits		44	40.4
Exacerbation frequency within the past 12 months			
1	23		21.3
2	23		21.3
3	24		22.2
4	12		11.1
5	3		2.8
6	2		1.9
Co-morbidities			
None	61		56.5
Yes‡ (n = 81)	47		43.5
Hypertension		31	38.3
Diabetes		18	22.2
Dyslipidemia		16	19.8
Cardiovascular disease		7	8.6
Arthritis		8	9.9
Osteoporosis		1	1.2
History of vaccination			
None	14		13
Yes‡ (n =132)	94		87
Pneumococcal		23	17.4
Influenza		15	11.4
Covid-19		94	71.2
Pulmonary rehabilitation participation			
No	73		67.6
Yes	35		32.4

Note: ‡ Can answer more than 1 item

Table 2 Possible score, actual score, mean, and standard deviation of variables (*N* = 108)

Variable	Possible score	Actual score	*M*	*SD*
COPD self-management	1-5	2.2-3.9	3.04	0.35
Symptom management	1-5	2.2-4.5	3	0.42
Daily life management	1-5	1.7-4.2	3.07	0.51
Emotion management	1-5	2.3-4.1	3.19	0.39
Information management	1-5	1.5-4.0	2.79	0.49
Dyspnea	0-4	1-4	2.49	0.89
Perceived stress	0-40	6-32	18.94	6.21
COPD knowledge	0-13	3-13	7.46	2.36
Perceived social support	1-7	2.3-6.7	4.86	0.95
Family support	1-7	2-7	5.23	1.07
Friend support	1-7	1-6	4.08	1.31
Other support	1-7	2-7	5.26	1.02

Discussion

The present finding showed that adults diagnosed with mild to moderate severity COPD had a moderate level of self-management. Compared with some previous studies, the present study's findings were slightly higher than those of the previous ones (Sheng et al., 2023; Yang et al., 2019). The highest mean score was shown in emotion management, which was quite similar to the research of Yang et al. (2019). The lowest mean score in the information management subscale is consistent with previous research findings (Sheng et al., 2023; Yang et al., 2019). However, all subscales were at a moderate level.

When attempting to explain results according to IFSMT (Ryan & Sawin, 2009), which shows that condition-specific such as complexity condition and treatment, not only social, environmental, and physical factors but also individual factors (age, gender, education, marital status) and family factors are also related to the outcome of self-management practices (Ryan & Sawin, 2009). Compared with other studies, the self-management level is a little high. This result can be explained by the fact that the previous studies included the majority of male participants (Korpershoek et al., 2016; Sheng et al., 2023; Yang et al., 2019), but this study consisted of almost equal proportions of males and females. Women are more actively engaged in self-management than men (Bringsvor et al., 2018). Moreover, the participants ranged from 19 to 64 years of age, while the mean was 54.6 years of age (SD = 9.83). They had no physical limitations and no cognitive impairment; thus, they could perform self-management activities. In addition, adults can actively be involved in managing their disease condition by taking responsibility, making decisions, having sufficient information, and having the ability to find health information (Bringsvor et al., 2018; Yadav et al., 2020).

Additionally, according to the literature, disease severity is vital in COPD self-management (Jolly et al., 2018), and the presence of more than one co-morbidity shows negative associations with self-management practices (Bringsvor et al., 2018; Yadav et al., 2020). In this study, all participants had mild and moderate levels of COPD, and 56.5% of participants reported having no co-morbidities. These could also be reasons for the moderate level of COPD self-management in this study.

Table 3 Predictors of COPD self-management behaviors among adults with mild to moderate COPD (*N* = 108)

Predicting variables	*B*	*SE*	β	*t*	*p*-value
Dyspnea	0.208	0.075	0.212	2.785	0.006
Perceived Stress	-0.011	0.005	-0.195	-2.397	0.018
COPD knowledge	0.039	0.012	0.263	3.304	0.001
Perceived Social support	0.135	0.030	0.366	4.473	<0.001
Constant = 2.129, R^2 = .439, *Adj* R^2 = 41.7%, $F_{(4,103)}$ = 20.169, *p* <0.01					

Furthermore, Ryan and Sawin (2009) showed disease complexity can affect the individual's and family's practices of self-management and families' responsibilities increase in parallel with patients' disease trajectory. In this study, 97.2% of participants had a main caregiver, while half of the participants' main caregiver was a spouse (55.6%). Therefore, they may have good emotional and social support for their disease management. These are also other possible reasons for the moderate level of COPD self-management in this study.

In addition, 78.7% and 86.1% of participants had not received pneumococcal and Influenza vaccines, respectively, and 67.6% had not participated in a pulmonary rehabilitation program. Moreover, participants demonstrated a low level of disease-related knowledge. Disease knowledge is essential in managing one's condition (Maples et al., 2010). Therefore, healthcare providers should focus on improving patients' knowledge of diseases.

Study results indicated that dyspnea can predict COPD self-management (β = 0.212, p = 0.006), which reflects that increases in dyspnea severity led to an increase in self-management behaviors. Based on IFSMT, disease conditions can affect the process dimension and, ultimately, the outcome dimension (Ryan & Sawin, 2009). Dyspnea belongs to disease conditions, and COPD self-management belongs to the outcome dimension in this theory. Reviewed literature showed that a lack of clinical symptoms may induce some patients to take therapy episodically rather than daily self-care management (Aredano et al., 2020). Levels of dyspnea and self-management showed a statistically significant association (r = 0.14, p <0.05) (Kilic et al., 2021). Moreover, dyspnea can influence adherence to COPD therapy (*OR* 3.318, 95% CI 1.050-9.892, p <0.05) (Aredano et al., 2020). However, contradictory results showed that higher dyspnea levels could influence emotional distress (β = 0.15, p <0.05), resulting in poor self-management among COPD patients (Bringsvor et al., 2018).

The current findings complied with previous studies and IFSMT, which revealed that perceived stress can influence COPD self-management behaviors (β = -0.195, p = 0.018). Perceived stress belongs to individual and family perception in IFSMT, and individual cognitive status, perspectives, and information processing can enhance or diminish self-management behaviors (Ryan & Sawin, 2009). A study revealed that perceived stress could influence quitting smoking in adults (β = -0.0164, p <0.01) (Barroso-Hurtado et al., 2023), which plays a vital role in daily life management among COPD patients. Furthermore, high stress had increased COPD-related emergency department visits (*OR* 2.51, 95% CI 1.06-5.98, p = 0.04) (Parekh et al., 2020). In addition, perceived stress was a significant predictor for disease management among COPD patients (R^2 = 0.256, p <0.05) (Hansen et al., 2023).

The study revealed that COPD knowledge could predict COPD self-management behaviors (β = 0.263, p = 0.001). The IFSMT explains that knowledge must be improved to improve understanding of self-management practices. It notes that improving health-specific knowledge and beliefs is positively associated with self-care and self-management practices (Ryan & Sawin, 2009). Consistent with previous studies, COPD knowledge strongly predicted COPD self-management in multiple countries, settings, and disease stages (Lim et al., 2022; Yadav et al., 2020; Yang et al., 2019).

In par with IFSMT by Ryan and Sawin (2009), the study showed a positive predictive value with social support perceived and self-management (β = 0.366, p = <0.001). Ryan and Sawin (2009) explained that social support could help improve knowledge, self-regulation skills, and self-efficacy, thereby increasing self-management behaviors. In addition, positive social support is associated with improved COPD disease management behaviors, and psychological support from families and close relationships is needed to manage feelings and worries (Lan et al., 2022). The results are on par with other international studies, highlighting that social support positively predicts COPD self-management (Lim et al., 2022; Zhao et al., 2023).

Increases in dyspnea and decreases in perceived stress in one unit lead to increased self-management in double. In addition, increases in COPD knowledge and social support in one unit result in increased self-management by approximately three to four units. These results provide clearer insights into priorities for interventions aimed at enhancing self-management by targeting the above factors.

Limitations

According to our knowledge, this was the first study providing insight into self-management practices and influencing factors among adults with mild to moderate COPD in Sri Lanka. However, there were some limitations. Even though the central chest clinic is the end referral station for chest diseases in the country, receiving referrals from all over the country, the data that has been collected belongs to one center. This might include some inequality in generalization to remote areas with no available pulmonary rehabilitation program. Moreover, all participants had mild and moderate levels of COPD, and we did not consider clinical differences among older adults. Hence, it may not describe the complete picture of self-management behavior among patients with COPD in Sri Lanka.

Implications to Nursing Practice

Based on the findings, nursing interventions should focus on improving COPD knowledge (e.g., conducting COPD awareness programs), improving family engagement in disease management, and reducing dyspnea and perceived stress (e.g., initiating family group discussions, teaching environmental arrangements for reducing air pollution, and encouraging breathing exercises). Moreover, nursing interventions can suggest a more personalized approach to managing the personal and social factors of patients diagnosed with COPD of mild to moderate severity.

Conclusion

The study found that a moderate level of self-management behavior and dyspnea, perceived stress, COPD knowledge, and social support can predict self-management behavior in the diagnosed COPD population of Sri Lanka. Therefore, intervention targets reducing perceived stress and dyspnea and promoting COPD knowledge and social support, which can help COPD people develop good self-management behavior, reduce COPD exacerbations and complications, delay the progress of the disease, and enhance their health-related quality of life.

Declaration of Conflicting Interest

All contributing authors declare no conflicts of interest.

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Authors’ Contributions

All authors contributed substantially to the conception or design of the manuscript, acquisition, analysis, or interpretation of data. Additionally, all drafted the manuscript, critically revised it, and approved the final version for publication. They also agreed to be accountable for all aspects of the work, ensuring that questions related to the accuracy or integrity of any part are appropriately investigated and resolved.

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Data Availability

The datasets generated during and analyzed for the current study results are available from the first and corresponding authors upon reasonable request.

Declaration of Use of AI in Scientific Writing

There is nothing to declare.

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Health-promoting activities among Saudi Arabian parents of children with disabilities: A cross-sectional study

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Abstract

Background: Engaging in health-promoting activities is crucial for maintaining overall well-being. However, parents of children with disabilities often face unique challenges that can impact their ability to engage in such activities. These challenges may include increased caregiving responsibilities, limited access to resources, and emotional and physical burdens, which may hinder their involvement in health-promoting behaviors.

Objective: This study aimed to assess and compare health-promoting activities among parents of children with and without disabilities, with a focus on identifying key differences and associated factors that influence their health and well-being.

Methods: A quantitative cross-sectional study was conducted with 118 parents of children aged 3 to 18 years recruited via social media and centers for children with disabilities in the Kingdom of Saudi Arabia. Data were collected using the eight-item Health-Promoting Activities Scale (HPAS) and demographic variables. The study utilized descriptive statistics, chi-square test, *t*-test, and ANOVA for data analysis, conducted using SPSS version 25.

Results: The results showed that parents of children with disabilities had significantly lower HPAS scores (31.73 ± 10.21) compared to parents of children without disabilities (34.83 ± 8.05), although this difference was not statistically significant ($p = 0.082$). Parents of children with disabilities reported significantly lower frequencies of spiritual or rejuvenating personal time ($p = 0.032$) and social activities ($p = 0.011$). Additionally, higher education ($p = 0.023$) and better health status ($p = 0.005$) were positively associated with higher HPAS scores among parents.

Conclusion: This study's findings highlight the significant impact that caring for a child with a disability can have on parents' health-promoting behaviors. Factors such as education and health status were found to play a crucial role in shaping these behaviors. The results suggest the need for tailored interventions and support programs by nurses and healthcare providers to enhance the well-being of parents of children with disabilities.

Keywords

Saudi Arabia; health status; health promotion; children; disabled children, parents

Background

Children with disabilities are considered a vulnerable group in need of specialized care and attention, according to a national survey conducted in Saudi Arabia (Bindawas & Vennu, 2018). According to Bindawas and Vennu (2018), among the 7,849,953 children surveyed, 209,574 reported having a disability, resulting in a prevalence rate of 2,670 per 100,000 people (2.7%). The survey also provided insights into the regional distribution of disabilities in the country. The Tabuk region had the highest ratio of people with disabilities, with 4.3% of the population reporting a disability, while the Northern Borders had the lowest ratio (1.3%). Additionally, the survey highlighted the types of disabilities that are most prevalent in Saudi Arabian society. Mobility disabilities were the most commonly reported, followed by eyesight disabilities. According to Bindawas and Vennu (2018), the overall prevalence rate of disability in Saudi Arabia is one in every 30 people.

Parents play a major role in fulfilling their children's physical, psychological, and social needs to enable them to grow and develop. As stated by the Centers for Disease Control and Prevention (CDC), disability can be defined as a physical or cognitive condition that hinders an individual's ability to perform daily tasks and interact with their surrounding environment (CDC, 2024). According to the World Health Organization (WHO), disability encompasses three dimensions: impairment, activity limitations, and participation restrictions (CDC, 2024; WHO, 2011). Impairment refers to a person's physical or mental limitations related to body structure or function, such as limb loss, vision impairment, or memory loss (CDC, 2024). Activity limitations are difficulties individuals may face in performing specific tasks or activities, such as seeing, hearing, or walking (CDC, 2024). Participation restrictions refer to the limitations individuals may experience in engaging in daily activities, such as work and social and recreational activities (CDC, 2024).

Parents, especially mothers, play a vital role for most children with disabilities, often serving as their primary caregivers. They also bear a significant responsibility for their children's everyday needs, development, and health, participating in over 95% of family situations (Crowe & Florez, 2006). Given the immense responsibilities that come with raising children with disabilities, several studies have consistently shown that many mothers experience high levels of stress and poor mental health (Bailey Jr, 2007; Montes & Halterman, 2007; Singer, 2006).

Health promotion is known as individuals' capacity to enhance their health status (WHO, n.d.). One of the most important variables that determine health is health-promoting behaviors (HPBs), which are crucial for health and life satisfaction (Ashgar, 2021; Xu et al., 2021). Pender (2011) classified health-promoting activities into six categories: interpersonal interactions, spiritual development, stress management, physical activity, diet, and health responsibility.

Behaviors that contribute to promoting health include maintaining a nutritious and healthy diet, engaging in regular exercise, avoiding harmful behaviors, taking precautions to prevent accidents, being aware of early signs of illness, managing emotions and feelings, adapting to stress and challenges, and fostering positive relationships (Davys et al., 2017; Peer & Hillman, 2014; Samadi et al., 2020). Numerous studies have examined the experiences of parents of children with disabilities and parents of typical children, revealing differences between the two groups. First, mothers in certain situations experience significant levels of stress when raising children with a disability (Bujnowska et al., 2021; Davys et al., 2017; Peer & Hillman, 2014; Samadi et al., 2020).

Furthermore, after receiving a diagnosis of disability, parents' overall satisfaction with their caregiving is affected, with reports indicating lower levels of satisfaction compared to parents of typically developing children (Alwhaibi et al., 2020; Davys et al., 2017; Samadi et al., 2020). Amireh (2019) conducted a comparative study to evaluate variations in stress levels and identify coping mechanisms employed by parents in raising their children, and found that parents of typically developing children do not experience the same levels of stress as parents of children with disabilities, particularly autism—the latter experience higher stress levels, even compared to parents of children with Down syndrome. However, there are slight differences in stress levels between parents of typically developing children and parents of children with Down syndrome, primarily in parent-child interactions (Amireh, 2019; Cuzzocrea et al., 2016).

In terms of coping mechanisms, both parents of typically developing children and parents of children with Down syndrome tend to use similar strategies, such as adopting a positive attitude and turning to religion (Amireh, 2019; Cuzzocrea et al., 2016). However, parents of children with autism more frequently employ problem-solving coping strategies and avoidance strategies compared to the other groups, whereas parents of typically developing children use these strategies less often (Amireh, 2019; Cuzzocrea et al., 2016). Engaging in light exercises, such as running, walking, or bowling, can improve quality of life by reducing stress, anxiety, and sadness while boosting communication, social skills, physical function, and self-worth (Heesch et al., 2012). Walking more than three times a week can help middle-aged women improve their mental health, live happier lives, and experience reduced stress and depression (Ashgar, 2021; Heesch et al., 2012). Furthermore, George et al. (2011) suggested that proper nutrition management benefits both the body and mind while improving metabolism. Stress, sleep, and nutrition management are interrelated, making frequent exercise, consistent physical activity, leisure activities, and a balanced diet essential for maintaining physical and mental well-being and controlling stress and depression.

A qualitative study conducted in the United States with a sample of mothers of disabled children explored their experiences participating in the Healthy Mother, Healthy Family program (Harris et al., 2022). The mothers reported engaging in more activities that promoted health and met their individual needs. They also reported feeling happier and more energized, experiencing less stress and worry, becoming more self-aware, and spending more time participating in leisure activities with their children. Mothers identified increasing physical activity, adopting healthier diets, improving sleep quality, connecting with the community, and practicing mindfulness exercises as key health-promoting objectives. Additionally, they found the program's website, workbook, and the involvement of their child's occupational therapists to be acceptable and helpful.

Being a primary caregiver for a child with a disability can affect a parent's ability to engage in health-promoting activities, which are essential for overall well-being. Despite the increasing prevalence of children with disabilities, there is a significant gap in the literature regarding health-promoting behaviors (HPBs) among parents of children with disabilities. Existing research on health-promoting activities has largely focused on parents of typically developing children, often overlooking the needs and unique experiences of families raising children with disabilities (Davys et al., 2017; Peer & Hillman, 2014; Samadi et al., 2020). This lack of understanding hinders the development of targeted interventions and support programs tailored to the specific challenges these families face. Addressing this gap in the literature is crucial for nurses to provide comprehensive, family-centered care and support for both the parents and their children.

The current study aimed to assess and compare health-promoting activities among parents of children with and without disabilities. The findings will provide valuable insights for nursing practice in Saudi Arabia. Understanding the factors that influence health-promoting behaviors in this population can guide the development of nurse-led interventions and support programs to enhance the overall well-being of parents caring for children with disabilities.

Methods

Study Design

A quantitative cross-sectional design was employed to assess and compare health-promoting activities among parents of children with disabilities and typically developing children.

Data were gathered from parents in various cities across Saudi Arabia.

Samples/Participants

Convenience sampling was used to recruit parents of children aged 3-18 years from the Saudi community. The inclusion criteria required parents to have children aged between 3 and 18, be able to read Arabic, and have either typically developing children or children with disabilities. Parents of children with psychological illnesses, hospitalized children, or critically ill children were excluded. A total of 118 parents (9 fathers and 109 mothers) participated in the study.

The study employed G*Power to determine the required sample size. The sample size was calculated to assess differences between two independent means using a two-tailed test with the following parameters: $\alpha = 0.05$, power = 0.95, and a medium effect size = 0.5. This calculation indicated an estimated sample size of 210 participants.

Instruments

The demographics section had two parts. The first part included personal information about the caregiver and child, covering the caregiver's gender, education level, marital status, age, family income, occupation, and relationship with the child. The second part focused on children with disabilities, including their age, birth order, number of siblings, type and severity of disability, and whether other children with disabilities were present in the family. The health promotion activities section collected information on how frequently participants engaged in self-selected activities promoting health, well-being, social connection, and leisure (Bourke-Taylor et al., 2012). The health promotion activities scale (HPAS) consists of eight items estimating the frequency of engagement in activities classified by purpose and whether they were performed alone or with others. Responses were recorded on a seven-point Likert scale, where 1 = Never, 2 = 1–3 times a year, 3 = Once a month, 4 = 2–4 times a month, 5 = Once a week, 6 = 2–4 times a week, and 7 = Daily.

Higher HPAS scores indicated more frequent engagement in healthy behaviors. The HPAS, developed specifically for mothers of children with disabilities, has demonstrated strong construct validity and reliability, with a Cronbach's alpha value of 0.78, indicating good internal consistency. The scale effectively differentiates between mothers with higher caregiving needs and others (Bourke-Taylor et al., 2012).

Data Collection

An electronic questionnaire was used to collect data from participants. Parents who met the inclusion criteria were required to read and sign a consent form before completing the questionnaire. Consent was obtained through a digital signature by clicking on the agreement icon. The consent form clearly outlined the study's purpose, procedures, and potential risks, ensuring that participants were fully informed before agreeing to participate. Data collection began in February 2024 and continued until April 2024. The use of electronic consent facilitated the process while maintaining the ethical standards required for participant involvement in the study.

Data Analysis

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 25. Categorical data were presented using frequency and percentage methods, while numerical data were presented as means and standard deviations. Comparative analyses were conducted using an independent sample t-test and chi-square test for two groups, and a one-way ANOVA test for multiple groups, assuming normality, equal variances, and independence of observations. A *p*-value of less than 0.05 (two-tailed) was considered statistically significant.

Ethical Consideration

Ethical approval for the study was obtained from the Ethics and Research Committee of the Faculty of Nursing, King Abdulaziz University (Ref No. 2B.41). Participation in the study was voluntary, and parents had the right to decline participation without any consequences. They were provided with detailed information about the study's purpose, procedures, and potential risks to ensure informed consent. Participants were assured that all personal data would remain confidential, their identities would not be disclosed, and any information collected would only be used for the purposes of this study. Additionally, all data were anonymized to protect the privacy of participants. Ethical considerations were carefully adhered to, following guidelines to ensure participants' rights and well-being throughout the research process.

Results

A total of 118 parents (9 fathers and 109 mothers) agreed to participate in this study. Of the participants, 56.78% were aged between 26 and 45, while 35.59% were 46 years or older (Table 1). The participants were further categorized into two groups: 48 parents (40.68%) of children with disabilities and 70 parents (59.32%) of children without disabilities (typically developing children).

A comparison of the demographics between the two groups of parents revealed statistically significant differences in gender ($p = 0.003$). Additionally, the proportion of parents with higher education (bachelor's degree or above) and employment was significantly lower among parents of children with disabilities compared to parents of children without disabilities ($p = 0.002$ and $p < 0.001$, respectively). Both groups were similar in terms of age, marital status, economic status, and health status (see **Table 1**).

According to **Table 2**, the majority of the 48 children with disabilities had moderate disabilities, with a prevalence rate of 45.83%. Mental disabilities were the most frequently reported type, sharing the same prevalence rate.

As shown in **Table 3**, children with disabilities were significantly older than those without disabilities ($p = 0.042$). The disabled group had a significantly higher proportion of 11- to 18-year-olds. Additionally, the type of education differed significantly between the two groups ($p < 0.001$), with a higher proportion of children with disabilities attending private schools compared to children without disabilities. No statistically significant differences were found between the two groups regarding gender or having siblings.

Table 1 Demographic data of the studied parents' groups

Item	Parents of children without disabilities (*n* = 70)	Parents of children with disabilities (*n* = 48)	*p*
Gender			
Male	1 (1.43%)	8 (16.67%)	0.003*
Female	69 (98.57%)	40 (83.33%)	
Age (years)			
≤25	6 (8.57%)	3 (6.25%)	0.719
26 - 45	41 (58.57%)	26 (54.17%)	
≥46	23 (32.86%)	19 (39.58%)	
Level of education			
High school or below	11 (15.71%)	20 (41.67%)	0.002*
Bachelor's degree or higher	59 (84.29%)	28 (58.33%)	
Marital status			
Married	63 (90%)	38 (79.17%)	0.28
Divorced	2 (2.86%)	3 (6.25%)	
Widowed	5 (7.14%)	7 (14.58%)	
Occupation			
Employed	47 (67.14%)	14 (29.17%)	<0.001*
Unemployed	23 (32.86%)	34 (70.83%)	
Economic status			
Less than 5000 SR/month	14 (20%)	13 (27.08%)	0.656
Between 5,000-15,000 SR/month	41 (58.57%)	25 (52.08%)	
More than 15,000 SR/month	15 (21.43%)	10 (20.83%)	
Health status			
Good	23 (32.86%)	19 (39.58%)	0.453
Very good	47 (67.14%)	29 (60.42%)	

Note: Data were analyzed using chi-square test

Table 2 Characteristics of disability

Characteristics of disability	*n*	%
Severity of disability		
Mild	15	31.25
Moderate	22	45.83
Severe	11	22.92
Type of disability		
Mental	22	45.83
Down syndrome	6	12.5
Autism	6	12.5
Learning	5	10.42
Physical	3	6.25
Cerebral palsy	2	4.17
Speech delay	1	2.08
Sensory	1	2.08
Mental, physical, sensory	1	2.08
ADHD, autism	1	2.08

Table 3 Demographic data of the studied children's groups

Item	Children without disabilities (*n* = 70)	Children with disabilities (*n* = 48)	*p*
Gender			
Male	31 (44.29%)	22 (45.83%)	0.868
Female	39 (55.71%)	26 (54.17%)	
Age (years)			
1 – 5	17 (24.29%)	4 (8.33%)	0.042*
6 – 10	23 (32.86%)	14 (29.17%)	
11 - 18	30 (42.86%)	30 (62.5%)	
Having siblings	61 (87.14%)	44 (91.67%)	0.441
Type of education			
Government	55 (78.57%)	16 (33.33%)	<0.001*
Private	9 (12.86%)	28 (58.33%)	
None	6 (8.57%)	4 (8.33%)	

Note: Data were analyzed using chi-square test

Compared to parents of children without disabilities, parents of children with disabilities showed a significantly lower frequency of having spiritual or rejuvenating personal time and participating in social activities with important and supportive individuals (*p* = 0.032 and *p* = 0.011, respectively). Overall, the total HPAS score was lower among parents of children with disabilities than among parents of children without disabilities (**Table 4**), although this difference was not statistically significant (*p* = 0.082).

Table 4 Health-promoting activities scores of the studied parents' groups

Item	Parents of children without disabilities (*n* = 70)	Parents of children with disabilities (*n* = 48)	*p*
Personal health care tasks, such as planning and eating healthy food and drinks; following exercise program; and other tasks for your health	4.46 ± 1.9	4.63 ± 2.01	0.646
A physically active recreational pursuit that you do alone	4.57 ± 1.6	4.46 ± 1.69	0.713
A physically active recreational pursuit that you do with other people	2.59 ± 1.5	2.73 ± 1.78	0.637
Spiritual or rejuvenating personal time	3.94 ± 2.13	3.08 ± 2.08	0.032*
Social activities with people who are important and supportive towards you	4.63 ± 1.26	3.96 ± 1.46	0.011*
Time out for yourself to spend as you wish	4.7 ± 1.84	3.94 ± 2.24	0.055
A quiet, physically inactive leisure pursuit that you do alone	4.8 ± 1.92	4.4 ± 2.07	0.278
A quiet, physically inactive leisure pursuit that you do with others	5.14 ± 1.7	4.54 ± 1.74	0.064
Total score	**34.83 ± 8.05**	**31.73 ± 10.21**	**0.082**

Note: Data were analyzed using an independent *t*-test

Among parents of children without disabilities, no statistically significant association was found between their characteristics and total HPAS scores. However, among parents of children with disabilities, a statistically significant association was observed between total HPAS scores and level of education (*p* = 0.023) and health status (*p* = 0.005). The scores were higher, or significantly higher, among parents with a bachelor's degree compared to those with a high school degree or lower, and they were significantly higher among parents with very good health status compared to those with good health status (**Table 5**).

Table 5 The association between parents' characteristics and total HPAS

Parents' characteristics	Parents of children without disabilities		Parents of children with disabilities	
	Total HPAS	*p*	Total HPAS	*p*
Gender				
Male	18 #	-	30.38 ± 13.87	0.759
Female	35.07 ± 7.84		32 ± 9.52	
Age (years)				
≤25	34.67 ± 6.28	0.824	43.33 ± 3.51	0.118
26 - 45	35.32 ± 6.3		31.42 ± 10.76	
≥46	34 ± 10.99		30.32 ± 9.23	
Level of education				
High school or below	34.09 ± 9.48	0.743	27.8 ± 11.23	0.023*
Bachelor's degree or higher	34.97 ± 7.84		34.54 ± 8.55	
Marital status				
Married	34.89 ± 8.21	0.981	32.71 ± 9.46	0.316
Divorced	34 ± 11.31		24 ± 13.89	
Widowed	34.4 ± 6.23		29.71 ± 12.63	
Occupation				
Employed	34.6 ± 8.1	0.732	34.29 ± 11.34	0.27
Unemployed	35.3 ± 8.09		30.68 ± 9.69	
Economic status				
Less than 5000 SR/month	33.71 ± 9.75	0.777	30.69 ± 11.91	0.894
5,000-15,000 SR/month	34.83 ± 7.46		32.36 ± 9.15	
More than 15,000 SR/month	35.87 ± 8.32		31.5 ± 11.37	
Health status				
Good	34.13 ± 9.43	0.615	26.79 ± 9.83	0.005*
Very good	35.17 ± 7.37		34.97 ± 9.24	

Note: Data were analyzed using independent *t*-test and ANOVA | #: Only one case was included in this category

Discussion

Summary of the Findings

Health-promoting activities play a crucial role in maintaining and improving overall well-being for parents, particularly those with children with disabilities. The primary aim of this study was to assess and compare health-promoting activities among parents of children with and without disabilities. The results indicated a significant difference in gender distribution between parents of children with disabilities and parents of typically developing children, with both groups being predominantly mothers. This finding is consistent with other studies, which also found that the majority of respondents were mothers, suggesting that mothers are usually the primary caregivers for their children (Alghamdi & Alsaigh, 2023; Vukicevic et al., 2023).

The present study found that parents of children with disabilities had a significantly lower level of education compared to parents of children without disabilities. Specifically, a higher percentage of parents in the group with disabled children had a high school education or below (41.67%), while a higher percentage of parents in the group with typically developing children had a bachelor's degree or higher (84.29%). Lower parental education has been associated with poorer health and developmental outcomes for children with disabilities, often due to factors such as limited access to information, resources, and support services (Arakelyan et al., 2019). This finding highlights the role of educational attainment in the experience and management of disabilities within the family context.

Consistent with the findings of Parish et al. (2010), the current study revealed that parents of children with disabilities were more likely to be unemployed (55%) compared to parents of children without disabilities (36%). Caring for a child with a disability often requires additional time, supervision, healthcare visits, and therapy, which can serve as barriers to parental employment (Singwane & Sandhleni, 2023). Implementing support programs that promote work-life balance could help address this issue, enabling parents to manage both their employment and caregiving responsibilities for their children with disabilities.

Regarding the characteristics of children with disabilities, the current study found that most disabilities were categorized as moderate, with mental disabilities being the most frequently reported. These findings highlight the prevalence of mental disabilities among the studied population and emphasize the need for targeted interventions and support for children with such disabilities.

Although the HPAS results did not show a statistically significant difference, parents of children without disabilities scored slightly higher overall compared to parents of children with disabilities. These findings suggest that parents, regardless of their child's disability status, recognize the importance of engaging in HPBs. Furthermore, there was a significantly lower frequency of spiritual or rejuvenating personal time among parents of children with disabilities compared to those of normally developing children. This finding highlights the potential emotional and psychological burden experienced by parents of children with developmental disabilities. Therefore, it is essential for healthcare providers to address these parents' psychological and spiritual needs and promote strategies to meet these needs.

The results also showed that parents of children with disabilities participated less frequently in social activities compared to parents of non-disabled children. This finding is consistent with those of other studies (Alghamdi et al., 2021; Ha et al., 2011; Langley et al., 2021). Reduced social activities may contribute to increased stress, burnout, and poor overall well-being among parents of children with disabilities (Peer & Hillman, 2014). Parents of children with disabilities may have more difficulty finding time for personal reflection, spiritual practices, and maintaining social connections with supportive individuals. These challenges may be attributed to the increased caregiving responsibilities and time demands associated with caring for a child with developmental disabilities (Langley et al., 2021). These findings suggest the need for tailored health promotion activities for parents of children with developmental disabilities to ensure they receive proper self-care and social support.

Additionally, the study found that parents of children with disabilities reported a lower level of HPAs compared to parents of typically developing children, particularly in the areas of personal rejuvenation and social participation. These parents also exhibited lower levels of participation in physical activities and recreational activities. This reduction in engagement could be explained by the increased physical and emotional strain parents of children with disabilities often experience, which may leave them with less time and energy to dedicate to personal well-being activities.

The results showed that educational level was associated with higher total HPAS scores among parents of disabled children. This finding suggested that parents with higher education levels may possess greater knowledge about HPBs and resources, enabling such parents to engage more actively with them. Education can be crucial in empowering parents to make informed decisions regarding their health and well-being (Alwhaibi et al., 2020; Sulaimani et al., 2023).

Furthermore, the study found that parents of children with disabilities had a significantly lower health status compared to parents of typically developing children, as indicated by the health status and HPAS correlation. Parents reporting "good" health had a notably lower HPAS score, which points to the connection between health and health-promoting behaviors. This result emphasizes the importance of addressing the physical and mental health of these parents, as poor health can limit their ability to engage in activities that promote well-being.

In summary, the findings of this study indicate that parents of children with disabilities engage less frequently in health-promoting activities compared to parents of typically developing children. Specifically, these parents reported significantly lower frequencies of spiritual or rejuvenating personal time and participation in social activities with supportive individuals. The overall health-promoting activities score was also lower, although the difference was not statistically significant. These results align with previous research suggesting that the challenges and demands of caring for a child with a disability can significantly impact parents' ability to engage in self-care and leisure activities (Bujnowska et al., 2021; Davys et al., 2017; Peer & Hillman, 2014; Samadi et al., 2020).

Implications of the Study for Nursing Practice

The findings of this study highlight the significant impact of caregiving for children with disabilities on parents' ability to engage in health-promoting activities. Nurses and healthcare providers play a pivotal role in addressing the unique needs of parents in this context. Given that parents of children with disabilities reported lower overall health-promoting activity scores and significantly lower frequencies of engaging in spiritual or rejuvenating personal time and social activities, it is essential for nurses to develop tailored interventions that consider these challenges.

One critical implication for nursing practice is the importance of regularly assessing the health-promoting behaviors of parents, especially those of children with disabilities. By identifying barriers to self-care and leisure activities, nurses can provide individualized support and education to help parents overcome these challenges. Nurses can offer resources on stress management, self-care strategies, and techniques for integrating physical activity and personal time into their daily routines, all of which can improve parents' overall well-being.

Additionally, healthcare providers should recognize the impact of socioeconomic factors such as education and health status on parents’ engagement in health-promoting activities. Nurses can advocate for programs that address these factors, such as community-based resources that offer support for parents' education and health needs. By fostering collaborative care models and connecting parents with community support networks, nurses can help alleviate the emotional and physical burdens associated with caregiving.

Lastly, integrating the well-being of parents into family-centered care is crucial. Nurses should work closely with multidisciplinary teams, including mental health professionals and social workers, to ensure that the needs of both parents and children are met. This approach can help improve the quality of life for parents of children with disabilities by promoting a balanced approach to caregiving and self-care.

Limitations

Although the current study highlighted important aspects of health-promoting activities in parents' lives, particularly those of parents with disabled children, some limitations need to be addressed in future research. The small sample size and the exclusion of parents of critically ill children limit the generalizability of the findings. Future studies with larger and more diverse samples would provide a more accurate understanding of health-promoting activities. Additionally, as this was a cross-sectional study, causal inferences cannot be drawn since not all confounders were measured. Future research could employ longitudinal or qualitative methods to explore in-depth causal relationships. Lastly, despite efforts to ensure clarity and conciseness in the questionnaire, recall bias may still be present, as the data were collected through self-report measures commonly used with parents of children with disabilities.

Conclusion

Compared to the overall HPAS scores of parents of children with disabilities, the scores of parents of children without disabilities were higher. These findings highlight the differences in health-promoting activities between parents of children with and without disabilities. Providing tailored interventions and comprehensive support services is crucial to addressing the needs and promoting the well-being of parents of children with disabilities. Future research should focus on identifying self-care needs and support services that are essential for enhancing the health and well-being of parents of children with developmental disabilities. Additionally, future research should aim to raise awareness of health-promoting activities. Interventions may include incorporating leisure activities and physical exercises into community programs and educational initiatives. The results of this study can inform strategies to enhance the overall well-being of parents of children with developmental disabilities.

Declaration of Conflicting Interest

No conflicts of interest to declare.

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Authors’ Contributions

SAA, HA, and FA contributed to the study concept, study design, writing, and management. They also analyzed and interpreted the data and provided critical input into the final draft. MA, RF, and FMA contributed to the study concept, study methods, and data collection and management, and they prepared the initial draft of the manuscript. All authors read and agreed to the manuscript’s final version.

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Data Availability

The datasets for the current study are available from the first and corresponding authors upon reasonable request.

Declaration of Use of AI in Scientific Writing

There is nothing to declare.

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Assessment of hand hygiene practices among nurses at a regional hospital in Kandahar, Afghanistan: A cross-sectional study based on the World Health Organization (WHO) 'Your 5 Moments for Hand Hygiene' guidelines

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Abstract

Background: Hand hygiene is a critical component of infection prevention and control (IPC) in healthcare settings, as emphasized by the World Health Organization (WHO). However, compliance with recommended hand hygiene practices remains suboptimal in many resource-limited settings, including Afghanistan. Despite its importance, limited research has been conducted on hand hygiene practices in Afghan healthcare facilities, highlighting the need for further investigation.

Objective: This study aimed to evaluate the self-reported hand hygiene practices of nurses at Mirwais Regional Hospital in Kandahar, Afghanistan.

Methods: A cross-sectional study was conducted among 141 nurses between August and October 2023. Self-reported hand hygiene compliance was assessed using WHO's "Your 5 Moments for Hand Hygiene" framework. Data on demographic characteristics, training, and compliance rates were collected. Descriptive statistics and logistic regressions were applied to analyze the data using SPSS version 26.0.

Results: The study found that 73.1% of nurses demonstrated good hand hygiene practices, while 26.9% had non-good compliance. Female nurses showed significantly higher compliance (87.5%) than their male counterparts (68.8%) with a p-value of 0.044, AOR = 1.15 (95% CI: 1.03–9.75). Nurses with a bachelor's degree had higher compliance (92.3%) compared to those with a diploma (59.4%) ($p = 0.046$, AOR = 2.1, 95% CI: 0.15–0.96). Nurses aged ≥30 years showed better compliance (96%) than those aged 20–29 years (75.3%) ($p = 0.006$, AOR = 2.1, 95% CI: 1.84–36.53). Hand hygiene training was positively associated with better compliance (88.3% vs. 61.9%, $p = 0.004$, AOR = 1.5, 95% CI: 0.07–0.6).

Conclusion: While overall compliance was relatively high, significant gaps persist, particularly among younger, less educated, and male nurses, as well as those in high-burden wards. Enhanced training programs, tailored strategies, and regular audits are essential for improving hand hygiene practices and strengthening infection prevention and control efforts, ultimately enhancing patient safety in resource-limited settings.

Keywords

Afghanistan; hand hygiene; nurses; resource-limited settings; hospitals; World Health Organization; demography; compliance

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Background

In both developed and developing nations, healthcare-associated infections (HAIs) continue to represent a considerable challenge to public health. They result in increased healthcare expenses, unnecessary medical tests, prolonged hospital stays, and heightened use of medications (Mu et al., 2016). Hand hygiene is widely acknowledged as the cornerstone of infection prevention and control (IPC) (Schmutz et al., 2023). Hand hygiene encompasses various practices, including handwashing with soap and water or the application of alcohol-based hand rubs (ABHR) and sanitizers to eliminate transient germs from hands (Nabavi et al., 2015). During healthcare procedures, hand contact is the primary channel for germ transmission. Consequently, a significant number of individuals worldwide die daily from infectious diseases contracted in healthcare facilities (WHO, 2009a).

Studies suggest that more than 1.4 million individuals worldwide are affected by HAIs (Saleh et al., 2022). Furthermore, according to the World Health Organization (WHO), the prevalence of HAIs is approximately 40% in developing nations and nearly 5–10% in developed countries (Mohaithef, 2020). Most HAIs are transmitted between patients via the hands of healthcare workers (HCWs), influenced by heavy workloads and clinical procedures (Nabavi et al., 2015). Research has demonstrated that using ABHR or washing hands with soap and water effectively reduces the spread of infectious diseases (Mohaithef, 2020; Mu et al., 2016; Nabavi et al., 2015; Wang et al., 2022). The WHO recommends the use of ABHR for routine hand decontamination in clinical settings when hands are not visibly soiled. Additionally, alcohol-based hand hygiene requires less time than washing hands with soap and water, yet it remains effective against most pathogens (Marra & Edmond, 2014).

In 2009, WHO proposed the “Your 5 Moments for Hand Hygiene” framework to enhance global hand hygiene practices (Chou et al., 2012; Shen et al., 2017). These five crucial moments include actions before patient contact, before clean procedures, after exposure to body fluids, after patient contact, and after contact with patient surroundings (Shen et al., 2017). Over the past 15 years, the 'five moments' framework has gained traction, emerging as the standard practice in healthcare centers (Chou et al., 2012). This variation in adherence underlines the need for a comprehensive understanding of hand hygiene practices worldwide.

This study is guided by the World Health Organization's “Your 5 Moments for Hand Hygiene” framework, which delineates critical moments for hand hygiene to prevent infection transmission. This conceptual model highlights the study's design by focusing on pivotal instances of hand hygiene practice among nurses in clinical settings. The research explores the relationship between demographic variables—gender, education level, years of experience—and hand hygiene practices. Existing literature suggests that these factors may influence hand hygiene adherence (Mu et al., 2016; Nabavi et al., 2015). For instance, gender differences in hand hygiene compliance have been reported, with female healthcare workers often exhibiting higher adherence rates compared to their male counterparts (Marra & Edmond, 2014).

Hand hygiene practices have been extensively investigated globally (Mohaithef, 2020; Nabavi et al., 2015; Saleh et al., 2022); however, a comprehensive study specifically addressing hand hygiene adherence among healthcare workers (HCWs) in Afghanistan, particularly in Kandahar province, remains unknown. This highlights a significant gap in understanding hand hygiene adherence in this region and its healthcare facilities. Addressing the lack of data on hand hygiene practices in Kandahar is crucial for improving infection prevention strategies. This study aims to be the first to evaluate hand hygiene practices among nurses at Mirwais Regional Hospital in Kandahar, thereby contributing to the global body of knowledge on hand hygiene adherence.

The objective is to assess adherence to the “Your 5 Moments for Hand Hygiene” protocol among nurses at Mirwais Regional Hospital, a major public healthcare facility serving approximately 7 million people in southwestern Afghanistan. Additionally, this study seeks to emphasize the critical role of hand hygiene adherence among nurses in preventing and controlling infectious diseases. The findings will enhance the scholarly understanding of hand hygiene practices among nurses and provide valuable data to healthcare authorities and policymakers in Afghanistan, supporting the development and implementation of effective hand hygiene policies and training programs tailored to the needs of HCWs in Kandahar. Ultimately, the publication of this research will provide essential data for healthcare authorities in Afghanistan, aiding in the formulation of effective hand hygiene policies and training programs to enhance patient safety and reduce healthcare-associated infections (HAIs).

Methods

Study Design

This was a descriptive cross-sectional study conducted at Mirwais Regional Hospital. This hospital was constructed in the late 1970s in Kandahar city, Afghanistan. It is the largest tertiary care hospital in the southwestern region of Afghanistan [see **Figure 1**, an original map created using GIS Software ArcGIS version 10.8.2 for this research (ESRI, 2020)]. This map was developed specifically for our study without any external sources. The hospital serves as the primary governmental healthcare facility for approximately 7 million people residing in the Kandahar zone, including the surrounding provinces of Helmand, Urozgan, and Zabul. The hospital has 1,000 beds, 1,567 healthcare workers (HCWs), and more than 13 clinical departments (International Committee of the Red Cross (ICRC), 2015).

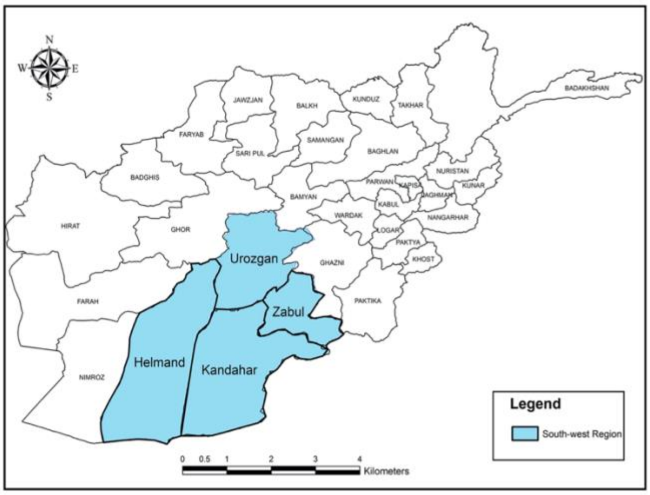

Figure 1 **The southwest region of Afghanistan**

Samples/Participants

In this study, only nurses who directly interact with patients at the hospital were targeted. Of the total nursing staff (222), 141 nurses across 13 clinical departments were selected for the study. The inclusion criteria were on-duty nurses (both male and female) aged over 18 years. The exclusion criteria included nurses who did not consent to participate in this study. The sample size was calculated using the Raosoft sample size calculator with a 95% confidence interval (CI) and a 5% margin of error. A minimum sample size of 141 was estimated. The Raosoft calculator was chosen for its straightforward application and suitability for survey-based research, focusing on parameters such as margin of error, confidence level, and population size, which align well with the needs of this study. This tool is widely used in similar studies for its ease of use and reliability in ensuring representative samples. According to the Research Advisors' guidelines, Raosoft is recommended for its efficiency and accuracy in survey research (The Research Advisors, 2006).

Instruments

The questionnaire was designed in two parts based on the WHO's "Your 5 Moments for Hand Hygiene" framework (WHO, 2009a). Many studies have already used these guidelines, translated them into different languages, and published them in peer-reviewed journals (Allegranzi et al., 2013; Sax et al., 2007; Walaszek et al., 2018; WHO, 2009b). The English version of the questionnaire was translated into Pashto using the forward-backward translation method. One of the co-authors translated the questionnaire into Pashto, and it was later cross-checked by an English language lecturer from the Faculty of Literature at Kandahar University.

The first section of the questionnaire covered demographic and occupational variables, including questions about hand hygiene training programs, age, gender, education, and job experience. The second part addressed hand hygiene practices, including before touching a patient, before a clean/aseptic procedure, after body fluid exposure risk, after touching a patient, and after touching the patient's surroundings (WHO, 2009a). This section also included additional questions related to hand hygiene practices, such as: before wearing gloves, after removing gloves, do you follow the WHO's handwashing procedure? Do you apply hand rub following the WHO procedure? Do you take care of your hands regularly using a protective hand cream or lotion? Do you wait for your hands to dry before putting on gloves after washing or hand-rubbing? Do you avoid wearing items like artificial fingernails, watches, and jewelry when in direct contact with patients?

Nurses took an average of 7–10 minutes to complete the 12-question questionnaire, with correct and incorrect answers scored as 1 and 0, respectively. If participants responded with 'sometimes,' it was marked as incorrect to minimize the influence of social desirability. Participants were classified into two groups based on their total scores ranging from 0 to 12. Those with scores below 9, indicating less than 75% adherence to hand hygiene practices, were classified as having non-good hand hygiene practices, while those with scores from 9 to 12, suggesting more than 75% adherence, were classified as having good hand hygiene practices (Mohaithef, 2020; Saleh et al., 2022).

Data Collection

From August to October 2023, the co-authors of this research team conducted in-person discussions at Mirwais Regional Hospital with each department's head nurse during their break times. The head nurses were provided with an overview of the research and assured that participation was entirely voluntary. Prior to data collection, informed consent was obtained from each participant. Additionally, the team emphasized that any data collected would be used solely for research purposes. The department heads then randomly distributed the questionnaires to the nurses, and the completed questionnaires were collected on the spot by the co-authors.

Data Analysis

The Statistical Package for the Social Sciences (SPSS) version 26 (Armonk, NY, USA) was used to analyze the data. Descriptive statistics, including frequencies and percentages, were used to summarize the hand hygiene practices of nurses. A logistic regression was conducted to assess the relationships between categorical demographic variables and hand hygiene practices, with statistical significance set at p <0.05. Additionally, adjusted odds ratios (AOR) and 95% confidence intervals (CI) were calculated to measure the strength and direction of associations between variables (Altman & Bland, 2011; Engdaw et al., 2019; McHugh, 2013).

Ethical Consideration

The ethical approval was obtained from the ethics committee of Kandahar University, Kandahar, Afghanistan (No. 932/594, dated April 13, 2023). Moreover, formal authorization was obtained from the Public Health Directorate of Kandahar province and the head of Mirwais Regional Hospital to conduct this study (No. 245/762, dated May 25, 2023).

Results

Two hundred twenty-two nurses from Mirwais Regional Hospital were contacted, and 141 agreed to participate in this study, resulting in a response rate of 63.5%.

Table 1 Characteristics of the participants (N = 141)

Variable	f (%)
Gender	
Male	109 (77.3)
Female	32 (22.7)
Educational level	
Diploma degree holder nurses	128 (90.8)
Bachelor degree holder nurses	13 (9.2)
Age (years)	
20-29	99 (70.2)
30+	42 (29.8)
Work experience (years)	
<5	70 (49.6)
5-10	29 (20.6)
>10	42 (29.8)
Department (wards)	
General Medical Ward	15 (10.6)
Medical Emergency Ward	15 (10.6)
Ear, Nose, and Throat Ward	6 (4.3)
Male Intensive Care Unit	16 (11.8)
Orthopedic Ward	6 (4.3)
Surgery Ward	6 (4.3)
Communicable Diseases Ward	6 (4.3)
General Pediatric Ward	20 (14.2)
Infectious Diseases Ward	6 (4.3)
Covid-19 Ward	12 (8.5)
Surgery Out Patient Ward	16 (11.3)
Ophthalmology Ward	4 (2.8)
Genecology Ward	13 (9.2)
Attend a formal training course about hand washing	
Yes	120 (85.1)
No	11 (7.8)
Not sure	10 (7.1)

Table 1 displays the general demographic characteristics of the research participants. Among the participants, 109 out of 141 (77.3%) were male, while 128 out of 141 (90.8%) were diploma nurses. Additionally, 99 out of 141 participants (70.2%) were aged 20–29 years, while 42 out of 141 (29.8%) had more than 30 years of clinical experience. Most participants (120 out of 141, or 85.1%) had completed an official hand-washing course.

The answers provided by participants to the hand hygiene practice questionnaire are summarized in **Table 2**. The highest hand hygiene compliance before touching patients was reported by 62.4% of males and 19.1% of females, while 73.0% of males and 22.7% of females strictly adhered to hand hygiene before clean procedures. Approximately 74.5% of males and 22.7% of females followed hand hygiene compliance after exposure to body fluids, with 68.8% of males and 21.3% of females consistently maintaining hand hygiene after patient contact. Following contact with patient surroundings, 64.5% of males and 17.7% of females practiced hand hygiene rigorously, while the percentage before wearing gloves was 58.9% of males and 21.3% of females.

Moreover, 62.4% of males and 20.6% of females meticulously followed hand hygiene after glove removal, and 64.5% of males and 21.3% of females regularly applied the WHO's handwashing procedure. Regarding hand care, 50.4% of males and 17.0% of females regularly utilized hand cream or lotion. Notably, only 14.2% of males and 10.6% of females patiently waited for their hands to dry before wearing gloves, while the majority, 58.2% of males and 19.1% of females, consciously avoided wearing items like artificial nails, watches, and jewelry when in direct contact with patients.

Table 2 Descriptive statistics of compliance of hand hygiene practices among nurses (*N* = 141)

Hand Hygiene Practices	Gender	Compliance and Non-Compliance			Total f (%)
		Yes f (%)	No f (%)	Sometimes f (%)	
1. Do you practice hand hygiene in the following situation?					
a. Before touching a patient	Male	88 (62.4)	4 (2.8)	17 (12.1)	109 (77.3)
	Female	27 (19.1)	3 (2.1)	2 (1.4)	32 (22.7)
	Total	115 (81.6)	7 (5.0)	19 (13.5)	141 (100)
b. Before clean or aseptic procedure	Male	103 (73.0)	1 (0.7)	5 (3.5)	109 (77.3)
	Female	32 (22.7)	0 (0.0)	0 (0.0)	32 (22.7)
	Total	135 (95.7)	1 (0.7)	5 (3.5)	141 (100)
c. After body fluid exposure risk	Male	105 (74.5)	0 (0.0)	4 (2.8)	109 (77.3)
	Female	32 (22.7)	0 (0.0)	0 (0.0)	32 (22.7)
	Total	137 (97.2)	0 (0.0)	4 (2.8)	141 (100)
d. After touching a patient	Male	97 (68.8)	3 (2.1)	9 (6.4)	109 (77.3)
	Female	30 (21.3)	1 (0.7)	1 (0.7)	32 (22.7)
	Total	127 (90.1)	4 (2.8)	10 (7.1)	141 (100)
e. After touching patient surroundings	Male	91 (64.5)	10 (7.1)	8 (5.7)	109 (77.3)
	Female	25 (17.7)	4 (2.8)	3 (2.1)	32 (22.7)
	Total	116 (82.3)	14 (9.9)	11 (7.8)	141 (100)
f. Before wearing gloves	Male	83 (58.9)	13 (9.2)	13 (9.2)	109 (77.3)
	Female	30 (21.3)	1 (0.7)	1 (0.7)	32 (22.7)
	Total	113 (80.1)	14 (9.9)	14 (9.9)	141 (100)
g. After removing gloves	Male	88 (62.4)	6 (4.3)	15 (10.6)	109 (77.3)
	Female	29 (20.6)	1 (0.7)	2 (1.4)	32 (22.7)
	Total	117 (83.0)	7 (5.0)	17 (12.1)	141 (100)
2. Do you follow the WHO's handwashing procedure?	Male	91 (64.5)	3 (2.1)	15 (10.6)	109 (77.3)
	Female	30 (21.3)	0 (0.0)	2 (1.4)	32 (22.7)
	Total	121 (85.8)	3 (2.1)	17 (12.1)	141 (100)
3. Do you apply hand rub following the WHO procedure?	Male	91 (64.5)	4 (2.8)	14 (9.9)	109 (77.3)
	Female	29 (20.6)	0 (0.0)	3 (2.1)	32 (22.7)
	Total	120 (85.1)	4 (2.8)	17 (12.1)	141 (100)
4. Do you take care of your hands by regularly using a protective hand cream or lotion?	Male	71 (50.4)	18 (12.8)	20 (14.2)	109 (77.3)
	Female	24 (17.0)	4 (2.8)	4 (2.8)	32 (22.7)
	Total	95 (67.4)	22 (15.6)	24 (17.0)	141 (100)
5. Do you wait for your hands to dry before putting on gloves after washing or hand rubbing?	Male	20 (14.2)	75 (53.2)	14 (9.9)	109 (77.3)
	Female	15 (10.6)	9 (6.4)	8 (5.7)	32 (22.7)
	Total	35 (24.8)	84 (59.6)	22 (15.6)	141 (100)
6. Do you avoid wearing items like artificial fingernails, watches, and jewelry when in direct contact with patients?	Male	82 (58.2)	6 (4.3)	21 (14.9)	109 (77.3)
	Female	27 (19.1)	1 (0.7)	4 (2.8)	32 (22.7)
	Total	109 (77.3)	7 (5.0)	25 (17.7)	141 (100)

According to the self-reported answers provided by the participants in the hand hygiene questionnaire, **Figure 2** illustrates the distribution of respondents based on their hand hygiene practices. Among the participants, 73.1% demonstrated good hand hygiene practices (with more than 75% of their responses aligning with the recommended hand hygiene practices). Additionally, 26.9% exhibited non-good hand hygiene practices and did not meet the standard (with less than 75% of their responses aligning with the recommended hand hygiene practices).

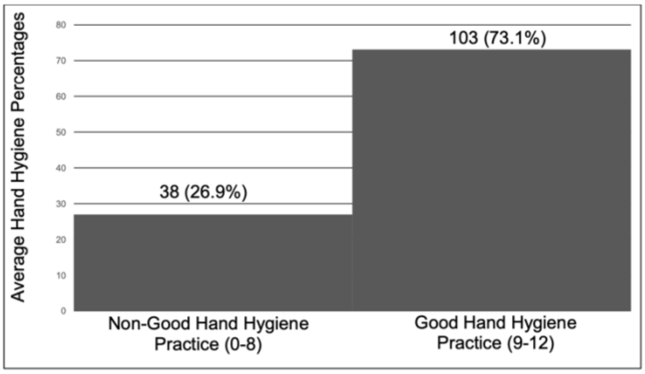

Figure 2 Distribution of nurses according to their compliance with hand hygiene protocols (*N* = 141)

The association between general demographic characteristics (gender, education level, age, work experience, and formal training) and nurses' hand hygiene practices, categorized as "Good" and "Non-good" hand hygiene practices, are presented in **Table 3**. Among the gender groups, a significantly higher proportion of female nurses (87.5%) demonstrated good hand hygiene practices compared to male nurses (68.8%), with a *p*-value of 0.044, indicating statistical significance. The adjusted odds ratio (AOR) of 1.15 suggests that female nurses are 1.15 times more likely to maintain good hand hygiene practices than male nurses; however, the wide confidence interval (CI) of 1.03–9.75 indicates some variability in this effect. Likewise, nurses with a bachelor's degree exhibited higher hand hygiene practice (92.3%) compared to those holding a diploma degree (59.4%) (*p* = 0.046, AOR 2.1, 95% CI: 0.15–0.96).

Age was also a factor influencing hand hygiene practices, with nurses aged 30 years and older exhibiting notably higher hand hygiene practice (96%) compared to those aged 20–29 years (75.3%) (*p* = 0.006, AOR 2.1, 95% CI: 1.84–36.53). In contrast, work experience was not significantly associated with hand hygiene practices (*p* = 0.212). However, hand hygiene practice rates were moderately higher among nurses with more than five years of experience (e.g., 86% compliance among those with 5–10 years of experience compared to 74% among those with less than five years). Additionally, nurses who received hand hygiene training demonstrated significantly higher hand hygiene practice (88.3%) than those without training (61.9%) (*p* = 0.004, AOR 1.5, 95% CI: 0.07–0.6).

Regarding department-specific compliance, participants from the Ear, Nose, and Throat Department, Male Intensive Care Unit, and COVID-19 Ward achieved a 100% rate of good hand hygiene practices. This was followed by the General Medical Ward (86.7%), Medical Emergency Ward (86.7%), Gynecology Ward (84.6%), Orthopedic Ward (83.7%), Surgery Ward (83.3%), and Communicable Diseases Ward (83.3%).

Table 3 The relationship between demographic characteristics and nurses' practices regarding hand hygiene (*N* = 141)

Variable	Hand Hygiene Practices Scores		*p*-value (Good vs Non-Good)	Adjusted OR (95% CI)
	Non-Good Practice *n* (%)	Good Practice *n* (%)		
Gender				
Male	34 (31.2)	75 (68.8)	0.044 (Significant)	AOR = 1.15 (1.03 – 9.75)
Female	4 (12.5)	28 (87.5)		
Education				
Diploma	52 (40.6)	76 (59.4)	0.046 (Significant)	AOR = 2.1 (0.15 – 0.96)
Bachelor	1 (7.7)	12 (92.3)		
Age				
20-29 years	22 (24.7)	77 (75.3)	0.006 (Significant)	AOR = 2.1 (1.84 – 36.53)
30+ years	2 (4)	40 (96)		
Work experience				
<5 years	18 (26)	52 (74)	0.212 (Insignificant)	AOR = 0.31 (0.83 – 2.22)
5-10 years	4 (14)	25 (86)		
>10 years	7 (16.7)	35 (83.3)		
Training				
Yes	14 (11.7)	106 (88.3)	0.004 (Significant)	AOR = 1.5 (0.07 – 0.6)
No	8 (38.1)	13 (61.9)		

Discussion

This study evaluated hand hygiene practices among nurses at Mirwais Regional Hospital in Kandahar, Afghanistan, using self-reported compliance with the WHO's "Your 5 Moments for Hand Hygiene" framework. The findings indicate that 73.1% of participants demonstrated good hand hygiene practices, while 26.9% fell into the non-good practice category. This result underlines a generally high level of compliance among nurses, although significant gaps remain in achieving universal adherence, particularly among specific demographic and professional subgroups.

Gender emerged as a significant factor influencing hand hygiene practices, with female nurses showing higher compliance (87.5%) compared to their male counterparts (68.8%). This finding aligns with previous studies indicating that female healthcare workers are generally more likely to adhere to infection prevention protocols, possibly due to differences in attitudes or perceptions of patient safety (Ahmed et al., 2020; Cruz & Bashtawi, 2016; Suen et al., 2019). However, the variability indicated by the wide confidence interval suggests that further research is needed to validate this association.

Education level also played a crucial role, with nurses holding a bachelor's degree demonstrating significantly higher compliance (92.3%) compared to those with diploma qualifications (59.4%). This result emphasizes the importance of higher education in fostering an understanding of the critical role hand hygiene plays in infection control. Similar findings have been reported in other settings, where advanced education is associated with better adherence to evidence-based practices (Mohaithef, 2020; Nabavi et al., 2015).

Age was another significant determinant, with nurses aged 30 years and older having notably higher compliance (96%) compared to younger nurses aged 20–29 years (75.3%). This trend may reflect the impact of accumulated clinical experience and maturity on adherence to infection control practices. However, while older nurses performed better, the lack of significance in the work experience variable suggests that factors beyond experience, such as attitudes and training, may influence compliance (Allegranzi et al., 2013; Harun et al., 2022).

Formal hand hygiene training had a profound effect on compliance rates. Nurses who had received such training were significantly more likely to adhere to recommended practices (88.3%) than those without training (61.9%). This finding highlights the critical need for structured hand hygiene education programs tailored to healthcare workers in resource-limited settings like Afghanistan. Training not only increases knowledge but also fosters behavior change, as demonstrated in similar studies globally (Randle et al., 2006; Shinde & Mohite, 2014).

Departmental differences in compliance were also observed. Notably, 100% of nurses from the Ear, Nose, and Throat Department, Male Intensive Care Unit, and COVID-19 Ward reported good hand hygiene practices. This higher compliance in specialized departments may be attributed to greater awareness of infection risks and stricter monitoring of hygiene protocols in high-risk environments. By contrast, other wards, such as General Medical, Medical Emergency, and Gynecology, exhibited lower but still commendable compliance rates. These differences highlight the importance of targeted interventions and monitoring tailored to specific clinical settings to address disparities in hand hygiene adherence (Memon & Afghan, 2020; Sharif et al., 2015).

Despite the generally high compliance rates, certain aspects of hand hygiene practice remain suboptimal. For example, only a small proportion of participants (14.2% of males and 10.6% of females) waited for their hands to dry before wearing gloves, an essential step in preventing pathogen transmission. Similarly, only 58.2% of males and 19.1% of females consciously avoided wearing jewelry, artificial nails, or watches, which can harbor microorganisms and compromise hygiene. These lapses may reflect gaps in training or a lack of emphasis on specific hand hygiene elements in daily practice (Abd Elaziz & Bakr, 2009; Jang et al., 2010).

The overall hand hygiene compliance rate in this study is comparable to those reported in other developing countries, where rates typically range from 40% to 75% (Mohaithef, 2020; WHO, 2009b) (WHO, 2009b; Mohaithef, 2020). However, the disparity between male and female compliance and the variability across departments mirrors trends observed in both developed and developing nations. These findings reinforce the need for gender-sensitive and context-specific strategies to improve adherence (Suen et al., 2019).

Implications for Policy and Practice

The findings of this study highlight critical areas for improvement in hand hygiene practices and the urgent need for targeted interventions. Policies should prioritize enhancing hand hygiene training programs, particularly for younger, less educated, and male nurses, to address observed gaps. Hospital administrators should integrate regular, department-specific training sessions into institutional policies, ensuring that these programs include mandatory refresher courses in infection prevention and control (IPC). Specific lapses, such as allowing hands to dry before wearing gloves and the removal of jewelry, should be addressed through tailored training curricula and reinforced with periodic audits and feedback. Additionally, the higher compliance rates among female nurses suggest that gender-sensitive approaches may be effective in fostering better hand hygiene practices across various wards.

Strengths and Limitations

This study makes a significant contribution by addressing a critical gap in the literature on hand hygiene practices among healthcare workers in Afghanistan, particularly in Kandahar, where little data exists. By investigating hand hygiene compliance within the framework of WHO guidelines, the study adds valuable insights to the global body of research in the public health sector.

However, several limitations must be acknowledged. First, the reliance on self-reported data may have introduced social desirability bias, potentially inflating compliance rates. The relatively small sample size and gender imbalance (77.3% male and 22.7% female participants) further limit the generalizability of the findings. Additionally, the study does not fully explore inconsistencies in compliance with the WHO's "Your 5 Moments for Hand Hygiene." For instance, while 73.1% of nurses were categorized as having good hand hygiene practices overall, certain critical practices, such as allowing hands to dry before wearing gloves, showed much lower compliance, with only 24.8% adherence. A more detailed examination of the reasons behind such discrepancies could provide actionable insights for future interventions.

Conclusion

This study provides valuable insights into hand hygiene practices among nurses at Mirwais Regional Hospital, highlighting both strengths and areas for improvement. While overall hand hygiene compliance was relatively high, significant gaps persist, particularly among younger, less educated, and male nurses. Training programs were identified as crucial for fostering better practices, with formal education and targeted interventions significantly improving compliance. The findings underscore the need for targeted interventions, including education, training, and mentorship, especially for male nurses and those in high-burden wards such as surgical and pediatric units. The Afghanistan Ministry of Public Health should actively support hospitals in increasing good hand hygiene practices among nurses through regular supervision and monitoring of hand hygiene implementation in all wards. Further studies are necessary to assess hand hygiene practices among other personnel, including doctors, midwives, and cleaners, to create a more comprehensive understanding. Expanding similar studies to public and private hospitals across all 34 provinces of Afghanistan will further enhance hand hygiene compliance and infection prevention nationally.

Declaration of Conflicting Interest

No conflicts of interest to declare.

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Authors' Contributions

All authors contributed equally to this research. AQB developed the research idea, guided it from concept to manuscript drafting, and handled the data design. AS and SM wrote the questionnaire and collected the data. BAR, AWM, and MHH analyzed the data and prepared the first draft of the manuscript, while PN and MSD revised the manuscript from the abstract to the references. Everyone read and approved the final draft of the article.

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Data Availability

The datasets generated during and analyzed for the current study results are available from the first and corresponding authors upon reasonable request.

Declaration of Use of AI in Scientific Writing

The authors used ChatGPT-4 to review English writing quality without creating content. They edited the text using the AI language model and took responsibility for the publication's content.

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Characteristics associated with career self-reliance behaviors of nurses working in nursing homes in Japan: A cross-sectional study

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Abstract

Background: With an aging global population, establishing integrated systems for long-term care is challenging in several countries. Adequate and quality service for older adults in nursing homes can improve their quality of life. The career self-reliance of nurses working in nursing homes may affect the quality of life of older adults; this suggests a need for educational support for career self-reliance behavior.

Objective: Our study aimed to identify characteristics associated with the career self-reliance behaviors of nurses working in nursing homes.

Methods: Data were collected from nurses working in 789 nursing homes in Japan using questionnaires in 2018. The questionnaire consisted of the Scale of Career Self-Reliance Attitude, Career Self-Reliance Behavior to measure the degree of nurses' career self-reliance, questions about personal attributes, work environment, and work commitment; and the Clinical Nursing Competence Self-Assessment Scale. A multiple regression analysis was conducted using career self-reliance as the dependent variable and characteristics as the independent variables.

Results: Consequently, a total of 336 questionnaires were collected, of which 289 without missing data were analyzed. Of the 289 participants, 79 (27.3%) had certifications or licenses other than those for nursing or had completed graduate school. As a result of multiple regression analysis, a higher frequency of nursing practice ($\beta = 0.38$, $p < 0.001$) was associated with career self-reliance attitudes. Having certifications or licenses other than those for nursing or completing graduate school ($\beta = 0.11$, $p = 0.03$), job satisfaction as a nurse ($\beta = 0.12$, $p = 0.03$), higher frequency of nursing practice ($\beta = 0.28$, $p < 0.001$), and a higher degree of career self-reliance attitude ($\beta = 0.45$, $p < 0.001$) were associated with career self-reliance behavior. Relationships with supervisors or colleagues were not associated with career self-reliance.

Conclusion: It is important for nurses working in nursing homes to enrich their nursing practice, continue learning, and be satisfied with their jobs to improve their career self-reliance. Nurses and administrators working in nursing homes should make efforts to obtain these characteristics for nurses' career self-reliance behaviors. Particularly, maintaining nursing practice frequency is essential for improving the quality of life of older adults through nurses' career self-reliance.

Keywords

career; competence; nurse; nursing home; nursing practice

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Background

With an aging global population (United Nations Department of Economic and Social Affairs, 2022), establishing integrated systems for long-term care is challenging in many countries (World Health Organization [WHO], 2015). Japan is already witnessing rampant aging, with a rate of approximately 30%, the highest in the world (United Nations Department of Economic and Social Affairs, 2022). Against this background, Japan has focused on building a community-based integrated care system since 2000s, which "enables citizens to keep living in a familiar environment, regardless of the type of housing, through the use of various services provided locally, around the clock and 365 days a year" (Tsutsui, 2014). The two core types of facilities in this system that support the lives of older adults are intensive care homes and long-term care health facilities.

Nurses play a central role in the delivery of care for older adults and can contribute to the provision of integrated care that results in better outcomes for older adults. As primary care providers, nurses enable dignified end-of-life experiences (World Health Organization [WHO], 2015). To fulfill these roles, nurses working in nursing homes are not only required to continue developing their competence and experience (Cooper et al., 2017; Fitzpatrick et al., 2023), but also to maintain their competence by engaging in continuous development and lifelong learning (International Council of Nurses [ICN], 2021). Career self-reliance refers to lifelong, independent learning and career development. Several prior studies in various countries have reported that adequate and quality service for older adults in nursing homes can improve their quality of life (Dung et al., 2020; Pramesona & Taneepanichskul, 2018). Career self-reliance of nurses working in nursing homes may affect the quality of life of older adults and suggest the need for educational support for career self-reliance behavior. Based on these reasons, the world is monitoring the professional development of Japanese nurses who are responsible for the care system for older adults.

Previous studies have suggested that factors related to the career self-reliance of nurses, in addition to continued learning, include personal attributes, such as years of clinical experience; work environment, such as the existence of role models and mentors; and reflection on nursing practice (Flinkman et al., 2017; Lang et al., 2023; Ma et al., 2022; Nishimoto et al., 2023). A previous study has shown that in various hospital settings, nurses who have developed careers and strong practical skills beneficially influence patients (Wong et al., 2017). Although it would be possible to examine measures to support career self-reliance behavior if the characteristics associated with it among nurses working in nursing homes were clarified, few prior studies have focused on this issue. These considerations indicate the necessity to conduct more studies on supporting nurses' career self-reliance in order to improve the quality of life of older adults in nursing homes.

Literature Review and Conceptual Framework

Adequate and high-quality service for older adults in nursing homes can improve their quality of life (Dung et al., 2020; Pramesona & Taneepanichskul, 2018). This means that nurses working in nursing homes must build strong careers to provide good care to older adults. Career self-reliance means trying to develop one's career independently and continuously while adapting to changes in the environment based on psychological factors such as self-awareness, a sense of one's own values, and a consciousness of proactively shaping one's own career (Horiuchi & Okada, 2009). Based on these studies, the career of nurses working in nursing homes, who develop their own careers autonomously through continuous learning, was measured using the concept of career self-reliance.

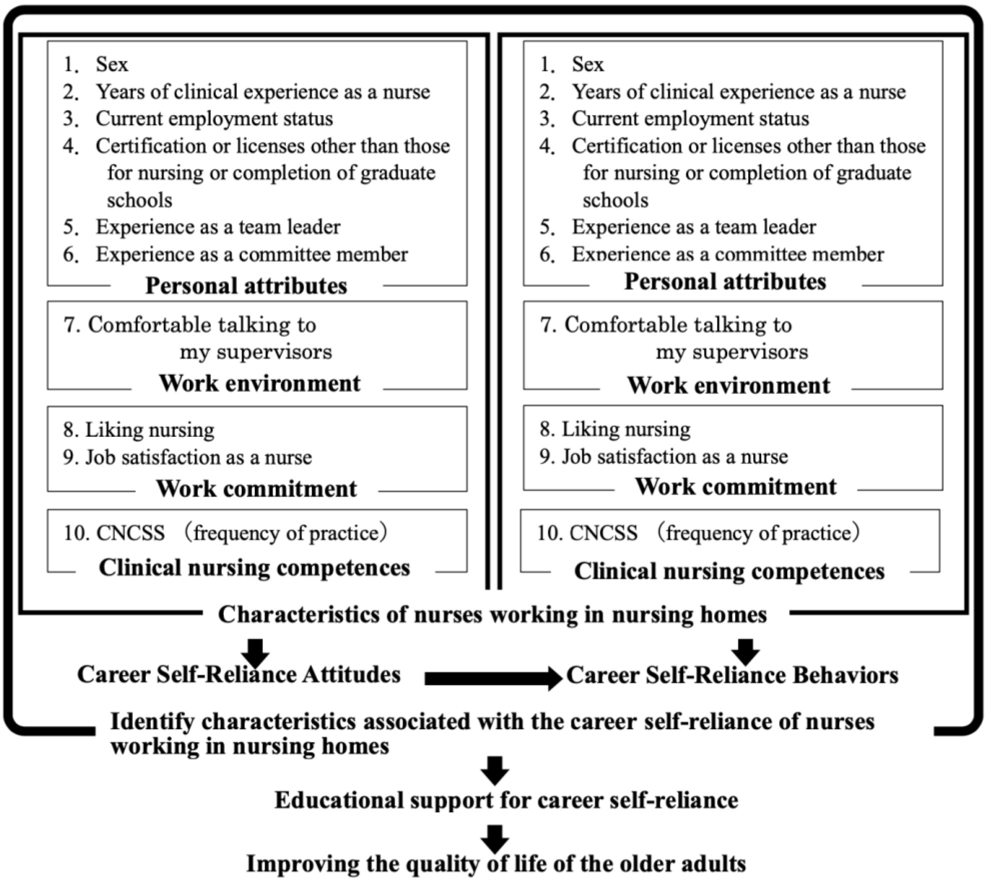

Figure 1 Conceptual framework

Abbreviation: CNCSS, Clinical Nursing Competence Self-Assessment Scale

Some previous studies have found that personal attributes such as years of clinical experience (Ma et al., 2022), employment status (Alameddine et al., 2017), and roles required to perform leadership and educational functions (Clark et al., 2023; Ting et al., 2024) may be associated with professional development. On the other hand, every nurse is responsible for maintaining their competence by engaging in continuous professional development and lifelong learning (International Council of Nurses [ICN], 2021; Smith, 1982). It can be inferred that continuing to learn as a nurse including going for higher studies or obtaining any licenses, is also related to career self-reliance. In addition, in work environment, existence of role models or mentors (Adeniran et al., 2013; Lang et al., 2023) and supportive work climates (Abou Hashish, 2017) can be associated with nurses' careers. Moreover, for work commitment, several studies have indicated an association between nurses' high job satisfaction, commitment, and their careers (Alameddine et al., 2017). Finally, nursing practice competence (Flinkman et al., 2017) and reflection on nursing practice (Nishimoto et al., 2023) are implicated in nurses' career self-reliance.

However, no studies have explored the association between the above-mentioned characteristics and career self-reliance among nurses working in nursing home settings.

Based on the literature review, this study explored the association between career self-reliance as a dependent variable, and characteristics of nurses working in nursing homes as independent variables. In this study, career self-reliance means trying to develop one's career independently and continuously while adapting to changes in the environment based on psychological factors such as self-awareness, a sense of one's own values, and a consciousness of proactively shaping one's own career. The characteristics potentially associated with career self-reliance, were composed of four aspects: 1) personal attributes, 2) work environment, 3) work commitment, and 4) clinical nursing competencies. **Figure 1** presents a conceptual framework that is based on the literature review.

Objective

This study aimed to identify characteristics associated with the career self-reliance behaviors of nurses working in nursing homes.

Methods

Study Design

We conducted a descriptive cross-sectional study and followed the STROBE statement for cross-sectional studies (Von Elm et al., 2007).

Sample and Setting

The participants were nurses working at 789 nursing homes in Prefectures A and B, as of 2018. These prefectures were adjacent to each other, and the people commuted to work, school, and shopping to and from the prefectures. This study focused on two types of nursing homes established under the Long-Term Care Insurance Act: intensive care homes and long-term care health facilities. Their main role was to support the daily lives of older adults. The intensive care homes provided care for bathing, bodily waste elimination, meals, other daily activities, functional training, health management, and medical care to people who required long-term care. By contrast, the long-term care health facilities provided nursing, care, functional training under the control of medical management, and other necessary care for medical treatment and daily activities to those who required long-term care in Japan.

The sample size was considered as follows. This study used multiple regression analysis to identify characteristics associated with the career self-reliance behaviors of nurses working in nursing homes. Multiple regression analysis requires approximately 10 observations per independent variable (Althubaiti, 2023). Over 100 objects were called for analysis in this study to use 10 to 11 independent variables. In addition, the response rate to the questionnaires was expected to be less than 10% because the questionnaires were sent to the nursing directors of nursing homes without asking about their willingness to cooperate. Moreover, we expected missing data. Therefore, it was decided to send around 2,500 questionnaires to the directors.

Data Collection

We used mailed questionnaires to collect data. We sent 2,535 questionnaires to the nurse directors of these facilities in the survey. In some of these nursing homes, nursing directors also directly participate in the care of older adults. Therefore, to reduce the burden on them, we sent the questionnaire to their facilities without asking them if they could cooperate or not. If nurse directors were able to cooperate, we asked them to distribute the questionnaires consisting of three measurement tools to nurses working at the nursing homes. If they could not participate, they were asked to discard the questionnaires. In addition, the nursing directors were asked that the nurses not be forced to answer the questionnaires. The participants responded to the anonymous questionnaires and returned them individually using envelopes.

Instruments

Career Self-Reliance Attitudes and Career Self-Reliance Behaviors scales

We used the Career Self-Reliance Attitudes (CSRA) and Career Self-Reliance Behaviors (CSRB) scales developed by Horiuchi and Okada (2009). They are unique measures scales focusing on career self-reliance, not just career.

The results of factor analysis on CSRA and CSRB for content validity and construct validity showed four and three factors, respectively. It provided their validity. The four factors of CSRA are "professional self-efficacy," "motivation to develop one's own career," "clarity of professional self-concept," and "awareness of self-responsibility related to career." The three CSRB factors are "career development behavior," "adapting behavior to changes in the work environment," and "proactive work behavior." Psychological factors of CSRA promote CSRB (Horiuchi & Okada, 2009).

Participants responded to 25 items each on the CSRA and CSRB scales using a five-point Likert scale ranging from 1 ("not applicable") to 5 ("applicable"). The CSRA included 25 items such as "I believe that I am responsible for my own satisfactory career path"; and those of the CSRB included such as "I invest in myself to develop my skills and abilities." Higher CSRA and CSRB scores indicated a higher degree of trying to develop one's career independently and continuously. Moreover, Cronbach's α = 0.65-0.91 were calculated for internal consistency of its reliability (Horiuchi & Okada, 2009).

Permission was obtained from the developers for the use of CSRA and CSRB. Additionally, they have agreed to translate these instruments into English for this study.

Questionnaire on characteristics of nurses working in nursing homes

In our conceptual framework, the characteristics associated with career self-reliance of nurses working in nursing homes include four aspects: 1) personal attributes, 2) work environment, 3) work commitment, and 4) clinical nursing competencies. To explore the characteristics associated with the CSRA and CSRB of nurses working in nursing homes, we used a questionnaire developed in this study to identify their characteristics. The questionnaire items comprised closed questions and were structured for three of the four aspects associated with the career self-reliance of nurses in nursing homes [Aspect 4 was measured using the Clinical Nursing Competence Self-Assessment Scale (CNCSS)]. Aspect 1 included personal attributes, such as age, sex, years of clinical experience as a nurse, license or certification as a public health nurse or a certified nurse specialist, graduate school, and experience in various committee memberships and team leadership roles related to work within the organization. Aspect 2 included work environment, such as the type and size of the current facility; the educational system in the facility, such as the clinical ladder; and trust in supervisors or colleagues. Aspect 3 covered work commitment and included the worthwhileness of nursing and job satisfaction. We considered the items through literature review and ensured the content validity through expert meetings. The members of the expert meeting comprised nurses with diverse and long clinical experiences, as well as nursing scientists specializing in gerontological nursing and nursing administration.

Clinical Nursing Competence Self-Assessment Scale

We used the Clinical Nursing Competence Self-Assessment Scale (CNCSS) to measure Aspect 4 of the clinical nursing competencies across the abovementioned four aspects associated with the career self-reliance of nurses working in nursing homes (Maruyama et al., 2011). The participants responded to 64 items about the frequency of practice using a four-point Likert scale ranging from 1 ("I never do") to 4 ("I always do"). The results of expert board, factor analysis, and known-group technique on CNCSS for content or construct validity showed four factors. They provided their validity. Moreover, the calculated Cronbach's α = 0.68-0.85 for internal consistency provided the reliability of them (Kudo et al., 2009; Maruyama et al., 2011). Permission was obtained from the developers for the use of CNCSS. The developers published this instrument in English, and we followed their wording in this study.

Data Analysis

Data analyses were performed using IBM SPSS Statistic ver.28. A *p*-value <0.05 was considered statistically significant.

Descriptive statistics were calculated for each measurement tool question.

Prior to the multiple regression analysis, independent variables were examined using the following procedure: first, each variable was divided into two groups and the means of the total CSRA and CSRB scores between the two groups were compared using an unpaired *t*-test. Variables that did not show significant differences were excluded. Second, to avoid the multicollinearity among independent variables in multiple regression analysis, Pearson's correlation coefficient *r* between continuous variables was calculated, and variables with relatively strong correlations that showed a statistical significance of $r \geq 0.5$ were excluded based on consideration. Through these procedures, we ensured that the variables that remained on all four aspects were likely to be associated with the career self-reliance of nurses working in nursing homes, and used as independent variables in the multiple regression analysis. After these considerations, to explore the characteristics associated with participants' career self-reliance, we conducted a multiple regression analysis using the forced entry method, in which CSRA or CSRB scores were the dependent variables and the above were independent variables. In the multiple regression analysis, we checked the variance inflation factor (VIF) values to avoid multicollinearity among independent variables.

Ethical Considerations

The purpose, methods, and significance of the research were explained to the participants in documents, and the right to self-determination was guaranteed by clearly stating that participation in the research was voluntary. To ensure anonymity, the questionnaire items did not include any personally identifiable information, and the participants were asked to answer the questions anonymously and return them individually. The study approval was obtained from the Research Ethics Committee of Gifu College of Nursing (Approval number: 0174).

Results

A total of 336 questionnaires were collected (13.3%), of which 289 without missing data were analyzed. The response rate was low because we sent the questionnaire to their facilities without asking the nursing directors if they could cooperate or not.

Participants Characteristics

Table 1 shows the participants' backgrounds. First, regarding Aspect 1, 46.8% of the 289 participants had more than 21 years of clinical experience as nurses, 78.2% were regularly employed. Moreover, 27.3% had certifications or licenses other than those for nursing or had completed graduate school. In addition, around 50% had experience as team leaders, and 66.1% had experience as committee members. Second, regarding Aspect 2, around 50% felt comfortable talking to their supervisors. Third, regarding Aspect 3, more than 90% of participants stated that they liked nursing a lot or fairly well and more than 50% stated that they were very satisfied with their jobs as nurses or fairly well. Finally, regarding Aspect 4, the mean of the CNCSS (frequency of practice) score was 458.4 ± 80.7.

Table 1 Participants' characteristics (*N* = 289)

Item		*n*	%
Aspect 1 Personal attributes			
Age	20s	6	2.0
	30s	47	16.3
	40s	98	33.9
	Over 50s	138	47.8
Sex	Male	9	3.1
	Female	268	92.7
	No answer / Unknown	12	4.2
Years of clinical experience as a nurse		Mean 21.5 ± 9.5	
	10 years	36	12.4
	20 years	104	36.3
	Over 20 years	136	46.8
	No answer / Unknown	13	4.5
Current employment status	Regular	226	78.2
	Non-regular	62	21.5
	No answer / Unknown, etc.	1	0.3
Certification or licenses other than those for nursing or completion of graduate school	Yes	79	27.3
	No	210	72.7
Experience as a team leader	Yes	140	48.4
	No	148	51.2
	No answer / Unknown	1	0.3
Experience as a committee member	Yes	191	66.1
	No	97	33.6
	No answer / Unknown	1	0.3
Aspect 2 Work environment			
Comfortable talking to my supervisors	Very / Fairly	138	47.8
	A little / Not at all	150	51.9
	No answer / Unknown	1	0.3
Aspect 3 Work commitment			
Like nursing	Very / Fairly	263	91.0
	A little / Not at all	23	8.0
	No answer / Unknown	3	1.0
Job satisfaction as a nurse	Very / Fairly	152	52.6
	A little / Not at all Neither	135	46.7
	No answer / Unknown	2	0.7
Aspect 4 Clinical nursing			
CNCSS (frequency of practice) score		Mean 458.4 ± 80.7	

CSRA and CSRB

Table 2 shows the CSRA and CSRB scores. The means of the CSRA and CSRB scores were 79.6 ± 11.1 and 78.1 ± 13.8, respectively. In this study, the Cronbach's α of CSRA and CSRB were α = 0.87 and α = 0.94, respectively.

Table 2 Career self-reliance attitudes and career self-reliance behaviors scale scores

Measurement	*Mean*	*SD*
Total CSRA scores	79.6	11.1
Professional self-efficacy	29.4	5.7
Motivation to develop one's own career	21.4	3.5
Clarity of professional self-concept	16.3	3.8
Awareness of self-responsibility related to career	12.5	2.0
Total CSRB scores	78.1	13.8
Career development behavior	28.3	7.2
Adapting behavior to changes in the work environment	19.6	4.0
Proactive work behavior	30.1	5.3

Abbreviations: CSRA, Scale of Career Self-Reliance Attitudes; CSRB, Scale of Career Self-Reliance Behaviors; SD, Standard Deviation

Selecting Independent Variables to Explore the Characteristics Associated with Career Self-Reliance

Through the consideration mentioned below, we selected 10 independent variables for multiple regression analysis with CSRA as the dependent variable, and 11 independent variables for multiple regression analysis with CSRB as the dependent variable from the four aspects of characteristics that were likely to be associated with the career self-reliance behaviors of nurses working in nursing homes.

First, among the four characteristic aspect likely to be associated with the career self-reliance behaviors of nurses working in nursing homes, independent variables were selected for Aspect 1 as follows: when the results of the responses to the nine items included in the characteristics questionnaire were divided into higher or lower groups and the means of the total CSRA and CSRB scores were compared, no significant differences were found in variables such as “sex”; however, significant differences were found in the following six variables for both the CSRA and CSRB: “years of clinical experience as a nurse,” “current employment status,” “current position,” “certifications or licenses other than those for nursing or completion of graduate schools,” “experience as a team leader,” and “experience as a committee member.” The significance of these six variables was also explored. As the years of clinical experience and current position could be related, the latter was excluded from the independent variables. Because of the team leader’s role within the department and the committee member’s role in the whole facility, they were judged to be different and included separately as independent variables. Although we did not find any significant sex differences, we included it as an independent variable because it is a basic demographic variable. The following six variables for Aspect 1 were selected as independent variables for multiple regression analysis with CSRA and CSRB as dependent variables: “sex,” “years of clinical experience as a nurse,” “current employment status,” “certifications or licenses other than those for nursing or completion of graduate schools,” “experience as a team leader,” and “experience as a committee member.” Furthermore, the correlation coefficient was calculated for age and years of clinical experience as a nurse, $r = 0.68$ ($p < 0.001$). We did not select age as an independent variable because of the possibility of multicollinearity.

Second, when the 13 items included in the characteristics questionnaire were compared in the same manner for Aspect 2, no significant differences were found for variables such as “size of current facility” and “dependability of colleagues when I have problems”; however, significant differences were found for “feeling comfortable talking to my supervisors” and “availability of supervisors for consultation about personal problems.” Next, the correlation coefficient between these two variables was calculated, which was $r = 0.619$. Therefore, “availability of supervisors for consultation about personal problems” was excluded because of a weak relationship with nursing practice. Based on these considerations, we selected “feeling comfortable talking to my supervisors” as the independent variable for Aspect 2 in a multiple regression analysis with CSRA and CSRB as dependent variables.

Table 3 Characteristics associated with career self-reliance attitudes

Aspect	**Item**	**Unstandardized regression coefficient *B***	***SE B***	**Standardized regression coefficient *β***	***p*-value**
	Constant	68.64	7.54		<0.001
1) Personal attributes	Sex†	-4.98	3.65	-0.09	0.17
	Years of clinical experience as a nurse	0.11	0.08	0.09	0.21
	Current employment status‡	-0.92	1.86	-0.03	0.62
	Certifications or licenses or completion of graduate schools	2.81	1.61	0.11	0.08
	Experience as a team leader	2.09	1.61	0.09	0.20
	Experience as a committee member	0.48	1.69	0.02	0.78
2) Work environment	Comfortable talking to my supervisors§	1.46	1.55	0.06	0.35
3) Work commitment	Liking nursing§	3.61	2.81	0.09	0.20
	Job satisfaction as a nurse¶	2.53	1.53	0.11	0.10
4) Clinical nursing competences	CNCSS (frequency of practice) score#	8.76	1.50	0.38	<0.001

Note: Multiple regression analysis using the method of forced entry, Dependent variables Total scores of CSRA
$R = 0.55$, $R^2 = 0.30$, Adjusted $R^2 = 0.26$
Abbreviations: SE, Standard Error; CNCSS, Clinical Nursing Competence Self-Assessment Scale
† Male: 1, Female: 2
‡ Regular: 1, Non-regular, etc: 2
§ A little / Not at all: 0, Very / Fairly: 1
¶ A little / Not at all / Neither: 0, Very / Fairly: 1
# Lower: 1, Higher: 2

Third, when the four items included in the characteristics questionnaire were compared in the same manner for Aspect 3, no significant difference was found for “motivation to continue working as a nurse,” but significant differences were found for “worthwhileness of nursing,” “liking nursing,” and “job satisfaction as a nurse.” Next, the correlation coefficient between these three variables was calculated, and “worthwhileness of nursing” was excluded as it showed a correlation of $r = 0.506–0.557$ with the other two variables. Based on these considerations, we selected two variables for Aspect 3: “liking nursing” and “job satisfaction as a nurse” as the independent variables in a multiple regression analysis, with CSRA and CSRB as the dependent variables.

Finally, when the frequency of practice in CNCSS was divided into higher and lower groups, and the means of the total CSRA and CSRB scores were compared for Aspect 4, significant differences were observed for the higher group. We selected “frequency of practice in CNCSS” as the independent variable in a multiple regression analysis, with CSRA and CSRB as the dependent variables.

Moreover, because a previous study showed that CSRA is related to CSRB (Horiuchi & Okada, 2009), we included CSRA as an independent variable in the multiple regression analysis, with CSRB as the dependent variable.

Characteristics Associated with CSRA

Table 3 shows the results of the multiple regression analysis with CSRA as the dependent variable. We performed a multiple regression analysis using the forced entry method on the association between the CSRA and the characteristics of the ten variables listed above (Adjusted $R^2 = 0.26$). The VIF was examined, and no multicollinearity was found between the variables. Consequently, we found that "frequency of practice in CNCSS" ($p < 0.001$) for the aspect related to nursing practice competence was associated with the CSRA of the participants in this study.

Characteristics Associated with CSRB

Table 4 shows the results of the multiple regression analysis with CSRB as the dependent variable. We performed a multiple regression analysis using the forced entry method on the association between CSRB and the characteristics of the 11 variables listed above (Adjusted $R^2 = 0.48$). The VIF was examined, and no multicollinearity was found between the variables. Consequently, we found that "certifications or licenses other than those for nursing or completion of graduate schools" ($p = 0.03$) for the aspect related to personal attributes, "job satisfaction as a nurse" ($p = 0.03$) for the aspect related work commitment, "frequency of practice in CNCSS" ($p < 0.001$) for the aspect related to nursing practice competence and CSRA ($p < 0.001$), which clarified the relationship based on a previous study were associated with and the CSRB of the participants in this study.

Table 4 Characteristics associated with career self-reliance behaviors

Aspect	Item	Unstandardized regression coefficient *B*	*SE B*	Standardized regression coefficient *β*	*p*-value
	Constant	55.21	8.00		<0.001
1) Personal attributes	Sex†	-8.51	3.76	-0.13	0.03
	Years of clinical experience as a nurse	0.03	0.09	0.02	0.76
	Current employment status‡	0.60	1.91	0.02	0.75
	Certifications or licenses or completion of graduate schools	3.54	1.66	0.11	0.03
	Experience as a team leader	0.40	1.66	0.01	0.81
	Experience as a committee member	1.88	1.74	0.06	0.28
2) Work environment	Comfortable talking to my supervisors§	0.69	1.59	0.03	0.67
3) Work commitment	Liking nursing§	4.56	2.88	0.09	0.12
	Job satisfaction as a nurse¶	3.44	1.58	0.12	0.03
4) Clinical nursing competences	CNCSS (frequency of practice) score#	7.67	1.64	0.28	<0.001
CSRA	Career Self-Reliance Attitudes#	12.41	1.67	0.45	<0.001

Note: Multiple regression analysis using the method of forced entry, Dependent variables Total scores of CSRA
$R = 0.71$, $R^2 = 0.51$, Adjusted $R^2 = 0.48$
Abbreviations: SE, Standard Error; CNCSS, Clinical Nursing Competence Self-Assessment Scale
† Male: 1, Female: 2
‡ Regular: 1, Non-regular, etc.: 2
§ A little / Not at all: 0, Very / Fairly: 1
¶ A little / Not at all / Neither: 0, Very / Fairly: 1
# Lower: 1, Higher: 2

Discussion

Characteristics Associated with the Career Self-Reliance Behavior of Nurses Working in Nursing Homes

At first, the total CSRA scores of the participants in this study tended to be higher than the 72.6 of nurses with up to five years of clinical experience working in hospitals (Hoshino et al., 2024). We also estimated that the total CSRB scores were higher than theirs because of the association between CSRA and CSRB (Horiuchi & Okada, 2009). Moreover, our study showed that male nurses exhibit higher career self-reliance behavior than female nurses. A previous study had shown that male nurses value their careers more than female nurses, supporting our research results (Prosen, 2022; Sugiura et al., 2017).

Following is the discussion discusses two useful implications from this study that apply to nursing home settings rather than general hospitals or acute care settings.

First, nursing practice and the education of nurses working in nursing homes should be discussed. The results revealed that a higher frequency of practice was associated with a higher degree of CSRA and CSRB. CSRB includes the factor "proactive work behavior," which is constructed from nine items such as "I try to improve the way I work," "I raise the quality of my work," and "I am responsible for my work" (Horiuchi & Okada, 2009). On the other hand, CNCSS measures the frequency of practice. Nurses working in nursing homes are required to have advanced skills, knowledge, competence, and experience to improve the safety, well-being, and quality of life of older adults (Cooper et al., 2017).

Therefore, as they perform a more advanced practice, they can try to improve their ways of working with responsibilities and raise the quality of their work. These considerations suggest that the frequency of nursing practice enhances CSRB. This supports the findings of this study that maintaining a high frequency of practice is associated with the career self-reliance attitudes and behaviors of nurses working in nursing homes.

Furthermore, nursing practice is associated with career self-reliance along with nurses' learning. The reasons for this are as follows. Professionals are characterized by a process of learning to reflect on their own practice experiences and resolve contradictions and issues in their practice (Kolb, 1984; Schön, 1983). Professional nurses are expected to develop their careers through continuous learning (International Council of Nurses [ICN], 2021) and are pedagogically placed as adult learners. Adult learners are characterized by their motivation to learn and develop professional competencies by reflecting on their experiences (Knowles, 1990). A previous study also reported a correlation between nurses' learning by reflecting on their practice and their ability to practice (Takase et al., 2015).

These findings support the results of our study, suggesting that frequent practice in nursing homes promotes reflection and learning among nurses and that the accumulation of learning outcomes motivated by practice is associated with career self-reliance, including the acquisition of professional competence. Similarly, the results of our study revealed that having certifications or licenses other than those for nursing or completing graduate school was associated with CSRB. Learning activities are essential for nurses to enter graduate school and obtain various licenses, and these activities are linked to career self-reliance, including the acquisition of professional competencies (Myers et al., 2024; Shen et al., 2019). These considerations suggest that nurses who are more competent in nursing practice, have certifications or licenses other than those for nursing, or have completed graduate school are more likely to develop their careers autonomously through their studies (Bell et al., 2023; Brand et al., 2016).

Second, this study revealed that those who were more satisfied with their jobs as nurses working in nursing homes were more likely to develop their careers autonomously. Several studies have suggested an association between high job satisfaction and career (Bonenberger et al., 2014; Karlsson et al., 2019), confirming the results of the present study. These imply that nurses with higher job satisfaction have higher career self-reliance behaviors.

However, our results showed that only aspects of the work environment, such as relationships with supervisors and colleagues, were not associated with career self-reliance for nurses working in nursing homes. More than 80% of the participants in this study had more than 10 years of clinical experience, and more than 90% were aged over 35. This result may indicate that nurses working in nursing homes have a high degree of autonomy through long-term practical experience and are less likely to be influenced by their relationships with others (Alruwaili & Abuadas, 2023).

Implications for Nursing Practice

First, not only the appropriateness of the nursing care provided but also the social significance, professionalism, and treatment of nursing for older adults should be evaluated from various aspects. The degree of nurses' satisfaction can be increased and extend their continuation of jobs by improving the treatment if one can do it by themselves. Second, nursing home administrators must support nurses to learn through practice to meet the goal of improving outcomes for residents and nurses (Aleo et al., 2024).

These findings of our study were generated by a cross-sectional method and could not mention a cause-effect relationship between these characteristics and career self-reliance. Future studies using longitudinal methods to clarify cause-effect relationships or intervention methods based on our findings are required. Based on the characteristics identified by our study, the quality of life of older adults can be enriched when nursing home administrators provide educational support for nurses' career self-reliance.

Potential Impact of the COVID-19 Pandemic

We collected data in 2018 before the COVID-19 pandemic. In the early phase of the pandemic, nursing was drastically affected, including in nursing homes; nurses were forced to practice under severe conditions (White et al., 2021). Throughout the pandemic, some of the responsibilities of nurses may have been changed, such as having strict infection prevention and crisis management in nursing homes where older adults have a high risk of infection (World Health Organization [WHO], 2021).

Today, nursing responsibilities generally return to normal in nursing homes; hence, the results of this study can be useful. However, the changes and stresses during the pandemic may have still affected the nurses' work environment and job satisfaction, thereby causing changes in career self-reliance. To improve career support and meet the actual needs of nurses, a follow-up study using recent data is required.

Limitations

We have two limitations in this study. First, the low response rate of 13.3% for the questionnaire suggests that the questionnaires requested to be distributed through the nursing directors of the facilities may not necessarily have been distributed to all nurses. We should consider other ways to distribute the questionnaires rather than requesting nurse directors. Additionally, the probability of coercion on nurses by the nurse directors who distributed the questionnaire could not be ruled out. Second, we asked participants about their work environment and commitment as nurses through a single-item question to reduce the burden of participants' responses to the questionnaires. However, they should be surveyed using scales tested for reliability and validity. The next study should be conducted by using scales to ask questions about these kinds of characteristics.

Conclusion

The following four characteristics were associated with the career self-reliance behaviors of nurses working in nursing homes: 1) having certifications or licenses other than those for nursing or completion of graduate schools, 2) job satisfaction as a nurse, 3) frequency of practice, and 4) career self-reliance attitudes. Nurses and directors working in nursing homes should make an effort to obtain these four characteristics for nurses' career self-reliance behaviors.

Declaration of Conflicting Interest

There is no conflict of interest to declare. Some parts of this paper were presented at the 40th Annual Conference of the Japan Academy of Nursing Science.

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Authors' Contributions

AN analyzed the data and wrote the paper. JH designed the study, collected the data, and assisted with writing the article. MH, MH, and NF collected the data and assisted with writing the article. All authors have read and approved the final manuscript.

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Data Availability

The dataset generated and analyzed during the current study is available from the corresponding author upon reasonable request.

Declaration of Use of AI in Scientific Writing

There is nothing to declare.

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Mothers' experiences as legal guardian of children's phlebitis during hospitalization in Indonesia: A phenomenological study

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Abstract

Background: Peripheral intravenous catheter (PIVC) insertion is a common procedure performed by nurses for hospitalized children, but phlebitis—an inflammation of the vein—is a frequent complication. The response of the mother, as the child's primary caregiver, plays a key role in the healing process when phlebitis occurs.

Objective: This study aimed to explore mothers' experiences and perceptions regarding the occurrence and management of phlebitis in their children during hospitalization.

Methods: A descriptive phenomenological design was employed for this study, conducted between August and October 2023. Semi-structured interviews were conducted with sixteen mothers whose children had experienced phlebitis during their hospital stay. The interviews were transcribed verbatim, and data were analyzed using content analysis. Each participant validated the transcripts before analysis.

Results: Three main themes emerged from the data: 1) Risk factors and causes of phlebitis; 2) Early detection and confirmation of phlebitis; and 3) Management of IV infusion occlusions.

Conclusion: Although the causes and risk factors for phlebitis in children cannot be entirely avoided, early detection by mothers can reduce some risks. The study also identified gaps in nursing practice, particularly regarding the management of infusion occlusions, with some practices deviating from standard procedures. To improve outcomes, nurses should adhere to evidence-based protocols for maintaining IV patency and proactively educate mothers on recognizing signs of phlebitis. Strengthening nurse-mother communication and ensuring consistent implementation of best practices are essential for preventing and effectively managing phlebitis in pediatric patients.

Keywords

children; Indonesia; infusions; inpatients; mothers; nurses; phlebitis

Background

Inserting an IV infusion in pediatric patients is a challenge for nurses. The adverse effects of performing this procedure can have long-term consequences (Oliveira et al., 2017). Families of these patients are also affected emotionally and psychologically (Buratti et al., 2015). However, IV infusions are among the essential procedures required for inpatients. Of these, 52.9% are administered for medication (72.6%) and fluid therapy (62.7%) purposes (Ullman et al., 2020). Studies indicate that 43% of pediatric patients from 25 countries undergo more than six IV infusions during treatment (Cooke et al., 2018). A previous study conducted across 47 countries revealed that nurses performed 71% of IV infusions, emphasizing the critical role of nurses in administering these procedures (Chotolli & Luize, 2015; Ying et al., 2020).

Several complications can arise during IV infusion, one of the most common being phlebitis (Oliveira et al., 2017). A study found that, out of 11,830 IV infusion cases, 12% of patients developed phlebitis after the procedure (Marsh et al., 2021). Phlebitis is the most frequent risk among hospitalized children receiving IV infusions and leads to increased hospitalization costs (Suliman et al., 2020). The estimated annual cost of treating phlebitis is US$866.18 (Furlan & Lima, 2020).

Maintaining the stability of IV infusions poses a significant challenge for nurses (Bennett & Cheung, 2020). Even with proper maintenance, various conditions can disrupt infusion stability. Among these, 48% are due to local complications such as phlebitis, 20% are caused by obstructions, and the remainder result from the child dislodging the infusion or discontinuation of therapy (Gomes et al., 2011). The challenge of IV infusion administration persists due to numerous factors, including physical, emotional, and habitual factors; nurses' experience and qualifications; workplace conditions; and the quality of materials used (Nascimento et al., 2022). During hospitalization, the mother plays a crucial role in monitoring and reporting issues with her child's IV infusion, including complications such as phlebitis (Jaber et al., 2021).

Several quantitative studies have examined phlebitis in children. One study reported that more than 90% of 386 children had an IV infusion, with most insertions performed by nurses (86%). Complications occurred following insertion, one of which was phlebitis. The contributing factors to these complications included inadequate insertion sites, poor dressing, insecurement methods, and improper flushing practices (Indarwati et al., 2023). Another study, from the perspective of nurses, highlighted the challenges of maintaining infusion patency. These challenges could be addressed by selecting the appropriate catheter and dressing, using aseptic techniques, and practicing proper hand hygiene. After installation, the infusion should be monitored periodically, and the infusion drip volume should be consistently maintained (Guanche-Sicilia et al., 2021).

Previous qualitative research on the phenomenology of 15 adult patients with IV infusions at Arifin Achmad Hospital in Pekanbaru identified four themes. The third theme involved problems encountered during infusion administration, which included pain, swelling, blocked infusions, and impaired mobility. Blockages often occurred due to patient hand movements while getting out of bed, such as when using the bathroom, which disrupted infusion flow, allowed blood to enter the infusion tube, or caused blood clots to form around the puncture site. The fourth theme involved solutions to infusion problems, such as calling a nurse to fix the infusion. Patients with mobility challenges were advised to lift the IV themselves or seek assistance from a family member when moving (Bayhakki et al., 2017).

According to Indonesia's Ministry of Health Regulation Number 26, clauses 28-29, nurses are the designated professionals responsible for administering and managing IV drips in hospital patients (Ministry of Health of Indonesia, 2019). Consequently, nurses must have an in-depth understanding of infusion management to minimize the risk of phlebitis.

Previous studies have predominantly focused on the perspectives of patients and nurses. However, in Indonesia, hospitalized children are required to have a guardian, typically the mother, as young children are often unable to describe their experiences. The research gap lies in comparing mothers' perspectives with those of patients and nurses regarding phlebitis. Mothers can provide valuable perspectives on their children’s phlebitis experiences and how nurses manage the infusion process. Previous phenomenological research exploring mothers' perspectives on accompanying their hospitalized children reached saturation at the fifteenth participant (Asci et al., 2022).

Discussions with the pediatric unit manager in early August 2023, based on an authorization letter from the hospital (No. 4122/DepKKL/MH/VII/2023), revealed persistent concerns about intravenous infusions in pediatric patients. Internal data from the inpatient department indicate that phlebitis occurs more frequently in this population than other complications.

In-depth research on phlebitis in children from mothers' perspectives is necessary to validate the phenomenon and address the identified research gap. Thus, our study aimed to explore mothers' experiences accompanying children who have experienced phlebitis during hospitalization.

Methods

Study Design

This study employed qualitative research with a descriptive phenomenological approach. Based on Husserl’s writings, this method is well-suited for exploring experiences in greater depth without imposing additional interpretative meaning (Sundler et al., 2019). The study adhered to the 32-item Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist to ensure comprehensive and standardized reporting of qualitative research practices (Tong et al., 2007). In-depth interviews were conducted with mothers of children who had experienced phlebitis at a private hospital in Jakarta. The data from the mothers' experiences were described without the need for interpretation, as the mothers provided detailed accounts of their experiences while caring for their hospitalized children. They also described their observations and the actions taken by nurses during their children's IV therapy.

Participants

The sampling technique used was purposive sampling. The inclusion criteria were: (1) mothers of inpatient children aged one to five years; (2) children with a history of phlebitis during hospitalization; and (3) mothers who speak Indonesian. The exclusion criteria were mothers who did not accompany their children during hospitalization, children who were discharged due to death, referral, or worsening conditions, and children with special needs. Enumerators informed the researchers about which mothers and children met the inclusion criteria.

Data Collection

Data collection was conducted between August and October 2023. Data collection was stopped when data saturation was reached. In previous phenomenological research on infusion management, data saturation was achieved with the fifteenth participant for adult patient perceptions and with the fifteenth participant for mothers' perceptions regarding the care of their children (Asci et al., 2022; Bayhakki et al., 2017). In this study, data saturation was reached after the 16th participant. None of the participants refused or withdrew from the study.

The enumerator informed the researcher daily about patients with a history of phlebitis during hospitalization and their discharge plans during working hours. Following this, the interviewer visited the hospital to obtain informed consent from the participants. During the interviews, voice recordings were made using a tape recorder, each lasting 40–60 minutes. Semi-structured interview guidelines were followed, and all interviewers used field notes to document nonverbal responses from participants.

The primary questions for the interviews included: Could you tell me how your child’s IV got stuck? How did you know that your child’s IV was stuck? How did you make sure whether or not the IV was stuck? Could you explain how the nurses fixed it? Additionally, the interviewer probed the mothers' responses with follow-up questions such as, "Could you explain more about this?" to gain deeper insights into their experiences.

Data Analysis

Verbatim transcription and conventional content analysis were used in this study (Creswell & Creswell, 2018). The first and second researchers prepared an interview guide. Next, the first, third, and fourth researchers conducted one-on-one interview trials with participants—mothers whose children had received an IV drip and experienced phlebitis during hospitalization. The results were reviewed by the second researcher, discussed with all interviewers, and finalized as the guide for interview questions.

When the enumerator identified a participant meeting the inclusion criteria, the researcher visited the mother and child and explained the study and interview procedures. Once the mothers agreed to participate (after understanding the purpose of the study), they signed an informed consent form. The interview was then conducted in a pre-arranged room at an agreed-upon time. During the interview, the child was provided with a toy, and other family members were present to accompany the mother and interviewer. None of the participants required a repeat interview.

The interviewer transcribed the voice recording verbatim within 24 hours, and another researcher reviewed the transcription. The interviewer then created a summarized version of the verbatim transcript, cross-referenced with field notes, and sent the summary to the participant for validation to ensure the information was accurate. All participants approved their summaries. Each researcher read the verbatim transcripts at least three times, highlighting and annotating sentences or words as keywords using Microsoft Word.

At the end of each week, the researchers met to discuss the identified keywords. When data saturation was achieved (no new keywords emerged), the researchers rechecked the verbatim results and categorized the keywords. They then organized the keywords into themes using Microsoft Excel, reaching a consensus. Each verbatim transcript generated at least 20 keywords. Participants were assigned initials and coded as P1 to P16 to maintain confidentiality.

Trustworthiness

To minimize interviewer bias in qualitative research, methods beyond triangulation are necessary, such as member checks, detailed interview transcripts, and systematic data analysis. These steps are crucial to ensure trustworthiness and rigor (Gunawan, 2015). In this study, the interviewers were researchers with experience conducting qualitative research at least three times. Before the interviews, the interviewers shared their perceptions, which were incorporated into the interview guidelines and field notes. The interviewers carefully transcribed the recordings and cross-checked them with other interviewers. Regular meetings were held to assess data saturation and identify keywords until themes emerged. None of the participants had prior familiarity with the interviewers before the study. All participants reviewed, confirmed, and agreed with the summarized research results sent to them. The research manuscript was prepared in the authors' national language, then translated by the English Manager at the first author's campus, and finally proofread by a sworn translator (No. 13.001/TEP/IX/2024).

Ethical Considerations

This research received ethical approval from UNRIYO (No. 0151.3/FIKES/PL/VII/2023) and a private hospital in Jakarta, Indonesia (No. 4204/DepKKL/MH/VII/2023). Throughout the study, the researcher adhered to strict ethical standards. The enumerator provided the mothers with a general overview of the research and, upon their agreement, notified the researcher. The researcher then explained the study in detail to the mother and the child. If they agreed to participate, the mother signed a consent form. The mother was free to choose the time and location of the interview at her convenience, and the researcher accommodated her choice. If, at any point, the mother or the child felt uncomfortable, they were free to withdraw from or reschedule the interview. All data collected were anonymized, with only numbers and codes used to protect the participants' identities.

Results

Characteristics of Participants

The participants in this study were mothers aged 26–43 years. Among them, six were private employees, four were housewives, three were lecturers, and the rest included doctors, dentists, and civil servants. The children, aged 13–48 months, were hospitalized for the first time in 62.5% of cases, with girls comprising 31.25% of the total (see **Table 1**).

This research generated three themes: risk factors and causes of phlebitis, early detection and confirmation of phlebitis, and the management of IV infusion occlusion (see **Table 2**).

Theme 1: Risk Factors and Causes of Phlebitis

While accompanying their children during hospitalization, mothers reported instances of phlebitis in their children. The onset of phlebitis in pediatric patients can be attributed to several factors, with the child's behavior being the primary contributor. This is followed by the management of the intravenous infusion and, lastly, the administration of medications.

Child Factor. The primary factor contributing to phlebitis in children is the child's own behavior. Mothers often attribute this to the child's developmental stage, particularly the acquisition of motor skills, which leads to increased activity and movement. As one mother expressed:

> *"The first reason for my child's phlebitis is that the child moves a lot. He goes here and there, and even when he is lying down, he sometimes suddenly moves, going around and around."* (P15)

Children's activity and movement are not limited to when they are confined to their bed. Such movements also occur frequently when the child needs to use the bathroom or change clothes. As described by two mothers:

> *"Getting in and out of bed, sometimes he gets stuck in a position, and the IV drip gets tangled (twice or more) after going to the bathroom."* (P11)

> *"The child wants to change clothes because they often get stained after eating or drinking. His water frequently spills, making his*

> *clothes sticky, so he changes clothes, but the IV drip often gets stuck."* (P1)

Mothers also believe that child factors can be related to the anatomy of the child's blood vessels. One mother stated:

> *"They tried it on his leg, but it didn't work. Then they tried several times on his hand, but it still didn't work, possibly because my child was premature. Small veins? Yes, because the veins are small," the mother said, recalling and confirming."* (P14)

Management of IV Infusion Patency. The majority of mothers reported lapses in maintaining the patency of the intravenous infusions. One mother explained that her child likely experienced obstruction in the infusion due to the failure to replace the IV bag at the appropriate time, which allowed air to enter the infusion line and disrupted the flow. Additionally, she mentioned forgetting to clamp the infusion line when her child was about to engage in physical activity. Two mothers shared similar experiences:

> *"At night, when the fluid runs out, and I am sleepy, I usually ask the nurse to replace it. But if the nurse seems busy and no one comes, I fall asleep, and the IV infusion is not replaced."* (P2)

> *"I did not turn it off, but when I came back from the bathroom and held it, for example, the blood suddenly started flowing back up." (The participant talked while demonstrating, recalling when she left the bathroom and hurriedly clamped the roller on the IV drip.)* (P3)

This situation, where the infusion either runs out or becomes obstructed (resulting in a lack of flow), often goes unaddressed promptly by the nursing staff, leading to delays that result in blood clotting in the line. One mother described the experience as follows:

> *"After half an hour, the infusion wasn't dripping, but no one came to fix it. Finally, it was clotting."* (P2) *(The mother reported that the infusion was not dripping, but after 30 minutes with no nurse responding to the complaint, she checked the infusion and found blood clotting in the tube.)*

This issue, where the infusion becomes obstructed and fails to drip, is commonly observed when the IV infusion is not positioned correctly (i.e., not high enough). One mother described the situation as follows:

> *"The IV infusion position is usually not high enough."* (P1)

Medication. Some mothers stated that the third factor contributing to the IV infusion stopping is medication. One mother stated:

> *"The medicine, too, sir. Sometimes, certain medications may be concentrated, and since the child is small, he might be afraid of that as well."* (P8)

Table 1 Characteristics of participants

Code	Children				Mothers		
	Age (Month)	**Sex**	**Siblings**	**Hospitalized History**	**Age (Years Old)**	**Education Level**	**Occupation**
P1	17	F	1/2	1	31	Master	Lecturer
P2	36	M	3/3	1	43	Associate's degree	Private Employee
P3	19	M	2/2	1	31	Associate's degree	Private Employee
P4	24	M	1/3	2	31	Bachelor	Doctor
P5	36	M	2/3	2	26	Senior High School	Housewife
P6	24	M	2/2	1	28	Bachelor	Civil Servant
P7	13	F	2/2	3	27	Junior High School	Housewife
P8	48	F	2/2	2	40	Associate's degree	Private Employee
P9	13	F	1/1	1	30	Associate's degree	Private Employee
P10	24	F	1/2	1	40	Master	Lecturer
P11	35	M	3/3	1	35	Master	Private Employee
P12	13	M	2/2	1	26	Senior High School	Housewife
P13	24	M	2/2	1	31	Master	Lecturer
P14	24	M	1/1	2	29	Bachelor	Private Employee
P15	36	M	2/2	1	31	Associate's degree	Housewife
P16	48	M	2/3	3	37	Master	Dentists

Theme 2: Early Detection and Confirmation of Phlebitis

This theme emerged from several mothers who reported that they could determine whether the IV infusion was stuck in various ways. The mothers suspected that when the IV stops, it indicates phlebitis.

Observing First. Most mothers believed that the infusion was stuck based on their observations. These observations included the IV infusion not dripping, blood flowing back into the tube, blood clotting, and the catheter being in an improper position. Three mothers shared their experiences:

> *"The IV infusion is stuck and won't turn on, causing the blood to flow back immediately. The needle inside… (the participant remembering) is bent, and the channel is not running smoothly."* (P13)

> *"Sometimes the child can't stay still, causing the blood to flow back into the tube."* (P15)

> *"The blood looks like it's clotting. Doesn't it usually take a long time to clot?"* (P7)

Meanwhile, if the child had an IV infusion pump installed, the mothers explained that if the machine beeped, it signified a problem with the IV infusion. Mothers of children who had an IV pump noted that if the machine made a sound, it could indicate the IV had become stuck. One mother described:

> *"There is also an IV infusion pump. Yes, the pump makes a sound like 'beep … beep,' indicating that the liquid is not dripping."* (P1)

Validation. On the other hand, mothers explained that to differentiate between an infusion obstruction caused by phlebitis and one resulting from improper positioning, they needed to communicate with their child and perform a clinical assessment to confirm the diagnosis. A stuck infusion would cause the child to cry, turn blue, swell around the infusion needle, and possibly develop a fever. Five mothers shared their experiences:

> *"In my version, I first place the child in the hand position and then adjust the drip; I don't twist it. For example, if it still doesn't drip and blood continues to come out, I call the nurse because the IV needs to be cleaned."* (P11)

> *"It was becoming more swollen, and my child still had a fever."* (P8)

> *"He didn't treat it, so I went home, but the next morning, I saw that it was getting more swollen, so the IV drip was finally removed." (P10)*

> *"Why is it that every time you are given medicine through an IV drip, you cry so loudly?"* (P1)

> *"My child's hand is swollen to the point where it looks very big, is red, blue, or purple, and when I touch it, it feels hard."* (P14)

Table 2 Theme, subtheme, and category of this research

Theme	Subtheme	Category
Risk factors and causes of phlebitis	Child Factor	Active and moving around a lot
		Toileting
		Changing clothes
		Anatomy of veins
	Management of IV infusions patency	Fluid running out, air coming in
		The infusion is not dripping, it is not treated immediately
		Forgetting the IV infusion clamp
		Height of IV infusion bottle
	Medication	
Early detection and confirmation of phlebitis	Observing first	The IV infusion is not dripping/ discontinuing
		There was blood in the IV line
		Clotting
		Catheter position
		Sound of the IV infusion pump
	Validation	Confirming position
		Fever and swelling
		Crying
		Turning Blue
Management of IV infusion occlusions	Appropriate way	Spooling
		Clearing the clotting
		Fixation
	Not appropriate way	Twisted or pulled

Theme 3: Management of IV Infusion Occlusions

Participants stated that when they reported that their child's IV was stuck, the nurse sometimes addressed the issue appropriately, but the nurse did not other times.

Inappropriate Way. Mothers highlighted that twisting or pulling the IV was an inappropriate action because it caused the child pain. One mother described:

> *"The nurse immediately fixed the tube, turned the button, twisted and pulled the cable, tied it, tapped it, tapped the IV, and finally, removed the tube, then put it back on."* (P9)

Appropriate Way. On the other hand, the method considered correct by the mothers involved cleaning the IV line when blood clots were present, injecting fluids, and securing the bandage. Two mothers shared their experiences:

> *"I've done this again. What does it mean so that it's tight? You know, it doesn't look like it's sticking out; it's true that the needle (pointing to the location of the infusion). And the nurse made spooling, like in this kind of part, the tube is like an injection, like putting liquid in."* (P1)

> *"When it was pried out, the blood clot was shaped like a worm… using a needle, it was pried out in this way. Oh my son, you can't keep still and move around too much…"* (P3)

Discussion

In this study, phlebitis in children was caused by several factors. The first was the child's developmental stage, particularly motor skills, which made the child more active and prone to movement, including during toileting and changing clothes. The second risk factor was the failure to replace IV fluids when they ran out, which caused air to enter the IV tube. The third factor was related to medication, specifically the concentration of the drugs, which contributed to stuck infusions. Based on the participants' reports, the causes of stuck infusions can be simplified into three categories. The first category is the bursting of blood vessels caused by drug concentration or high pressure resulting from excessive movement.

The findings of this study align with other research, which shows that 56.8% of nurses understand risk factors for phlebitis in children. These factors include the administration of too-concentrated medication (Marsh et al., 2021; Ying et al., 2020). Extrinsic factors that increase the risk of phlebitis include drugs with high pH or osmolarity (Joaquin-Apaza et al., 2021). The second cause is the absence of gravitational force due to the infusion bottle being positioned lower than the blood vessels. The third cause is clotting, which blocks the flow of the infusion.

Children often move too much, making long-term IV placement challenging (Suciyanti et al., 2020). Stuck infusions were reportedly caused by hand movements, such as when getting out of bed or going to the bathroom (Bayhakki et al., 2017). Phlebitis in children typically occurs because their blood vessels are weaker and thinner than in adult patients (Özalp Gerçeker et al., 2018). Most IV infusions stop due to blood clots in the infusion tube, which can happen when the patient's body compresses the tube, the tubing is bent, the patient places their hand too high or too far from the IV infusion bottle, or due to excessive hand movement (Syauqi & Zaini, 2022). The dislocation of the infusion can further increase the risk of phlebitis (Marsh et al., 2021).

It is necessary to monitor the infusion periodically and ensure the correct volume of the infusion drip, as this is the nurse's responsibility and can help reduce the risk of phlebitis (Guanche-Sicilia et al., 2021). In this study, one mother asked the nurse to help fix the infusion because it wasn't dripping; however, the nurse did not come until the air had filled the hose. This situation demonstrates that when an infusion is stuck for an extended period due to a lack of flow, air can enter the tube, blood may backflow into the infusion line, or blood clots can form around the puncture site (Bayhakki et al., 2017). A stuck infusion that is not treated immediately can lead to blood clotting and eventually block the flow of the IV infusion. A low-positioned IV infusion container can also contribute to blocked infusion, as gravity does not apply and fluid flows under higher pressure. Blood clots can form in IV lines (Gunawan et al., 2022).

Participants in this study indicated that the nurse would clean the blood clots from the IV tube when clotting occurred. However, when the infusion was not dripping and no blood clots were present, the nurse would reposition the patient or push fluid through (flushing). Nurses generally adjust the transparent bandage and either tighten or add plaster around the child's hand where the IV is inserted. Several mothers complained that nurses frequently and repeatedly used practices that did not meet standards when dealing with blocked infusions. One such practice involves twisting or pulling the IV tube. The purpose of twisting or pulling the IV tube is to apply more force to push the fluid into the blood vessels. However, this procedure causes pain for the child, and the IV becomes stuck again if the tube is simply twisted or pulled.

When there is a blood blockage in the infusion tube, the nurse typically administers sterile fluid to restart the infusion (Syauqi & Zaini, 2022). In children, flushing with normal saline can help maintain the permeability of the infusion route, with an average of 44.05 hours of effective use for 87 pediatric patients using this method (Yeung et al., 2020). Unfortunately, only 31% of cases involve routine flushing. Flushing has been proven to reduce the risk of phlebitis (Indarwati et al., 2023), while tight bandages and irregular flushing are risk factors (Ying et al., 2020). Stabilization and flushing using normal saline are recommended to reduce the risk of phlebitis (Guanche-Sicilia et al., 2021). This study found that the cause of phlebitis in children was that nurses did not respond quickly to fix the infusion when it stopped dripping. When they arrived late, they often used incorrect methods, such as twisting or pulling the infusion hose. If the blood were not cleaned immediately, it would clot. Furthermore, excessive movement (twisting or pulling) could cause the catheter to shift from its position, increasing the risk of ruptured blood vessels due to external pressure.

In this study, the mothers were already familiar with how to check for phlebitis based on the signs and symptoms of their child. The mother would first check if the IV were dripping and whether there was blood in the tube. They would also check if the catheter were still accessing the blood vessels. If the infusion was not dripping, the mother suspected clotting. Additionally, they would observe for symptoms of inflammation, such as swelling and bluishness around the infusion site, as well as fever. In response to inflammation, the child may experience pain, and mothers reported that their children cried due to the discomfort.

Children may experience pain after receiving an infusion (Casman et al., 2022a; Silva et al., 2022). Crying is a natural response for babies and children to express discomfort, especially when they cannot communicate verbally (Casman et al., 2023). Inflammation can occur when a child has an IV installed, characterized by tumor (swelling around the insertion site), rubor (redness), dolor (discomfort or pain), and calor (warmth around the insertion site, potentially causing fever) (Casman et al., 2022b).

Implications of this Study

This study directly impacts nurses working in hospitals and nursing students during their practice. The mothers in this study were highly attentive to their children's condition and could recognize signs, symptoms, and situations that could indicate phlebitis. Unfortunately, some nurses still delay responding to complaints, leading to a high occurrence of phlebitis. To improve nursing care, nurses need to be more responsive. This study also suggests that hospitals should educate parents on preventing phlebitis. Hospitals can create educational materials, such as posters, to teach parents about preventing phlebitis. These could include instructions for changing clothes while a child has a PIVC, turning off the infusion line or raising the IV bottle when the child uses the bathroom, and using checklists to track infusion completion and ensure regular flushing with normal saline. Future research could explore the harmful practices among nurses in preventing and treating phlebitis in children.

Limitations of the Study

This study has some limitations. First, the sample was limited to one private hospital, so the findings cannot be generalized to the entire population of children with phlebitis. Additionally, not all mothers stayed with their children 24 hours a day during hospitalization, but mothers were typically the primary caregivers during this time. It is possible that other family members, such as fathers or grandmothers, also experience the challenges of caring for children with phlebitis, but this was not explored in the study.

Conclusion

This study identified several factors contributing to phlebitis in children, including motor skills, failure to replace IV fluids, and high drug concentrations promptly. Delays in addressing blocked infusions and improper nurse practices, like twisting or pulling the IV tube, were noted as causes of complications. Mothers detected phlebitis attentively by checking the IV for blood flow, inflammation, or pain. To improve outcomes, the study suggests educating parents on phlebitis prevention and ensuring nurses follow best practices for IV management, such as regular flushing and proper positioning, to reduce the risk of phlebitis. For nursing practice, timely intervention and adherence to standard procedures are essential in preventing and managing phlebitis.

Declaration of Conflicting Interest

The authors declared no potential conflicts of interest regarding the research, authorship, and publication of this article.

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Authors' Contributions

CC and DM planned and designed the research study. CC, BAMW, and MFI carried out data collection and analysis. CC, DM, DRA and AAP drafted and revised the manuscript. All authors read and approved the final manuscript.

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Data Availability

Supporting data for this study are available on request from the corresponding author on reasonable request.

Declaration of Use of AI in Scientific Writing

None to declare.

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The relationship between stress, social support, and quality of life among spouses of patients at the end-of-life stage in Thailand: A correlational study

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Abstract

Background: Non-communicable diseases have become a leading global health challenge, with mortality rates steadily rising. Insufficient patient care can worsen chronic illness, often placing significant caregiving responsibilities on the patient's spouse. In some cases, spouses may need to leave their jobs to provide full-time care, especially during the end-of-life stage. Spousal caregivers often face emotionally distressing circumstances while caring for their loved ones, which can lead to elevated stress levels. However, research indicates that adequate social support can improve caregivers' quality of life, reducing some of the burdens associated with end-of-life care.

Objectives: This study aimed to assess and analyze the relationships between stress, social support, and quality of life experienced by spousal caregivers in Thailand, guided by Lazarus and Folkman's (1984) Stress and Coping Theory.

Methods: A correlational descriptive study design was used. The study was conducted with 84 spouses of patients in the end-of-life stage at a university hospital between October 2021 and March 2022. Data were collected using a questionnaire covering stress, social support, and quality of life and analyzed using Pearson's Product Moment and Spearman Rank Correlation Coefficients.

Results: The majority of spouses were women aged between 31 and 83 years (Mean = 61.24, SD = 10.42). The mean stress level was 6.40 (SD = 1.62), the mean social support was 55.07 (SD = 9.06), and the mean quality of life was 94.69 (SD = 10.04). There was no significant correlation between social support and stress (r = -0.098, p = 0.373). However, stress was negatively correlated with quality of life (r = -0.299, p = 0.006), and social support was positively related to quality of life (r = 0.219, p = 0.045).

Conclusion: Spousal caregivers of patients at the end-of-life stage experienced varying levels of stress, social support, and quality of life. While no significant relationship was found between social support and stress, stress negatively impacted quality of life, while higher social support was associated with improved quality of life. Healthcare providers, especially nurses, should assess and address the stress, social support, and overall well-being of spousal caregivers to enhance their quality of life.

Keywords

caregivers; spouses; stress; social support; quality of life; end-of-life; nursing; Thailand

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Background

Palliative care is an approach to improving the quality of life for patients and their families facing life-threatening illnesses (World Health Organization [WHO], 2020). This care focuses on reducing pain and symptoms while offering comprehensive support throughout the end-of-life process. Patients in this stage often experience pain, fatigue, and breathing difficulties (Lindeza et al., 2024) and may depend on medical devices. The primary goal during this period is symptom management, which seeks to reduce discomfort and provide holistic care until death (Akkadechanunt, 2017). Since this phase often extends beyond hospitalization, patients typically require continued care at home. Frequently, the spouse becomes the primary caregiver once the patient is discharged from the hospital. This transition can be overwhelming, as the spouse must learn to manage new responsibilities, often leading to significant stress.

When a family member faces a critical illness and requires hospitalization, other family members must adjust their roles to cope. If this adaptation is difficult, it can cause stress and complications (Lindeza et al., 2024). Such stress can affect a family's physical, mental, social, and financial well-being (Yongpattanajit et al., 2020). However, stress can be significantly reduced when a spouse has effective coping strategies and decision-making skills (Lazarus & Folkman, 1984). According to Lazarus and Folkman (1984) stress theory, spouses are uniquely positioned to offer the most valuable support in managing stress. Liu (2021) also emphasized that Chinese spouses, in particular, often experience poor mental health, highlighting the urgent need for mental health services to alleviate symptoms, encourage self-care, improve emotional stress management, and strengthen social support networks. Facilitating discussions on stress and providing effective coping strategies are crucial for improving the overall quality of life of caregivers.

International studies on end-of-life caregiving have primarily focused on the patient, with less attention given to the challenges faced by caregivers, especially spouses. These challenges often include a lack of knowledge, limited confidence in self-care, insufficient time for caregiving, and confusion about the care process. Williams and Addis (2021) noted that caregivers, particularly women, face additional physical burdens when taking on caregiving responsibilities. Women who frequently balance caregiving with domestic tasks and childcare experience heightened stress due to financial worries and a lack of social or healthcare support. Koçak et al. (2022) shows that female caregivers bear a heavier burden than male caregivers, exacerbating their psychological and social challenges. Furthermore, Donison et al. (2022) pointed out that inadequate support for caregivers results in poorer quality of care for the patient, leading to increased suffering for both the caregiver and the patient. These findings are echoed in Valero-Cantero et al. (2022), which found that caregivers often face reduced healthcare benefits themselves, further increasing their stress and diminishing their quality of life.

Research on caregiving for patients with relatives in Thailand has shown that prolonged caregiving creates significant stress. The demands of patient treatment and care increase the caregiver's workload, leading to reduced incomes, higher costs, and negative impacts on their health and sleep. This stress often results in fatigue, reducing caregivers' ability to manage effectively, ultimately leading to a lower quality of life. In a study by Yongpattanajit et al. (2020) of 83 end-of-life caregivers, it was found that caregivers were particularly stressed about their physical condition, which in turn caused psychological stress for relatives, families, and society. When stressed, caregivers sought support sources to help alleviate their burdens. A study by Choupolsat et al. (2018) on 90 caregivers of dementia patients found that while caregivers received moderate social support (mean = 76.21, range = 15-105), their health was still affected by caregiving responsibilities. Increased care burdens led to more stress and insufficient rest, further deteriorating the caregiver’s health. Similarly, Prakobkit et al. (2014) found that spouses of breast cancer patients who had a strong relationship before the illness experienced a better quality of life during treatment. However, when stress occurred, caregivers sought anxiety management strategies and support to address the problem and improve their quality of life. Despite these findings, most research continues to focus on caregiving within hospital settings, leaving a gap in understanding caregiving in home environments. These studies consistently show that caregivers, particularly spouses, face significant physical, psychological, and social challenges that impact their overall well-being. Tailored interventions to reduce stress and enhance social support for caregivers are needed.

Across both international and Thai research, it has been consistently observed that spouses of end-of-life patients experience substantial stress due to caregiving responsibilities. This stress is often compounded by a lack of social support, negatively affecting the caregiver’s quality of life. Spouses must adapt to new caregiving roles, which increases their psychological and physical burden. As the number of end-of-life patients continues to grow, there is an increasing need for research to examine the relationship between caregiver stress, social support, and quality of life, especially for spouses in Thailand. Addressing these gaps, this study explores the relationship between stress, social support, and quality of life among spouses of end-of-life patients. The findings can inform nursing interventions by assessing the stress levels experienced by caregivers, the types and sources of social support available, and the overall quality of life of these caregivers. Such interventions would provide strategies to reduce stress, improve social support, and ultimately enhance the quality of life for spouses caring for end-of-life patients.

Our study aimed to assess and analyze the relationships between stress, social support, and quality of life experienced by spousal caregivers of end-of-life patients in Thailand.

Theoretical Framework

This study employed the Stress and Coping Theory, proposed by Lazarus and Folkman (1984), as a theoretical framework to explore the stress, coping mechanisms, and quality of life among spousal caregivers of end-of-life patients. The theory emphasizes the dynamic interaction between individuals and their environment, where individuals assess situations as positive or negative. When a situation is perceived negatively, it generates stress, prompting an initial appraisal of the potential impact or loss caused by the stressor. A secondary appraisal follows, in which individuals assess available resources and support, as well as the severity of the stressor. The process of appraising stress is influenced by situational factors, such as the characteristics, certainty, and intensity of the situation, as well as personal factors, including individual involvement, beliefs, and cognitive styles.

Lazarus and Folkman (1984) categorize coping strategies into two main types: 1) problem-focused coping, which involves directly addressing the stressor, and 2) emotion-focused coping, which aims to regulate emotional responses. This framework is particularly relevant to understanding the experiences of spouses or partners of end-of-life patients who face significant stressors, including the patient's illness, fatigue, and dependence on medical equipment. These stressors, combined with the demands of caregiving and other family or work obligations, can deeply affect caregivers' emotional and psychological well-being.

When caregivers perceive these demands as manageable and are able to have available social support, they may cope effectively and maintain a satisfactory quality of life. However, when stress levels are high and social support is insufficient, caregivers' quality of life may be significantly impacted. The objectives of this study align with the Stress and Coping Theory by assessing the stress levels, social support, and quality of life experienced by spousal caregivers of end-of-life patients. Furthermore, the study analyzes the relationships between stress and quality of life, social support and quality of life, and stress and social support among caregivers.

By applying this theoretical framework, the study aims to gain insight into how caregivers' coping strategies, influenced by their stress levels and social support, affect their overall well-being. Future research can build upon these findings by examining specific coping strategies and evaluating interventions designed to enhance social support, ultimately improving caregivers' and patients' outcomes.

Methods

Study Design

This research utilized a correlative descriptive study design to examine the relationships among stress, social support, and quality of life in spouses of patients in the end-of-life stage.

Samples/Participants

The target population for this study consisted of spouses of end-of-life patients receiving care from a palliative care team at a university hospital. A purposive sampling method was employed to select participants based on specific criteria. The inclusion criteria for participation were as follows: 1) Spouses of patients in the end-of-life stage, aged 18 years or older, regardless of gender. For spouses aged 60 and older, a cognitive impairment assessment was conducted using the Six-Item Cognitive Impairment Test (6CIT) (Areeue & Youngcharoen, 2020). A score of 0-7 out of a possible 28 indicated no cognitive impairment; 2) Spousal caregivers must be aware that their partner is in the end-of-life stage; 3) Participants should have a minimum caregiving experience of at least 2 weeks; 4) Participants should be able to communicate effectively in Thai, both verbally and in comprehension; 5) Stress screening must indicate a stress level of ≥4.

To determine the required sample size, G*Power version 3.1.9.4 was used, setting α at 0.05 and aiming for 80% power. The literature review suggested an effect size ranging from 0.30 to 0.47 for the correlation between stress and coping strategies (Opasrattanakorn et al., 2015) and between social support and quality of life in post-surgical breast cancer patients (Prakobkit et al., 2014). For the purpose of this study, an effect size of 0.30 was selected for calculations. One-sided hypotheses were employed, as prior reviews indicated consistent directional relationships between stress and related factors internationally and within Thailand. Given the limited number of multidisciplinary studies in Thailand and the potential impact of multicenter settings on the relationships between stress, social support, and quality of life among spousal caregivers, a cautious approach was taken. Consequently, the study included 84 participants, which was deemed sufficient to achieve the research objectives.

Instruments

This study used research tools, including a cognitive impairment screening instrument for participants aged 60 and older and an assessment tool for stress levels.

1. Screening Instruments for Data Collection:

1.1 Thai Version of the 6-Item Cognitive Impairment Test (6CIT): originally developed by Brooke and Bullock (1999), the 6CIT was translated into Thai through a rigorous process of translation and back-translation to ensure validity and reliability. The initial translation was performed by bilingual experts, followed by back-translation into the original language by a separate team. Any discrepancies were resolved through expert consensus. A validation study by Areeue and Youngcharoen (2020) confirmed the tool's suitability for use in Thailand. A pilot test with 10 participants further ensured its clarity and cultural appropriateness. The 6CIT is a widely recognized tool for screening cognitive impairment in elderly populations. In this study, participants were eligible if their 6CIT score was ≤ 7. The questionnaire comprises six concise, easily understandable questions assessing cognitive function across three dimensions. Scores range from 0 to 7, indicating no cognitive impairment, and 8 to 28, indicating cognitive impairment.

1.2 Visual Analog Scale (VAS) for Stress Level Assessment: The Visual Analog Scale (VAS) was used to measure the stress levels of spousal caregivers. This instrument was a horizontal line, approximately 10 centimeters long, with numbers and labels indicating the minimum and maximum stress levels. The leftmost end represented the lowest stress level (score 0), and the rightmost end represented the highest stress level (score 10). Participants marked a vertical line across the scale to indicate their perceived stress level. A score of 4 or higher was considered significant. The Thai translation of this tool was completed by Launrujisawat and Jetiyanuwat (2015).

2. Research Instruments for Data Collection:

2.1 Demographic Inventory of Spousal Caregivers: The researchers developed this inventory based on a literature review. It captured various variables related to spousal caregivers, including gender, age, income, highest level of education, number of children, presence of underlying health conditions, duration of caregiving, number of family members under the caregiver's care, perceived benefits of caregiving, impact of caregiving on personal health, and any health problems caused by caregiving responsibilities.

2.2 Demographic Inventory of Patients: Developed by the researchers based on a literature review, this inventory gathered personal and medical information about the patients, including gender, age, religion, marital status, education level, occupation, family monthly income, and medical expense coverage.

2.3 Social Support Questionnaire Part II (SSQ Part II): originally developed by Schaefer et al. (1981), aimed to measure the perceived social support of spousal caregivers. The principal investigator obtained permission from the original authors to use the instrument. The Thai translation process included forward and back translation, with reviews by three experts to ensure cultural relevance and clarity, resulting in a content validity index of .90. The questionnaire consists of five items across three domains of social support: two items on emotional support, two on material and service support, and one on informational support. Respondents were asked to report the quantity of support they received from family members, close individuals (such as relatives, neighbors, or colleagues), and healthcare providers (such as doctors and nurses). In this study, the reliability of the SSQ Part II was tested on 84 participants, yielding a Cronbach's alpha coefficient of 0.87.

2.4 WHOQOL-BREF-THAI: The WHOQOL-BREF-THAI, a shortened version of the World Health Organization Quality of Life questionnaire, was used to assess the quality of life of spousal caregivers. Permission was obtained from the original authors to translate the tool into Thai, which was completed by Mahatnirunkul et al. (2002). The questionnaire comprises 26 items across four domains: 1) Physical, 2) Psychological, 3) Social Relationships, and 4) Environment. The translation process involved iterative linguistic reviews and cultural adaptations to ensure the tool's clarity and relevance in the Thai context. The reliability of the Thai version of the WHOQOL-BREF was tested with a Cronbach's alpha coefficient of 0.84 in the original study and 0.87 in this research, based on a sample of 84 participants.

Data Collection

Data collection for this study was conducted after obtaining permission from the Human Research Ethics Committee. Data collection took place from October 2021 to March 2022. Participants were selected from spouses of patients who met the inclusion criteria under the supervision of the head nurse. The researchers introduced themselves to the participants, explained the objectives of the study, and invited them to take part in the data collection process. Upon agreement, the researchers obtained the participants' informed consent signatures.

The data collection procedure was then carried out as follows: For spouses aged 60 or older, cognitive impairment screening was first administered. Next, participants completed the stress level assessment. Following this, they filled out a series of questionnaires, including the demographic inventory, the social support questionnaire, and the quality-of-life questionnaire, specifically designed for spousal caregivers of end-of-life patients. Throughout the process, participants were encouraged to ask for clarification or address any concerns they might have. For participants who were unable to read or write in Thai or had vision impairments, the researchers read the questionnaire items aloud and recorded the participants' verbal responses. To ensure comfort and reduce anxiety, research assistants were available to offer caregiving support during the completion of the questionnaires. Once the data collection was completed, all documents were securely stored in envelopes to ensure confidentiality.

Data Analysis

Data collected from participants were analyzed using the SPSS/pc+ (Statistical Package for the Social Sciences) version 26 for Windows, following established statistical research methodology. The demographic data of both spousal caregivers and end-of-life patients were analyzed using frequency, percentage, rank, mean, and standard deviation. Data related to stress, social support, and quality of life were analyzed using mean and standard deviation. Information regarding the disease, treatment of patients, and the supportive needs of spousal caregivers was analyzed through frequency distribution, percentage, mean, and standard deviation. When the data met statistical assumptions, the correlation between stress, social support, and quality of life among spousal caregivers was examined using Pearson's product-moment correlation coefficient. In cases where the data did not meet these assumptions, the Spearman rank correlation coefficient was applied.

Ethical Considerations

This research was approved by the Human Research Ethics Committee of the Faculty of Medicine at Ramathibodi Hospital, Mahidol University, Thailand, under approval number (COA.MURA2021/591) on 19 July 2021. Potential participants were identified and invited to voluntarily consent to participate in the study. All collected data were kept confidential and anonymous, with identification numbers assigned to participants. The study ensured participants' confidentiality and their right to withdraw at any time, with the assurance that their decision would not affect their treatment or care.

Results

General Characteristics of Spousal Caregivers of Patients at the End-of-Life Stage

The study found that the majority of spousal caregiver participants were female (63.10%), with ages ranging from 31 to 83 years (Mean = 61.24, SD = 10.42 years) and predominantly Buddhist (98.80%). Among participants aged over 60, 51 were screened using the 6CIT cognitive test, and all passed. Regarding education, the highest level achieved by most participants was a bachelor's degree or higher (36.90%). The majority of spousal caregivers were housewives or househusbands (59.52%), followed by shopkeepers or vendors (19.02%). Most caregivers (69%) exclusively cared for their spouse, while 31% cared for additional individuals. Over half of the spousal caregivers had underlying health conditions (58.33%), primarily hypertension (27.38%) and diabetes mellitus (9.52%). Caregiving responsibilities led to various physical symptoms, including muscle, back, and waist pain (46.43%), headache or dizziness (32.14%), and sleep deprivation (28.57%). Psychological symptoms included stress (5.95%) and anxiety (5.95%). Nearly half of the participants reported insufficient income to meet their needs (47.62%).

Financial support was most commonly provided as assistance with living expenses (71.43%). Support from healthcare personnel was minimal, with only 2.38% receiving home healthcare visits. However, caregiving activity support was prevalent, with 77.38% receiving food assistance and 75.00% receiving help with caregiving tasks. A small number of participants (2.38%) received resource support for childcare, as summarized in **Table 1**.

Table 1 Demographic data of spousal caregivers, characteristics of illness, symptoms, and resource support for spousal caregivers

Spousal Caregivers' Characteristics	*f*	%
Gender		
Female	53	63.10
Male	31	36.90
Age	Mean = 61.24, SD = 10.42 (Min – Max = 31 - 83 years)	
Religion		
Buddhism	83	98.80
Islam	1	1.20
Highest level of education		
Primary school	24	28.57
Secondary school	29	34.53
Bachelor's and higher	31	36.90
Occupation		
Househusband/Housewife	50	59.52
Shopkeeper/vendor	16	19.02
Government officer/ Authority officer	7	8.33
Employee	7	8.33
Agriculturist	4	4.80
Number of family members in caregiving		
End-of-life spousal patients only	58	69.00
End-of-life spousal patient and other family members	26	31.00
Underlying disease prevalence among spousal caregivers		
Having underlying disease	49	58.33
Having no underlying disease	35	41.67
Hypertension	23	27.38
Diabetes Mellitus	8	9.52
Physical *		
Muscle pain/ back pain/ waist pain	39	46.43
Headache/dizziness	27	32.14
Sleep deprivation	24	28.57
Psychological *		
Stress	5	5.95
Anxiety	5	5.95
Adequacy of family income		
Inadequate income	40	47.62
Adequate income	30	35.71
Adequate income with saving	14	16. 67
Social support		
Financial*		
Living expense	60	71.43
Healthcare personnel*		
Healthcare home visits	2	2.38
Patient caring assistance*		
Food providing	65	77.38
Caregiving role assistance	63	75.00
Other activities assistance*		
Child caring assistance	2	2.38

Note: * Respondents can choose more than one choice

Characteristics of Demographic Data and Health Status of End-of-Life Patients

The study revealed that most end-of-life patients were male (63.10%), while females accounted for 36.90%. Patients' ages ranged from 40 to 85 years, with a mean age of 62.4 years (SD = 9.78). Nearly half of the patients (40.50%) had attained a bachelor's degree or higher. Regarding occupation, the majority were housewives or househusbands (58.33%), followed by employees (13.10%). The primary healthcare benefits utilized by patients were Civil Servant Benefits (58.33%) and Universal Coverage (29.76%). The main symptoms leading to hospital admission were pain (55.95%) and dyspnea (35.71%). The most common primary diagnosis among patients was lung cancer (60.71%), followed by cancers of the gastrointestinal system (58.33%).

Almost all patients in this study sought medical services for pain management through analgesic prescriptions (94.04%), and a significant proportion received follow-up care for dyspnea (61.90%). Many patients required medical devices, such as analgesic syringes (91.70%), oxygen tubes (66.70%), and enteral feeding tubes (29.80%). Palliative care interventions included intravenous feeding (100%), intravenous infusion (100%), and a No-CPR order (100%), as summarized in **Table 2**.

Table 2 Characteristics of demographic data and health status of end-of-life patients (*n* = 84)

Demographic and Health Characteristics of End-of-Life Patients	*f*	%
Gender		
Male	53	63.10
Female	31	36.90
Age	Mean = 62.4, SD = 9.78 (Min – Max = 40 - 85 years)	
Education level		
Primary school	19	22.60
Secondary school	31	36.90
Bachelor's degree and higher	34	40.50
Occupation		
Househusband/housewife	49	58.33
Employee	11	13. 10
Government/Authority officer	10	11.90
Shopkeeper/vendor	9	10. 72
Agriculturist	5	5.95
Healthcare benefit		
Original affiliation/Civil servant benefit	49	58.33
Universal coverage	25	29.76
Social security scheme	7	8.31
Self-support	3	3.60
Symptoms leading to hospitalization*		
Pain	47	55.95
Dyspnea	30	35.71
Diagnosis*		
CA lung	51	60.71
Gastrointestinal system	49	58.33
Medical therapy in current illness*		
Analgesic drug	79	94.04
Dyspnea follow-up	52	61.90
Antibiotic	13	15.50
Fluid and mineral infusion	13	15.50
Medical equipment used*		
Analgesic drug syringe	77	91.70
Oxygenation	56	66.70
Enteral tube feeding	25	29.80
Palliative care therapy to improve patient's quality of life*		
Intravenous feeding	84	100.00
Intravenous infusion of fluid/blood	84	100.00
NO Cardiopulmonary resuscitation	84	100.00

Note: * Respondents can choose more than one choice

Characteristics of Support Needed by Spousal Caregivers of End-of-Life Patients

Most spousal caregivers primarily required support in caregiving-related activities. This included assistance with discharge care (20.23%) and efforts to alleviate patients' suffering (11.90%). In the economic dimension, caregivers frequently sought help with living expenses (36.90%). Within the healthcare personnel support, a substantial proportion of caregivers (57.14%) expressed the need for support in managing symptomatic treatment, as detailed in **Table 3**.

Table 3 Support needed by end-of-life patients' spousal caregivers

Support Needed	*f*	%
Caring dimension*		
Discharge care support	17	20.23
Help minimize patients' suffering	10	11.90
Expense dimension*		
Cost of living	31	36.90
Healthcare personnel support*		
Symptomatic treatment	48	57.14
Providing caring information	11	13.09

Note: * Respondents can choose more than one choice

Characteristics of Stress, Critical Stressors for Spousal Caregivers, and Outcomes of Stress

Table 4 shows that participants experienced moderate stress levels (Mean = 6.40, SD = 1.62). All caregivers (100%) identified patients' symptoms and suffering as the primary stressors, followed by concerns about disease progression (14.28%). Financial burdens (9.52%) and caregiving challenges during the COVID-19 no-visit policy (4.76%) were also significant stressors. Physical effects included sleep deprivation (83.33%) and headaches (15.47%), while psychological impacts included anxiety (33.33%), lack of concentration, and agitation (16.66%).

Table 4 Stress characteristics, the critical stressors for spousal caregivers, and the outcomes of stress

Characteristics	***f***	**%**
Stress	Mean = 6.40, SD = 1.62 (min-max = 4-10)	
The most severe stressor of spousal caregivers concerning end-of-life patients		
Stressors concerning patient's disease and illness*		
Patient's symptoms and suffering	84	100.00
Disease and prognosis	12	14.28
Stressor concerning caregiving role*		
Medical and living expenses	8	9.52
Inpatient caregiving (Due to COVID-19 no-visit policy)	4	4.76
Stress outcome in spousal caregivers*		
Physical*		
Sleep deprivation	70	83.33
Headache	13	15.47
Psychological*		
Anxiety	28	33.33
Agitation	14	16.66

Note: * Respondents can choose more than one choice

Social Support and Quality of Life of Spousal Caregivers of End-of-Life Patients

Table 5 shows that spousal caregivers reported a high overall social support score (Mean = 55.07, SD = 9.06) from relatives (Mean = 22.88, SD = 3.52), intimate partners (Mean = 14.58, SD = 4.76), and healthcare personnel (Mean = 17.60, SD = 4.24). Caregivers' overall quality of life was moderate (Mean = 94.69, SD = 10.04), with the highest scores in the physical dimension (Mean = 22.82, SD = 3.68) and psychological dimension (Mean = 22.01, SD = 2.79). The relationship dimension scored 12.29 (SD = 2.04), and the environmental dimension scored 31.48 (SD = 3.39).

Table 5 Social support and quality of life of end-of-life patients' spousal caregivers ($n = 84$)

Variables	**Possible range**	**Actual range**	**Mean**	**SD**
Overall social support	15 - 75	28 - 75	55.07	9.06
Relatives	5 - 25	11 - 25	22.88	3.52
Intimate persons	5 - 25	5 - 25	14.58	4.76
Healthcare personnel	5 - 25	7 - 25	17.60	4.24
The overall quality of life	26 - 130	59 - 125	94.69	10.04
Physical dimension	7 - 35	14 - 34	22.82	3.68
Psychological dimension	6 - 30	16 – 28	22.01	2.79
Relationship dimension	3 - 15	6 - 15	12.29	2.04
Environmental dimension	8 - 40	18 - 40	31.48	3.39

Correlation between Stress, Social Support, and Quality of Life

Table 6 shows a significant negative correlation between stress and overall quality of life ($r = -0.299$, $p = 0.006$) and a positive correlation between overall social support and quality of life ($r = 0.219$, $p = 0.045$). Social support from healthcare personnel positively correlated with overall quality of life ($r = 0.269$, $p = 0.013$) and the psychological dimension of quality of life ($r = 0.297$, $p = 0.006$). Social support strongly correlated with the relationship dimension of quality of life, particularly from relatives ($r = 0.375$, $p < 0.001$), intimate partners ($r = 0.532$, $p < 0.001$), and healthcare personnel ($r = 0.534$, $p < 0.001$).

Table 6 Correlation between stress, social support, and quality of life among spouses of patients at the end-of-life stage ($n = 84$)

Items	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1. Stress	1									
2. Overall social support	-0.098	1								
3. Relatives	0.113	0.524**	1							
4. Intimate person	-0.138	0.719**	0.093	1						
5. Healthcare personnel	-0.144	0.775**	0.348**	0.271*	1					
6. Overall quality of life	-0.299**	0.219*	-0.002	0.139	0.269*	1				
7. Physical dimension	-0.211	0.042§	-0.194	0.028	0.177§	0.813**	1			
8. Psychological dimension	-0.307**	0.166	0.068	-0.018	0.297**	0.842**	0.586**	1		
9. Relationship dimension	-0.079	0.659**	0.375**	0.532**	0.534**	0.345**	0.020	0.284**	1	
10. Environmental dimension	-0.005	0.191	-0.053	0.210	0.189	0.701**	0.448**	0.480**	0.222*	1

Note: * <0.05 | **<0.01 | §Analyzed by Pearson's Correlation

Discussion

Principal Findings

The mean stress level reported by spousal caregivers in this study was 6.40 out of a possible score of 10. This finding is consistent with the study by Yoosamran et al. (2020), which examined stress in relatives of patients receiving palliative care and found that 63.09% of relatives experienced moderate stress. Similarly, Yongpattanajit et al. (2020) reported that spousal caregivers of end-of-life patients also exhibited moderate levels of stress. The stress experienced by spousal caregivers can be attributed to several factors associated with end-of-life situations, including health concerns, illness, and economic challenges. Caregivers often face stress related to the symptoms and suffering of their loved ones, the disease prognosis, medical expenses, and daily living expenses.

Moreover, spousal caregivers endure not only the stress of caregiving but also the emotional burden of impending loss, which may exacerbate their stress compared to other caregiver groups. The knowledge that a beloved spouse is nearing the end of life can lead to heightened anxiety and grief. This result is congruent with the stress-coping theory of Lazarus and Folkman (1984), which emphasizes the role of emotional and cognitive responses in coping with stressors.

This study assessed the social support available to spousal caregivers of end-of-life patients from three primary resources: family members, intimate partners, and healthcare personnel. The evaluation focused on three components of social support: informational support, emotional support, and material and service support. The results indicated that spousal caregivers received high social support, with scores ranging from 28 to 75 and an average score of 55.07. Among the sources of support, family members were identified as the primary providers, likely due to the strong bonds of love and connection that exist among them.

Furthermore, spousal caregivers reported receiving various forms of financial assistance, including support for living expenses and life insurance premiums and patient care resources such as food assistance, respite caregiving, and transportation support. This aligns with findings by Donison et al. (2022), which indicate that the spouses of cancer patients still require support and guidance regarding physical health conditions, financial expenses, and treatment information from the healthcare team. Additionally, Khatta et al. (2018) found that a moderate level of social support positively influenced the caregiving behaviors of caregivers.

The quality of life of spousal caregivers for end-of-life patients was assessed across four dimensions: physical, psychological, relational, and environmental. The findings revealed that spousal caregivers exhibited moderate to high overall quality of life, with an average of 94.69 (range: 56–125). This aligns with the results of Faramee (2024), who studied caregivers of terminal cancer patients. According to Lazarus and Folkman (1984) stress and coping theory, caregivers' quality of life can be influenced by their appraisal of caregiving situations. When caregivers perceive their responsibilities as stressful, they employ various coping strategies based on available resources and social support. Specifically, the average for the physical dimension of quality of life was 22.82. Many spousal caregivers reported experiencing physical symptoms during their caregiving, including muscle, back/waist pain (46.43%) and headaches/dizziness (32.14%). In contrast, psychological, relational, and environmental assessments indicated a high quality of life in these areas. This may suggest that caregivers in this study learned to manage their caregiving roles effectively, enabling them to cope with associated challenges.

The study also found a significant negative correlation between stress and quality of life. Caregivers often experienced stress as they adapted to their additional roles, which complicated their daily lives and caregiving tasks. Consequently, spousal caregivers face stress across various dimensions, including physical, economic, psychological, and spiritual (Tangchitsumran et al., 2023). The perception of caregiving as a stressful experience adversely affected their quality of life. However, caregivers sought support from social resources such as family, intimate partners, and healthcare personnel, contributing to an enhanced quality of life (Aoyama et al., 2021). This knowledge likely motivated caregivers to familiarize themselves with treatment regimens and palliative care, leading to higher quality-of-life scores. Additionally, caregivers cultivated a harmonious and supportive caregiving environment, engaging in daily activities together with their spouses to foster happiness, unity, and a sense of responsibility within their families. They also engaged in discussions regarding family management with good mutual understanding.

Furthermore, the study revealed a significant positive correlation between social support and quality of life. Caregivers had access to robust social support resources, including family, intimate partners, and healthcare personnel. The mean social support score was 55.07 out of a possible 75, reflecting a high level of perceived support. This finding is consistent with Tangchitsumran et al. (2023), who observed that individuals with strong social support networks tended to report higher quality of life. The types of social support received by spousal caregivers included financial assistance, patient care support, medical follow-up aid, caregiver role replacement, transportation assistance, food provisions, burden sharing, and support for religious activities, such as visits to temples. Healthcare personnel provided critical support, offering caregiving consultation and information. This aligns with findings from Koçak et al. (2022), which indicated that caregivers receiving information support from healthcare professionals demonstrated improved adaptation. This study's spousal caregivers reported sufficient social support, including financial, healthcare, patient care, and burden-sharing assistance, which positively correlated with quality of life (Jeon & Jun, 2024).

Spouses play a crucial role as social support resources. Strong spousal relationships can foster love, understanding, patience, forgiveness, and effective communication, enhancing problem-solving capabilities and boosting self-esteem. Previous studies indicate that caregivers who managed to balance their professional responsibilities with caregiving roles employed effective time management strategies. However, the demands of caregiving for end-of-life patients often overwhelm them, limiting opportunities for recreation and personal activities. Many caregivers also experienced financial constraints, particularly among those with low incomes, such as agricultural workers, which further intensified their burden (Puangkam et al., 2020). Conversely, spousal caregivers in this study benefited from support from family members, including siblings and spouses, who helped facilitate discussions and problem-solving strategies.

Interestingly, the study found no correlation between stress and social support among spousal caregivers, contradicting the initial hypothesis. While spousal caregivers reported moderate stress levels, they also experienced high levels of social support. Despite this, the correlation analysis revealed no significant relationship between stress and overall social support. Caregivers in this study acknowledged that social support was crucial in mitigating stress by helping them better appraise and manage their circumstances. The moderate stress levels among caregivers may be attributed to their high levels of social support, which is a critical factor in reducing stress (Liu, 2021). Additionally, the spousal caregivers in this study had an average monthly income exceeding 20,000 Thai Baht and educational attainment at the Bachelor's degree level or higher. They received support in various forms, including financial assistance, healthcare support, patient care aid, and shared responsibilities. This aligns with findings by Schaefer et al. (1981), who reported that caregivers receiving diverse forms of support experienced increased encouragement and self-esteem and reduced stress (Choupolsat et al., 2018).

This study's findings support Lazarus and Folkman's Stress and Coping Theory. Spousal caregivers face moderate to high-stress levels while caring for their partners in end-of-life situations. However, they benefit from robust social support systems, which significantly enhance their quality of life. The study also identified negative correlations between stress and quality of life and positive correlations between social support and quality of life, further affirming the relevance of the Stress and Coping Theory in understanding the experiences of spousal caregivers.

Limitations

This study has several limitations. The cross-sectional design restricts the ability to establish causal relationships between stress, social support, and quality of life. Additionally, the use of purposive sampling focused on spousal caregivers of terminally ill cancer patients limits the generalizability of the findings to caregivers of patients with other end-of-life diseases, whose caregiving contexts may differ. Self-reported data may introduce biases and unaccounted confounding factors such as illness severity or prior caregiver experience could influence the results. Furthermore, the study assessed social support from family, partners, and healthcare personnel, excluding other potential support sources. Future research should include longitudinal studies and diverse caregiver populations and explore additional support systems to understand caregiving experiences comprehensively.

Implications to Nursing Practice

This study has important implications for nursing practice. Nurses should be aware of the high levels of stress experienced by spousal caregivers of terminally ill patients and provide proactive, tailored support to alleviate this burden. Offering caregivers comprehensive information about the patient's condition, treatment options, and available resources is crucial. Additionally, regular assessments of caregiver stress should be conducted to provide timely interventions and reduce the negative impacts on their quality of life. Nurses can also facilitate access to emotional, financial, and healthcare-related support and encourage caregivers to use social support systems to manage stress and enhance coping. Training nurses to offer compassionate communication and strategies for stress management could significantly improve caregivers' well-being and caregiving effectiveness.

Conclusion

This study found that spousal caregivers of terminally ill cancer patients experienced moderate stress levels but received significant social support, primarily from family members, contributing to a moderate to high overall quality of life. A significant negative correlation was found between stress and quality of life, while social support was positively associated with quality of life. The role of healthcare personnel in supporting caregivers was also highlighted, assisting them in managing caregiving duties and emotional challenges during end-of-life care. These findings also emphasize the critical role of nursing support in alleviating caregiver stress and enhancing their well-being through education, emotional support, and resource access.

Declaration of Conflicting Interest

There are no conflicts of interest to declare.

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Authors' Contributions

RT contributed conceptual framework and design, manuscript writing, data collection, data analysis, and interpretation. TJ contributed conceptual framework and design, data analysis, manuscript writing, interpretation, and discussion. BS contributed conceptual framework and design, data analysis, manuscript writing, interpretation, and discussion.

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Data Availability

The datasets analyzed for the current study results are available from the first and corresponding authors upon reasonable request.

Declaration of Use of AI in Scientific Writing

There is nothing to declare.

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The correlations between demographic factors, self-efficacy, and quality of life among Indonesian patients with ischemic stroke: A cross-sectional study

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Abstract

Background: Ischemic stroke is the primary cause of neurological disability and can lead to psychological issues that affect self-efficacy. Changes in self-efficacy, in turn, influence the overall quality of life. Although many studies have examined factors that affect self-efficacy, quality of life, or both, few have specifically explored the role of demographic factors in shaping the quality of life in patients with ischemic stroke.

Objective: This study aimed to identify the correlations between demographic factors, self-efficacy, and quality of life Indonesian in patients with ischemic stroke.

Methods: This study employed a quantitative approach with a cross-sectional design. A total of 143 participants were recruited between February and April 2024 based on defined inclusion criteria. The research instruments included a demographic questionnaire, the Stroke Self-Efficacy Questionnaire, and the Specific Stroke Quality of Life Questionnaire. Data were analyzed using descriptive statistics, logistic regression, and Spearman rank test.

Results: The findings revealed that females were 2.213 times more likely (95% CI = 1.128–4.341; *p* = 0.031) to achieve high self-efficacy compared to males. Occupational status significantly influenced self-efficacy, with employed individuals being 6.333 times more likely (95% CI = 3.134–16.599; *p* <0.001) to achieve high self-efficacy. The duration of stroke experienced by respondents also had a significant impact, with an odds ratio (OR) of 1.908 (95% CI = 0.980–3.715; *p* = 0.025). Additionally, occupational status significantly affected the quality of life, as employed respondents were 7.213 times more likely to achieve a good quality of life (OR = 7.213; 95% CI = 3.134–16.599; *p* <0.001). There was a significant positive correlation between self-efficacy and quality of life (*r* = 0.898, *p* <0.001).

Conclusion: The results of this study provide valuable insights for nursing practice, emphasizing the importance of interventions to enhance patients' self-efficacy. By increasing patients' confidence in managing their condition, such interventions can lead to improved quality of life and better recovery outcomes. Strategies including health education, psychological support, and patient empowerment during rehabilitation are essential for strengthening self-efficacy and improving overall care outcomes. These findings highlight the need for healthcare professionals and families to address the psychological aspects of care in patients with stroke. Enhancing self-efficacy is critical in helping patients achieve a better quality of life and more successful recovery.

Keywords

Indonesia; self-efficacy; ischemic stroke; psychological issues; quality of life; nursing

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Background

Stroke is a non-communicable disease that remains a topic of discussion in the health sector, as it is the second leading cause of death worldwide (De Havenon et al., 2023). Stroke directly affects health systems, leading to significant expenses, and is regarded as a global public health issue because of the severe disabilities, functional impairments, and compromised quality of life (QoL) (Ramos-Lima et al., 2018). In 2019, a total of 101.5 million people globally had experienced a stroke, including 77.2 million with ischemic strokes (Alshehri & Muhammad, 2023). Global forecasts indicate that for individuals aged over 25 years, the lifetime risk of experiencing any stroke is 24.9%, while the risk specifically for ischemic stroke is 18.3% (Pu et al., 2023). Disability resulting from stroke presents a new challenge for patients in their daily lives, including during the rehabilitation phase (Dewilde et al., 2020).

The rehabilitation phase for patients with stroke is prolonged. Rehabilitation benefits patients with stroke by maximizing bodily functions for independent performance of basic activities and preventing complications (Bindawas & Vennu, 2016). Despite this, many patients with stroke still face difficulties in performing basic daily activities, even while undergoing rehabilitation (Brouwer-Goossensen et al., 2018). The duration of rehabilitation and the presence of disability in patients with stroke can lead to psychological issues, including anxiety and depression (Brouwer-Goossensen et al., 2018). Many stroke survivors often feel that disability leads to feelings of low self-esteem, worry, and dissatisfaction with their lives (Volz et al., 2019). Therefore, high self-efficacy is required to achieve well-being for patients with stroke (Brouwer-Goossensen et al., 2018). Prior studies suggest that successfully boosting self-efficacy in individuals results in enhanced skills, greater confidence, and increased independence in managing their illness. Furthermore, these improvements have lasting benefits that improve the overall quality of life (Rui & Lirong, 2023).

Self-efficacy in patients with stroke is a crucial factor in the ability to choose behaviors and enhance independence in performing self-care activities to achieve desired goals (Lo et al., 2022). Previous research indicates that individuals with high self-efficacy can improve self-management, including independent activity fulfillment (Lo et al., 2022). The impact on patients with high self-efficacy tends to be more cautious in decision-making (Honado et al., 2023). Additionally, self-efficacy can influence patients such as thinking, motivation, and behavior related to health (Jia et al., 2021). With high self-efficacy, patients with stroke can effectively manage their health and undergo rehabilitation. Success in self-management in patients with stroke is closely related to improving their quality of life. Patients with strokes with high self-efficacy are also closely associated with a better quality of life(Tielemans et al., 2015).

Quality of life is crucial as it relates to health conditions for patients with stroke (Bártlová et al., 2022). Quality of life reflects health status, including physical well-being, cognitive function, psychological state, rehabilitation phase, and assessing treatment effectiveness from the patient's perspective (Wong et al., 2021). Previous research has explored how the correlation between self-efficacy and quality of life in patients with stroke. Tielemans et al. (2015) found a strong relationship between self-efficacy and quality of life, with high self-efficacy correlating with better quality of life. Consistent with this, van Mierlo et al. (2014) noted that improving self-efficacy is essential for achieving a good quality of life. However, some studies indicate that sociodemographic factors also affect the quality of life (Wróblewska et al., 2019). Other research suggests that psychological factors can mediate quality of life in patients with stroke (Trochimczyk et al., 2017).

Additionally, identifying aspects influencing quality of life is essential for developing effective management strategies, and these factors include demographic factors (Kariyawasam et al., 2020). In Sri Lanka, research indicated that younger age, higher income, and better health infrastructure were linked to a higher quality of life before experiencing a stroke. In contrast, younger age, female gender, limited health infrastructure, lower education levels, greater disability, and hypercholesterolemia were associated with a lower quality of life across various domains after a stroke (Mahesh et al., 2018). Kariyawasam et al. (2020) also found that demographic factors significantly related to the quality of life in patients with stroke included marital status, monthly income, occupation, gender, and education level.

Research on quality of life is essential as it impacts an individual's social life. However, research in Asia, particularly in Indonesia, remains limited regarding the relationship between self-efficacy and quality of life in stroke patients, as well as the impact of demographic factors on quality of life in patients with stroke ischemic as potential risk factors. This gap highlights the need for a deeper understanding of the risk factors affecting quality of life.

Thus, our study aimed to analyze the correlations between demographic factors, self-efficacy, and quality of life in patients with ischemic stroke.

Methods

Study Design

The study utilized a cross-sectional design to investigate demographic factors, self-efficacy, and quality of life. This design allowed researchers to assess outcomes and exposures concurrently among the participants, providing a snapshot of the relationships between variables at a single point in time.

Samples/Participants

Patients with ischemic stroke were recruited from the outpatient neurology clinic at K.R.M.T Wongsonegoro General Hospital in Indonesia between February 2024 and April 2024. The inclusion criteria for the study encompassed all patients with ischemic stroke attending the outpatient clinic, aged 18 to 65 years, and without cognitive impairment, as assessed by the MMSE (Mini-Mental State Examination) with a score greater than 22. The exclusion criteria involved patients with disabilities unrelated to ischemic stroke and those with comorbid conditions, including renal failure, coronary heart disease, and diabetes mellitus. The sample size was calculated by the G*Power program, yielding a total of 143 participants selected from the population using a consecutive sampling technique.

Instruments

Three instruments were utilized and authorized by the authors of the original research and Indonesian versions. Initially, the demographics questionnaire was created by the researchers and included questions about education level, gender, marital status, age, occupational status, years with stroke, and number of attacks.

The Stroke Self-Efficacy Questionnaire (SSEQ) was utilized to assess self-efficacy related to functional status and self-management during the recovery process for post-stroke patients (Muina-Lopez & Guidon, 2013). This scale, created by Jones et al. (2008), includes 13 items rated on a Likert scale from 0 to 3, where 0 signifies no confidence and 3 denotes full confidence, yielding a total score between 0 and 39. The Indonesian version of the SSEQ has undergone validity and reliability testing with 31 stroke patients, demonstrating a calculated *r*-value equal to or exceeding the table *r*-value

(0.355) in content validity testing, while reliability was confirmed with a Cronbach's alpha of 0.916 (Nurjihan et al., 2022).

The Short Version of the Stroke-Specific Quality of Life scale (SSQ-12), consisting of 12 items, was used to assess quality of life. This scale covers aspects such as upper limb function, cognitive abilities, self-care, work, social roles, upper extremity function, language, mobility, vision, family roles, energy, mood, and personality (Post et al., 2011). It employs a Likert scale from 1 to 4, with total scores ranging from 12 to 48. The validity and reliability of this questionnaire were assessed in a study involving 30 stroke patients. The validity was established through construct validity, with all items scoring between 0.393 and 0.717 (r >0.30), and the reliability test indicated a Cronbach's alpha of 0.882 (Dharma, 2015). Permission to use the instruments was obtained from the original developers.

Data Collection

Data collection was conducted after obtaining ethical approval and research permission from KRMT Wongsonegoro Hospital, Semarang. The research was carried out directly by the researcher without the assistance of enumerators. The study was conducted after the respondents left the neurology outpatient clinic room, where they were presented with an informed consent form for research approval. The researcher assisted respondents in completing the questionnaire to help them respond to the questions more easily. The data collection process was conducted every Monday through Friday from February to April 2024., while observing health protocols in accordance with applicable regulations. Research focusing on these three variables is limited; hence, this study was conducted with an alpha error probability of 0.05, a power (1-β probability) of 0.8, and an effect size of 0.3 (Cohen's f). Consequently, the minimum required sample size was 107 respondents. Ultimately, from the total population, 143 patients consented to participate in this study.

Data Analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS) version 23.0. The statistics assessed the frequency and percentage of demographic characteristics, including marital status, gender, employment status, age, education level, years with stroke, and number of stroke occurrences. The standard deviation (SD), minimum, maximum, mean, and median were calculated for age. Logistic regression, including Confidence Intervals (CI) and Odds Ratios (OR), was applied to determine the likelihood of high self-efficacy and good quality of life-based on demographic factors. Spearman rank correlation was utilized to examine the relationship between self-efficacy and quality of life because none of the variables were normally distributed.

Ethical Considerations

The study protocols obtained ethics approval from the ethics committee of RSD K.R.M.T Wongsonegoro Semarang with number 019/Kom.EtikRSWN/II/2024. Before distributing the questionnaires, the research objectives were communicated to the participants, who were assured of information confidentiality and provided with informed consent. To adhere to ethical guidelines, the questionnaires were distributed anonymously. The questionnaires were distributed while participants were waiting in the outpatient neurology clinic waiting area and were completed within 10-15 minutes. The completed questionnaires were then returned to the researcher. It is important to note that all questionnaires were utilized with permission from the original developers, ensuring that the research adhered to proper usage and copyright protocols.

Results

As shown in **Table 1**, 72% of the participants were aged between 18 and 59 years, with a mean of 55.17 (SD= 7.067; min = 25; max = 65). Males comprised over half of the participants (53%), and nearly all were married (97.2%). Most of the participants had a low level of education (97.2%) and were predominantly unemployed (65%). Over half of the participants had suffered a stroke less than one year ago (51%), with the majority experiencing their first stroke (84.6%).

Table 1 Participants' demographic characteristics

Characteristics	n	%
Gender		
Male	77	53.8
Female	66	46.2
Age		
Mean = 55.17, SD = 7.067, Min = 25, Max = 65		
≥ 60 years	40	28
18-59 years	103	72
Marital status		
Unmarried	4	2.8
Married	139	97.2
Education level		
Lower education	103	72
Higher education	40	28
Occupational status		
Unemployed	93	65
Employed	50	35
Years with stroke		
≥1 year	70	49
<1 year	73	51
Number of attacks		
Recurrent stroke	22	15.4
Primary stroke	121	84.6

Table 2 shows that females had a 2.213 times greater likelihood (95% CI = 1.128–4.341; p = 0.031) of achieving high self-efficacy compared to males. Occupational status significantly influenced self-efficacy, with employed individuals being 6.333 times more likely (95% CI = 3.134–16.599; p <0.001) to achieve high self-efficacy. The large CI value obtained was likely due to the variability within the data.

The duration of stroke experienced by respondents also had a significant impact, with an OR of 1.908 (95% CI = 0.980–3.715; p = 0.025). However, the characteristics of age, marital status, education level, and type of stroke attack did not have a significant influence on the self-efficacy of patients with ischemic stroke.

Table 2 Correlations of the respondents' characteristics of their self-efficacy (N = 143)

Characteristics	***n* (%)**	**Self-efficacy level**		**OR (95% CI)**	***p***
		Low *n* (%)	**High *n* (%)**		
Gender					
Male	77 (53.8%)	43 (55.8%)	34 (44.2%)	Ref	-
Female	66 (46.2%)	24 (36.4%)	42 (63.6%)	2.213 (1.128-4.341)	0.031*
Age					
≥60 years	40 (28%)	22 (55%)	18 (45%)	Ref	-
18-59 years	103 (72%)	45 (43.7%)	58 (56.3%)	1.575 (0.756-3.284)	0.303
Marital status					
Unmarried	4 (2.8%)	3 (75%)	1 (25%)	Ref	-
Married	139 (97.2%)	64 (46%)	75 (54%)	3.516 (0.357-34.634)	0.525
Education level					
Lower education	103 (72%)	52 (50.5%)	51 (49.5%)	Ref	-
Higher education	40 (28%)	15 (37.5%)	25 (62.5%)	1.6999 (0.805-3.589)	0.226
Occupational status					
Unemployed	93 (65%)	57 (61.3%)	36 (38.7%)	Ref	-
Employed	50 (35%)	10 (20%)	40 (80%)	6.333 (2.821-14.221)	<0.001**
Years with stroke					
≥1 year	70 (49%)	40 (57.1%)	30 (42.9%)	Ref	-
<1 year	73 (51%)	27 (37%)	46 (63%)	1,908 (0.980-3.715)	0.025*
Number of attacks					
Recurrent stroke	22 (15.4%)	15 (68.2%)	7 (31.8%)	Ref	-
Primary stroke	121 (84.6%)	52 (43%)	69 (57%)	2.843 (1.081-7.476)	0.052

Note: *significant level (<0.05); **significant level (<0.001)

Table 3 shows that occupational status had a significant impact on the quality of life of patients with ischemic stroke, with employed respondents being 7.213 times more likely to achieve a good quality of life compared to unemployed respondents (OR = 7.213; 95% CI = 3.134–16.599; p <0.001).

Table 3 Descriptive characteristics of quality of life of patients with stroke (*N* = 143)

Characteristics	***n* (%)**	**Quality of life level**		**OR (95% CI)**	***p***
		Low *n* (%)	**High *n* (%)**		
Gender					
Male	77 (53.8%)	40 (51.9%)	37 (48.1%)	Ref	-
Female	66 (46.2%)	26 (39.4%)	40 (60.6%)	1.663 (0.854-3.238)	0.183
Age					
≥60 years	40 (28%)	23 (57.5%)	17 (42.5%)	Ref	-
18-59 years	103 (72%)	43 (41.7%)	60 (58.3%)	1.888 (0.901-3.953)	0.131
Marital status					
Unmarried	4 (2.8%)	2 (50%)	21 (50%)	Ref	-
Married	139 (97.2%)	64 (46%)	75 (54%)	1.172 (0.160-8.557)	1.000
Education level					
Lower education	103 (72%)	53 (51.5%)	50 (48.5%)	Ref	-
Higher education	40 (28%)	13 (32.5%)	27 (67.5%)	2.202 (1.023-4.737)	0.064
Occupational status					
Unemployed	93 (65%)	57 (61.3%)	36 (38.7%)	Ref	-
Employed	50 (35%)	9 (18%)	41 (82%)	7.213 (3.134-16.599)	<0.001*
Years with stroke					
≥1 year	70 (49%)	38 (54.3%)	32 (45.7%)	Ref	-
<1 year	73 (51%)	28 (38.4%)	45 (61.6%)	1,908 (0.980-3.715)	0.081
Number of attacks					
Recurrent stroke	22 (15.4%)	14 (63.6%)	6 (36.4%)	Ref	-
Primary stroke	121 (84.6%)	52 (43%)	69 (57%)	2.322 (0.907-5.946)	0.120

Note: *significant level (<0.05); **significant level (<0.001)

The result of the bivariate analysis using Spearman rank, according to **Table 4**, showed a significant positive correlation between self-efficacy and quality of life in patients with ischemic stroke (r = 0.898, p <0.001). This indicates that as self-efficacy levels increase, patients' quality of life also improves.

Table 4 Correlation between self-efficacy and quality of life of patients with stroke (*N* = 143)

	SSQ-12	***p***
SSEQ	0.898	<0.001**

Note: *significant level (<0.05); **significant level (<0.001)

Discussion

This study found a significant correlation between self-efficacy and factors like gender, employment status, and stroke duration. Additionally, a notable correlation was found between quality of life and employment status. Previous studies have suggested that gender and employment status may influence self-efficacy and could serve as risk factors for changes in self-efficacy (Thomet et al., 2018). In this study, there are differences in perceptions of male and female abilities. We found that women are more likely to have higher self-efficacy than men. This finding contrasts with an earlier study, which suggested that men generally exhibit higher self-efficacy than women (Thomet et al., 2018). Additionally, the duration of a stroke can impact an individual's self-efficacy, as a longer duration often leads to a decline in self-efficacy. This decline is attributed to ongoing physical deterioration, increased dependency on others, and growing feelings of hopelessness or frustration. Previous studies have demonstrated that patients with stroke who have been living with the condition for more than two years tend to have lower self-efficacy compared to those who have experienced a stroke more recently (Long et al., 2020). In this study, self-efficacy was also found to be influenced by employment status. This aligns with previous studies, which found that employment status affects self-efficacy (Thomet et al., 2018). Employment status emerged as the most significant risk factor influencing self-efficacy in this study.

The results of this study found that there is no relationship between self-efficacy and age, marital status, education level, or the number of strokes. This suggests that self-efficacy may not be significantly associated with these variables in stroke patients, emphasizing the importance of addressing psychological support in rehabilitation programs instead (Maujean & Davis, 2013). The result also found a wide confidence interval in analyzing the relationship between marital status and self-efficacy, indicating high uncertainty in the estimate. This may reflect significant variability in the sample. It is essential to highlight that such variability may arise from heterogeneity in the participants' characteristics, such as cultural differences in how marital status influences psychological outcomes or measurement inconsistencies.

In examining the correlation between demographic characteristics and quality of life, employment status was found to impact quality of life and act as a risk factor for its changes. These results differ from other studies that have identified marital status, gender, education level, age, and socioeconomic status as the demographic factors influencing quality of life (Wang & Langhammer, 2018). However, individuals who are unemployed and lack a primary source of income may face challenges in accessing healthcare services, which can negatively impact their quality of life. Unemployment can lead to financial uncertainty, adversely affecting mental and physical well-being, thus lowering socioeconomic status and, consequently, quality of life. Conversely, low income can be an obstacle to accessing necessary follow-up care. Patients with higher income levels may have improved access to healthcare services and transportation. Thus, health education programs designed to raise patients' awareness of treatment options and follow-up care may help improve or maintain their quality of life (Kariyawasam et al., 2020). The study's results revealed that age and educational status are not associated with the quality of life of stroke patients. This finding is consistent with previous research, which also found no relationship between age, educational status, and the quality of life of patients with ischemic stroke (Ramos-Lima et al., 2018).

This study also revealed a notable positive correlation between self-efficacy and quality of life. Earlier research has shown that patients with lower self-efficacy tend to experience higher levels of depression within one to six months following a stroke, with low self-efficacy being strongly linked to a diminished quality of life (Szczepanska-Gieracha & Mazurek, 2020). Additionally, previous studies found that participants who did not experience an improvement in self-efficacy after three weeks of treatment reported worse well-being, less acceptance of their illness, and decreased functional ability (Tielemans et al., 2015).

A sudden change in life following a stroke can bring about various adverse psychological and behavioral effects, such as a sense of helplessness, mood disorders, anxiety, and decreased self-efficacy (Szczepanska-Gieracha & Mazurek, 2020). Self-efficacy represents patients' confidence in their ability to handle challenges they may face in the future successfully. It is shaped by mastery experiences, observing others' experiences, verbal encouragement, and emotional and physical conditions (Linge et al., 2021). Patients with high self-efficacy are more likely to be motivated to participate actively in rehabilitation programs (Gangwani et al., 2022). They believe their efforts will yield positive results, enhancing their functional abilities. This belief is part of the emotional and physiological state of patients. This confidence enables them to better adapt to the physical and psychological changes following a stroke, improving their quality of life.

Self-efficacy is another critical factor affecting the quality of life and the recovery process in stroke patients (Topçu & Oğuz, 2017). In addition to rehabilitation efforts to improve quality of life, self-efficacy significantly impacts the physical health dimension of quality of life in these patients. Self-efficacy is a primary factor influencing health behaviors, as it is directly connected to expected actions and outcomes (Brouwer-Goossensen et al., 2018). Therefore, self-efficacy can help enhance quality of life, particularly regarding physical health. Research has also shown a strong correlation between self-efficacy and the psychosocial components of quality of life, as stroke patients with lower self-efficacy often exhibit traits like neuroticism, pessimism, helplessness, and passive coping styles (van Mierlo et al., 2014). Self-efficacy can enhance the psychosocial aspects of patients with stroke (Mohammed Weheida et al., 2019).

Implication for Nursing Practice

The main implications highlight the significance of psychological factors in the well-being of patients with ischemic stroke. Nurses should focus on both the physical and psychological health of their patients. Additionally, attention should be given to other influencing factors, such as demographic characteristics, affecting patients' psychological state and quality of life. Nurses can implement interventions designed to boost patients' self-efficacy, making them feel more confident in their recovery process and ultimately leading to an improved quality of life. Furthermore, the results can provide foundational data for the development of new policies and strategies in nursing practice aimed at enhancing patients' overall health, including physical and psychological dimensions. By addressing the comprehensive needs of patients, it is anticipated that their health outcomes will significantly improve.

Limitations

This study has several limitations. First, it relies on self-reported data from participants, which may introduce response bias and inaccuracies in their self-efficacy and quality-of-life assessments. Participants might provide answers they believe are socially acceptable or inadvertently misreport their behaviors, leading to discrepancies between what they report and their actual behaviors. Such factors could affect the validity of the study's conclusions. Future research could address these limitations by increasing the sample size and ensuring more homogeneous sampling to improve the precision of the estimates. Furthermore, the cross-sectional design restricts its ability to establish a causal correlation between the variables. While associations were identified, the order of events remains unclear. Experimental or longitudinal studies are necessary to draw stronger cause-and-effect inferences. Lastly, the predefined variables in the study may exclude other significant factors, limiting a comprehensive understanding in patients with ischemic stroke of self-efficacy, quality of life, and their determinants.

Conclusion

The findings of this investigation demonstrated that among Chinese patients with CHD, self-efficacy mediated the association between self-management behaviors and family functioning. The findings provide insightful information for future studies aimed at creating efficient treatments to promote the self-management practices of CHD patients. Health professionals who engage with patients in this capacity, such as nurses, should emphasize the value of self-efficacy and implement plans to assist patients in boosting it. This approach is designed to strengthen family functioning, ultimately leading to improved self-management behaviors.

Declaration of Conflicting Interest

There are no conflicts of interest to declare.

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Authors' Contributions

The first author contributed to designing the research, reviewing the literature, collecting data, performing data analysis, drafting the article, and writing the manuscript. The second and third authors contributed by supervising the research development and critically reviewing and revising the manuscript. All authors were responsible for each step of the research and read and approved the final draft of the manuscript.

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Data Availability

The datasets produced and analyzed in this study are available from the corresponding author upon reasonable request.

Declaration of Use of AI in Scientific Writing

In this study, AI tools were utilized to enhance language clarity. Nevertheless, the authors reviewed all interpretations afterward to verify their accuracy.

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