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Reclaiming human narratives in maternal and child health in digital era through narrative inquiry

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Abstract

Narrative inquiry is uniquely suited to nursing research, particularly when engaging with vulnerable populations. Narrative inquiry facilitates reclamation of lived experiences. By converting rich lived experiences into actionable insights, narrative inquiry provides a robust foundation for the advancement of true person-centered care. In the context of maternal and child health, this approach has value extending beyond capacity for data collection. This approach offers a powerful mechanism for continuous clinical practice and public health care improvement and transformation, empowering mothers and caregivers to move beyond the role of passive recipients of healthcare intervention and become active protagonists in their own stories.

Keywords: maternal and child health; narrative inquiry; qualitative research

Advancements in digital technology have optimized maternal and child healthcare through data-informed decisions. However, clinical protocols often prioritize quantitative measures and overlook the social, cultural, and emotional aspects of pregnancy, birth, and childhood. This can lead to clinical depersonalization. Narrative inquiry (NI) addresses the mismatch between clinical expectations and lived experiences of patients in healthcare delivery (Haydon et al., 2018; Kabir & Chan, 2023; Sumankuuro et al., 2019), centering on individual voices and emphasizing personal journeys and experiences are defined. This editorial aims to provide an overview of NI and highlight the application and impact of NI on maternal and child health research.

Overview of Narrative Inquiry

Understanding of human behavior is vital to nursing knowledge as part of a professional identity's definition centered on health and person-centered care integration (Watson, 2008). Hence, qualitative approaches provide essential pathways for knowledge development across diverse areas of nursing practice (Barradas et al., 2026; Thorne et al., 2016). NI is a qualitative methodology in which stories are the primary unit analyzed. NI aims to explore the rich lived experiences of individuals (Clandinin & Connelly, 2000) and give voice to the complexity of every nursing practice often taken for granted (Aranda & Street, 2001). Although a diverse range of narrative approaches exist, key commonalities are shared by these approaches. Therefore, careful attention to how research questions and clinical context align with the chosen methodology is required in selecting a specific narrative approach (Casey et al., 2016).

Ontologically, human existence is viewed in NI as inherently holistic and interconnected (Connelly & Clandinin, 1990). Human existence preserves the wholeness of stories by recognizing social and cultural contexts. NI functions as both a conceptual framework and a methodological tool that captures lived experiences through the processes of "living" and "telling" (Clandinin, 2006; Haydon & van der Riet, 2017). Experiences of a phenomenon are shared through stories while narratives serve as the analytical construct

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created from these accounts. This re-authoring process provides opportunity for individuals to find meaning within personal experiences, fosters a sense of agency, and improves overall quality of life (Frank, 2013; Haydon et al., 2018).

Clandinin and Connelly (2000) posit that lived experiences are defined by the interplay of three fundamental dimensions: temporality, sociality, and spatiality. Temporality accounts for the flow of time (past, present, and future); sociality includes interpersonal and intrapersonal relationships within stories; and spatiality recognizes the physical and social environments in which these experiences are situated. Stories are continuously told and reshaped by the fluid relationship between time, social context, and environment (Clandinin, 2006; Clandinin & Connelly, 2000). By exploring these complexities, researchers can uncover hidden

patterns and stories to gain deeper understanding of lived experiences.

NI prioritizes a trusting relationship between researchers and participants in a storytelling. Hence, trustworthiness in NI is considered when a narrative possesses an explanatory and invitational quality, underpinned by its authenticity, adequacy and plausibility (Clandinin & Connelly, 2000). Through prolonged engagement, researchers build a rapport with participants. This temporal depth offers opportunities for participants to actively participate in the validation of their own stories, both during data collection and analysis, thereby ensuring methodological authenticity (Haydon & van der Riet, 2017). Crucially, rigorous reflexivity is required and serves to mitigate research bias and address power dynamics inherent in encounters (Berry, 2016; Lai, 2010; Rozario et al., 2026).



Figure 1. The Three Concentric Circles of Narrative Justification (AI Generate Image)

While the relational nature of NI promotes deep connections, the emergence of richer stories requires ethical rigor. Researchers must employ a relational ethical framework that values participants' autonomy over mere procedural compliance (Clandinin, 2006; Smythe & Murray, 2000). The complex power dynamics inherent in the sharing of personal stories entails dual responsibility (Lai, 2010; Smythe & Murray, 2000; Wang & Geale, 2015). Researchers must protect participants from psychological vulnerabilities while managing the emotional impact from these narratives on themselves. Suggestions were made for researchers to cultivate trust without inadvertently assuming therapeutic or clinical roles (Berry, 2016; Wang & Geale, 2015). In addition, narrative integrity requires continuous reflexivity to reduce power imbalance, over-disclosure, and research bias (Berry, 2016; K. C. & Dahal, 2026; Wang & Geale, 2015).

According to Lindsay & Schwind (2016), NI operates through "*concentric circles of justification*" (Figure 1). At the personal level, narratives rely on deep dialogue to uncover individual truths. At the practical level, narratives connect these stories to broader nursing practice, clinical realities and theoretical frameworks, making the outer circle reach the social level. Justification focuses on examining how these stories impact the wider world and contribute to the evolution of healthcare practice and policy. These concentric circles of justification demonstrate how reconstructed narratives are not only authentic to individuals, but also hold profound significance for the nursing profession and society at large.

The Matter of Narratives in Maternal and Child Health

NI has been widely used in maternal and child health research. The true value of narratives in maternal and child care lies in scalability from personal experiences to systemic reform, a process best understood through the three concentric circles of narrative justification (Lindsay & Schwind, 2016).

At the personal level, narrative sharing enables mothers to process childbirth trauma, reduce tokophobia, and manage realistic expectations (Mahdavi et al., 2022), while also exposing deep-rooted socio-cultural dynamics that delay timely care-seeking in resource-constrained settings in rural Ghana (Sumankuuro et al., 2019). In an integrative review, Mahdavi et al. (2022) demonstrated how childbirth storytelling impacts both the storyteller and the listener. On one hand, telling stories enables an individual to construct meaning from lived experiences, and the transmission of lived experiences to peers can promote personal resilience. On the other hand, positive stories empower individuals and reduce anxiety while traumatic stories may exacerbate fear

and prompt requests for medical invention, such as elective C-sections.

Maternal and child health stories are translated into clinical intelligence at the practical level. Narratives amplify women's voice to expose gaps in practice, such as transactional care, dismissive communication, and fear of maltreatment, across global contexts (Kabir & Chan, 2023; Sumankuuro et al., 2019). Research by Alex-Ojei et al. (2023) illustrates how narratives can pinpoint specific failures in care, such as judgmental attitudes and communication gaps that dictate healthcare utilization among adolescent mothers in Nigeria. In this capacity, NI is a diagnostic tool used to identify intersectional gaps between patient needs and institutional care delivery. This study provided the actionable insights necessary to refine professional training and care protocols.

Finally, storytelling moves beyond the personal and practical to fulfill its role within the social circle of narrative justification. NI serves as a transformative bridge between quantitative clinical data and the complex socio-cultural background of women's lived experiences. Project Detroit illustrates how this framework operates at the societal level (Carr et al., 2026). This project produced storytelling videos about birthing that feature Black and Brown women. Through this medium, storytelling functions as an active intervention within a health equity framework. These narratives transformed individual experiences into compelling evidence, driving urgent policy reforms needed to reduce preventable maternal mortality (Carr et al., 2026).

Conclusion

The future of nursing lies in the ability to navigate tensions between clinical precision and the profound need for meaning among humans. NI provides an essential tool for this balance, bridging the gap between fragmented illness and ontological wholeness. Nurses can empower patients to reclaim agency over life through a narrative approach. In the digital era, nurses can leverage storytelling as a transformative health education tool for counteracting online misinformation and engaging a global audience.

Declaration of Interest

I have no conflict of interest.

Declaration of AI Use

The author used Gemini and dotblueAI for English grammar editing and refining, paraphrasing assistance, and for creating the illustrative graphics featured in Figure 1 (dotblueAI). All conceptual framing, narrative structures, and data interpretations are original, and the author assume full responsibility for the content.

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Aretrospective study: Analysis of factors related to readmission of schizophrenia patients

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Abstract

Background: Hospital readmission among patients with schizophrenia is an important indicator of healthcare quality and the effectiveness of community-based support. Readmissions are influenced by a complex interplay of clinical and environmental factors that affect patients' long-term recovery and stability.

Purpose: This study aimed to identify factors associated with hospital readmission among patients with schizophrenia at the Bali Provincial Mental Hospital.

Methods: A retrospective cross-sectional study was conducted using medical records of patients diagnosed with schizophrenia who received treatment at the Bali Provincial Mental Hospital in 2023. From a total population of 2,669 eligible medical records, 401 were selected through simple random sampling. Data were analyzed using descriptive statistics, chi-square tests for bivariate analysis, and multivariable logistic regression to identify factors independently associated with readmission.

Results: Four factors were significantly associated with hospital readmission among patients with schizophrenia: age (*p* = 0.038), residual symptoms (*p* = 0.003), medication adherence (*p* < 0.001), and comorbidities (*p* < 0.001). Among these, medication adherence was the strongest predictor of readmission, with an adjusted odds ratio (AOR) of 83.902.

Conclusion: Age, residual symptoms, medication adherence, and comorbidities were independently associated with hospital readmission among patients with schizophrenia. Strengthening medication adherence through family supervision and comprehensive management of residual symptoms and comorbid conditions may help reduce the risk of readmission and improve long-term clinical outcomes.

Keywords: comorbidity; medication adherence; readmissions; residual symptoms schizophrenia

Introduction

Hospital readmission, defined as an unplanned return to hospital following discharge for the same or a related condition within a specified period, is widely recognized as an important indicator of healthcare quality, continuity of care, and the effectiveness of disease management. Frequent readmissions increase healthcare utilization, impose substantial economic burdens on healthcare systems, and are associated with poorer clinical outcomes and reduced quality of life (Hou et al., 2024; Kum Ghabowen et al., 2024; Owusu et al., 2022).

Schizophrenia is a chronic, severe mental disorder affecting approximately 24 million people worldwide, representing one of the leading causes of disability among mental illnesses (Solmi et al., 2023). Despite substantial advances in pharmacological and psychosocial interventions, schizophrenia remains characterized by recurrent relapses that frequently require rehospitalization. Mental health services, particularly those caring for individuals with schizophrenia and other severe mental disorders,

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report substantially higher rates of unplanned readmissions, reaching up to 43%. These elevated rates reflect the multifactorial challenges of relapse prevention and maintaining continuity of care across hospital and community settings (Zhou et al., 2023). Moreover, systematic reviews have reported long-term rehospitalization rates ranging from 33% to 55%, highlighting the persistent burden of recurrent hospitalization among individuals with severe mental illness (Sato et al., 2023).

Hospital readmission in schizophrenia is a multifactorial phenomenon resulting from complex interactions among clinical, demographic, environmental, and psychosocial factors. Clinically, poor adherence to antipsychotic treatment remains one of the strongest predictors of relapse and subsequent readmission. Medication non-adherence may result from limited insight into illness, inadequate motivation for treatment, distressing medication side effects, or misconceptions regarding the necessity of long-term therapy. These factors substantially reduce treatment effectiveness and increase the likelihood of relapse requiring rehospitalization (Owusu et al., 2022; Pitanupong et al., 2022). Consequently, nurses play a pivotal role in preventing avoidable readmissions through early identification of relapse, patient education, medication monitoring, discharge planning, and coordination of multidisciplinary follow-up care.

Psychosocial determinants also contribute substantially to readmission risk. Family involvement facilitates medication adherence, supports recognition of early warning signs of relapse, and promotes continuity of community-based care. Conversely, inadequate family support has consistently been associated with poorer treatment adherence and higher relapse rates. In addition, both public stigma and self-stigma may discourage individuals with schizophrenia from seeking treatment, maintaining social functioning, and engaging with mental health services, thereby increasing the likelihood of clinical deterioration and rehospitalization (Mlay et al., 2024). Although these factors are recognized as important determinants, they were not included in the present study because the retrospective design relied exclusively on routinely collected medical records, which did not systematically document family functioning or perceived stigma.

In addition to psychosocial influences, several clinical characteristics have been associated with hospital readmission. Individuals with schizophrenia frequently experience multiple chronic comorbidities, including cardiovascular disease, diabetes mellitus, hypertension, and dyslipidemia, which complicate treatment and increase healthcare utilization. These comorbid conditions have been associated with higher mortality, prolonged hospitalization, increased healthcare costs, and greater risks of rehospitalization (Goldfarb et al., 2022; Yu et al., 2024). Persistent psychotic symptoms, including hallucinations, delusions, and disorganized

behaviour, further increase relapse risk despite ongoing treatment. Disease subtype and illness severity may also influence readmission patterns, although findings remain inconsistent across healthcare settings (Rivelli et al., 2024; Witkowski et al., 2023).

Previous studies investigating predictors of schizophrenia readmission have produced inconsistent findings. Several studies have identified demographic variables, including age, sex, marital status, and employment, as significant predictors, whereas others have reported that treatment-related variables such as previous hospitalization history, illness severity, medication adherence, and comorbidities exert stronger influences than sociodemographic characteristics (Cabello-Rangel et al., 2024; Han et al., 2020; Virtanen et al., 2024). Although schizophrenia is one of the leading causes of psychiatric hospitalization in Indonesia, evidence regarding factors associated with hospital readmission remains limited. Existing Indonesian studies have primarily examined relapse, medication adherence, or selected patient characteristics rather than comprehensively evaluating multiple clinical and sociodemographic predictors of hospital readmission. Consequently, the available evidence is fragmented and insufficient to inform targeted readmission prevention strategies.

Bali Provincial Mental Hospital is the principal referral psychiatric hospital in Bali and manages a substantial number of patients with schizophrenia each year. A preliminary review conducted in March 2024 indicated that 3,330 hospital admissions involving schizophrenia occurred during 2022, placing schizophrenia among the five most frequently treated diagnostic categories at the hospital. Furthermore, hospital records demonstrated an increasing trend in schizophrenia-related readmissions, rising from 20.37% in 2021 to 25.72% in 2022 and 36.99% in 2023. A pilot review of 30 medical records found that 36.67% of patients experienced readmission, with nearly three-quarters of these patients being readmitted more than once. These findings indicate a considerable clinical burden and underscore the need to identify factors contributing to recurrent hospitalization.

Given the inconsistent findings reported in previous studies, the limited evidence available from Indonesia, and the increasing burden of schizophrenia readmissions in Bali, further investigation is warranted. Unlike many earlier studies that examined isolated predictors using predominantly bivariate analyses, the present study employed a retrospective design with multivariate analysis to simultaneously evaluate the independent contributions of sociodemographic and clinical factors associated with hospital readmission. Identifying these determinants is expected to provide stronger evidence for developing targeted interventions aimed at reducing avoidable readmissions and improving continuity of care for individuals living with schizophrenia (Tasijawa et al.,

Table 1. Demographic and Clinical Characteristics of Patients with Schizophrenia at Bali Provincial Mental Hospital (N = 401)

Variable	Frequency	Percentage (%)
Age		
17-25 Years	43	10.8
26-35 Years	102	25.4
36-45 Years	102	25.4
46-55 Years	154	38.4
Gender		
Male	265	66.1
Female	136	33.9
Occupation		
Employee	194	48.4
Unemployed	207	51.6
Residual Symptoms		
Yes	59	14.7
No	342	85.3
Types of Schizophrenia		
Hebephrenic schizophrenia	217	54.1
Paranoid schizophrenia	153	38.2
Other types of schizophrenia	31	7.7
Medication Compliance		
Compliant	77	19.2
Non-compliant	324	80.8
Comorbidity		
Yes	197	49.1
No	204	50.9
Readmission Event		
Yes	155	38.7
No	246	61.3

Source: Primary Data, 2024

2021).

Therefore, this study aimed to examine the factors associated with hospital readmission among patients with schizophrenia at Bali Provincial Mental Hospital in 2023 using a retrospective analytical approach.

Materials and Methods

Design

This study employed a retrospective cross-sectional design using secondary data extracted from medical records. The design enabled the simultaneous assessment of demographic and clinical characteristics associated with hospital readmission among patients with schizophrenia treated at Bali Provincial Mental Hospital, Indonesia. Medical records from 1 January to 31 December 2023 were reviewed, while data extraction was conducted in July 2024.

Sample

The study population comprised 2,669 medical records of patients diagnosed with schizophrenia who received inpatient treatment at Bali Provincial Mental Hospital during 2023. A total of 401 medical records were selected using simple random sampling, ensuring that each eligible record had an equal probability of selection. The sample size represented approximately 15% of the target population, which was considered sufficient to provide stable estimates for multivariable logistic regression analysis while maintaining the feasibility of retrospective data collection. Eligible records met the following inclusion criteria: (1) patients aged 17–55 years and (2) a diagnosis of schizophrenia based on the International Classification of Diseases, Tenth Revision (ICD-10), codes F20.0–F20.9. Medical records of patients under the responsibility of Social Services (neglected patients) and those discharged against medical advice were excluded because incomplete treatment episodes could influence

Table 2. Bivariate Analysis of Factors Associated with Hospital Readmission Among Patients with Schizophrenia (N = 401)

Variable	Readmission Event				X2	P-value
	Yes		No			
	n	%	n	%		
Age						
17-25 Years	11	7.10	32	13.01	8.425	0.038
26-35 Years	33	21.29	69	28.05		
36-45 Years	40	25.81	62	25.20		
46-55 Years	71	45.81	83	33.74		
Gender						
Male	100	64.52	165	67.07	0.277	0.598
Female	55	35.48	81	32.93		
Occupation						
Employee	69	44.52	125	50.81	1.510	0.219
Unemployed	86	55.48	121	49.19		
Residual Symptoms						
Yes	33	21.29	26	10.57	8.710	0.003
No	122	78.71	220	89.43		
Types of Schizophrenia						
Hebephrenic schizophrenia	93	60.00	124	50.41	3.575	0.167
Paranoid schizophrenia	51	32.90	102	41.46		
Other types of schizophrenia	11	7.10	20	8.13		
Medication Compliance						
Compliant	1	0.65	76	30.89	56.079	0.000
Non-compliant	154	99.35	170	69.11		
Comorbidity						
Yes	102	65.81	95	38.62	28.125	0.000
No	53	34.19	151	61.38		

Source: Primary Data, 2024

Table 3. Goodness-of-Fit Statistics for the Multivariable Logistic Regression Model

Parameter	Mark
Significance of Hosmer and Lemeshow Test	0.906
Significance of Omnibus Tests of Model Coefficients	0.000
Initial -2 Log likelihood (step 0)	535.072
-2 Log likelihood (step 1)	413.591
Nagelkerke R Square	0.355

Source: Primary Data, 2024

readmission outcomes.

Data collection

Data were obtained exclusively from anonymized medical records. Because this retrospective study relied entirely on secondary data, no questionnaires, interviews, or direct patient contact were involved. Data extraction was performed using a structured documentation form developed by the research team. The following variables were collected: Sociodemographic characteristics: age,

sex, education level, marital status, occupation, and religion. Clinical characteristics: schizophrenia subtype, residual symptoms, medication adherence, comorbidities, readmission status, frequency of readmission, and time to readmission. Data collection followed standardized medical record review procedures, including institutional authorization, screening of eligibility criteria, extraction of study variables, verification of data completeness, coding, and entry into the statistical database for analysis.

Data analysis

Statistical analyses were performed using IBM SPSS Statistics version 20 (IBM Corp., Armonk, NY, USA). Descriptive (univariate) statistics were used to summarize the distribution of sociodemographic and clinical characteristics. Categorical variables are presented as frequencies and percentages. Bivariate analyses were performed using the Chi-square test to examine associations between each independent variable and hospital readmission. Variables with a significance level of $p < 0.05$ were considered statistically significant. Crude odds ratios (ORs) with 95% confidence intervals (95% CIs) were calculated to estimate the strength of these associations.

Variables demonstrating statistical significance in the bivariate analysis, together with clinically relevant variables identified from previous literature, were entered into a multivariable binary logistic regression model to identify independent predictors of hospital readmission. Adjusted odds ratios (AORs) with 95% confidence intervals were reported. Model adequacy was evaluated using the Omnibus Test of Model Coefficients, the Hosmer–Lemeshow goodness-of-fit test, Nagelkerke's R^2 , the classification table, and overall model accuracy. Statistical significance was established at $p < 0.05$.

Ethical consideration

Ethical approval was obtained from the Research Ethics Committee of the Institute of Technology and Health Bali (Approval No. 04.0249/KEP-ITEKES-BALI/VI/2024). Institutional permission to conduct the study was also granted by the Director of Bali Provincial Mental Hospital (Approval No. B.41.000.9.2/8692/PENJNONMED/RSJ). As the study involved retrospective review of anonymized medical records without direct patient involvement, the requirement for written informed consent was waived by the ethics committee in accordance with institutional and national ethical guidelines. All extracted data were de-identified before analysis to ensure patient confidentiality and privacy.

Results

Participant Characteristics

The characteristics of the study participants were described using data extracted from the medical records of patients with schizophrenia. Descriptive statistics were used to summarize the demographic and clinical characteristics of the study sample.

Based on Table 1, the largest proportion of participants was aged 46–55 years (38.4%). Most participants were male (66.1%) and unemployed (51.6%). The majority had no residual symptoms (85.3%), were diagnosed with hebephrenic schizophrenia (54.1%), and were non-adherent to medication (80.8%). Approximately half of the participants had no documented comorbidity (50.9%). Overall, 61.3% of patients did not experience hospital readmission during the study

period, whereas 38.7% experienced at least one readmission.

Bivariate analysis

The associations between demographic and clinical characteristics and hospital readmission were examined using the Chi-square test.

As shown in Table 2, age, residual symptoms, medication adherence, and comorbidity were significantly associated with hospital readmission (all $p < 0.05$). In contrast, gender, employment status, and schizophrenia subtype were not significantly associated with hospital readmission ($p > 0.05$). Among the variables examined, medication adherence demonstrated the strongest bivariate association with hospital readmission ($\chi^2 = 56.079$, $p < 0.001$), followed by comorbidity ($\chi^2 = 28.125$, $p < 0.001$). Patients with residual symptoms were also significantly more likely to experience readmission than those without residual symptoms ($\chi^2 = 8.710$, $p = 0.003$). In addition, age was significantly associated with hospital readmission ($\chi^2 = 8.425$, $p = 0.038$). However, no statistically significant associations were observed for gender ($\chi^2 = 0.277$, $p = 0.598$), employment status ($\chi^2 = 1.510$, $p = 0.219$), or schizophrenia subtype ($\chi^2 = 3.575$, $p = 0.167$).

Multivariate analysis

Multivariate logistic regression analysis was performed to identify independent factors associated with hospital readmission among patients with schizophrenia.

The overall model demonstrated a good fit to the observed data, as indicated by the Hosmer–Lemeshow goodness-of-fit test (χ^2 , $p = 0.906$). The Omnibus Test of Model Coefficients was statistically significant ($p < 0.001$), indicating that the set of predictor variables significantly improved the model compared with the intercept-only model. Model fit was further supported by a reduction in the $-2 \log$ likelihood from 535.072 in the null model to 413.591 in the final model. The Nagelkerke R^2 value was 0.355, indicating that approximately 35.5% of the variance in hospital readmission was explained by the variables included in the model. After adjustment for other variables, medication adherence remained the strongest independent factor associated with hospital readmission, followed by comorbidity and residual symptoms. Age was also independently associated with hospital readmission, whereas gender, employment status, and schizophrenia subtype were not retained as significant predictors in the final model (Table 3).

The adjusted odds ratios (AORs) from the multivariable logistic regression model are presented in Table 4. Medication adherence emerged as the strongest independent factor associated with hospital readmission (AOR = 83.90, 95% CI: 11.32–621.64, $p < 0.001$). In addition, residual symptoms ($p = 0.002$) and comorbidity ($p < 0.001$) remained significantly associated with hospital readmission

Table 4. Multivariable Logistic Regression Analysis of Factors Associated with Hospital Readmission Among Patients with Schizophrenia at Bali Provincial Mental Hospital (N = 401)

Variable	Readmission Event				AOR	95% CI	P-value
	Yes		No				
	n	%	n	%			
Residual Symptoms							
Yes	33	21.29	26	10.57	0.335	0.169-0.663	0.002
No	122	78.71	220	89.43			
Medication Compliance							
Compliant	1	0.65	76	30.89	83.902	11.324-621.644	0.000
Non-compliant	154	99.35	170	69.11			
Comorbidity							
Yes	102	65.81	95	38.62	0.294	0.185-0.466	0.000
No	53	34.19	151	61.38			

Source: Primary Data, 2024

after adjustment for other variables. The wide confidence interval observed for medication adherence indicates substantial uncertainty around the estimated effect size, suggesting that the magnitude of the association should be interpreted with caution. Nevertheless, medication adherence remained the strongest predictor of hospital readmission in the final multivariable model.

Discussion

Readmission among Patients with Schizophrenia at Bali Provincial Mental Hospital

Hospital readmission remains an important indicator of treatment effectiveness and continuity of care among individuals with schizophrenia. Although most patients in the present study did not experience readmission during the observation period, a substantial proportion required rehospitalization, indicating that recurrent hospitalization continues to represent a significant clinical challenge.

The present study found that schizophrenia readmission remains a common clinical outcome, consistent with evidence from previous research. A nationwide study reported a one-year readmission rate of 23.7%, demonstrating that recurrent hospitalization continues to impose a substantial burden on mental health services (Pinho et al., 2023). Similarly, a systematic review reported long-term rehospitalization rates ranging from 33% to 55% among individuals with severe mental illness, suggesting that repeated hospitalization remains a persistent challenge despite ongoing treatment (Sato et al., 2023). Comparable findings have been reported in previous studies, with cumulative readmission rates of 16.69% within 30 days and 33.79% within one year among patients with schizophrenia (Han et al., 2020). Together, these findings support the present results and indicate that reducing schizophrenia readmission requires not only effective inpatient treatment but also sustained

community-based follow-up and continuity of care after hospital discharge (Han et al., 2020; Pinho et al., 2023; Sato et al., 2023).

The occurrence of readmission is likely influenced by multiple interacting factors rather than a single determinant. Previous studies have identified poor medication adherence, inadequate continuity of outpatient care, delayed recognition of relapse symptoms, insufficient post-discharge follow-up, and suboptimal discharge planning as important contributors to repeated hospitalization among patients with schizophrenia. Medication non-adherence has consistently been associated with an increased risk of relapse and rehospitalization, while timely outpatient follow-up and continuity of community-based mental health services have been shown to reduce the likelihood of readmission (Abdullah-Koolmees et al., 2021; Barliana et al., 2023). Although these variables were not directly measured in the present study because of its retrospective design, they provide plausible explanations for the continued occurrence of readmission among a proportion of patients.

Another important consideration is the role of psychosocial support following hospital discharge. Family involvement, continuity of community mental health services, and timely outpatient follow-up have been shown to improve treatment adherence, facilitate early recognition of symptom recurrence, and reduce the risk of rehospitalization among individuals with schizophrenia (Ye et al., 2023). Conversely, stigma toward mental illness may discourage individuals from seeking help promptly, reduce engagement with ongoing treatment, and ultimately compromise recovery and continuity of care (Thornicroft et al., 2022). Because information regarding family support, stigma, and community-based services was unavailable in the medical records, these factors could not be evaluated in the present study and should be considered in future prospective research.

From a clinical perspective, these findings highlight the importance of strengthening transitional

care after hospital discharge. Current guidelines and evidence support comprehensive discharge planning, psychoeducation, medication adherence support, family involvement, and coordinated community-based follow-up to promote continuity of care and improve recovery among individuals with schizophrenia (Thongsalab et al., 2023). Although recent evidence regarding the effect of transitional discharge interventions on readmission remains inconclusive, these interventions may improve patient functioning, satisfaction with care, and engagement with community mental health services. Integrating these strategies into routine psychiatric care may enhance long-term clinical stability while reducing the personal and economic burden associated with recurrent hospitalization.

Age and Its Association with Hospital Readmission Among Patients with Schizophrenia

The present study identified a statistically significant association between age and hospital readmission among patients with schizophrenia. This finding suggests that age may influence the likelihood of rehospitalization, although the underlying mechanisms are likely multifactorial and should be interpreted cautiously given the retrospective cross-sectional design of the study.

Previous studies have reported inconsistent findings regarding the relationship between age and psychiatric readmission. Although age has been identified as a potential predictor of readmission, its effect appears to vary across healthcare settings and is often influenced by coexisting clinical and psychosocial factors (Pinho et al., 2023). Similarly, evidence suggests that the risk of readmission is determined by multiple interacting factors, including illness severity, previous hospitalization, treatment adherence, and continuity of outpatient care, rather than age alone. These findings suggest that age is unlikely to be an independent determinant of rehospitalization but may interact with other patient- and healthcare-related factors.

One possible explanation for the observed association is that middle-aged and older adults with schizophrenia frequently experience greater physical health burdens, longer disease duration, and accumulated functional impairment than younger patients. Individuals with chronic schizophrenia have a substantially higher prevalence of cardiometabolic disease, cognitive impairment, and reduced functional capacity, all of which may complicate treatment and increase vulnerability to relapse requiring hospitalization. Furthermore, increasing age is often accompanied by multiple medical comorbidities and more complex medication regimens, creating additional challenges for long-term disease management (Correll et al., 2022).

From a clinical perspective, these findings emphasize the importance of age-sensitive discharge planning and long-term follow-up for

patients with schizophrenia. Older individuals may benefit from comprehensive physical health assessment, medication optimization, psychosocial support, and coordinated community-based mental health services to improve continuity of care and reduce the likelihood of recurrent hospitalization. Future prospective studies should investigate whether the relationship between age and readmission is mediated by disease duration, comorbidity burden, functional status, medication adherence, and access to community mental health services (Pinho et al., 2023).

Gender and Its Association with Hospital Readmission Among Patients with Schizophrenia

The present study found no statistically significant association between gender and hospital readmission among patients with schizophrenia. Although male patients constituted a larger proportion of the study population and accounted for more readmission episodes, the similarity in readmission rates between men and women suggests that gender alone may not be an independent predictor of rehospitalization. This finding is consistent with previous studies indicating that demographic characteristics, including gender, have limited predictive value once clinical and treatment-related factors are considered. Systematic reviews have consistently identified medication adherence, illness severity, previous hospitalization, continuity of care, and substance use as stronger predictors of psychiatric readmission than demographic variables, while cohort studies have likewise demonstrated that healthcare utilization patterns and clinical characteristics contribute more substantially to rehospitalization than sex (Owusu et al., 2022; Pinho et al., 2023; Virtanen et al., 2024; Zhou et al., 2023).

Although gender was not independently associated with readmission in the present study, previous research suggests that relapse and rehospitalization are primarily driven by illness severity, persistent psychotic symptoms, treatment adherence, and psychosocial support rather than biological sex alone (Hou et al., 2024; Mlay et al., 2024; Witkowski et al., 2023). Because these clinical and behavioral factors were not comprehensively assessed in the present study, it was not possible to determine whether they mediated the observed pattern of readmission among male patients.

The absence of a significant association between gender and readmission suggests that strategies to reduce rehospitalization should prioritize modifiable clinical and psychosocial factors rather than demographic characteristics alone. Interventions that improve medication adherence, strengthen discharge planning, enhance family involvement, and ensure continuity of community-based mental health services have demonstrated benefits in reducing relapse and rehospitalization among individuals with schizophrenia regardless of

sex (Abdullah-Koolmees et al., 2021; Rodriguez et al., 2024; Thongsalab et al., 2023; Ye et al., 2023). Future prospective studies should further investigate whether gender influences readmission indirectly through mediating factors such as substance use, treatment adherence, illness severity, or social support.

Employment Status and Its Association with Hospital Readmission Among Patients with Schizophrenia

The present study found no statistically significant association between employment status and hospital readmission among patients with schizophrenia. Although unemployment was common among the study population and a greater proportion of unemployed patients experienced readmission, employment status was not identified as an independent predictor of rehospitalization. This finding is consistent with recent evidence indicating that employment status alone has limited predictive value for psychiatric readmission after clinical characteristics and treatment-related factors are considered. Systematic reviews have shown that medication adherence, previous hospitalization, illness severity, continuity of outpatient care, and substance use are more consistent predictors of psychiatric readmission than sociodemographic characteristics, including employment status (Owusu et al., 2022; Zhou et al., 2023). Similarly, nationwide and prospective cohort studies have reported that recurrent hospitalization is more strongly associated with clinical complexity and patterns of healthcare utilization than occupational status (Pinho et al., 2023; Virtanen et al., 2024).

Although employment status was not significantly associated with readmission in the present study, unemployment remains an important indicator of impaired psychosocial functioning among individuals with schizophrenia. Employment promotes social participation, financial independence, daily structure, and meaningful engagement, all of which facilitate functional recovery and community reintegration. Conversely, unemployment is commonly associated with poorer psychosocial functioning, reduced quality of life, and social exclusion among individuals with schizophrenia, although these factors do not necessarily lead directly to hospital readmission when adequate treatment and community-based mental health services are available (Mlay et al., 2024; Thongsalab et al., 2023; Thornicroft et al., 2022).

The lack of a significant association observed in this study may reflect the multifactorial nature of psychiatric readmission. Clinical factors, including medication adherence, residual symptoms, previous hospitalization, illness severity, and comorbidities, are consistently identified as stronger determinants of rehospitalization than employment status alone (Cabello-Rangel et al., 2024; Han et al., 2020; Hou et al., 2024; Virtanen et al., 2024). Consequently, employment should be viewed as an important

component of functional recovery rather than an independent predictor of hospital readmission.

From a nursing perspective, these findings highlight the importance of adopting a recovery-oriented approach that extends beyond symptom management. Psychiatric nurses should collaborate with multidisciplinary teams to promote psychosocial rehabilitation, vocational support, family engagement, and community reintegration. Although employment status was not independently associated with readmission in the present study, interventions that improve occupational functioning, strengthen recovery-oriented care, and enhance community participation may contribute to long-term recovery, improve quality of life, and support sustained community living among individuals with schizophrenia (Rodriguez et al., 2024; Thongsalab et al., 2023; Ye et al., 2023). Future longitudinal studies are warranted to determine whether improvements in employment status indirectly reduce readmission through enhanced treatment adherence, functional recovery, or social support.

Residual Symptoms and Their Association with Hospital Readmission Among Patients with Schizophrenia

The present study demonstrated a statistically significant association between residual symptoms and hospital readmission among patients with schizophrenia. Although most patients in the study were recorded as having no residual symptoms, this distribution reflects the characteristics of the overall study population rather than the relationship between residual symptoms and readmission. Therefore, the observed association should be interpreted based on the inferential statistical analysis rather than the absolute frequencies alone.

Residual symptoms are persistent manifestations that remain after remission of acute psychotic episodes and commonly include diminished motivation, reduced emotional expression, cognitive impairment, social withdrawal, and functional decline. Although generally less prominent than acute positive symptoms, these persistent symptoms may substantially impair daily functioning, compromise treatment adherence, and increase vulnerability to relapse (Pitanupong et al., 2022; Witkowski et al., 2023). The present findings are consistent with previous studies demonstrating that residual symptoms are associated with poorer clinical outcomes and an increased likelihood of relapse and rehospitalization. Patients with persistent residual symptoms have been reported to experience significantly higher relapse rates and poorer long-term outcomes than those achieving more complete symptom remission (Pitanupong et al., 2022). Likewise, persistent negative and cognitive symptoms have been identified as important predictors of functional impairment, reduced treatment adherence, relapse, and recurrent psychiatric hospitalization (Hou et al., 2024; Rivelli et al., 2024; Witkowski et al., 2023).

Several mechanisms may explain this association. Residual symptoms may reduce patients' ability to recognize early warning signs of relapse, adhere to prescribed treatment, and actively participate in psychosocial rehabilitation. Persistent impairments in motivation, cognition, and social functioning may also hinder successful community reintegration following hospital discharge, thereby increasing the likelihood of subsequent psychiatric deterioration requiring rehospitalization. Nevertheless, because this study employed a retrospective cross-sectional design, causality cannot be established, and residual symptoms should be interpreted as an important clinical correlate rather than a direct cause of hospital readmission.

From a clinical perspective, these findings underscore the importance of comprehensive post-discharge assessment that extends beyond the resolution of acute psychotic symptoms. Psychiatric nurses should routinely monitor residual symptoms during follow-up visits, reinforce medication adherence, provide psychoeducation to patients and their families, and collaborate with multidisciplinary teams to implement psychosocial rehabilitation and relapse-prevention strategies. Early identification and effective management of residual symptoms may improve functional recovery and reduce the likelihood of preventable hospital readmission among individuals with schizophrenia (Rodriguez et al., 2024; Thongsalab et al., 2023; Ye et al., 2023).

Schizophrenia Subtype and Its Association with Hospital Readmission

The present study found no statistically significant association between schizophrenia subtype and hospital readmission. Although hebephrenic schizophrenia was the most frequently recorded diagnosis in the study population, schizophrenia subtype was not independently associated with the likelihood of rehospitalization. This finding is consistent with current psychiatric classification systems and contemporary evidence indicating that traditional schizophrenia subtypes have limited prognostic value for predicting relapse, functional outcomes, or hospital readmission. Both the Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR) and the International Classification of Diseases (ICD-11) have abandoned the traditional schizophrenia subtypes because of their limited diagnostic stability, low predictive validity, and minimal contribution to treatment decision-making. Consequently, recent research has increasingly emphasized symptom severity, functional impairment, treatment response, and psychosocial factors rather than diagnostic subtype when evaluating the risk of relapse or hospital readmission.

The predominance of hebephrenic schizophrenia observed in the present study differs from findings reported in some Indonesian studies, where undifferentiated schizophrenia was more common. This discrepancy may reflect differences in patient

characteristics, referral patterns, or diagnostic practices across healthcare settings rather than true epidemiological variation. Because diagnoses in the present study were obtained from routine medical records coded according to ICD-10, the distribution of schizophrenia subtypes should be interpreted within the context of the hospital's clinical classification system.

The absence of a significant association between schizophrenia subtype and readmission suggests that recurrent hospitalization is more strongly influenced by modifiable clinical and psychosocial factors than by diagnostic subtype alone. Previous studies have consistently demonstrated that medication adherence, residual symptoms, previous hospitalization, illness severity, comorbidities, and continuity of community mental healthcare are more reliable predictors of psychiatric readmission than diagnostic subtype (Han et al., 2020; Hou et al., 2024; Owusu et al., 2022; Pinho et al., 2023; Virtanen et al., 2024; Zhou et al., 2023). These findings are consistent with the multivariable analysis of the present study, which identified medication adherence as the strongest determinant of hospital readmission.

From a clinical perspective, these findings support a person-centred approach to schizophrenia management that prioritizes comprehensive assessment of symptom control, treatment adherence, psychosocial functioning, and recovery needs rather than relying solely on diagnostic subtype. Psychiatric nurses should therefore focus on individualized discharge planning, relapse prevention, medication management, and coordinated community follow-up to reduce the risk of recurrent hospitalization regardless of schizophrenia subtype. Interventions that strengthen medication adherence, psychosocial rehabilitation, and continuity of community-based mental health services remain central to reducing avoidable rehospitalization among people living with schizophrenia (Rodriguez et al., 2024; Thongsalab et al., 2023; Ye et al., 2023).

Medication Adherence and Its Association with Hospital Readmission Among Patients with Schizophrenia

Medication adherence was the strongest factor associated with hospital readmission among patients with schizophrenia in the present study. This finding underscores the critical role of sustained antipsychotic treatment in maintaining symptom stability and reducing the likelihood of recurrent hospitalization. Consistent with the multivariable analysis, medication adherence remained the most influential factor associated with readmission after adjustment for demographic and clinical characteristics, highlighting its importance as a modifiable target for intervention.

The present findings are consistent with a growing body of evidence demonstrating that poor medication adherence is among the

strongest predictors of relapse and psychiatric rehospitalization. Previous systematic reviews and cohort studies have consistently identified medication adherence, together with illness severity, previous hospitalization, and continuity of care, as key determinants of psychiatric readmission (Owusu et al., 2022; Virtanen et al., 2024; Zhou et al., 2023). Furthermore, non-adherence to antipsychotic treatment has been shown to significantly increase the risk of rehospitalization among individuals with psychotic disorders, while better adherence is associated with fewer hospitalizations and improved long-term clinical outcomes (Abdullah-Koolmees et al., 2021; Barliana et al., 2023).

Medication non-adherence among individuals with schizophrenia is multifactorial. Poor insight into illness, adverse effects of antipsychotic medications, cognitive impairment, limited family support, inadequate continuity of community mental healthcare, and psychosocial challenges have all been identified as barriers to sustained adherence (Mlay et al., 2024; Owusu et al., 2022; Thongsalab et al., 2023). Because the present study relied on retrospective medical record data, these underlying determinants could not be examined directly. Nevertheless, they may partially explain why medication adherence demonstrated the strongest association with hospital readmission.

Notably, the magnitude of the association observed in this study was greater than that reported in many previous investigations and should therefore be interpreted cautiously. Large odds ratios may reflect differences in patient characteristics, healthcare delivery, documentation practices, sample composition, or the distribution of exposure variables within the study population. Consequently, although medication adherence was the strongest factor associated with readmission in this study, prospective multicentre investigations are needed to confirm the magnitude and generalizability of this association.

From a clinical and nursing perspective, these findings emphasize that improving medication adherence should remain a priority in efforts to reduce preventable psychiatric readmissions. Psychiatric nurses play a pivotal role by providing individualized psychoeducation, routinely assessing barriers to adherence, collaborating with patients and families to develop shared care plans, and recognizing early warning signs of relapse. Structured discharge planning, family psychoeducation, community-based follow-up, psychosocial rehabilitation, and the appropriate use of long-acting injectable antipsychotics for selected patients with recurrent non-adherence have all been shown to improve treatment continuity and reduce the risk of rehospitalization (Rodriguez et al., 2024; Ye et al., 2023). Strengthening these evidence-based interventions may enhance long-term recovery while reducing the clinical and economic burden associated with recurrent hospitalization among individuals with schizophrenia.

Comorbidity and Its Association with Hospital Readmission Among Patients with Schizophrenia

The present study demonstrated a statistically significant association between comorbidity and hospital readmission among patients with schizophrenia. This finding suggests that patients with coexisting medical or psychiatric conditions are more likely to experience recurrent hospitalization than those without additional health conditions, highlighting the importance of comprehensive management of multimorbidity in schizophrenia care. This finding is consistent with growing evidence indicating that comorbid conditions substantially influence the clinical course of schizophrenia. Previous studies have demonstrated that psychiatric and physical comorbidities, including cardiometabolic disorders, are associated with poorer clinical outcomes, increased healthcare utilization, and a greater likelihood of psychiatric readmission (Cabello-Rangel et al., 2024; Han et al., 2020; Owusu et al., 2022; Virtanen et al., 2024). In addition, predictive models of schizophrenia readmission have identified comorbidity as an important contributor to recurrent hospitalization alongside illness severity, medication adherence, and previous hospitalization (Hou et al., 2024).

Several mechanisms may explain this association. Comorbid physical illnesses often require complex medication regimens, frequent healthcare visits, and coordinated management across multiple specialties. Concurrent psychiatric conditions may further increase symptom severity, reduce treatment adherence, impair insight, and diminish patients' ability to recognize early warning signs of relapse. Together, these factors complicate disease management and increase susceptibility to recurrent hospitalization. Nevertheless, because this study employed a retrospective cross-sectional design, the temporal relationship between comorbidity and readmission cannot be established, and causality should not be inferred. Another important consideration is the bidirectional relationship between schizophrenia and physical health. Individuals living with schizophrenia have a substantially higher prevalence of cardiometabolic disorders than the general population because of shared lifestyle risk factors, reduced access to preventive healthcare, and the metabolic adverse effects of antipsychotic medications. These comorbid conditions contribute to poorer overall health outcomes and increase the complexity of long-term disease management, underscoring the need to integrate physical and mental healthcare (Goldfarb et al., 2022; Yu et al., 2024).

From a nursing perspective, these findings emphasize the importance of integrated and person-centred care for individuals with schizophrenia and multimorbidity. Psychiatric nurses should routinely assess both physical and mental health status, monitor for metabolic complications associated with antipsychotic therapy, reinforce medication

adherence, and collaborate with multidisciplinary teams to coordinate the management of coexisting illnesses. Comprehensive discharge planning that incorporates physical health monitoring, patient and family education, and timely community follow-up may improve continuity of care and reduce the likelihood of preventable readmissions among individuals living with schizophrenia (Rodriguez et al., 2024; Thongsalab et al., 2023; Ye et al., 2023).

Primary Determinant of Hospital Readmission Among Patients with Schizophrenia

The present study identified medication adherence as the strongest independent factor associated with hospital readmission among patients with schizophrenia. Compared with other demographic and clinical variables, medication adherence demonstrated the greatest contribution to the multivariable model, highlighting its central role in maintaining clinical stability and reducing the likelihood of recurrent hospitalization. Because medication adherence is a modifiable factor, this finding has important implications for clinical practice and mental health policy.

The strong association observed in this study is consistent with previous evidence identifying medication non-adherence as one of the most important predictors of relapse and psychiatric rehospitalization. Systematic reviews and cohort studies have consistently demonstrated that poor adherence to antipsychotic treatment substantially increases the risk of relapse and hospital readmission, whereas sustained adherence is associated with fewer hospitalizations and improved long-term clinical outcomes (Abdullah-Koolmees et al., 2021; Barliana et al., 2023; Owusu et al., 2022; Zhou et al., 2023). These findings support the present study and reinforce the importance of continuous pharmacological treatment as a cornerstone of schizophrenia management.

Notably, the magnitude of the association observed in the present study was considerably greater than that reported in many previous investigations. Although this finding underscores the importance of medication adherence, the estimated odds ratio should be interpreted cautiously. Large effect estimates may reflect differences in patient characteristics, healthcare delivery, documentation practices, sample composition, or the distribution of exposure variables within the study population. Furthermore, because this study employed a retrospective cross-sectional design, causal relationships cannot be established. Prospective multicentre studies are therefore warranted to confirm the magnitude of this association and evaluate its generalizability across diverse clinical settings.

Several mechanisms may explain why medication adherence is strongly associated with hospital readmission. Continuous antipsychotic treatment helps maintain symptom stability, reduces

the risk of relapse, supports functional recovery, and facilitates sustained engagement with mental health services. Conversely, treatment discontinuation may result in symptom exacerbation, impaired insight, reduced treatment engagement, and increased vulnerability to psychiatric deterioration requiring hospitalization (Abdullah-Koolmees et al., 2021; Barliana et al., 2023; Hou et al., 2024). Medication adherence should therefore be regarded not merely as compliance with pharmacotherapy but as an essential component of comprehensive long-term schizophrenia management.

These findings have important implications for psychiatric nursing practice. Given that medication adherence was identified as the strongest modifiable factor associated with hospital readmission, interventions to improve adherence should be prioritized throughout the continuum of care. Psychiatric nurses play a pivotal role in providing individualized psychoeducation for patients and families, monitoring medication-related adverse effects, identifying barriers to adherence, conducting regular medication reviews, and recognizing early warning signs of relapse during follow-up. Coordinated discharge planning, family psychoeducation, community-based follow-up, psychosocial rehabilitation, and individualized treatment planning including consideration of long-acting injectable antipsychotics for selected patients with recurrent non-adherence may improve treatment continuity and reduce the risk of rehospitalization (Rodriguez et al., 2024; Thongsalab et al., 2023; Ye et al., 2023). Strengthening these evidence-based interventions may enhance long-term recovery while reducing the clinical and economic burden associated with recurrent hospitalization among individuals with schizophrenia.

Conclusions

This study demonstrated that medication adherence was the strongest independent factor associated with hospital readmission among patients with schizophrenia at Bali Provincial Mental Hospital. In addition to medication adherence, age, residual symptoms, and comorbidities were significantly associated with readmission, whereas gender, employment status, and schizophrenia subtype were not. These findings underscore that clinical factors, particularly those that are potentially modifiable, play a more important role in predicting readmission than demographic characteristics. The results highlight the importance of strengthening relapse prevention strategies through comprehensive medication adherence programs, early identification and management of residual symptoms, and integrated care for patients with coexisting medical conditions. As medication adherence emerged as the most influential predictor of readmission, interventions aimed at improving treatment continuity should be prioritized throughout the continuum of care.

From a clinical perspective, Bali Provincial

Mental Hospital should strengthen multidisciplinary collaboration involving psychiatrists, psychiatric nurses, psychologists, primary care physicians, pharmacists, and social workers to provide coordinated, person-centred care for individuals with schizophrenia. Strategies such as individualized psychoeducation, routine medication adherence monitoring, comprehensive discharge planning, family engagement, community-based follow-up, home visitation programs, and the appropriate use of long-acting injectable antipsychotics for patients with recurrent non-adherence may contribute to reducing preventable hospital readmissions.

Future research should employ prospective longitudinal or multicentre study designs to establish temporal relationships between risk factors and readmission. In addition, future studies should incorporate psychosocial variables that were unavailable in the present retrospective study, including family support, perceived stigma, socioeconomic conditions, treatment insight, and access to community mental health services, to provide a more comprehensive understanding of the determinants of hospital readmission among individuals with schizophrenia.

Declaration of Interest

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

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Data Availability

The datasets generated and/or analyzed during the current study are not publicly available because they contain confidential patient information. However, de-identified data are available from the corresponding author upon reasonable request and with permission from Bali Provincial Mental Hospital, subject to applicable ethical and institutional regulations.

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Identifying therapeutic elements of islamic spiritual nursing education to reduce depression in patients with coronary artery disease: A delphi study

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Abstract

Background: Patients with coronary artery disease (CAD) face a higher risk of depression, which negatively affects their quality of life. For Muslim patients, culturally and religiously sensitive interventions are crucial. Islamic-based psychotherapy shows promise, but further research is needed to determine the most effective content.

Purpose: This study aims to achieve expert consensus on the therapeutic components of Islamic nursing spiritual education to alleviate depression in CAD patients.

Methods: The Delphi method was used, with three rounds of data collection from Muslim healthcare professionals experienced in Islamic-based care. The first round gathered qualitative insights through open-ended questions. Rounds two and three used Likert-scale assessments to evaluate the relevance and urgency of proposed topics. Consensus was defined as ≥90% agreement among the experts, with stable central tendency values and declining input indicating strong consensus. In Phase 4, we qualitatively evaluated the final consensus on therapeutic strategies with patients to gather their perspectives and inform potential program adaptations.

Results: Seven key themes emerged, including the Islamic view on health and illness, the prophetic guidance of Prophet Muhammad SAW regarding illness, and the role of faith, gratitude, and worship in mental well-being. Over 90% agreement was achieved across all themes, with mean relevance scores ranging from 3.8 to 4.0 and urgency scores from 3.7 to 4.0, confirming consensus stability. Patients validated the content, noting its potential to reduce anxiety and fear.

Conclusion: Integrating Islamic spiritual education into psychotherapeutic interventions could help address depression among Muslim CAD patients. Further studies are needed to evaluate its clinical effectiveness.

Keywords: delphi study; depression; education; heart disease; islam

Introduction

Patients diagnosed with coronary artery disease (CAD) are at a significantly increased risk of developing depression compared with non-CAD populations. This risk is two to three times higher than in the general population (Carney and Freedland, 2017; Vaccarino et al., 2020). Depression in these patients is associated with numerous complications, including reduced quality of life (Altino et al., 2017; Nuraeni et al., 2019), increased comorbidity, and higher mortality rates (Lichtman et al., 2014; Carney and Freedland, 2017; Kuhlmann et al., 2019). The American Heart Association (AHA) underscores the vital importance of efficacious secondary prevention strategies, including the management of psychosocial factors such as depression and anxiety,

in reducing mortality and morbidity in patients with CAD (Mozaffarian et al., 2016).

Current treatments for depression in CAD patients primarily include Cognitive Behavioral Therapy (CBT) and antidepressant medications (Dowlati et al., 2010; Nuraeni et al., 2023). While CBT has shown some effectiveness in reducing mild depression, especially during early rehabilitation phases, its long-term impact on severe depression remains uncertain (Reavell et al., 2018; Nuraeni et al., 2023). Similarly, antidepressants offer limited efficacy in managing depressive symptoms in this population, highlighting the need for alternative therapeutic approaches (Hughes et al., 2022).

Considering the increasing prevalence of Islam across the globe, it is imperative to adopt culturally and religiously sensitive approaches to psychotherapy for Muslim CAD patients (World Population Review, 2022; Nuraeni et al., 2023). Cultural beliefs, religious practices, and societal norms exert a profound influence on the experience of depression and the response to therapeutic interventions among Muslim patients. For example, the concept of *qalb* (heart) in Islamic thought, which encompasses the mind, spirit, and soul, is central to understanding the spiritual dimensions of mental health (Yusuf, 2012; Setiawan, Tajab and Chaer, 2019; Warsah, 2020). It is believed that the health of the *qalb* directly influences an individual's spiritual well-being, which in turn affects their psychological state (Keshavarzi and Haque, 2013; Marzband and Zakavi, 2014). This demonstrates the importance of integrating Islamic teachings into psychotherapy to address the unique needs of Muslim CAD patients.

Islamic-based psychotherapy has emerged as a promising alternative, particularly therapies rooted in Islamic teachings, such as Islamic hope therapy and Islamic teaching therapy (Tajbakhsh et al., 2018; Amjadian et al., 2020; Masjedi-Arani et al., 2020). These models are based on principles drawn from the Qur'an and Sunnah, with an emphasis on purifying the *qalb* to foster spiritual and psychological well-being. Results from studies conducted in Iran indicate that these therapies may be an effective approach to reducing depressive symptoms among CAD patients (Amjadian et al., 2020; Masjedi-Arani et al., 2020; Tajbakhsh et al., 2018). Nevertheless, further investigation is required to gain a comprehensive understanding of their theoretical underpinnings, therapeutic modalities, and applicability across diverse Muslim populations.

Despite the promising findings, research on Islamic-based psychotherapy remains limited, with significant gaps that require attention. Most existing studies suffer from small sample sizes and insufficient descriptions of therapeutic content, limiting the generalizability of their findings (Nuraeni et al., 2023). Additionally, the cultural and religious appropriateness of the therapeutic interventions has not been sufficiently assessed, particularly outside of Iran. Acknowledging these limitations is critical for guiding future research and ensuring

the development of more robust and effective therapeutic models.

The systematic review conducted by Nuraeni et al., (2023) highlights the multifaceted nature of Islamic psychotherapy, focusing on its role in reducing depression and improving quality of life through Islamic teaching. While these studies collectively underscore the diverse components integral to psychotherapy for depression management, they also reveal gaps in the existing research. Therefore, it is not yet possible to draw definitive conclusions about the efficacy of this therapy based on the available evidence. Notably, only three of the six studies reviewed offer detailed explanations of the therapeutic content. The limited sample sizes across these studies hamper the generalizability of their findings, underscoring the need for further research to solidify these preliminary results. Additionally, the review highlights a variety of Islamic teaching elements that could help alleviate depression.

Nevertheless, determining the most effective approach, preferably with Muslim experts or scholars, is crucial to guarantee cultural and religious suitability in therapy. This Delphi study aims to achieve consensus among Muslim experts on the therapeutic content of Islamic teaching strategies designed to alleviate depression in CAD patients. These findings are expected to contribute to the development of culturally and religiously appropriate Islamic-based psychotherapy, thereby better addressing the unique needs of the growing Muslim CAD patient population.

Furthermore, it is crucial to integrate the perspectives of patients with coronary artery disease (CAD) regarding their experiences with depression and their preferences for Islamic psychotherapeutic interventions to develop patient-centered care. A thorough understanding of these perspectives may facilitate the adaptation of interventions to more effectively address the specific needs of Muslim CAD patients, potentially leading to improved treatment outcomes. This patient-centered approach offers valuable insights into the lived experiences of depression and the effectiveness of Islamic-based psychotherapy. Consequently, this study also examines the perspectives of CAD patients with depression towards psychotherapy, utilizing methods derived from Islamic teachings, as identified through the Delphi study.

Materials and Methods

Study design

This study used a modified Delphi method to reach consensus on the relevance and urgency of therapeutic topics within Islamic teaching strategies for patients with CAD who are experiencing or at risk of depression. The Delphi method, recognized for its systematic approach to reaching expert consensus through iterative rounds of data collection, was conducted in three phases (Holey et al., 2007; Keeney, Hasson and McKenna, 2010). In the fourth

Table 1. Characteristics of Participants (n=17)

Characteristics of Participants	n	%
Participants: Professional Experts (Delphi)		
	10	
Gender (Female)	6	60
Age (Years):		
18-35	1	10
36-45	4	40
46-55	4	40
>55	1	10
Occupation or Roles:		
Chaplain	2	20
Nurse Educator	5	50
Mental Health Nurse	1	10
Nurse	1	10
Physician	1	10
Expertise:		
Health professionals with experience in Islamic religious education.	4	40
Qualified healthcare professionals serving as hospital Islamic Chaplains	2	20
Nurses with an Islamic religious background who have clinical experience caring for CHD patients in hospitals.	1	10
Mental health professionals with experience in Islamic-based religion counseling.	1	10
Educators involved in Islamic outreach.	2	20
Length of experience (Years):		
1-2	1	10
3-5	1	10
>5	8	80
Participants: Patients with CAD		
	n=7	
Gender (Female)	1	14
Age (Years):		
18-35	2	29
36-45	-	
46-55	1	14
>55	4	57
Depression Category:		
Minimal depression	3	43
Mild depression	1	14
Moderate depression	3	43

phase, the findings were qualitatively tested with CAD patients undergoing hospital treatment to gather their perspectives on the consensus results and their views on the role of Islamic teachings in the hospital setting. These patient insights can provide additional recommendations on the significance of applying such therapies in the care of CAD patients within the hospital environment.

(1)Phase 1: The initial round used open-ended questions to gather qualitative insights from experts on key educational topics that provide Islamic

spiritual support to CAD patients. These qualitative responses were carefully evaluated, categorized, and coded to identify recurring themes and topics (Holey et al., 2007; Keeney, Hasson and McKenna, 2010).

(2)Phase 2: The topics identified in Phase 1 were further tested in the second round using a Likert scale questionnaire. This phase involved a quantitative assessment in which experts rated the relevance and urgency of each topic. Their responses were analyzed by calculating individual

Table 2. Results of the first round of Delphi: Suggested topics for Islamic teaching strategies to alleviate depression in CHD patients

Suggested educational topics	Categories	Topics included in Delphi round 2
The concept of health in the context of health, nursing, and even from an Islamic perspective, where health includes bio-psycho-social-spiritual elements. Illness from an Islamic perspective: An explanation of what illness means to humans in Islam. God's compassion for the suffering of people. Things one can learn from ill people. The guidance provided by the Prophet to one who was challenged by illness. The appropriate conduct in the event of a health crisis encompasses recitations of prayers and dhikr.	Understand the meaning of health and illness in Islam.	1. Understand the meaning of health and illness in Islam. 2. The Prophet's precepts and guidance for dealing with illness.
The essence of life. Recognize that our life in this world is only temporary and prepare for a more eternal life in the afterlife. Realize that life will be filled with tests and difficulties. Ma'rifatul insan: the essence of human beings Life's meaning and purpose. Seeking Allah's pleasure by piety, good deeds, and constant improvement is the aim of life. Worshiping Allah and cultivating positive relationships with other people are the two main goals of life.	Understand the Islamic perspective on the meaning and purpose of human life.	3. Understand the Islamic perspective on the meaning and purpose of human life.
Learning about Allah, learning about His attributes, particularly those concerning sickness, Almighty Allah, for instance, is the Most Healer and Most Merciful. The meaning of syahadah encompasses both the understanding and application of syahadatain. Understanding Allah (Ma'rifatullah) includes the significance of Ma'rifatullah and the path leading there. The Pillars of Faith firmly believe in the existence of Allah SWT, His Angels, His Books, His Messengers, and the Hereafter. Pillars of Faith. Topic Limitation 1: Have complete faith in Allah SWT, His Angels, His Books, His Messengers, the Hereafter, and Qadha and Qadar (destiny). The explanation in Qadha and Qadar (destiny) is tied to the illness's fate.	Increasing faith in God: -Meaning of syahadah -The reinternalization of the pillar of faith. -The meaning of faith in Muslim life. -Understanding the attributes of God	4. Discover the meaning of syahadatain and the pillars of faith. 5. Understanding Asmaul Husna: Ar-Rahman, Ar-Rahim, Asy Syifaa.
Topics that explain a Muslim's attitude toward health and illness include gratitude, patience, effort, and trust as a Muslim's commitment to dealing with Allah's destiny. Following your best efforts for treatment and prayer, the next step is to place your trust in Allah. Tawakal entails relinquishing all possessions to Allah. We must trust that Allah will provide the best for His devotees. Tawakal addresses the following topics: trying, praying, and thinking positively of Allah. Understand and believe that any disease that befalls a believer is a blessing for his sins, as long as he is patient and attempts to recover. The explanation in Qadha and Qadar (destiny) is tied to the illness's fate.	Islamic guidance on handling life's pleasures and calamities emphasizes the importance of perseverance, gratitude, endeavor, and tawakal.	6. Islamic guidance on handling life's pleasures and calamities emphasizes the importance of perseverance, gratitude, endeavor, and tawakal.
Understand and follow out the Apostle's seven daily commandments, Qiyamullail, including as reading the Koran and giving alms. Worship to alleviate depression and other health issues. Topics covered include Islamic religious services to promote health, particularly depression; being thankful all the time; fasting; prayer; dhikr; repentance; performing good deeds; and companionship. Increase engagement with the Al-Quran. Depression can be addressed with the Koran. Seeking Allah's blessings through acts of devotion or good deeds.	Increase devotion to Allah.	7. Strengthening relationship with Allah through worship.

judgments, including frequency and percentage distributions. Additionally, central trend values such as the mean, median, mode, minimum-maximum value range, and ranking of each subject were identified to determine the collective expert opinion (Holey et al., 2007; Keeney, Hasson and Mckenna, 2010).

(3)Phase 3: In the final phase, the results were re-evaluated to test the consistency and stability of expert consensus. This was achieved by comparing pooled individual judgments from Phase 2 to Phase 3, looking for $\geq 90\%$ stability in responses and assessing the change in central tendency trends (Holey et al., 2007; Keeney, Hasson and Mckenna, 2010).

(4)Phase 4: The final expert consensus on therapeutic strategies within Islamic teachings for CAD patients with depression, derived from phase 3, was subsequently evaluated qualitatively with patients to gather input for potential program adaptations.

Participants and setting

The participants in this study consisted of healthcare professionals experienced in Islamic teachings and CAD patients who were undergoing treatment in the hospital. The healthcare professionals experienced in Islamic teachings for this Delphi study were selected based on specific criteria to ensure they possessed relevant expertise in Islamic-based educational activities, healthcare, and counseling. The selection criteria included:

(1)Professional Background: Participants were healthcare professionals, such as educational nurses, care providers, doctors, and psychotherapists, with experience in Islamic-based educational activities or counseling. Furthermore, clergy members engaged in hospital settings or experienced in Islamic teaching activities were also considered.

(2)Experience: Participants were required to have at least 5 years of experience in their respective fields, ensuring they possessed sufficient knowledge and expertise to make meaningful contributions to the study.

(3)Recruitment Process: Potential participants were contacted directly via WhatsApp. Of the 33 experts contacted, 10 confirmed their willingness to participate. The researcher considered this number sufficient, as it met the minimum requirement for Delphi studies, which typically call for at least 10 participants (Okoli and Pawlowski, 2004; Skulmoski, Hartman and Krahn, 2007). Furthermore, the limited availability of experts and findings from previous research that provided initial insights into the study were taken into account (Okoli and Pawlowski, 2004; Skulmoski, Hartman and Krahn, 2007; Nuraeni et al., 2023). Many participants were female (60%) and aged between 36 and 55 years. Most served as nurse educators specializing in health professions and had experience in Islamic religious education.

Meanwhile, the patients with CAD were selected

based on the following criteria: (1)Patients diagnosed with CAD (Stable Angina, Unstable Angina, ST-Elevation Myocardial Infarction (STEMI), or Non-ST-Elevation Myocardial Infarction (NSTEMI)). (2) Patients currently receiving treatment in a cardiac-specific ICU/high care unit, or a non-ICU/high care cardiac-specific ward, who had been free from chest pain for the past 24 hours. (3)Adult patients aged 19 years or older.

Data Collection and Analysis

Data Collection and Analysis to Reach Consensus

(1)Phase 1 (Qualitative Analysis): The first round involved collecting responses to open-ended questions. These responses were analyzed qualitatively, with statements sharing similar meanings grouped into codes. This process ensured that all relevant topics were included for further testing in Phase 2. (Holey et al., 2007; Keeney, Hasson and Mckenna, 2010).

(2)Phase 2 (Quantitative Analysis): In the second round, a Likert scale questionnaire was used to evaluate the relevance and urgency of the topics identified in Phase 1. The Round 2 and Round 3 items were derived directly from the coded themes and subthemes identified in Round 1 and were presented as final topic statements for expert rating. Items were rated on a 4-point Likert scale for both relevance (1 = not relevant to 4 = very relevant) and urgency (1 = not urgent to 4 = very urgent). The questionnaire was administered via Google Forms. In addition to the Likert scale, experts were invited to provide additional comments. The responses were then analyzed by calculating frequency, percentage distributions, and central trend values (mean, median, mode, minimum-maximum range, ranking, and IQR) (Holey et al., 2007; Keeney, Hasson and Mckenna, 2010).

(3)Phase 3 (Consensus Identification and Stability Assessment): In the third round, we assessed the stability and consistency of the expert consensus by comparing pooled individual judgments across rounds. Stability was indicated by $\geq 90\%$ agreement among experts, with minimal changes in central tendency between Phase 2 and Phase 3. In addition to the $\geq 90\%$ agreement criterion, stopping was supported by the stability of responses across rounds, as indicated by consistent median and mode values, a relatively narrow interquartile range (IQR), and fewer expert comments in the final round. These indicators indicated that consensus had reached a sufficient level of stability and that further rounds were unlikely to produce meaningful changes to the results (Holey et al., 2007; Keeney, Hasson and Mckenna, 2010).

Data Collection and Analysis for Identifying Patients' Perspectives

To collect data, the researchers conducted semi-structured interviews with patients. We inquired about the patients' perspectives on receiving Islamic spiritual education during their hospital

Table 3. Comparison of Delphi study rounds 2 and 3 consensus on the relevance of intervention topics

	Topik-1			Topik-2			Topik-3			Topik-4			Topik-5			Topik-6			Topik-7		
	R-2	R-3		R-2	R-3		R-2	R-3		R-2	R-3		R-2	R-3		R-2	R-3		R-2	R-3	
N	10	10		10	10		10	10		10	10		10	10		10	10		10	10	
Mean	3.90	3.70		3.90	3.80		3.90	3.80		3.70	3.90		3.80	3.80		3.90	3.80		3.90	3.70	
Median	4.00	4.00		4.00	4.00		4.00	4.00		4.00	4.00		4.00	4.00		4.00	4.00		4.00	4.00	
Mode	4.00	4.00		4.00	4.00		4.00	4.00		4.00	4.00		4.00	4.00		4.00	4.00		4.00	4.00	
Standard deviation	0.316	0.483		0.316	0.422		0.316	0.422		0.483	0.316		0.422	0.422		0.316	0.422		0.316	0.483	
Minimum	3	3		3	3		3	3		3	3		3	3		3	3		3	3	
Maximum	4	4		4	4		4	4		4	4		4	4		4	4		4	4	
Q1	4	3.25		4	4		4	4		3.25	4		4	4		4	3		4	3.25	
Q3	4	4		4	4		4	4		4	4		4	4		4	4		4	4	
IQR	0	0.75		0	0		0	0		0.75	0		0	0		0	1		0	0.75	
Frequencies (%)																					
Very relevant	90	80		90	80		90	80		90	90		80	80		80	80		90	80	
Relevant	10	20		10	20		10	20		10	10		20	20		20	20		10	20	
Total relevant	100	100		100	100		100	100		100	100		100	100		100	100		100	100	
Not relevant	0	0		0	0		0	0		0	0		0	0		0	0		0	0	
Very not relevant	0	0		0	0		0	0		0	0		0	0		0	0		0	0	

stay, the type of Islamic spiritual education they felt they needed while undergoing treatment, and their opinions on receiving Islamic spiritual education based on topics derived from consensus. Each interview lasted from 15 to 30 minutes, and most participants were involved in member checks. The qualitative data were analyzed using thematic analysis, following a four-step procedure: 1) Identification of codes; 2) Grouping of codes into categories; 3) Identification of relationships between codes or categories within the data; and 4) Recognition of overarching themes (Utarini, 2020).

Trustworthiness and Strategies to Minimize Bias

Several strategies were applied to enhance the trustworthiness of the study and minimize potential bias. In the Delphi phase, experts were recruited using predefined eligibility criteria to ensure relevant professional and religious expertise. Experts from different backgrounds were included to obtain varied perspectives. All participants received the same instructions and completed each round independently to reduce conformity bias and maintain consistency.

In Round 1, responses to open-ended questions were systematically coded and grouped to ensure that the topics for the subsequent rounds were derived from the experts' input. In Rounds 2 and 3, the same questionnaire format and rating criteria were used for all experts. Consensus was evaluated based on the level of agreement, response stability across rounds, and the reduction in comments.

In the patient phase, semi-structured interviews were conducted using the same general interview guide, and member checking was carried out with all participants to confirm the interpretation of the data. These strategies were used to strengthen the credibility

Table 4. Comparison of Delphi study rounds 2 and 3 consensuses on the urgency of intervention topics

	Topik-1			Topik-2			Topik-3			Topik-4			Topik-5			Topik-6			Topik-7		
	R-2	R-3		R-2	R-3		R-2	R-3		R-2	R-3		R-2	R-3		R-2	R-3		R-2	R-3	
N	10	10		10	10		10	10		10	10		10	10		10	10		10	10	
Mean	3.90	3.90		3.90	3.90		3.80	3.90		3.70	3.80		3.70	3.80		3.80	3.90		3.80	3.80	
Median	4.00	4.00		4.00	4.00		4.00	4.00		4.00	4.00		4.00	4.00		4.00	4.00		4.00	4.00	
Mode	4.00	4.00		4.00	4.00		4.00	4.00		4.00	4.00		4.00	4.00		4.00	4.00		4.00	4.00	
Standard deviation	0.316	0.316		0.316	0.316		0.422	0.316		0.483	0.422		0.483	0.422		0.422	0.316		0.422	0.422	
Minimum	3	3		3	3		3	3		3	3		3	3		3	3		3	3	
Maximum	4	4		4	4		4	4		4	4		4	4		4	4		4	4	
Q1	4	4		4	4		4	4		3.25	4		3.25	4		4	4		4	4	
Q3	4	4		4	4		4	4		4	4		4	4		4	4		4	4	
IQR	0	0		0	0		0	0		0.75	0		0.75	0		0	0		0	0	
Frequencies (%)																					
Very urgent	100	90		90	90		90	80		70	80		70	80		90	80		80	80	
Urgent	0	10		10	10		10	20		30	20		30	20		10	20		20	20	
Total urgent	100	100		100	100		100	100		100	100		100	100		100	100		100	100	
Not urgent	0	0		0	0		0	0		0	0		0	0		0	0		0	0	
Very not urgent	0	0		0	0		0	0		0	0		0	0		0	0		0	0	

and consistency of the findings.

Ethics considerations

This study was conducted in accordance with ethical standards and received approval under number 253/UN6.KEP/EC/2023 from the Universitas Padjadjaran Research Ethics Commission, in compliance with the Declaration of Helsinki. Participants were informed in writing about the study's purpose and procedures and provided informed consent before participating. Their participation was entirely voluntary, with the option to withdraw at any stage without consequences. To ensure confidentiality, data were analyzed in groups, and participants' identities were anonymized. The information obtained was used solely for academic purposes and kept confidential. Furthermore, the principle of non-maleficence was upheld by purposively selecting only participants with relatively stable clinical conditions. Interviews were conducted according to participants' tolerance, and no participants reported chest pain, dyspnea, worsening symptoms, or other complaints related to the data collection procedures.

Results

Table 1 outlines the characteristics of both the expert participants and the CAD patients undergoing hospital treatment. Based on Table 1, the study included 17 participants, divided into two groups: professional experts (n=10) and CAD patients (n=7). Among the experts, 60% were female, with ages ranging from 18 to over 55 years. This group comprised Chaplains (20%), Nurse Educators (50%), and others, with the majority having over 5 years of experience. Their expertise encompassed healthcare and Islamic religious education. By comparison, the patient cohort was predominantly male (86%) and of an older demographic, with

Table 5. Expert opinion regarding topics

Delphi Round 2		
Topics	Comments	Decision
Understand the meaning of health and illness in Islam.	-	Included
The Prophet's precepts and guidance for dealing with illness.	-	Included
Understand the Islamic perspective on the meaning and purpose of human life.	"Human meaning should be added."	Included
Discover the meaning of shahadatain and the pillars of faith.	"Include a section about knowing God."	Included
Understanding Asmaul Husna: Ar-Rahman, Ar-Rahim, Asy Syifaa.	Change Asy Syifaa to Asy Syafii	Included
Islamic guidance on handling life's pleasures and calamities emphasizes the importance of perseverance, gratitude, endeavor, and tawakal.		Included
Strengthening the relationship with Allah through worship.	"Is the role of the family—including involving friends and family in the course of treating congestive heart failure (CHD) or fostering positive connections with the patients' closest relatives—included in the themes mentioned above? or is this covered in subject 7's Habluminannas?"	Included
Delphi Round 3		
	Comments	Decision
Understand the meaning of health and illness in Islam.	-	Included
The Prophet's precepts and guidance for dealing with illness.	-	Included
Ma'rifatul Insan: Knowing oneself and the essence of man's creation (discovering one's life mission and purpose according to Islam).	-	Included
Knowing God, discover the meaning of shahadatain and the pillars of faith.	-	Included
Understanding Asmaul Husna: Ar-Rahman, Ar-Rahim, Asy Syafii.	-	Included
Islamic guidance on handling life's pleasures and calamities emphasizes the importance of perseverance, gratitude, endeavor, and tawakal.	-	Included
Strengthening the relationship with Allah through worship: The benefits of prayer, dhikr, engagement with the Qur'an, prayer, zakat/infaq/alms, and good deeds in daily activities (Habluminallah and habluminannas) because of Allah.	-	Included

57% exceeding the age of 55 years. Depression levels among the patients varied, with 43% experiencing minimal depression and another 43% experiencing moderate depression.

Delphi Study Round 1

Table 2 presents the results of the first round of the Delphi study. During this round, data were collected qualitatively, leading to the identification of seven major topics that were proposed for expert consensus in the subsequent rounds of the Delphi study. These topics encompass various aspects of

Islamic teachings related to health, illness, human life, faith, and worship, as they pertain to patients with coronary artery disease (CAD) who are experiencing or at risk of depression. The topics were structured to offer a comprehensive, Islamic-based approach to psychotherapy for patients with Coronary Artery Disease (CAD), emphasizing spiritual support and religious practices.

Several Islamic terms were identified in the results, each carrying essential theological and spiritual significance within the Islamic worldview. These terms are explained as follows: Syahadah

Table 6. Patients' insights on the consensus results and Islamic teachings in the hospital setting

Theme	Sub-themes	Statements/Quotes
Positive Perception of Islamic Spiritual Education	The need for Islamic spiritual education during illness	"Islamic spiritual education is also necessary in situations like this because we sometimes forget. So, there should be someone to educate us, someone to remind us. It is indeed important.."
	God as a source of hope	"I am interested in that (Islamic spiritual education), I want to learn more about Islam because during my stay here, I haven't received any spiritual guidance like that... we pray to the One above."
	Islamic spiritual education can reduce anxiety and fear	"I strongly agree with the implementation of Islamic spiritual education, not just after something like this, after surgery, but it should be provided before the surgery, explaining, for instance, what to expect during heart surgery, so the patient does not feel anxious or afraid. Providing spiritual guidance is much better."
Specific Needs for Islamic Education	Worshiping Allah: Prayer, Gratitude, and Remembrance	"(The education needed) is like performing prayers to express gratitude and engage in remembrance (dhikr)."
	Understanding of Faith, the Pillars of Islam, and Ihsan	"Understanding of faith, the pillars of Islam, and Ihsan... the realization that everything comes from Allah, Inna lillahi wa inna ilayhi roji'un."
Responses to the Proposed Program	Flexibility in Acceptance	"Acceptance of spiritual education can vary depending on an individual's level of patience and awareness."
	The material is comprehensive for enhancing patients' spirituality	"The proposed program was deemed comprehensive, covering all aspects necessary to enhance the patient's spirituality."

refers to the declaration of faith in Islam, consisting of two fundamental testimonies: "*Ashhadu an la ilaha illa Allah*" (I bear witness that there is no deity but Allah) and "*Wa ashhadu anna Muhammadur Rasulullah*" (And I bear witness that Muhammad is the Messenger of Allah). This declaration represents the core of Islamic belief and practice (Esposito, 2003). Ma'rifatullah, meaning "*knowledge of Allah*," denotes a deep understanding and recognition of Allah's attributes and essence. It is considered an essential component of spiritual development and the sincere internalization of the syahadah (Al-Ghazali, 2003). Asmaul Husna, or "*The Most Beautiful Names of Allah*," refers to the 99 names describing Allah's attributes. Among the most frequently mentioned are Ar-Rahman (The Most Compassionate) and Ar-Rahim (The Most Merciful), both of which emphasize Allah's boundless mercy and compassion towards His creation (Kabbani,

1999). Asy-Syifaa, meaning "*The Healer*" or "*The One who grants healing*," is derived from Allah's attributes in Islamic theology, affirming that ultimate healing—both physical and spiritual—comes solely from Allah (Qur'an, Surah Ash-Shu'ara [26]: 80) (Ali, 2015). Dzikr (remembrance) refers to the act of remembering Allah through specific phrases and names. It is a form of worship that involves reciting praises such as Subhanallah (Glory be to Allah), Alhamdulillah (Praise be to Allah), and Allahu Akbar (Allah is the Greatest), and serves to maintain spiritual awareness and tranquility (Nawawi, 2010; Ali, 2015). Qadha and Qadar in Islamic teachings refer to the concepts of divine decree and predestination, indicating that everything that occurs in the universe is predetermined by Allah (Esposito, 2003). Delphi Study Rounds 2 and 3

Tables 3 and 4 summarize the findings from Delphi Rounds 2 and 3. These rounds were used to

assess the relevance and urgency of the identified topics, transitioning from qualitative assessments to quantitative evaluations. As shown in [Table 2](#), the seven finalized themes from Round 1 were translated into topic statements that were rated by experts in Rounds 2 and 3. In these rounds, each item was rated using a 4-point Likert scale for relevance (1 = not relevant to 4 = very relevant) and urgency (1 = not urgent to 4 = very urgent). The analysis reveals strong agreement among experts on the importance and urgency of these topics, with only minor fluctuations observed in scores between the two rounds.

The consistently high scores in both relevance and urgency, as reflected by mean values close to 4.00 and a mode and median of 4.00 across all topics, indicate a robust consensus among the experts. The standard deviations remained low, further supporting the stability of expert opinions throughout the Delphi process. Despite the observed increase in the IQR between rounds 2 and 3 for topics 1, 6, and 7 in terms of relevance, other parameters, such as Q1 and Q3, fall within the range of scores 3 and 4, indicating agreement on the relevance of these topics. This does not alter the consistency of consensus among experts regarding the relevance of the topics related to efforts to reduce depression in CAD patients.

The slight variations in mean scores between Rounds 2 and 3 did not significantly impact the consensus, reinforcing the suitability of the identified topics for inclusion in an educational framework targeting depression in CAD patients through Islamic-based psychotherapy. The high level of agreement on the relevance and urgency of these topics underscores their importance in the proposed intervention structure.

Expert Commentary and Consensus Convergence

[Table 5](#) details the expert commentary and decisions regarding the inclusion of specific topics across the Delphi rounds. A noticeable decrease in expert commentary from Round 2 to Round 3 suggests a convergence of opinions, indicating that experts were reaching a consensus on the topics under consideration. This reduction in commentary enhances the consensus's credibility, confirming the appropriateness of incorporating all identified topics into the final intervention framework. Each topic identified was ultimately incorporated into the educational framework, reflecting the strong consensus among experts regarding the relevance and urgency of addressing depression in CAD patients through Islam-based psychotherapy. The gradual convergence of the experts' opinions and the stability of the consensus strengthened the credibility of the results.

Based on the interviews ([Table 6](#)), all patients expressed a positive perception of Islamic spiritual education. They emphasized that such education is essential during challenging situations, as they

see God as their only source of hope. Furthermore, a close relationship with God was said to reduce their feelings of fear and anxiety. The patients also expressed the need for Islamic education during illness, particularly in relation to worshipping Allah and gaining a fundamental understanding of faith, Islam, and ihsan (the awareness of being observed by Allah). They responded that the proposed materials from the Delphi study were comprehensive in strengthening their connection with God. However, the implementation of the spiritual education program should consider the patients' openness and receptiveness to Islamic spiritual education.

Discussion

Consensus Regarding the Therapeutic Content of Islamic Nursing Spiritual Education

[Table 2](#) presents the outcomes from the first round of the Delphi study, where qualitative data collection identified seven key themes crucial for developing Islamic spiritual psychotherapy tailored to CAD patients with depression. These themes encompass fundamental Islamic teachings on health, illness, human life, faith, and worship, forming the foundation of the proposed psychotherapeutic intervention ([Keshavarzi & Haque, 2013](#); [Marzband et al., 2016](#); [Nuraeni et al., 2023](#)).

In the subsequent rounds, as detailed in [Tables 3](#) and [4](#), quantitative assessments were conducted to evaluate the relevance and urgency of the identified themes. Experts consistently rated these themes as highly relevant and urgent, with minimal fluctuations observed between Rounds 2 and 3. The consistently high scores, including mean values close to 4.00 and a consistent mode and median of 4.00, indicate a robust consensus among the experts ([Holey et al., 2007](#)). Despite minor declines in the quantitative ratings of relevance or urgency across rounds, the experts emphasized the continued importance of these themes. This persistence in high relevance and urgency scores, even with slight variations, underscores the experts' unanimous agreement on the necessity of incorporating these themes into an educational framework aimed at addressing depression in CAD patients through Islamic-based psychotherapy.

As detailed in [Table 5](#), the reduction in expert commentary from Round 2 to Round 3 suggests a convergence of opinions, indicating that experts were reaching a consensus on the identified themes ([Holey et al., 2007](#)). This convergence enhances the credibility of the findings and supports the inclusion of all seven themes in the final intervention framework. The experts' unanimous agreement on these themes reinforces their significance and applicability in developing Islamic spiritual psychotherapy for CAD patients with depression ([Hidayat, 2021b](#); [Nuraeni et al., 2023](#)).

The discussion of how these themes relate to Islamic disciplines such as aqeedah, fiqh,

and tazkiyah further underscores their relevance within the Islamic framework. These disciplines collectively influence cognition, emotions, and spiritual well-being, which are crucial for addressing depression in CAD patients (Keshavarzi and Haque, 2013; Haque and Keshavarzi, 2014; Hidayat, 2021c). The integration of these elements into the psychotherapeutic intervention highlights the potential for Islamic spiritual care to provide holistic support, enhancing both mental and spiritual health.

The identified themes align closely with the broader research objectives, which aim to integrate Islamic spiritual care into therapeutic interventions for CAD patients with depression. The themes, including belief in God, the significance of life's meaning according to divine will, and strengthening one's bond with God through worship and virtuous actions, align well with core teachings identified in previous systematic reviews on the impact of Islamic spiritual care on depression and quality of life in CAD patients (Nuraeni, et al., 2023).

Moreover, supplementary topics within these themes, such as self-awareness from an Islamic perspective, understanding divine attributes, and the significance of Shahadah and the pillars of faith, complement the core teachings highlighted in systematic reviews. These topics are crucial for fostering a deeper connection and trust in God, potentially helping alleviate depression and enhance mental well-being among CAD patients (Asadzandi et al., 2020; Hidayat, 2021c). The themes also resonate with essential Islamic disciplines like aqeedah (creed), fiqh (jurisprudence), and tazkiyah (spiritual purification), further emphasizing their relevance within the Islamic framework (Keshavarzi and Haque, 2013). For example, the theme of Ma'rifatul Insan (knowing oneself and the essence of man's creation), as well as understanding the attributes of God and the significance of Shahadah (the declaration of faith), are interlinked with the broader concepts of belief in God and the meaning of life according to divine will. These foundational teachings are vital for CAD patients as they offer a pathway to strengthen faith, find purpose in life, and ultimately foster a harmonious relationship with God, which is crucial for mental well-being (Ghazali, 2001; Hidayat, 2021b).

Patients' insights on the consensus results and Islamic teachings in the hospital setting.

Further insights were gathered on how CAD patients undergoing hospital treatment, whether diagnosed with depression or at risk of depression, perceive the consensus results and provide their opinions on the proposed topics within an Islamic teaching-based psychotherapy program. The mechanisms explaining the relationship between spirituality/religiosity (S/R) and mental health, as well as the role of interventions, still require further research. Previous research indicates that mental health providers should ask about patients' spiritual and

religious dimensions to deliver comprehensive and patient-centered care (Lucchetti, Koenig and Lucchetti, 2021). Integrating religious aspects into care can help create a more comprehensive approach that aligns with patients' spiritual needs.

This study illustrates the patients' positive views on Islamic spiritual education. They expressed that such education is highly needed during illness, particularly to reduce anxiety and fear before undergoing medical procedures such as heart surgery. Patients reported that spiritual education focused on worship, dhikr (remembrance of God), and their relationship with God helped alleviate anxiety and fear, especially before significant medical procedures like heart surgery. One patient stated, *"Remembering Allah during dhikr gave me peace, and I felt more mentally prepared to face the surgery."* This experience demonstrates that this spirituality-based approach not only enhances patients' spiritual well-being but also improves their mental health during treatment.

Previous studies have also highlighted the critical importance of addressing the spiritual and religious needs of Muslim CAD patients in Indonesia (Nur'aeni et al., 2013; Nuraeni et al., 2015). Following a diagnosis of Acute Coronary Syndrome (ACS), patients often experience fear, particularly the fear of death, sadness, and physical weakness (Nur'aeni et al., 2013). According to patients in this study, Islamic spiritual education can enhance their sense of calm and strength when facing fear during treatment.

Regarding the specific topics required by patients, education on worship, prayer, gratitude, and dhikr was deemed essential. Understanding faith, the pillars of Islam, and ihsan were also relevant. For Muslims, drawing closer to Allah through prayer, dhikr, repentance, and acts of charity can enhance their strength and patience. Especially during illness, the need to strengthen their connection to God becomes even greater, making religious rituals more important than ever during times of sickness. When facing hardship, a servant turns to their Lord for help. Therefore, supporting worship activities like prayer, repentance, and supplication plays a vital role for both the patient and their family (Marzband, Hosseini and Hamzehgardeshi, 2016). Additionally, strengthening understanding of faith, the pillars of Islam, and ihsan has been proven in several studies to reduce depression and improve quality of life. Furthermore, strengthening the understanding of faith, the pillars of Islam, and ihsan has been proven in several studies to reduce depression and improve quality of life (Nuraeni et al., 2023).

Previous research has reported that the effects of spirituality/religiosity on mental health can be either positive or negative, depending on how religious beliefs are used to cope with stress (e.g., positive or negative coping) (Lucchetti, Koenig and Lucchetti, 2021). For example, studies on Christian-based spiritual counseling and mindfulness practices in Buddhism have demonstrated similar effects

in promoting mental well-being through coping mechanisms rooted in religious practices (Koenig, Al and Ahmed, 2012; Guo et al., 2019). In the Islamic context, the concepts of a healthy qalb (heart), dhikr, and sincere worship help patients alleviate anxiety and strengthen inner peace, fostering positive coping mechanisms.

At the same time, these findings should be interpreted with caution. Although Islamic spiritual education may prove advantageous for numerous Muslim patients, it is important to acknowledge that not all individuals experience religious coping in an identical manner. Differences in religiosity, openness to spiritual discussion, and personal preferences should be considered. In some cases, religious coping may also be negative and may contribute to feelings of guilt or distress (Lucchetti, Koenig and Lucchetti, 2021). Therefore, the proposed framework should be implemented in a patient-centered, non-coercive, and culturally sensitive manner. The two themes, positive perceptions of Islamic spiritual education and the specific needs expressed by patients regarding this education, reinforce the consensus that has been achieved. Furthermore, the program is considered comprehensive by patients in enhancing their spirituality. This underscores the significance and the substantial need for Islamic-based psychoeducation among Muslim patients with CAD who are experiencing depression. Furthermore, it was recognized that flexibility is essential in the implementation of the program, considering the differing levels of receptiveness among patients.

The findings from this Delphi study closely align with the study's objectives and contribute significantly to the broader context of Islamic spiritual psychotherapy. The identified themes offer valuable insights into potential therapeutic approaches tailored to CAD patients with depression, supporting existing research and opening avenues for future interventions and studies in this domain. The study successfully integrates Islamic spiritual care into a structured therapeutic framework, highlighting its potential to address depression in CAD patients through faith-based interventions (Asadzandi, 2020; Hidayat, 2021a).

Furthermore, the insights from patients regarding this consensus strengthen the argument that the discussed Islamic educational topics can be adapted, developed, and piloted to evaluate their effectiveness in reducing depression levels among CAD patients suffering from depression. However, before full implementation, a preclinical trial is necessary to assess the feasibility, acceptance, and potential effectiveness of this intervention in addressing depression in CAD patients within hospital settings. Should the results prove positive, this could serve as a foundation for broader and more in-depth research in the future.

In general, these findings also reinforce O'Brien's theory of patients' spiritual well-being during illness. According to O'Brien, an individual's

capacity to find spiritual meaning during illness is influenced by several factors. The first and most important factor is the individual's perception of the spiritual meaning of their illness experience, which depends on their spiritual and religious attitudes and behaviors. These attitudes and behaviors include various aspects, including 1) Personal Faith: belief in God, peace in spiritual and religious beliefs, belief in God's power, strength derived from personal faith, and trust in God's providence; 2) Spiritual Satisfaction: contentment with faith, feeling close to God, absence of fear, reconciliation, security in God's love, and faithfulness; and 3) Religious Practices. Based on this theory, spiritual approaches from other religions, beyond Islam, also have the potential to be developed as psychological therapies in addressing mental health issues (O'Brien, 2003, 2021). Based on this theory, spiritual approaches from other religions, beyond Islam, also have the potential to be developed as psychological therapies for addressing mental health issues.

Clinical Nursing Implications

Furthermore, to integrate this spirituality-based intervention into the care of Muslim patients with coronary artery disease (CAD), healthcare providers need to undergo training so they can address the specific spiritual needs, particularly education related to the consensus topics. In addition, they can collaborate with religious leaders or spiritual experts to provide structured religion-based counseling. Hospitals can enhance depression screening for CAD patients and incorporate spiritual education sessions as part of cardiac rehabilitation programs, especially for those experiencing depression, where patients are given the opportunity to strengthen their spiritual connection through religious guidance relevant to their health condition. Additionally, the educational materials developed in this study can be adapted for use in group sessions or individual counseling in hospitals, involving nurses or trained spiritual counselors.

Moreover, Future research should explore the effectiveness of Islamic spiritual care interventions in diverse cultural settings beyond Indonesia, as well as among patients with different religious backgrounds. Conducting randomized controlled trials with larger sample sizes in different regions would allow for a more comprehensive understanding of the intervention's applicability and generalizability. Additionally, comparative studies between Islamic-based and other religion-based spiritual therapies could provide valuable insights into the universal aspects of spiritual care that promote mental health in patients with chronic illnesses.

Limitations of the Study

This study should be interpreted within the context of a Delphi design, which aims to establish informed expert consensus rather than to produce statistically generalizable findings. Therefore, the findings reflect the perspectives of selected experts and patients

within an Indonesian Muslim care context. In addition, the patient phase was conducted to explore the relevance and acceptability of the identified themes, not to evaluate the clinical effectiveness of the proposed intervention. Because the framework was developed within an Islamic spiritual care perspective, its application may be most appropriate for Muslim patients and may require adaptation in other cultural or religious settings.

This study also has several strengths. It used a structured, modified Delphi process with predefined expert selection criteria, iterative rounds, and explicit indicators of consensus and stability. Strategies were also applied to enhance trustworthiness and minimize potential bias, including consistent procedures across rounds, independent expert responses, systematic qualitative coding, and member checking in the patient phase. The inclusion of patients' perspectives further strengthened the contextual relevance and practical value of the findings.

Conclusion

This study identified and refined seven key themes of Islamic spiritual education for Muslim patients with coronary artery disease who are experiencing or are at risk of depression. The identified topics include: understanding the meaning of health and illness in Islam; the Prophet's guidance for dealing with illness; self-awareness and the essence of human creation; understanding God's attributes and the significance of Shahadah (the declaration of faith); strengthening faith through the pillars of faith and divine attributes; Islamic guidance on handling life's challenges through perseverance, gratitude, and tawakal; and strengthening the relationship with God through worship. The modified Delphi process showed strong expert agreement on the relevance and urgency of these themes, while the patient phase supported their acceptability and contextual relevance during illness. These findings offer a credible foundation for developing an Islamic spiritual nursing education framework that is responsive to the spiritual needs of Muslim patients with CAD. Nevertheless, the findings represent expert-informed framework development rather than proof of therapeutic efficacy. Further research is needed to pilot the framework and examine its feasibility, acceptability, and effectiveness in broader clinical and cultural contexts.

Declaration of Interest

The author is listed as one of the active reviewers in this journal. However, throughout the manuscript publication process, the author had no personal communication with the editorial team, and all decisions made regarding this article were left to the editorial board and the journal policy.

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Data Availability

All data generated or analyzed during this study are included in the published article.

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Reducing attitude toward the stigma of post-restraint individuals with mental illness: A pre-experimental study on FGD-Based mental health education

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Abstract

Background: Stigma refers to socially constructed negative meanings, labels, and stereotypes that lead to fear, social distancing, discrimination, and exclusion toward individuals with mental illness. Stigma toward people with post-restraint mental illness is still high, mainly due to limited mental health literacy within the community and strong cultural beliefs in agricultural communities that view mental illness as a disgrace. Focus group discussions (FGD) facilitate interactive dialogue, collective reflection, and social learning processes, making it more suitable for targeting attitude change and stigma reduction because it addresses both cognitive and social dimensions of stigma.

Purpose: This study aimed to assess the effect of mental health education, conducted through focus group discussions, on reducing community attitudes toward the stigma of Post-Restraint Individuals with Mental Illness.

Methods: This study employed a pre-experimental one-group pre-posttest design, involving 40 respondents who were purposively selected. The intervention consisted of four FGD sessions conducted over one month. The level of stigma was measured using the Community Attitudes Toward the Mentally Ill questionnaire, and data were analyzed using descriptive frequencies and the Wilcoxon Signed-Rank test.

Results: The results showed a decrease in the level of high stigma from 90.0% to 52.5%, and an increase in the level of low stigma from 10.0% to 47.5%. Wilcoxon Signed-Rank test results showed significant differences before and after the intervention ($p = 0.000$). FGDs allowed participants to reflect on their views, share their experiences, and gain a better understanding of people with mental illness, thus reducing attitude toward the stigma of people with post-restraint mental illness.

Conclusions: Based on these findings, it can be concluded that mental health education through the FGD method is effective in reducing community attitude toward stigma of people with post-restraint mental illness.

Keywords: focus group discussion; mental health education; people with mental illness; post-restraint; stigma

Introduction

Many people with mental illness experience stigma in society (World Health Organization, 2022), including those who have been shackled (Luni et al., 2024). Social stigma experienced by people with mental illness after being restrained has a major impact on their psychological condition and that of their families (Dewi et al., 2019). The high level of stigma can occur due to a lack of knowledge and understanding of mental health illnesses (Fatin et al., 2020). The community can act as social support to help the process of handling and recovering people with mental illness (Pavarini et al., 2021). Communities, especially those in agricultural areas, are often difficult to engage in mental health intervention programs; therefore, special adjustments are needed (King et al., 2023).

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Globally, 970 million people around the world are living with mental illness, and this number is increasing after the COVID-19 pandemic (World Health Organization, 2022). In Indonesia, 315,621 households have a member with psychosis/schizophrenia, with a prevalence of mental illness and depression of 630,827 each (Ministry of Health of the Republic of Indonesia, 2023). The high prevalence of mental illness in Indonesia contributes to stigma, discrimination, and denial of human rights to sufferers, including the practice of restraint which still occurs (Ministry of Health of the Republic of Indonesia, 2023), especially in East Java Province, with 754 cases recorded (Ministry of Health of the Republic of Indonesia, 2019). In Jember District in 2024, there were 3,286 cases of people with mental illness, of which 21 cases were in restraint. Stigma related to mental illness has significant consequences affecting individuals, families, communities, and even societal structures. It is widely associated with increased severity of psychiatric symptoms, lower self-esteem, reduced quality of life, slower recovery, social withdrawal, and reduced employment opportunities (Guerrero et al., 2025). Based on the results of a preliminary study, the working area of the Wuluhan Community Health Center showed the highest prevalence of people with mental health illness, reaching 128 patients, including six cases of post-restraint. A survey conducted among 43 community members in the working area of Wuluhan Community Health Center showed that 35 (81.4%) of them had high stigma toward people with post-restraint mental illness, which was reinforced by cultural background and lack of adequate knowledge.

Efforts to increase community knowledge and reduce stigmatizing attitudes are carried out through health education (Sari & Daryanto, 2021). The form of the educational method has an impact on the accurate and clear delivery of information to the audience. Educational methods include lectures (Suryani, 2020), printed media such as leaflets and posters (Hasanica et al., 2020), films (Putri et al., 2022), audio-visual (Kurniasari et al., 2023; Ruhyandi et al., 2022), and Focus Group Discussion (FGD) (Kansil et al., 2019; Shahwan et al., 2022). Research conducted by Muiswanah et al. (2023) emphasized the importance of knowledge as a source of information to improve the community's positive attitude toward people with mental illness. One method that has proven effective is focus group discussion (FGD), which can significantly increase knowledge through a problem-solving process based on social interaction and exchange of experiences. Diverse opinions encourage participants to think critically during the discussion (Suryani, 2020). Accordingly, this study was conducted to determine the effectiveness of FGD as an educational method in reducing attitude community toward the stigma of people with post-restraint mental illness in the working area of Wuluhan Community Health Center.

Materials and Methods

Study design

The research design used was pre-experimental with a one-group pre-posttest approach. The intervention was conducted in four meetings for one month.

Sample and Setting

The sampling technique used was purposive sampling, with the following inclusion criteria: aged 18 to under 65 years; living near a person with mental illness who had been restrained for at least one year; having completed elementary school or an equivalent level of education; having no family history of mental illness; being able to read and write; and having no verbal communication disorder. The exclusion criteria included: respondents who did not complete the questionnaire, did not attend all intervention sessions, withdrew before signing the informed consent, or died during the data collection process. Based on these criteria, 40 respondents were selected as research samples.

Variable

The dependent variable is community stigma toward people with post-restraint mental illness, and the independent variable is mental health education through the FGD method.

Instruments

Stigma was measured using the Community Attitudes Toward the Mentally Ill (CAMI) questionnaire, which has been translated into Indonesian. CAMI questionnaire consists of four dimensions: authoritarianism, benevolence, social restrictiveness, and community mental health ideology. Of the 40 statement items tested for validity and reliability, 35 items were declared valid with r values ranging from 0.365 to 0.786, exceeding the r table of 0.361 at the 5% significance level. Five items (numbers 5, 17, 18, 26, and 40) were dropped because r count < r table. The questionnaire was also reliable with a Cronbach's Alpha value of 0.728, indicating good internal consistency (Hasrianti, 2023). The retained 35 items still represent all four CAMI dimensions, as each dimension continued to be covered by multiple valid items, and no dimension was eliminated entirely. The internal consistency of each subscale remained within acceptable reliability thresholds, indicating that the construct coverage and conceptual integrity of the CAMI were preserved despite item reduction.

Intervention

The intervention in this study is mental health education through the FGD method, which was implemented based on a protocol. Respondents were divided into groups based on the village of residence to ensure contextual homogeneity and ecological validity of the FGD process. Individuals

Table 1. Characteristics of Respondents (n = 40)

Variable	Median	Min	Max	n (%)
Age (Years)	44.50	38	58	
Gender				
Male				13 (32.5%)
Female				27 (67.5%)
Socioeconomic Status				
Equal to or above minimum wage				3 (7.5%)
Below minimum wage				19 (47.5%)
No income				18 (45.0%)

Table 2. Results of Analysis of Scores Before and After Intervention (n=40)

Variable	Median (Min-Max)
Before Intervention	78.00 (67-101)
After Intervention	87.00 (71-113)

Table 3. Wilcoxon Signed-Rank Statistical Test (n = 40)

Variable	p-value	Rank
Difference in Stigma Before and After Intervention	0.000	Negative 1 Positive 39 Ties 0

Table 4. Differences in Community Stigma by CAMI Aspect

Aspect	Median		
	Pre	Post	Difference (Post-Pre)
Authoritarianism	20.00	13.00	-7.00
Benevolence	16.00	20.47	+4.47
Social Restrictiveness	19.00	20.00	+1.00
Community Mental Health Ideology	22.50	32.00	+9.50

from the same village share similar sociocultural norms, collective experiences, and prior exposure to post-restraint individuals with mental illness, which facilitates open discussion, mutual understanding, and richer interaction. In this study, respondents were divided into five groups of 6-10 people. The intervention was given to respondents gradually in four FGD meetings over one month. Each meeting lasted 30-45 minutes, and each group was facilitated by a facilitator. All facilitators have received a briefing session before data collection, including an orientation to the study objectives, mental health concepts, FGD guiding questions, and facilitation techniques. Regular coordination and debriefing among facilitators were conducted to maintain consistency of the educational intervention across all groups. Before the first FGD session, all respondents were asked to complete a pre-test questionnaire to measure their initial attitudes toward people with mental illness. After all intervention

sessions were completed, participants were again asked to complete the same questionnaire as a post-test to assess the effectiveness of the intervention.

The educational materials were systematically organized based on respondents' needs, informed by findings indicating that knowledge level is significantly associated with attitudes toward people with mental illness (Asriani et al., 2020). The materials included an understanding of the causes, treatment, and prevention of mental illness, as individuals with low knowledge levels tend to show negative attitudes toward people with mental illness. Therefore, the materials were developed to cover basic knowledge aspects. Topics discussed at each FGD meeting included: (1) Introduction to Mental Health; (2) Causes of Mental Illness; (3) Prevention of Mental Illness; and (4) Access to Services and Treatment. Stigma-related content was not presented as a separate theoretical topic during the FGD due to methodological

Table 5. Statements with the Most Change per Aspect of CAMI

Aspect	Item statements with	Comparison		Difference
		Pre	Post	
Authoritarianism	Almost anyone can become mentally ill.	2.5% (Disagree)	47.5% (Disagree)	+25% (Disagree)
Benevolence	It is best to avoid anyone with mental problems.	22.5% (Disagree)	45% (Disagree)	+22.5% (Disagree)
Social Restrictiveness	A woman would be a fool to marry a man who has suffered from a mental illness. even if it appears that he is fully recovered.	12.5% (Disagree)	32.5% (Disagree)	+20% (Disagree)
Community Mental Health Ideology	Having mentally ill patients living in residential neighborhoods may be a good therapy. but the risk to residents is too great.	20% (Strongly Agree)	0% (Strongly Agree)	-20% (Strongly Agree)
		27.5% (Disagree)	47.5% (Disagree)	+20% (Disagree)

considerations. The FGD was designed with a contextual and experiential approach, meaning that stigma was addressed implicitly through discussions of community perceptions, social reactions, exclusion, and acceptance of people with post-restraint mental illness. This approach was chosen to prevent defensive responses from community participants and to encourage reflective dialogue and attitude change. Importantly, stigma was clearly operationalized and measured in the pre-post assessment, ensuring consistency between the intervention and the study outcomes.

Data collection

Data was collected twice, before (pre-test) and after (post-test) the implementation of mental health education intervention through the FGD method. The instrument used was the Indonesian version of the CAMI questionnaire, which has been proven valid and reliable. The questionnaire consists of 35 statements covering four aspects of attitudes toward people with mental illness, namely Authoritarianism, Benevolence, Social Restrictiveness, and Community Mental Health Ideology. Completion was done directly with the assistance of researchers and facilitators to ensure participants' understanding. The results of the pre-test and post-test were analyzed to evaluate changes in attitudes after the intervention.

Data analysis

The analysis included frequency, percentage, median, minimum, and maximum values to describe demographic characteristics and stigma distribution. The Shapiro-Wilk test showed that the data was not normally distributed ($p = 0.024$ pre-test; $p = 0.002$ post-test). Therefore, the Wilcoxon Signed-Rank test was used to assess significant differences in stigma levels before and after the intervention. Data was analyzed using SPSS version 22.

Ethical consideration

This study was approved by the Health Research Ethics Committee (KEPK), Faculty of Nursing, University of Jember, under approval number 014/UN25.1.14/KEPK/2025. Before the pre-test and intervention were conducted, all participants were given a detailed explanation of the objectives, research methods, potential risks, and benefits through in-person information sessions. Participants were assured of the confidentiality and anonymity of their responses in accordance with research ethics principles. Consent for participation was obtained in writing through an informed consent form. All data was stored securely and could only be accessed by the research team to maintain the privacy of the study participants.

Results

Based on the respondents' characteristics, age was not normally distributed ($p = 0.018$) and is therefore presented as a median of 44.50 years. Most of the respondents were female (67.5%). Based on socioeconomic status, most respondents had incomes below the minimum wage (47.5%), while 45.0% had no income (Table 1).

Before the intervention, most of respondents were in the high stigma category. After the intervention, the number of respondents with high stigma decreased significantly while the number of respondents in the low stigma category increased (Figure 1).

The median score before the intervention was closer to the minimum value, indicating a relatively high level of stigma. After the intervention, the median score increased, indicating an improvement in the level of stigma, although still in the low value range (Table 2).

The Wilcoxon Signed-Rank test results showed a significant value of $p = 0.000$ ($p < 0.05$), indicating

a significant difference between the pre-test and post-test scores. A total of 39 respondents experienced a decrease in stigma score (positive rating), one respondent experienced an increase in stigma (negative rating), and no one had a fixed score (Table 3).

There was a change in the median of four aspects in the CAMI questionnaire. Three aspects improved after the intervention, namely benevolence, social restrictiveness, and community mental health ideology, with the highest improvement observed in the community mental health ideology aspect. One aspect, authoritarianism, decreased. The decrease in authoritarianism and the increase in benevolence and community mental health ideology reflected a decrease in stigma, while the increase in social restrictiveness showed an increase in stigma (Table 4).

The most significant change is seen in the authoritarianism aspect, with a 25% increase in disagreement with the statement "Almost anyone can become mentally ill," which shows an understanding that mental illness can be experienced by anyone. On benevolence, disagreement with the statement "It is best to avoid anyone with mental illness" increased by 22.5%, reflecting the growth of empathy toward people with mental illness. On social restrictiveness, disagreement with the statement "A woman would be foolish to marry a man who has suffered from mental illness, even though he seems to be fully recovered" increased by 20%, indicating the beginning of social acceptance in the context of personal relationships. While on community mental health ideology, there was a 20% decrease in "strongly agree" and 20% increase in "disagree" responses to negative statements about the presence of people with mental illness in the

neighborhood, reflecting an increase in community acceptance (Table 5).

Discussion

Characteristics of Respondents

Age

The median age of respondents in this study was 44.50 years, which is categorized as middle adulthood (Hurlock, 2012). This is based on data from the Central Bureau of Statistics, which shows a large proportion of Indonesia's population in this group, also reflected in the research area (Center for Statistics, 2023; Centre for Statistics of Jember Regency, 2024). According to Erikson (Rizki, 2022), individuals of this age are at the developmental task of generativity versus stagnation, focusing on productivity, social contribution, and guiding the next generation. At the same time, according to Hurlock (2012) in Rizki (2022), this age is the most stable period experienced by individuals emotionally; so, they can control themselves well. These characteristics also support the effectiveness of FGDs in shaping a more open and accepting attitude toward people with post-restraint mental illness.

Gender

Most of the respondents in this study were female, 27 (67.5%), while 13 (32.5%) were male. This difference can be attributed to the higher number of low-educated women in rural areas (Iqbal et al., 2023) and the high involvement of women in the study area in social activities, especially in the health and family sectors. The dominance of

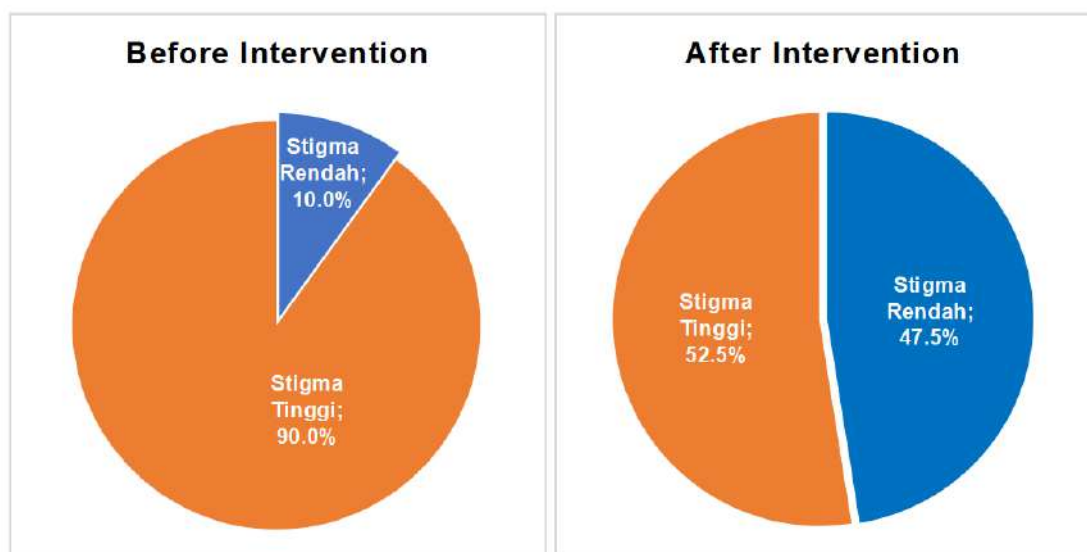


Figure 1. Distribution of Stigma Categories Before and After Intervention (n = 40)

female respondents in this study reflects a rural community group whose education, social roles, and involvement in health issues actively contribute to the dynamics of the discussion on the stigma against people with post-restraint mental illness and are relevant in promoting social change at the community level.

Socioeconomic Status

Based on the research data, 3 respondents (7.5%) had an income equal to or above the minimum wage, 19 people (47.5%) had an income below the minimum wage, and 18 respondents (45.0%) had no income at all. This is based on 2023 data from the Central Bureau of Statistics of Wuluhan District, which shows that the largest proportion of employment is in the agriculture and livestock sector, with a total of 30,087 individuals (Centre for Statistics of Jember Regency, 2024). This sector generally has a low economic status because it depends on uncertain agricultural yields (Amelia et al., 2021). Research by Rusdiadi et al. (2024) also revealed that many farming households experience difficulties in achieving economic welfare. These characteristics reflect the socioeconomic status of the community in the study area, most of whom have incomes below the minimum wage due to the dominance of the agriculture/livestock sector, which has not been able to guarantee economic welfare.

Overview of Community Attitude toward Stigma Before and After Intervention

Overview of Community Attitude toward Stigma Before Intervention

Before the intervention, most respondents (90.0%) had a high attitude toward stigma of people with post-restraint mental illness, and only 10.0% had a low attitude toward stigma, with a median score of 78.00 (67-101). These results indicate that most of the community is highly stigmatized, which may hinder the social acceptance of people with post-restraint mental illness. This high attitude toward stigma is influenced by the community's lack of knowledge and understanding of mental health (Fatin et al., 2020). This is consistent with the characteristics of the respondents, all of whom had low educational attainment, primarily at the elementary school level. This was also reflected in their responses when asked to define "mental health," as many described incorrect characteristics of mental illness and expressed beliefs that mental illness is caused by supernatural factors.

Local culture in agricultural areas also reinforces stigma, particularly the tendency to view mental illness as a sign of weakness (King et al., 2023). In addition, mental health education is still limited to school children, while it has not been conducted in the general community, and many people are unaware that community health center provide mental health services. This ignorance is compounded by concerns about the cost of

treatment. According to Goffman's (1964) stigma theory in Ihsan (2024), this condition causes people with mental illness to experience social exclusion. Based on the findings and references, the high level of stigma towards people with post-restraint mental illness before the intervention was caused by low understanding, community culture, and limited access and information on mental health services.

Overview of Community Attitude toward Stigma After Intervention

After the intervention, the proportion of high attitude toward stigma decreased (52.5%), while low attitude toward stigma increased (47.5%), with the median score remaining in the high category, namely 87.00 (71-113). The low median score among all respondents can be attributed to the characteristics of people living in rural areas (rural), who generally have strong cultural values (Saleena, 2022) and the low education level of respondents which makes the process of receiving and understanding information more limited (Akbar et al., 2020). Although health education through FGDs can reduce stigma, a more in-depth strategy is needed to achieve optimal changes in rural communities.

Differences in Community Attitude toward Stigma Before and After Intervention

Differences in Community Attitude toward Stigma Based on Percentage, Median, and Wilcoxon Signed-Rank Test

The difference in community attitude toward stigma of people with post-restraint mental illness can be seen in several ways. First, the percentage of respondents with high attitude toward stigma levels decreased from 90.0% to 52.5%, and the percentage of respondents with low attitude toward stigma increased from 10.0% to 47.5%. Second, the median score increased from 78.00 (67-101) to 87.00 (71-113), indicating a decrease in attitude toward stigma, although it is still in the high category. Third, the Wilcoxon Signed-Rank test showed a significant difference ($p = 0.000$), with 39 respondents experiencing a decrease in stigma, and only one respondent showing an increase.

This result is in line with the research of Muiswanah et al. (2023), which emphasized that increased community knowledge contributed to a more positive attitude change toward people with mental illness, and Wahyudi et al. (2024), indicating that FGD participants experienced increased understanding after participating in group discussions. FGDs have also proven effective in reducing stigma on other health issues, such as PLWHA (Putri et al., 2022). Nola J. Pender's Health Promotion Model supports this, where health behavior change is influenced by awareness, perceived benefits, and social support (Yani & Ibrahim, 2017). Meanwhile, the increase in attitude toward stigma in one respondent may be explained by differences in individual responses

to the information provided. Factors such as age affect how a person absorbs information (Corrigan et al., 2012). Therefore, naturally, a 53-year-old respondent would show a more negative attitude after the intervention. In addition, Seidler et al. (2016) emphasized that traditional gender views, particularly in adult males, can be a barrier to receiving educational messages that emphasize empathy or gentleness in understanding mental conditions. In this study, one male respondent may have perceived the educational material as conflicting with his masculinity values, leading him to reject the information and maintain stigmatizing attitude towards people with post-restraint mental illness.

Differences in Attitude toward Stigma Based on CAMI Aspects

Differences in community attitude toward stigma of people with post-restraint mental illness are also supported by the results of the analysis on each aspect of the CAMI instrument. High scores on the authoritarianism and social restriction aspects reflect high community stigma towards people with mental illness, while high scores on the benevolence and community mental health ideology aspects indicate lower levels of stigma (Zaini et al., 2024). The following is a description of each aspect:

Authoritarianism

The median score after the intervention decreased from 20.00 to 13.00 (a difference of -7.00), indicating a decrease in authoritarian attitudes towards people with post-restraint mental illness. According to Safitri et al. (2022) and Zaini et al. (2024), the low score in this aspect indicates that the community does not consider individuals with mental illness inferior to other members of the community. A significant shift was also seen in the statement item that mental illnesses are only experienced by certain groups; the answer "disagree" increased from 22.5% to 47.5%. This result is in line with Rahayu and Nugraha (2024), which shows low attitude toward stigma in this aspect, because people consider that almost everyone can experience mental illness. This finding is different from the results of Seo and Kim (2010), where education using online media did not significantly change the authoritarian attitude of people with mental illness, indicating that the intervention using the FGD method in this study was more effective in reducing the authoritarian attitude of the community towards people with mental illness. Participants also admitted that they began to see people with post-restraint mental illness more humanely, although there were still concerns about the potential aggressive behavior of people with post-restraint mental illness.

Benevolence

There was an increase in the median from 16.00 to 20.47, with a difference of +4.47. According to Safitri et al. (2022) and Zaini et al. (2024), this high score

indicates that the community tends to be humanizing and sympathetic towards people with mental illness. Disagreement with the statement "It is best to avoid anyone with mental illness" increased from 22.5% to 45%. The increase of 22.5% in the "Disagree" category indicates an increase in empathy and openness, which reflects a more supportive and less ostracizing view of people with mental illness. This result is inconsistent with a study by Seo and Kim (2010), which emphasized that education with online media did not provide significant changes in the benevolence aspect. This comparison suggests that the FGD intervention is more effective in increasing community compassion towards people with mental illness. The results are reinforced by the participants' responses when they received the materials in the FGD, which showed a positive change in the way they interact with people with mental illness. Participants began to understand the importance of treating people with mental illness humanely, such as inviting conversation and not judging, as a tangible form of increasing empathy and the quality of social interaction.

Social Restrictiveness

There was an increase in the median from 19.00 to 20.00 (difference +1.00). According to Safitri et al. (2022) and Zaini et al. (2024), the tendency of high scores in this aspect indicates that the community still considers people with mental illness as threatening individuals. This result is in line with Seo and Kim's (2010) study, which found that education did not provide a significant change in social restrictions by the community on people with mental illness. However, there was a change in the item "A woman would be a fool to marry a man who has suffered from a mental illness, even if it appears that he is fully recovered.", where disagreement increased from 12.5% to 32.5%. This increase reflects the community's growing acceptance of people with post-restraint mental illness in the context of personal relationships. Another indication can be seen from the existence of the neighborhood security post as a space for social interaction between people with mental illness and the community. After the intervention, respondents also began to be willing to interact, although it is still situational and has not been completely released from the sense of vigilance.

Community Mental Health Ideology

There was a significant increase, with the highest pre-post-test difference compared to other aspects, from 22.50 to 32.00, with a difference of +9.50. Disagreement with the statement "Having mentally ill patients living in residential neighborhoods may be a good therapy, but the risk to residents is too great." increased from 27.5% to 47.5%, while the "strongly agree" response decreased from 20% to 0%. According to Safitri (2022) and Hasrianti (2023), the high score on this aspect indicates community acceptance of mental health and the services of

Fitria, Y., et al. (2026)

people with mental illness in the community. Although the initial score on this aspect was already high, the score increase after the intervention shows that the FGD intervention strengthened this acceptance. This shift shows that the community's concern about people with post-restraint mental illness has been replaced with the belief that support from the social environment plays an important role in the recovery process. According to Jung and Baik (2005) in Seo and Kim (2010), when an individual knows mental health, his/her positive attitude towards mental health ideology in the community tends to be high. Some respondents also recognized the importance of mental health education after participating in the FGD. They considered this activity useful and thought that it should be held more often. However, there were views that imply doubts about the effectiveness of education in rural environments. Some respondents felt that rural communities often find it difficult to receive information through an educational approach, indicating the need for strategies more suited to the local social and cultural context.

Overview of Respondents' Perceptions by FGD Topic

In the first meeting (Introduction to Mental Health), respondents began to understand that mental illness is not limited to extreme behavior, but also includes symptoms such as stress, withdrawal, behavioral changes, or sleep disturbances. Then, the second meeting (Causes of Mental Illness) explained that social, economic, and trauma factors contribute to mental illness, although some respondents still attributed mental illness to a lack of faith or spiritual influence. Furthermore, the third meeting (Prevention of Mental Illness) touched on emotional aspects and personal experiences. Respondents realized the importance of sharing stories, getting social support, and not harboring problems. Lastly, the fourth meeting (Access to Services and Treatment) helped change attitudes from excluding people with mental illness to a greater acceptance of the importance of treatment and the availability of mental health services.

The FGDs provided an opportunity for participants to explore various views, share experiences, and correct negative prejudices, to create a more comprehensive and informed understanding. The topics covered in the discussions, ranging from mental health concepts, causes, prevention to the importance of treatment, provided space for participants to understand the issue from various sides. The role of the FGD facilitator was also important in determining the results of this study. Facilitators who are able to manage group dynamics can create a conducive environment for respondents to express their opinions (Ridlo et al., 2018). In this study, the facilitator was able to direct the discussion effectively and understand the group dynamics, so that the FGD resulted in significant changes in respondents' stigma after the intervention. In

addition, the involvement of community leaders in educational initiatives may further support efforts to reduce stigma associated with restraint (Agustina et al., 2025). In this study, community leaders such as the village secretary and dusun (sub-village) head were also involved in encouraging the community to actively participate in regular discussions, as well as creating a sense of security and comfort for the community to participate. This created a conducive atmosphere for the community as FGD respondents reflected on their perceptions and attitudes towards people with post-restraint mental illness, resulting in a more positive shift in attitudes.

Conclusion

Based on the results of the study, before the intervention, most of the respondents showed a high level of stigma towards people with post-restraint mental illness, and some respondents showed low stigma. After the intervention, there was a decrease in high stigma and an increase in low stigma. There is a significant difference between before and after the intervention, indicating that mental health education delivered through the FGD method had an effect on community attitudes toward stigma of people with post-restraint mental illness in the working area of Wuluhan Community Health Center. The community is advised to be more active in seeking correct information about mental health, building empathy, and supporting the social reintegration of people with post-restraint mental illness. Wuluhan Community Health Center is expected to continue providing services to people with post-restraint mental illness to strengthen support for them.

Declaration of Interest

The authors declare that they have no conflict of interest related to this study.

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Data Availability

The data used in this study is available upon request to the corresponding author and are not published openly to maintain participant confidentiality.

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Enhancing bullying prevention among Indonesian adolescents through Digital Social–Emotional Skills Training (D-SEST): A quasi-experimental study

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Abstract

Background: Bullying among adolescents in schools has both short- and long-term negative consequences for victims as well as perpetrators. Documented impacts include anxiety, feelings of insecurity, reduced concentration, declining academic performance, and depression. Social–emotional approaches to bullying prevention have not been widely implemented among adolescents, despite the need for comprehensive intervention strategies.

Purpose: This study aims to examine the effect of Digital Social–Emotional Skills Training (D-SEST) on preventing bullying among adolescents in school settings.

Methods: This experimental study involved 106 adolescents identified as being at high risk of bullying perpetration. Participants were assigned to two equal groups: intervention and control ($n = 53$ each). Adolescents in the intervention group received information and training through the D-SEST program. Outcomes were measured by assessing bullying risk and helping behavior toward victims. The Wilcoxon signed-rank test and Mann–Whitney U test were used to analyze within-group and between-group differences.

Results: Adolescents who participated in D-SEST showed significant improvements in their ability to help bullying victims ($M_{pre} = 1.30$ vs. $M_{post} = 2.32$) and in bullying prevention skills ($M_{pre} = 1.64$ vs. $M_{post} = 2.91$), with $p < 0.001$.

Conclusion: Thus, this study contributes to the understanding of how digital-based social–emotional training influences adolescents' responses as helpers to bullying victims by enhancing empathy, sense of belonging, and social skills. These improvements may play an important role in preventing bullying behavior in school settings.

Keywords: bullying; social emotional skill training; digital; adolescent; schools

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Introduction

Bullying is highly pervasive in various countries, especially bullying in schools (Guy et al., 2019). Adolescents are at high risk of being involved in bullying cases, whether they are victims or perpetrators (Bowes et al., 2019) and bullying is a common experience among adolescents (Le et al., 2017). Bullying is synonymous with aggressive actions carried out on others with the aim of being hurt and repeatedly (Pontes et al., 2018). Bullying incidents involving adolescents often occur in the school environment, so it can disrupt social interactions between students and cause insecurity and discomfort in activities in the school environment, which is frequently overlooked (Jan, 2015; Kibriya et al., 2015).

Ignoring bullying cases can cause potential problems and disrupt the learning process and student interactions at school, bullies tend to avoid activities and not focus during learning activities (Cheng et al., 2010; Lefta et al., 2023). In addition, bullying has short-term and long-term impacts, where the long-term impact of bullying on victims is on aspects of quality

of life related to physical health conditions (Chen & Huang, 2015); has an impact on psychological health and well-being (Le et al., 2016; World Health Organization, 2022); and also disruptive cognitive processing in adolescence, low self-efficacy in particular (Liu et al., 2023). This situation shows that the negative impact of bullying is very detrimental to the adolescent group, it is important to provide special interventions by strengthening the adolescent's self-capacity to control bullying cases, especially in Indonesia.

Research conducted in 40 countries involving 202,056 school adolescents showed a prevalence of 12.6% as victims of bullying and 10.7% as perpetrators (Silva et al., 2019). World Health Organization (WHO) reported that the global incidence of bullying is estimated to reach one billion adolescents who experienced physical, sexual, or emotional violence or neglect in the past year, especially children aged 2-17 years (World Health Organization, 2022). The Global school-based student health survey (GSHS) revealed in 2015 that 32% of Indonesian students aged 13 to 17 years-old had experienced physical violence and 20% had been bullied in their school (Borualogo & Casas, 2022). The Indonesian National Commission for Child Protection revealed that there were 2.473 cases of bullying at school, from 2011 to 2019 (Indonesian Child Protection Commission, 2020). Bullying cases can increase drastically without proper intervention and collaboration for adolescents.

Various interventions for handling bullying in adolescents in schools are quite diverse. Some of these programs include the "Tutoría Entre Iguales" (TEI) program, a school program with a peer-tutoring approach that enhances a positive school climate through problem-solving programs to reduce and prevent cyberbullying (Ferrer-Cascales et al., 2019); The KiVa anti-bullying, KiVa derived from the Finnish word for "nice" and an acronym for "against bullying," this program trains teachers to teach children safe strategies for preventing bullying. The KiVa program are considered quite effective in preventing bullying through self-assessment tested with an ordered multinomial model and a binomial logistic regression model (Huitsing et al., 2020); and the Olweus bullying prevention program (OBPP) is a comprehensive bullying prevention program that involves students, staff, teachers, and parents or families in its interventions. This intervention focuses on encouraging pro-social behavior and building a sense of community. This Program significantly reduces the prevalence of bullying in German schools (Ossa et al., 2021). Based on previous research, many studies have focused on improving peer tutoring, the role of teachers in educating about bullying prevention, and comprehensive approaches involving parents. Meanwhile, previous research has shown that bullies tend to experience difficulties adjusting their social and emotional functioning, and this has not been implemented as an intervention approach (Fullchange & Furlong, 2016).

Social emotional learning (SEL) is a long-term educational model that can improve children's abilities and skills in managing emotions. This model was initiated with the aim of dynamically connecting schools, families and communities (Elias et al., 1997). SEL has so far only been intended for curriculum development in schools (Blewitt et al., 2018). The social emotional aspect is rarely revealed and developed as a main component in handling bullying cases; the impact of digital-based social emotional teaching needs to be proven. The digital approach to preventing bullying in adolescents is considered very suitable because it is in line with the developmental characteristics of adolescents as digital natives, digital as a current pattern of social interaction, and several interventions that are easily accessible. Empirical evidence regarding the effectiveness of digital-based social-emotional learning interventions as a bullying prevention strategy among adolescents in Indonesian schools is still limited. This study aims to determine the effect of digital social-emotional learning on preventing adolescent bullying in schools.

Materials and Methods

Design

This study employed a quasi-experimental design with a pre-post test control group to compare the effectiveness of the intervention before and after implementation. The treatment group received the Digital Social-Emotional Skills Training intervention delivered across four sessions, whereas the control group received standard bullying education typically provided by local health services.

Sample and setting

The participants were composed of adolescents who were still attending in public junior high schools in Lamongan (Indonesia) with total 326 adolescents. This study used a purposive sampling technique based on inclusion and exclusion criteria determined by the researcher. A total of 106 selected respondents were randomly divided into a control group and a treatment group with 53 adolescents, respectively (Figure 1). The inclusion criteria for this study were (1) adolescents aged 12-15 years; (2) adolescents who are currently undergoing formal education in junior high schools, (3) adolescents who are at risk of bullying in the last 3 months; (4) not physically or mentally ill or disabled, (5) can be communicated with properly and correctly. Meanwhile, the exclusion criteria in this study were adolescents who did not receive education at public junior high schools in Lamongan Regency, were on leave or study leave, and adolescents who refused to become research respondents.

Instruments

Age, gender, grade and place of residence were all collected using a self-designed questionnaire.

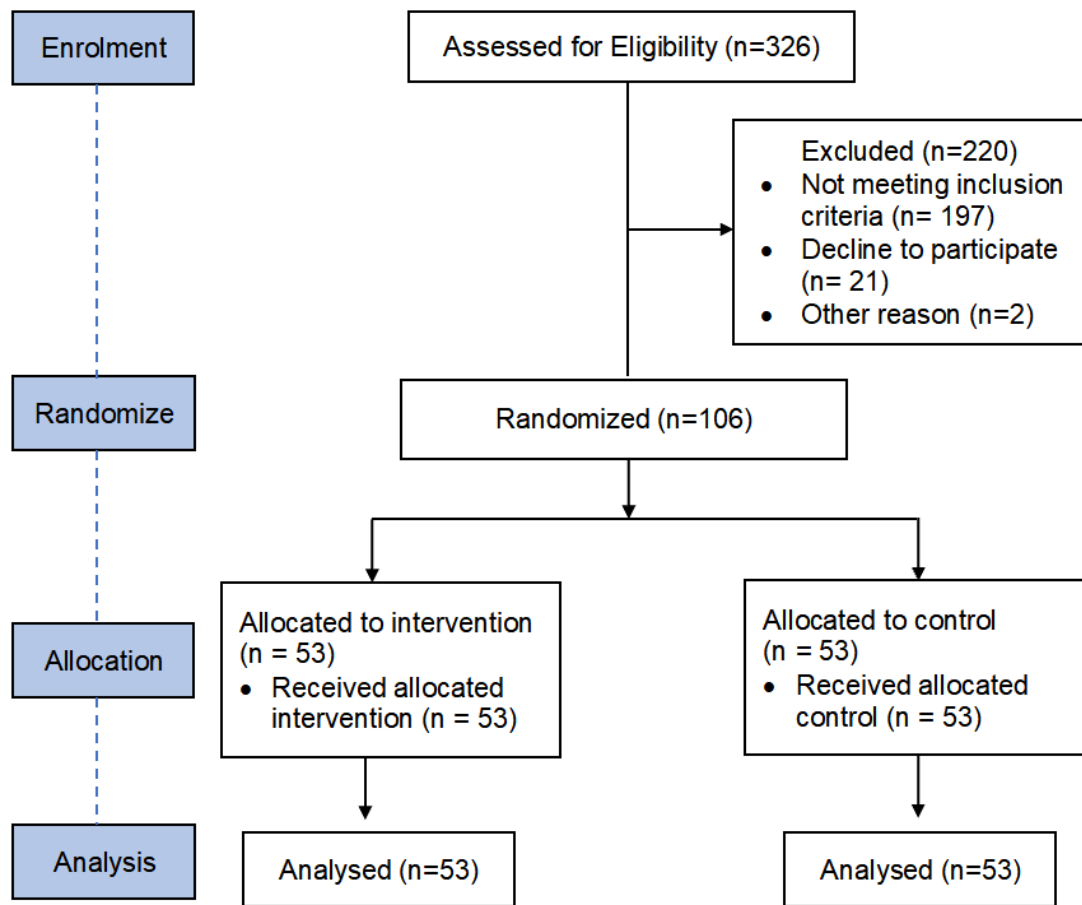


Figure 1. CONSORT 2010 Flow Diagram

Digital social emotional skill training

The intervention given to the treatment group was to provide digital-based social emotional training created and developed by researchers based on previous literature (Payton et al., 2000). Although formal psychometric validation was not conducted at this stage, expert observations and preliminary testing support the content validity and practical applicability of the program. This application called as Digital Social Emotional Skill Training (D-SEST). This social emotional skills training consists of several components, such as self-management, self-awareness and social-awareness, responsible decision-making and relationship skills. All of these components will be packaged in one application that can be accessed in real time by respondents with interesting features and the nature of exploring respondent information. Participants in the control group did not receive the digital social-emotional skills training. Instead, they were provided with standard information on bullying prevention through printed educational leaflets.

Bully Scale

The bully scale or bullying perpetrator was measured using a questionnaire from the English

version of the Questionnaire on School Bullying which consists of 17 questions (Figula et al., 2019). This questionnaire was adapted into Indonesian through forward translation, back-translation, and cultural adaptation within the research environment. The initial translation from English to Indonesian was carried out independently by a translator. The researcher then summarized the Indonesian version, which was then back-translated into English by another bilingual translator not involved in the initial translation process. It is explained that there are several question domains, including the physical aggression subscale (4 questions), verbal aggression subscale (5 questions), exclusion subscale (5 questions), and positive profit subscale (3 questions). Grading takes place according to the following scale: almost never (0), sometimes (1), often (2), almost always (3). The internal consistency of the factor was adequate Cronbach's alpha of 0.86.

Helper participant Scale

Helper participant scale or ability to help victims of bullying was measured using a questionnaire from the English version of the Questionnaire on School Bullying which consists of 8 questions (Figula et

Table 1. Session and Intervention of Digital Social Emotional Skill Training (D-SEST)

Session	Duration	Intervention
Session 1: Bullying Education	30 minutes	Explanation to adolescents about bullying and how to handle it. In this session, the researcher confirmed the results of the previous stage evaluation and made them aware that they were at risk of being bullies.
Session 2: Explanation and practice of self-management	30 minutes	Adolescents receive information and training on improving their ability to control various holistic elements within themselves such as physical, emotional, feelings, thoughts and behavior to achieve good and targeted things.
Session 3: Explanation and practice of Self Awareness	30 minutes	Adolescents receive information and training on how to improve their abilities in understanding awareness of thoughts, feelings, and self-evaluation. The goal is for teens to be able to know the strengths, weaknesses, drives, and values of themselves and others.
Session 4: Explanation and practice of Social Awareness	40 minutes	Adolescents receive information and training on how to raise awareness of issues faced by their society or community, especially while at school.
Session 5: Explanation and practice of Responsible Decision Making	40 minutes	Adolescents receive information and training on how to improve their ability to make appropriate decisions that do not harm others and consider the values and ethics that apply in the community.
Session 6: Explanation and practice of Relational Skill	40 minutes	Adolescents receive information and training on how to improve their communication, listening, cooperation, resistance to social pressure or bullying, negotiation of conflict constructively, and seeking and offering help when someone needs it.

al., 2019). This questionnaire was adapted into Indonesian through forward translation, back-translation, and cultural adaptation within the research environment. The initial translation from English to Indonesian was carried out independently by a translator. The researcher then summarized the Indonesian version, which was then back-translated into English by another bilingual translator not involved in the initial translation process. There are several question domains including reconciling interposition subscale (3 questions), interposition appealing for help subscale (2 questions) and Affective Subscale (inner tension in relation to the violence) (3 questions). Grading takes place according to the following scale: almost never (0), sometimes (1), often (2), almost always (3). The internal consistency of the factor was adequate Cronbach's alpha of 0.76.

Intervention

The treatment group received six offline sessions of digital social-emotional skills training, each lasting approximately 30 to 40 minutes. The meetings were held weekly, as follows The 1st meeting is training on bullying education and training on self-management, the 2nd meeting is training on self-awareness and social-awareness, the 3rd meeting is training on making the right decisions (responsible decision making) and relationship skills. Participants in the control group did not receive the digital social-emotional skills training. Instead, they were provided with standard information on bullying prevention

through printed educational leaflets.

Data collection

Before the study began, the researcher ensured that this study was declared ethical by the health research ethics commission. Adolescents who meet the inclusion and exclusion criteria and are willing to sign informed consent will be included as research respondents. The study began with initial data collection conducted on 326 respondents who were at risk of bullying, and then determined 106 respondents who had the highest scores. Furthermore, this data was validated by the school (teachers) related to subjective assessments of student behavior while at school.

The respondents received information about the definition, objectives, benefits, disadvantages and research procedures that would be carried out during the research, at the end respondents would fill out an informed consent. The intervention was carried out at one of the schools in Lamongan district which was considered strategic for providing education with large capacity. The Respondents will be divided into control and treatment groups with the same proportion. The control and treatment groups will fill out a bullying prevention skills questionnaire before and after (pre-post) the intervention is given.

Data analysis

This study used descriptive statistical tests to see the distribution of data, as well as to see the mean and standard deviation. The Mann-Whitney test was

conducted to analyze possible differences between groups before the intervention. Then, the main analysis was conducted to investigate the intragroup intervention effects between pre-test and post-test data collection, the Wilcoxon test was conducted with each group. The SPSS 16.0 software program was used to process the data.

Ethical consideration

This study has been reviewed and approved by the Health Ethics Committee of Muhammadiyah University of Lamongan (Approval Number 145/EC/KEPK-S4/07/2024). Adolescents who consent will provide an informed consent to participate and will obtain permission from their school, acting as institutional guardian, to conduct the study. Confidentiality and anonymity are guaranteed

throughout the study, and participants are allowed to withdraw at any time without penalty.

Results

Table 1 shows that the results of the analysis show that the majority are male groups and the majority are grade 8 respondents. Some of them also participate in extracurricular activities while at school and lives with their nuclear family.

The results of the Wilcoxon and Mann Whitney tests are shown in Tables 2 and 3 showing the impact of the intervention. In the experimental group, significant differences were found between before and after the intervention in the variables of bullying prevention ability and ability to help bullying victims. In both variables, the scores after the intervention

Table 1. Demographic Data

Characteristic	n	%
Gender		
Male	66	62.3
Female	40	37.7
Age		
12 years old	27	25.5
13 years old	40	37.7
14 years old	39	36.8
Grade		
7 Class	31	29.2
8 Class	53	50.0
9 Class	22	20.8
Lives with		
Nuclear Family	91	85.8
Aunt/Uncle	13	12.3
Grandma or Grandpa	2	1.9

Table 2. The Comparison of Effect of Intervention

		Control Group (n = 53)			Experimental Group (n = 53)		
		M (SD)	Z	p	M (SD)	Z	p
Bullying Prevention	Pre	1.32 (0.510)	- 1.732	0.083	1.64 (0.522)	- 6.413	0.000
	Post	1.38 (0.527)			2.91 (0.295)		
Helping Victims	Pre	1.21 (0.409)	- 2.000	0.046	1.30 (0.463)	- 6.474	0.000
	Post	1.28 (0.455)			2.32 (0.471)		

Table 3. The Differences between Group After the Intervention

	Control Group (n = 53) M (SD)	Experimental Group (n = 53) M (SD)	Z	p
Bullying Prevention	1.38 (0.527)	2.91 (0.295)	- 9.076	0.000
Helping Victims	1.28 (0.455)	2.32 (0.471)	- 7.828	0.000

were higher than before. Specifically, the mean score for bullying prevention in the experimental group was 2.91 (SD = 0.295), while in the control group it was 1.38 (SD = 0.527). The Mann–Whitney test indicated a significant difference between the two groups ($Z = -9.076$, $p = 0.000$), suggesting that the intervention effectively improved participants' ability to prevent bullying behavior. Similarly, for the helping victims variable, the experimental group obtained a higher mean score ($M = 2.32$, $SD = 0.471$) than the control group ($M = 1.28$, $SD = 0.455$), with a statistically significant difference ($Z = -7.828$, $p = 0.000$). These results indicate that the D-SEST intervention substantially enhanced adolescents' empathy and prosocial behavior, particularly their willingness and ability to support peers who experience bullying.

Discussion

The Digital Social Emotional Skills Training (D-SEST) intervention significantly impacted bullying prevention among adolescents after participants received the intervention according to the researchers' guidelines. The results showed an increase in the ability to help victims of bullying and a decreased risk of becoming perpetrators of bullying. This is supported by previous research that social skills are important in anti-bullying interventions and form the basis of cross-sector interventions, including peer mentoring and cooperative learning (Gregus et al., 2020; J. L. da Silva et al., 2018). Other research suggests that adolescents with high levels of empathy tend to be more active in defending victims of bullying, while those with low levels of empathy tend to reinforce bullying behavior or act as passive bystanders (Graf et al., 2019; Hikmat et al., 2024; Longobardi et al., 2020).

These findings highlight the impact of delivering a digitally packaged five-component social-emotional learning intervention. Programs that include social and emotional skills training, awareness campaigns, and learning approaches that promote tolerance and respect for diversity can potentially reduce the incidence of bullying in adolescents (Hikmat et al., 2024). Social skills, in this context, relate to students' empathy in recognizing and responding to the emotions of others during interactions, thereby reducing the likelihood of engaging in bullying behavior (Nasti et al., 2023). Other research confirms that programs that improve social skills can enhance positive peer relationships and can be implemented in school settings, such as fostering attachment, togetherness, and a sense of belonging (Suresh & Vijaya, 2023).

In addition to social characteristics, cultural characteristics are now being considered. This is reinforced by previous interventions that suggest that interventions based on sociocultural characteristics and focused on SCT theory can reduce bullying and victimization (Salimi et al., 2019). Furthermore, recent research suggests that a positive culture that

supports bullying prevention in schools involves parents, teachers, administrators, and community members (Donoghue et al., 2025). The involvement of all parties in controlling bullying in schools is crucial, given the different roles each component plays.

This study emphasizes the potential of digital-based social-emotional learning interventions in developing adolescents' emotional and social competencies. Previous research has demonstrated the importance of assessing school climate and implementing gender- and grade-level-specific prevention programs focused on social-emotional learning (Yang et al., 2020). The individuals with lower levels of moral detachment are less likely to be involved in bullying at school (Kokkinos & Kipritsi, 2018). Evaluation of decision-making skills was also found to be effective in preventing bullying. This finding aligns with previous research that suggests effective decision-making can encourage bystanders or victims to take action against bullying, thereby reducing its occurrence (Donoghue et al., 2025). Furthermore, decision-making using the logic model approach to anti-bullying in Abu Dhabi involved multiple stakeholders and resulted in a strategic framework tailored to local needs (Al-ketbi, 2025). Social skills that adolescents need to develop while at school to prevent bullying include self-management, social awareness, and decision-making. Teenagers who lack a sense of belonging tend to perceive themselves as outsiders, leading to abusive behavior.

In another aspect, this intervention has an influence on the ability of adolescents to improve their skills in helping victims of bullying, this is in line with recent research that improving social-emotional skills can create a more supportive environment for victims, such as helping in emergency situations and having a commitment to being involved positively (Xiao et al., 2025). Adolescent who have good interpersonal, good empathy and stress management skills tend to be able to help adolescent intervene effectively and support victims of bullying to live more meaningful lives (Song & Kim, 2022).

Children's decision-making is also influenced by policy decisions within the school environment. A key implication for nursing practice, particularly for community nursing, which plays a strategic role as educators, facilitators, and health advocates and to choose a social emotional approach as an effective intervention in preventing bullying, in addition it is important for schools to integrate digital-based social-emotional learning into their curriculum for first grade students. This study has several limitations that should be acknowledged, the research design was limited to a quasi-experimental approach with a relatively small sample size, which may restrict the generalizability of the findings to broader adolescent populations. The participants were recruited from a specific school setting, and differences in school climate, peer relationships, or socio-cultural backgrounds in other contexts

might influence the intervention outcomes. Second, the data were collected based on self-reported measures, which are subject to response bias and social desirability effects. Finally, the study did not control for all potential confounding variables, such as family dynamics, peer influence outside school, or prior exposure to anti-bullying programs, which could have affected the observed effects.

Conclusion

Digital Social Emotional Skills Training is effective in improving bullying prevention skills and victim-supporting behavior. These findings strengthen social behavioral theories and provide practical contributions to the development of mental health education and promotion programs among adolescents. Preventing bullying among adolescents in schools requires specific and comprehensive interventions. Academic-based approaches are no longer the primary factor; instead, students' socialization and emotion management skills are more important. Digital social-emotional skills training has a positive impact on reducing the risk of students becoming bullies. Schools and families play a crucial role in accustoming children to a life free from bullying.

Based on the results of this study, the Digital Social Emotional Skills Training program can be recommended to be integrated into school health programs to create a safe and positive environment and support the improvement of adolescent mental health, especially at the junior high school level. Future research is recommended to test the effectiveness of Digital Social Emotional Skills Training with a larger sample size and broader coverage.

Declaration of Interest

All authors declare that they have no conflict of interest.

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Data Availability

This data exists and is complete

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Benefits of preceptorship for strengthening nursing students' clinical competence in professional nursing education

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Abstract

Background: Preceptor ship is a structured clinical supervision model that facilitates nursing students' transition from academic learning to professional clinical practice. By integrating theoretical knowledge with supervised clinical experience, preceptorship plays a crucial role in developing students' clinical competence and professional readiness.

Purpose: To analyze the implementation of preceptorship and explore the contextual factors related to the development of nursing students' clinical competence during professional education.

Methods: This study employed a convergent mixed-methods design, integrating a quantitative descriptive component with a qualitative component. Quantitative and qualitative data were collected simultaneously, analyzed separately, and integrated during interpretation. A total of 51 clinical preceptors participated in the quantitative phase. From this cohort, 12 preceptors who met the predefined inclusion criteria were purposively selected for in-depth interviews in the qualitative phase. Quantitative data were analyzed using descriptive statistics, whereas qualitative data underwent thematic analysis. Findings from both datasets were integrated during the interpretation phase.

Results: The majority of preceptors were female (96%), had a bachelor's degree in nursing (84%), and had attended preceptor training (96%). Most respondents viewed the implementation of preceptorship positively, with 74% rating it excellent and 26% rating it good. Qualitative findings identified themes related to institutional support, preceptor competency, student preparedness, communication and collaboration, learning strategies, barriers to implementation, enabling factors, and preceptor expectations. Challenges included workload constraints, the theory-practice gap, and inconsistencies between academic and clinical practice.

Conclusion: Preceptorship was perceived positively as a support for clinical learning. Strengthening preceptor development, communication, and institutional collaboration is important to improve preceptorship implementation and students' clinical competence.

Keywords: clinical competence; clinical rotation; preceptorship

Introduction

Preceptorship is a structured clinical supervision approach designed to support nursing students' transition to professional practice and enhance their readiness to meet clinical competency standards. This provides ongoing, high-quality support and facilitates the integration of theory into clinical application. Generally, preceptorship has been recognized as an important strategy in bridging the gap between academic preparation and clinical performance (Alhassan et al., 2024). However, a major challenge in its implementation is the high workload of clinical nurses, which often

limits their capacity to fulfill their preceptor roles (Davis, 2024). Consequently, limited interaction between preceptors and preceptees can hinder effective communication, reflective learning, and optimal learning outcomes (Varghese et al., 2023). Preceptors are expected to demonstrate clinical expertise, teaching skills, and a professional attitude during clinical supervision of students (Chipwanya et al., 2024). However, they often seek institutional recognition and structured support for their role (Chan et al., 2025). Effective preceptorship requires a balance between the challenges of clinical care and the responsibilities of clinical supervision, while maintaining ongoing professional development. Preceptorship models vary across countries and institutions, depending on organizational structure, policies, and available resources (Ardinata et al., 2018; Davis, 2024). Ensuring adequate facilities and standardized clinical learning experiences is crucial for improving the quality of nursing care and educational outcomes (Dube & Rakhudu, 2021). Previous research has demonstrated the effectiveness of preceptorship in developing students' critical thinking, communication, interaction, and adaptation skills (Chua et al., 2022; Jung et al., 2020). Additionally, a study reported that preceptorship implementation was influenced by communication patterns and professional interactions between preceptors and students, which significantly affected students' clinical competency achievement (Wahyuni et al., 2019). However, qualitative evidence continues to highlight issues such as the preceptor's professional role, limited time for clinical supervision, and unmet expectations during the preceptorship process (Chan et al., 2025). Despite these challenges, there is limited empirical evidence on how preceptorship is implemented and the contextual factors associated with its implementation, particularly within Indonesian nursing clinical education (Chan et al., 2025). In Indonesia, preceptorship faces additional challenges, including inadequate preceptor preparation, heavy clinical workloads, and inconsistencies between hospital policies and academic curricula (Irwan et al., 2021). Therefore, this study aims to analyze the implementation of preceptorship and explore the contextual factors surrounding its implementation from the perspective of clinical preceptors to provide evidence for strengthening preceptorship practices and improving clinical learning outcomes.

Materials and Methods

Design

The study used a convergent mixed-methods approach in which quantitative and qualitative data were collected simultaneously and analyzed separately (Creswell, 2022). Quantitative data from clinical preceptors and nursing students were analyzed descriptively using frequencies and percentages to describe participants' characteristics and perceptions of preceptorship implementation.

Quantitative data were analyzed descriptively using frequency distributions and percentages. Questionnaire responses were classified into four implementation categories: excellent (81-100%), good (61-80%), fair (41-60%), and poor (<40%) based on predefined scoring criteria. In addition, questionnaire items were grouped into major domains of preceptorship implementation to evaluate trends across specific aspects of clinical supervision and preceptorship implementation. The qualitative data consisted of focus group discussions (FGDs) and in-depth interviews with clinical preceptors. Qualitative data were analyzed thematically through coding, categorization, and theme development to identify patterns and experiences related to the preceptorship implementation. Findings from the quantitative and qualitative data were integrated during the interpretation phase to provide a comprehensive understanding of preceptorship implementation in clinical nursing education (Fetters & Molina-Azorin, 2017).

Although the parent mixed-methods study involved both clinical preceptors and professional nursing students, the present article reports only findings related to preceptors' perspectives on preceptorship implementation. Data collected from nursing students were analyzed independently and are presented in a separate manuscript to provide a more in-depth understanding of students' perspectives.

Population and Sample

The target population consisted of 59 clinical preceptors who served as clinical supervisors during students' clinical rotations. The study employed a descriptive survey design involving a finite population. Therefore, the minimum sample size was estimated using the Slovin formula with a 5% margin of error, resulting in a required sample of 51 participants. Eligible preceptors who met the predefined inclusion criteria were subsequently recruited for the quantitative component. The final sample represented approximately 86% of the target population.

Data Collection

Quantitative and qualitative data were collected from December 2024 to January 2025 using two complementary approaches.

First, a quantitative approach was implemented by distributing structured questionnaires to students and preceptors. Before distributing the preceptors' questionnaires, an orientation session was held to foster a common understanding of the preceptorship concept and align perceptions of the implementation process. The questionnaire for preceptors focused on their experiences and roles in guiding students. Data collection was conducted using a structured questionnaire to facilitate accessibility and response accuracy.

Second, a qualitative approach was conducted through semi-structured interviews

followed by Focus Group Discussions (FGDs) involving preceptors and relevant stakeholder. Semi-structured interviews were undertaken to explore participants' individual experiences and perspectives in depth. Subsequently, FGDs were conducted to clarify and enrich the findings obtained from the interviews through discussion among clinical preceptors, academic preceptors, and key nursing leaders responsible for clinical education and quality management. The qualitative data were collected using semi-structured interviews and FGD guides developed from the literature on preceptorship implementation. The guides consisted of open-ended questions exploring institutional support, preceptor roles, student preparedness, communication, learning strategies, institutional policies, implementation processes, and both facilitating and inhibiting factors related to preceptorship implementation. All interviews and FGDs were conducted in the Indonesian language.

Research Instruments

The research instruments consisted of two components: a structured questionnaire assessing preceptorship implementation plus semi-structured interviews and FGD guides developed in accordance with the study objectives. Preceptorship implementation was measured using a structured Likert-scale questionnaire with four response options: never, rarely, sometimes, and often.

The questionnaire was adopted from a previously validated preceptorship questionnaire developed by [Nurhidayah et al. \(2019\)](#) and [Nurhidayah et al. \(2021\)](#). The original instrument consisted of 40 items assessing multiple aspects of preceptorship implementation. Following validity testing, six items were excluded, resulting in 34 valid items. The original study reported acceptable content and construct validity, with a Cronbach's alpha coefficient of 0.729, indicating acceptable internal consistency.

Data analysis

The study used a convergent mixed-methods approach, collecting quantitative and qualitative data simultaneously and analyzing them separately. Quantitative data from clinical preceptors were analyzed descriptively using frequencies and percentages to describe participants' characteristics and perceptions of preceptorship implementation. Qualitative data from FGDs were analyzed thematically through coding, categorization, and theme development to identify patterns and experiences related to the preceptorship process. Both datasets were integrated during the interpretation phase to complement and strengthen the overall understanding of preceptorship implementation in clinical nursing education.

Ethical consideration

Ethical approval for this study was obtained from the Health Research Ethics Committee of Universitas Sumatera Utara (Number:142/EC/KEPK/USU)

in 2024. Prior to data collection, coordination and administrative approval were obtained from Dr. Pirngadi General Hospital in Medan to facilitate the research process. All participants were informed about the purpose of the study, the procedures, the confidentiality of their data, and their right to withdraw from the study at any time without consequences. Written informed consent was obtained from all participants before participation. Participant anonymity and confidentiality were maintained throughout the research process.

Results

These study findings were derived from quantitative data collected through questionnaires and qualitative data obtained from interviews and focus group discussions. The analysis aimed to evaluate the effectiveness of preceptorship, identify supporting and inhibiting factors, and explore preceptors' perceptions of clinical supervision of students.

Most respondents were female (96%) and held a bachelor's degree in nursing (84%). Over half of the preceptors were aged 40-50 years (57%) and had 5-15 years of professional nursing experience (57%). Nearly all respondents (96%) had completed preceptorship training in accordance with AIPNI standards, whereas only 4% had participated in hospital-based preceptorship training.

Most preceptors perceived the implementation of preceptorship as excellent (74%), whereas 26% rated it as good. None of the respondents rated the implementation as fair or poor. These findings indicate that preceptors generally perceived the implementation of preceptorship positively during clinical rotations.

The strongest aspects of preceptorship implementation were guidance and supervision (78%), and professional role models (75%), categorized as excellent. Reflective feedback (69%), facilitation of learning and discussion (65%), and competency assessment (61%) were categorized as good. However, post-conference activities (52%) were categorized as moderate, and facilitation of independent learning (49%) shows lower levels of implementation, indicating that these domains still require continuous improvement. Overall, the findings indicate that preceptorship is implemented positively, particularly in the domain of clinical supervision and professional role modeling. However, reflective learning and the facilitation of independent student learning were implemented less consistently.

Qualitative Findings

The qualitative findings revealed several contextual factors influencing the implementation of the preceptorship phase clinical rotation. The thematic analysis identified eight major themes related to the implementation of preceptorship during clinical rotation. These themes reflected the experiences, perceptions, supporting factors, and challenges

Table 1. Preceptor of Characteristics (n=51)

Characteristic	f	%
Gender		
Female	49	96
Male	2	4
Education Level		
Bachelor Degree	43	84
Master Degree	8	16
Age		
30-40Years	22	43
40-50Years	29	57
Years of Work as Nurse		
5-15Years	29	57
16-25Years	22	43
Years of Work as Preceptor		
1-5Years	33	39
6-15Years	18	61
Preceptorship Training Experience		
Yes	49	96
No	2	4
Number of Preceptorship Trainings Attended		
Once	41	80
Two to Three times	10	20

Table 2. Distribution, Frequency of Preceptorship Implementation Categories (n = 51)

Category Implementation Perceptorsip	Frequency	Percentage
Excellent	38	74
Good	13	26
Fair	0	0
Poor	0	0

Table 3. Domains of Preceptorship Implementation Based on Preceptors' Perceptions

Domain of Preceptorship	Dominant Positive Response (%)	Interpretation
Guidance and Supervision	78	Excellent
Professional Role Modeling	75	Excellent
Reflective Feedback	69	Good
Competency Assessment	61	Good
Learning Facilitation & Discussion	65	Good
Post-Conference Activities	52	Moderate
Independent Learning Facilitation	49	Needs Improvement

Interpretation: Higher percentages indicate stronger implementation of the corresponding preceptorship domains during clinical supervision.

encountered by preceptors and stakeholders in the clinical learning process. The identified themes included: (1) institutional preceptorship policy, (2) preceptor roles and competence, (3) student preparedness and response, (4) communication and collaboration, (5) learning and evaluation strategies,

(6) barriers to implementation, (7) supporting factors, and (8) preceptor expectations and reflections. These themes reflect the comprehensive nature of preceptorship practice, including both organizational and individual factors that influence the success of clinical learning.

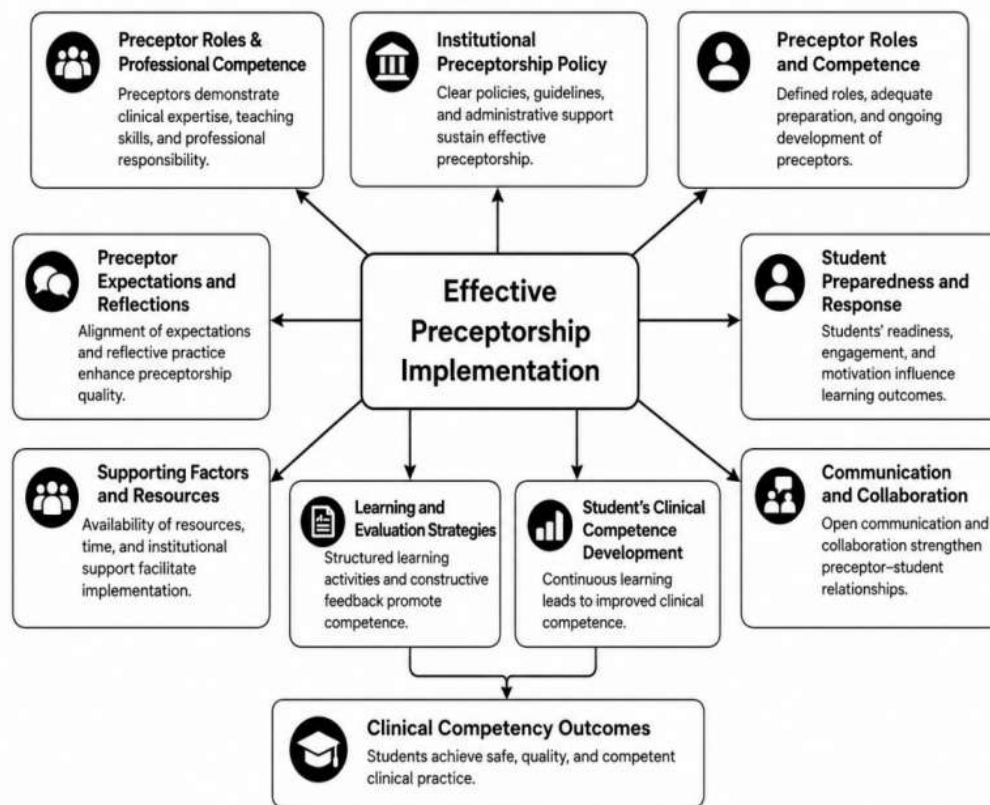


Figure 1. Thematic framework of preceptorship implementation on clinical rotation

Figure 1 illustrates the interaction among institutional support, preceptor competence, student readiness, communication processes, learning strategies, supporting factors, and implementation barriers influencing preceptorship implementation during clinical rotation.

Theme 1: Institutional Policies and Managerial Support

Institutional policies and managerial support were identified as fundamental components influencing the successful implementation of preceptorship programs in clinical learning. Participants described the presence of formal regulations related to preceptorship, clear preceptor selection mechanisms, structured socialization of preceptorship guidelines, and the provision of both basic and advanced training as essential. Institutions such as Pringadi Hospital had established support systems, including monitoring and evaluation systems to maintain the quality of preceptorship implementation.

"This preceptorship program was implemented based on hospital policy, with responsibilities coordinated under the head of the nursing division and the Komkordik" (P2).

Participants also reported limitations in access to training opportunities for preceptors.

"Every year we submit requests for the necessary training, but only one or two staff members are accommodated" (P1).

"Each preceptorship assignment has been guided by operational indicators aligned with the hospital's quality standards" (P2).

These findings highlight that formal policy support, training allocation, and managerial consistency are essential to sustaining high-quality preceptorship, though limited training access remains a challenge.

Theme 2: Preceptor Roles and Professional Competence

Preceptors played a strategic role as mentors and facilitators, guiding students toward achieving clinical competency. Their responsibilities included supervising case studies, facilitating clinical reasoning, and providing continuous feedback. However, challenges such as time constraints, limited refresher training, and frequent rotations between clinical units affected role consistency. Effective communication and continuous professional updating were identified as critical elements in the implementation of preceptorship.

Several preceptors reported difficulty maintaining up-to-date clinical skills due to limited refresher training. One preceptor described,

"Sometimes we are not able to answer the students' questions because we haven't practiced in that section for a long time, and there hasn't been an update on preceptorship knowledge and clinical guidance skills" (P6).

To overcome this issue, some preceptors

initiated peer-support mechanisms to exchange information and support one another,

"We created a communication group between preceptors so they can share and help each other exchange information" (P5).

Despite these efforts, communication between hospitals and academic institutions remained limited, leading to inconsistencies in student competency achievement.

"The implementation of preceptorship in hospitals and education should have a shared perspective, but in fact, communication between preceptors is still lacking. Consequently, student competency targets are not met. This needs to be communicated to academics to prevent recurrence" (P11).

Preceptor emphasized the importance of a shared understanding of clinical expectations,

"We need to improve our shared perceptions about the difficulties faced in clinical guidance, so it will be easier for us to provide direction, for example, shared perceptions about students' readiness for practice, case presentation procedures, and other requirements" (P12).

These findings showed that sustained communication, collaboration, and consistent updates on clinical guidance standards are essential for strengthening the quality of preceptorship between hospitals and educational institutions.

Theme 3: Student Readiness and Engagement

Clinical practice was perceived as an important process in developing students' clinical competencies. Participants reported that students' readiness and adaptability to standardized digital nursing documentation systems influenced the effectiveness of clinical learning. Several preceptors explained that some students still had difficulty applying standardized nursing diagnosis, outcome, and intervention documentation systems used in hospitals, leading to inconsistencies in clinical documentation and increasing the preceptors' supervisory responsibilities.

"There are still students who have not been adequately exposed to standardized digital nursing documentation systems used in hospitals. Some students still apply older nursing documentation approaches that differ from the documentation standards currently implemented in clinical practice settings" (P1).

In addition to limited technical readiness, absenteeism and low participation were also reported as barriers to effective clinical learning.

"There were some who did not come for several days due to personal reasons, and there was no confirmation from education, so they did not fully understand the development of patient nursing care" (P4).

Another preceptor reported that some students were less proactive in seeking learning opportunities and clinical cases during practice.

"Sometimes students tend to be shy and less

proactive, giving the impression that they're lazy about seeking out cases to build their competency. In this case, it's the preceptor's responsibility to motivate and assist them" (P7).

These findings suggest that student readiness, particularly in adapting to digital documentation systems and maintaining active engagement, plays a crucial role in determining the effectiveness of preceptorship. When students are less prepared or less engaged, preceptors must assume additional responsibilities to ensure clinical learning objectives are achieved.

Theme 4: Communication and Interinstitutional Collaboration

Communication and collaboration were identified as critical components of successful preceptorship. Effective interaction among clinical preceptors in hospitals, academic preceptors from educational institutions, and students in clinical learning contributed significantly to the program's success. However, coordination between student shifts and ward nurses presented unique challenges in maintaining the continuity and consistency of clinical guidance. It was reported as an essential yet challenging aspect of preceptorship implementation. Several preceptors described inconsistencies in coordination and unclear boundaries of responsibility between hospital preceptors and academic supervisors.

"Sometimes the supervising lecturer only meets with the student in the clinic, where they discuss the matter, and we, the hospital preceptors, don't know the extent of the student's supervision. This must be agreed upon to avoid complicating the supervision process" (P6).

The involvement of institutional structures, such as the hospital-academic clinical education coordination committee (Komkordik), was considered crucial in bridging communication gaps.

"The involvement of the Education Coordination Committee in the guidance process is to maintain good relations and communication between the hospital and education so that student learning progress can be monitored" (P13).

Another preceptor emphasized the importance of clarity regarding evaluation responsibilities between academic and hospital preceptors.

"From what we feel, communication with students is not a problem, but communicating the way in which hospital preceptors have a role in evaluating students who are practicing is important" (P2).

These findings indicate that while interpersonal communication between preceptors and students functioned well, institutional collaboration between hospitals and academic settings remained fragmented. Strengthening coordination mechanisms, clarifying evaluation responsibilities, and establishing joint feedback systems are essential steps to enhance the effectiveness and continuity of preceptorship.

Theme 5: Learning and Evaluation Strategies

Various learning methods were implemented in clinical practice, including direct clinical supervision and bedside teaching, handovers, procedural demonstrations, group patient visits, pre- and post-conferences, case studies, and case seminars. The Education Coordination Committee played a central role in monitoring and supervising students' competency development ensuring systematic and consistent implementation through established competency lists and stage-specific evaluation criteria. The implementation of diverse learning methods in clinical settings was supported by structured coordination to ensure that students achieved the required clinical competencies. When clinical case exposure was limited, adaptive learning strategies, such as the Education Coordination Committee, facilitated case reallocation and simulation-based activities to provide students' competency achievement.

"If a student has not yet received a case, the Coordinating Committee will look for a case in another treatment room so that the student's competency can be achieved" (P2).

"If there are student competencies that have not been achieved for cases that cannot be handled directly by patients, then we conduct workshops like real cases" (P3).

These findings illustrate that clinical learning in nursing education requires adaptive strategies to maintain competency standards. Through proactive case management and alternative learning approaches such as workshops and simulations, preceptors and coordinators collaboratively ensured that students achieved their learning outcomes despite variations in clinical case availability.

Theme 6: Barriers to Preceptorship Implementation

The implementation of preceptorship learning faced several challenges that should be considered for future improvement. These included reduced numbers of hospitalized patients, increased preceptor workloads, and limited integration between academic curricula and clinical practice. Differences in academic standards among educational institutions also created inconsistencies in students' abilities and placed additional burdens on preceptors during competency evaluation. Several challenges were identified during the implementation of preceptorship in clinical learning, particularly related to patient availability, workload distribution, and policy alignment between educational institutions and hospitals. A shortage of patients was reported to hinder students' ability to meet case study milestones and achieve competency targets.

"The small number of patients is a constraint, making it difficult for students to meet the case study milestones and competency targets. Consequently, room transfers are often necessary" (P2).

Another challenge involved excessive academic

workloads, requiring students to complete numerous assignments from both the university and their preceptors. Many students experienced fatigue and reduced performance.

"We saw that the students had a lot of assignments from the campus, and then there were also some from us as preceptors, and finally, the students complained and were unable to complete the assignments given by the clinical preceptors" (P7).

Preceptor further reported inconsistencies in policies between the hospital and academic institutions, which affected the implementation of clinical supervision and competency evaluation.

"Sometimes we experience difficulties when there is a mismatch between the policies of educational institutions and hospitals, and there are hospital policies that also have different rules from educational ones" (P11).

These findings highlight the need for improved coordination between hospitals and educational institutions to harmonize curriculum, synchronize student workload, and ensure sufficient clinical case exposure. Strengthening institutional collaboration and aligning policy frameworks are essential to enhancing the sustainability and effectiveness of preceptorship implementation.

Theme 7: Supporting Factors for Success

Several factors were identified as supporting the successful implementation of preceptorship. These included strong institutional commitment and managerial support from both hospitals and educational institutions, students' motivation and readiness for clinical learning, and the active participation of trained preceptors. Although still limited, the implementation of clinical workshops and collaborative practice programs between hospitals and academic institutions has fostered a more comprehensive understanding of clinical learning and strengthened the overall preceptorship experience. Motivation and commitment from both preceptors and students were identified as key drivers of successful preceptorship implementation. Preceptors demonstrated enthusiasm in guiding students to develop clinical competence and professional confidence.

"We are committed to helping students improve their clinical skills. We also believe it's important to improve student morale in nursing education for their future careers as nurses" (P10).

"We are very enthusiastic because the preceptors here already have special training certificates in their fields, such as dialysis and wound care" (P4).

The preceptors also emphasized the reciprocal nature of motivation in clinical learning.

"If the students are enthusiastic about clinical learning, we will be enthusiastic about guiding them" (P2).

This finding underscores the importance of emotional engagement and mutual motivation between preceptors and students in fostering

a supportive clinical learning environment and sustaining the overall effectiveness of the preceptorship program.

Theme 8: Preceptors' Reflections and Future Expectations

Preceptors expressed their aspirations for a fairer and more transparent evaluation system that actively involves hospital-based clinical supervisors. They emphasized the need for formal recognition, through institutional support, professional development opportunities, and involvement in academic activities.

"If we as clinical preceptors could be assessed and recognized as field supervisors, perhaps our enthusiasm would be even higher" (P3).

Others highlighted the importance of preceptor collaboration between academic institutions and the hospital in clinical evaluation and decision-making processes,

"The hospital's preceptorship should play a role in determining whether a student graduates or not" (P3).

Participants expressed strong motivation to improve their academic and research competencies through training, seminars, scientific writing, and collaborative scholarly.

"We want to be able to write case reports and be taught how to publish" (P8),

"We hope that educational institutions can facilitate further training and participation in seminars" (P5).

These reflections indicate a growing motivation among preceptors to expand their academic and research competencies. A further theme emerging from the data was the need for both financial and non-financial recognition.

"We remain enthusiastic about carrying out our preceptorship duties and hope that our leaders will pay attention to incentives, not based on quantity, but on value. For educational institutions, preceptors can be facilitated in self-development, for example: becoming a supervisor for practical work, teaching practitioners on campus, conducting joint research, and engaging in other scientific activities" (P9).

Preceptors also recognized that professional development should extend to scholarly collaboration and the development of academic competence.

"As hospital assessors, we must enhance our scientific capabilities through collaboration with academic advisors, such as producing case reports, case studies, and joint publications in scientific journals. This is a requirement and component of hospital accreditation in human resource development" (P8).

These findings indicate that preceptors expect greater institutional recognition, stronger academic-clinical collaboration, and expanded opportunities for professional and scholarly development. Continuous support through training, collaborative research, and involvement in academic activities was perceived as essential to sustain motivation and strengthen the

quality of preceptorship implementation.

Discussion

The findings of this study indicate that preceptorship was generally perceived positively in supporting students' clinical learning during clinical rotation. Preceptors played important roles as facilitators, supervisors, and professional role models in helping students integrate theoretical knowledge into clinical practice.

The preceptorship has been recognized as an effective clinical learning method that enables nursing students to develop their cognitive, affective, and psychomotor competencies through continuous supervision, guidance, and role modeling (Wahyuni et al., 2020). Effective preceptorship processes provide a structured framework that clearly defines their goals, objectives, and learning outcomes (Chipwanya et al., 2024). Preceptors, as experienced professional nurses, play a pivotal role in bridging the gap between theory and clinical practice by supporting students or novice nurses in applying theoretical knowledge within real healthcare settings. Compared with the traditional facilitator model, the preceptorship approach fosters greater engagement, interaction, and experiential learning opportunities for students (Irwan et al., 2021; Mathisen et al., 2023). Furthermore, the program strengthens clinical competence by emphasizing critical knowledge discussions, skills assessments, and direct demonstrations of clinical procedures (Lima & Alzyood, 2024).

The positive perceptions identified in this study reflect the important contribution of preceptors in creating supportive clinical learning experiences for nursing students. Preceptors functioned as clinical supervisors and as professional role models who facilitated students' adaptation to clinical environments, strengthened communication skills, and supported the development of critical thinking during patient care activities (Thompson et al., 2024). Previous study reported that supportive clinical environments, institutional collaboration, and effective supervision can strengthen students' clinical learning experiences (Mathisen et al., 2023). These findings suggest that the effectiveness of preceptorship depends on the integrating individual competencies, institutional support systems, and collaborative clinical learning processes. A study by Lau et al. (2024) highlighted the importance of institutional support systems and collaborative communication among stakeholders in sustaining positive preceptorship experiences. However, the study also identified several contextual challenges influencing the implementation of preceptorship, including communication barriers between academic and clinical supervisors, workload constraints, limited reflective learning opportunities, and inconsistencies between academic preparation and the demands of clinical practice. These findings indicate that successful preceptorship requires

competent preceptors, structured institutional collaboration, adequate training systems, and supportive learning environments to ensure the sustainability and quality of clinical competencies (Mathisen et al., 2023; Chan et al., 2025). A previous study showed that institutional support systems, stakeholder dialogue, and recognition of preceptors are important for strengthening positive precepting experiences and sustaining commitment in clinical education (Lau et al., 2024).

The results of this study indicate that preceptors effectively performed their roles in fundamental areas, including providing guidance, offering constructive feedback, and serving as professional role models for students. The success of clinical supervision is closely linked to students' perceptions of their preceptors' teaching competence and interpersonal approach. Effective preceptorship supports students' adaptation to clinical environments, strengthens communication skills, and enhances critical thinking during patient care activities (Thompson et al., 2024). Previous findings reported by Alhassan et al. (2024) that preceptors with strong clinical expertise tend to possess superior teaching and communication skills, enabling them to build trust and foster professional behavior among students. The importance of ensuring that preceptors remain adequately prepared and supported to fulfill their educational responsibilities (Irwan et al., 2021). Conversely, when students lack trust in their supervisors, they may resist new information and fail to internalize professional attitudes through preceptorship. Competent preceptors thus play an important role in developing nursing students' clinical abilities and in facilitating their adaptation to the work environment. Strengthening preceptors' role as clinical role models has been shown to enhance students' critical thinking, problem-solving, communication, social interaction, and adherence to professional ethics (Fadhlan et al., 2023). The research study aligns with Chipwanya et al. (2024), who reported that preceptorship implementation improves students' self-confidence, job satisfaction, retention, and clinical performance. Structured preceptorship training significantly improved preceptors' knowledge, thereby enhancing their ability to facilitate post-conference sessions (Likewise et al., 2023), serve as effective clinical role models, and increase student satisfaction with clinical guidance. These outcomes collectively reinforce the significance of preceptor training and mentorship systems as effective strategies for improving the quality of nursing professional graduates (Hong & Yoon, 2021).

Despite the generally positive perceptions, several challenges affecting preceptorship implementation were identified. The implementation of reflective learning activities, including post-conference sessions and early competency evaluations, remained suboptimal due to workload constraints, limited supervision time, and communication barriers (Lima & Alzyood, 2024). Similar findings

were reported that identified time limitations and ineffective communication as major barriers to reflective clinical learning during the preceptorship process in the hospital (Chan et al., 2025). Limited supervision time may reduce opportunities for reflective discussion, feedback, and competency evaluation, potentially affecting students' clinical learning experiences and competency development. The findings also demonstrated that preceptors played important roles in strengthening students' clinical reasoning and independent problem-solving abilities through case study, discussions, and implementation of the nursing process. Experiential learning approaches helped students integrate theoretical concepts into real clinical situations and supported the development of critical thinking during patient care activities. However, integrating updated theoretical approaches, evidence-based practice, and technology-assisted learning into clinical supervision still required improvement (Nurhidayah et al., 2022). Similar findings were reported by Kim and Shin (2025), who emphasized the importance of preceptors' clinical expertise and theoretical mastery in developing novice nurses' clinical reasoning. These findings highlight the need for continuous preceptor development and innovative learning strategies to support effective clinical learning.

Students' readiness and adaptability to clinical learning environments also influenced the effectiveness of preceptorship implementation. Preceptors reported difficulties related to students' understanding of standardized nursing documentation systems and inconsistencies between academic preparation and clinical practice demands. These conditions increased supervisory responsibilities and highlighted the importance of experiential learning approaches, effective communication, and continuous guidance in supporting students' adaptation during clinical practice (Hong & Yoon, 2021; Kim & Shin, 2025).

The findings of this study showed that preceptors demonstrated professionalism, ethical attitudes, patience, and commitment in guiding students during clinical learning. Preceptors were perceived as clinical supervisors and professional role models who supported students' confidence, problem-solving abilities, and adaptation to clinical practice (Wahyuni et al., 2019). However, limited continuing education opportunities and insufficient training remained challenges affecting preceptors' roles in professional learning environments. Previous studies have emphasized that structured preceptor development implementation is important to strengthen teaching competence, professional confidence, and the quality of clinical supervision (Hong & Yoon, 2021; Chan et al., 2025). These findings highlight the importance of continuous training and institutional collaboration to maintain consistent standards of preceptorship in clinical education.

However, the findings also revealed challenges related to limited opportunities for innovative and

Karota, E., et al. (2026)

technology-supported learning during clinical supervision. Previous studies have emphasized that experiential learning, simulations, and collaborative learning approaches can strengthen students' clinical reasoning, communication skills, and readiness for professional practice (Kim & Shin, 2025; Thompson et al., 2024). In addition, supportive clinical learning environments and adaptive supervision strategies are important for facilitating the effective implementation of innovative learning methods in clinical education (Mathisen et al., 2023).

The integration of technology and innovative learning strategies was also considered important in strengthening clinical learning (Hong & Yoon, 2021). The use of digital learning resources, simulations, bedside teaching, and experiential learning approaches may enhance students' clinical reasoning, knowledge retention, and readiness for professional practice (Kim & Shin, 2025). Previous studies have demonstrated that technology-supported learning methods contribute positively to students' clinical competence and learning satisfaction (Thompson et al., 2024).

Limitation of the study

This study was conducted in a single teaching hospital, and the qualitative findings reflect participants' experiences within one institutional context. Therefore, caution should be exercised when transferring these findings to other clinical education settings.

Implication of the study

The findings of this study provide important implications for nursing education and student clinical practice, particularly in strengthening the implementation of preceptorship during clinical rotations. Institutional collaboration between hospitals and educational institutions, structured ongoing preceptor development programs, effective communication systems, and supportive clinical learning environments are crucial for improving the quality of clinical supervision and students' clinical learning experiences. Furthermore, ongoing training and organizational support for preceptors may enhance the effectiveness and sustainability of preceptorship practices in clinical settings.

Conclusion

The study found that clinical preceptors generally perceived the implementation of preceptorship positively during professional nursing education. Preceptors effectively performed their roles as clinical facilitators and professional role models in supporting students' clinical learning. However, challenges remained in communication and coordination, in students' readiness to apply standardized nursing documentation systems, in workload management, and in ongoing training opportunities for preceptors. These findings highlight the importance of strengthening institutional

collaboration, structured preceptor development, and supportive clinical learning environments to improve preceptorship implementation and support students' clinical competence development.

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Effectiveness of a mobile app-based intervention using local foods on maternal knowledge, attitude, practice, and toddlers' growth: A quasy experimental study

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Abstract

Background: Stunting remains a major public health concern in Indonesia. Mothers frequently face barriers in meeting children's nutritional needs due to lack of knowledge, insufficient support, and a non-enabling environment. Strengthening maternal behaviour through targeted education, access to local nutritious foods, and mobile-based interventions is essential.

Purpose: This study evaluated the effectiveness of a mobile application-based nutrition intervention on maternal knowledge, attitudes, and practices (KAP) and toddler growth outcomes.

Methods: Guided by the PRECEDE-PROCEED model, this quasi-experimental study involved 138 dyads of mother-toddler who were purposively selected and divided equally into intervention and control groups through simple random sampling within clusters. Primary outcomes included maternal KAP related to stunting, nutritional monitoring, and meal preparation using Nile tilapia fish. Data were collected through pre- and post-tests using the set of knowledge, attitude and behavior questionnaire and Developmental Pre-Screening Questionnaire. The data analyzed using descriptive statistics and non-parametric tests (Wilcoxon, Mann-Whitney).

Results: Baseline characteristics were comparable between groups. After the intervention, the intervention group showed significantly higher maternal knowledge (mean±SD: 18.72±1.87 and 17.20±1.08), attitudes (85.97±5.47 and 75.09±3.72), and practices (77.06±3.55 and 70.13±2.16) than the control group (all $p < 0.001$). Height-for-age (HFA) scores also improved (0.70±0.91 and -1.06±0.78; $p < 0.001$), whereas no significant changes were observed in child development (9.54±0.65 and 8.94±0.82).

Conclusion: Enhanced knowledge and attitudes, combined with access to local food sources and simple recipes, facilitated behavior adoption, while the mobile module helped sustain these improvements. Cross-sector collaboration may support standardized maternal education and strengthen integration of this intervention within national stunting prevention programs.

Keywords: mobile-app; maternal kap; nutritional intervention; stunting; toddlers

Introduction

Stunting remains a major health issue in Indonesia, affecting approximately 2.3 million children under five year across the country as of 2024 (Unicef, 2025). As the country with the third-highest stunting rate in Southeast Asia,

Indonesia continues to experience a slow decline in stunting prevalence, which currently only at 3% (Ministry of Health of the Republic of Indonesia., 2025; Ministry of Health of the Republic of Indonesia, 2018; World Health Organization (WHO), 2022). Stunting prevalence varies significantly across provinces, and depend on the characteristics of the provinces and sub districts (Mulyaningsih et al., 2021). The study also highlight other factors that associated with the prevalence of stunting in Indonesia such as socioeconomic status, maternal education, water, and sanitation infrastructure, and limited access to community health services (Mulyaningsih et al., 2021). The various contextual factors and characteristics of each region necessitate the suitable and context-specific strategies for stunting reduction (Eryando et al., 2022). For instance, Ciamis Regency, an area in West Java Province (Indonesia), has experienced a substantial increase in stunting prevalence, rising from 16% in 2021 to 25.4% in 2023 (Health Development Policy Agency of Health Ministry Indonesia, 2024). According to recent study on stunting determinants in Ciamis Regency, it is found that access and availability of food were not associated with stunting, whereas maternal educational status showed a significant association (Betaditya et al., 2022). These findings underscore the importance of providing adequate support and appropriate health education for mothers to ensure sufficient dietary intake for their children.

The UNICEF Conceptual Framework of Malnutrition 2020 identifies inadequate dietary intake and disease as the immediate causes of malnutrition, including stunting (UNICEF, 2020). These two factors directly interrelated causing the impairment of a child growth and development. Poor dietary intake compromises the immune system and increasing children's susceptibility to infections which can exacerbate further nutritional deficiencies by reducing nutrient absorption and appetite (Black et al., 2013). A study conducted using data from the Indonesian Basic Health Research, showed that limited dietary diversity significantly affected the nutritional status of children aged 6–23 months (Samosir et al., 2023). Similar study also found that many mothers are lack of knowledge about exclusive breastfeeding, complementary feeding, and balanced dietary requirements (Sahanggamu et al., 2017). Although parents have reportedly added animal-source foods (ASF) (e.g. meat, eggs, and dairy products) to their children's diet, these foods are consumed infrequently and in small quantities (Arini et al., 2022). This inadequate intake of animal-source of protein may contribute to the widespread deficiencies in iron, zinc, calcium, and vitamin among the children (Arini et al., 2022). Promoting mothers' positive behavioral changes to improve toddler dietary intake is essential for reducing stunting.

Mothers' feeding behaviors are shaped by multiple factors. According to the PRECEDE-PROCEED model, behavioral change is influenced

by predisposing, enabling, and reinforcing factors, and modifying these factors is essential for achieving sustainable behavior changes (Porter, 2016). Previous studies have shown that maternal educational background is a major predisposing factor influencing maternal knowledge about child nutrition and related feeding practices (Laksono et al., 2022). For instance, higher maternal education has been associated with better nutrition knowledge and improved feeding practices. However, evidence from rural communities in West Java indicates that limited maternal education attainment is commonly linked to inadequate nutrition knowledge and suboptimal infant and young child feeding practices (Mauludyani & Khomsan, 2022). These challenges are further compounded by insufficient health education and nutrition promotion activities, contributing to the persistently high prevalence of stunting among children (Berutu et al., 2024; Haryanti et al., 2024a). A community-based study conducted in a village in Ciamis Regency similarly identify gaps in maternal feeding knowledge and caregiving practices contributing to persistent stunting in village samples (Suminar et al., 2025). Furthermore, low feeding practices also intensified by socioeconomic constraints and limited access to affordable nutritious foods even when they are aware of recommended feeding guidelines (Kolopaking et al., 2011).

Utilizing locally available and affordable food resources is a powerful strategy to overcome the socio-economic barriers. For instance, complementary feeding programs implemented in Southeast Sulawesi Province, eastern Indonesia, promoted diverse diets using locally available ingredients (e.g. seafood, eggs, and vegetables), and enhanced maternal nutrition knowledge through mini classes and home visits significantly improved dietary diversity and feeding practices (Effendy et al., 2020). Similarly, a community-based intervention in rural East Nusa Tenggara Province, one of Indonesia's most stunting-affected regions used locally produced supplementary foods, and promoted caregiver knowledge has succeeded in reducing stunting prevalence from 42.3% to 28.7% over 12 months (Dwianto, 2025). This evidence suggests that using local food resources combined with nutritional education is a promising strategy to reduce stunting prevalence.

Nile tilapia (*Oreochromis niloticus*), a freshwater fish species native to Africa, is widely cultivated in the West Java Province due to its rapid growth, ease of breeding, and affordability. From a nutritional perspective, Nile Tilapia provides high-quality protein and is a valuable source of essential micronutrients such as iron, zinc, calcium, and vitamin B. Given its wide availability and nutrient density, the Nile Tilapia is increasingly promoted as a locally sourced food to improve dietary intake (Wibowo et al., 2024). Unfortunately, despite the fact that the fish is nutritious, its consumption in West Java remains low at 38.48 kg per capita per year, and even lower in

Ciamis Regency at only 22.15 kg per capita (Baliwati & Saputra, 2014; Ministry of Marine Affairs and Fisheries Republic of Indonesia, 2023). Based on dietary recommendation, a minimum of 15-25 kg per capita per year is considered a baseline for adequate intake, while 40-50kg per capita per year reflects a more optimal intake associated with better health outcome (World Health Organization (WHO), 2011, 2020). However, many mothers lack knowledge and skills in processing fish into child-friendly meals. The mother more concerns on the danger of fish bones, taste preferences, or unfamiliarity with age-appropriate recipes can discourage fish inclusion in children's diets (Gibson et al., 2020). Furthermore, a recent mixed-methods study also added that common parental concerns included fears that the fish may cause allergies, digestive problems, or illness (Yigit et al., 2025). This misconception should be addressed through targeted nutritional education for parents, especially mothers who play a key role in managing children's dietary intake.

The mobile-based intervention has the potential to provide accessible nutrition education, facilitate behavior change, and support decision-making for parents. It allows the users to learn anytime and anywhere, making it especially beneficial for the busy caregivers or mothers. Unlike traditional methods, mobile-based intervention is not time-bound, more durable than printed materials, and offers greater accessibility, particularly in remote or underserved areas. A recent study suggests that a smartphone-based education program on complementary feeding significantly improved maternal nutritional literacy and led to better children's' growth outcomes (Seyyedi et al., 2020). Given the high smartphone uses in West Java Province (70.37%) and particularly in Ciamis Regency (79.38%), along with increased internet accessibility, mobile-based intervention emerge as a promising solution for expanding nutritional education (Regional Development Planning Agency of Ciamis Regency, 2022; Statistics Indonesia (BPS), 2021; West Java Provincial Office of Communication and Informatics, 2020). Considering the beneficial features of the mobile-based intervention, this study aimed to develop an application named "MENUMIS STUNTING" (*Menu Seputar Nutrisi Sehat untuk Anak Stunting [Healthy Nutrition Menu for Stunted Children]*) and examine its impact on maternal knowledge, attitudes, and practices (KAP), as well as toddler growth.

Materials and Methods

Study Design

The current study used quasi-experimental study adopts the PRECEDE-PROCEED in analyzing the influence of mobile-based health education programs in improving mothers' feeding knowledge, attitude, and practice. The PRECEDE-PROCEED framework provided a structured approach for identifying predisposing, enabling, and reinforcing

factors and for supporting sustainable behaviour change.

Development of Mobile-App Intervention and Program Description

The program utilized a smartphone-based application titled MENUMIS STUNTING (*Menu Seputar Nutrisi Sehat untuk Anak Stunting [Healthy Nutrition Menu for Stunted Children]*) as an online platform for educational activities and interactive discussion, enabling users to access learning materials and participate in Q&A sessions. Several nutrition education themes were formulated into a 12-week program consisting of weekly 6-minute educational videos, downloadable supplementary materials, and an integrated Q&A feature that allowed participants to submit questions through the application (Appendix 1). During the intervention period, participants were required to access supplementary materials and health education videos at least once per week with flexible scheduling and were encouraged to use the application at a minimum frequency of three times per week. User engagement was enhanced through reminder notifications delivered via WhatsApp groups and by monitoring application usage, including frequency of access, duration of use, and completion of educational materials. The application also included a question-and-answer (Q&A) feature designed to facilitate interactive online discussion. The monitoring process was conducted online by surveyors via WhatsApp to assess whether participants had completed the weekly educational materials, identified risks of participant dropout, and addressed any technical issues encountered during application use. During the study period, the control group received standard care in the form of routine health and nutrition education delivered face-to-face during weekly Posyandu sessions by healthcare personnel or community health cadres using standard printed materials. No access to the mobile learning application was provided.

The intervention was conducted over 12 weeks (Appendix 2), with each session addressing a specific topic related to stunting prevention, toddler nutrition, and meal preparation using local source food. Weeks 1-4 covered understanding about stunting, the role of nutrition in toddler growth and development, nutritional status monitoring, and mothers' roles in meeting toddlers' nutritional needs. Weeks 5-7 introduced Nile tilapia as an animal protein source for stunting prevention, explained its nutritional benefits for toddler growth, and presented various tilapia-based recipes for toddlers. Weeks 8-12 focused on practical food preparation sessions, including steamed Nile tilapia, tilapia porridge, tilapia soup, tilapia nuggets, and tilapia rice porridge.

The intervention materials were developed through three stages: needs assessment, prototype development, and usability testing. The needs assessment was conducted using FGDs and semi-structured interviews with 18 key informants,

Table 1. Limited Trial Result

		Mean	N	Std. Dev	Std. Error Mean
Knowledge	Pre-test	12.53	36	1.404	0.234
	Post-test	18.17	36	1.207	0.201
Attitude	Pre-test	54.97	36	1.028	0.171
	Post-test	80.03	36	2.063	0.344
Practice	Pre-test	50.11	36	1.833	0.305
	Post-test	65.08	36	1.105	0.184

Notes:

*Chi-Square test with Significant at $p < 0.05$. **t-test with Significant at $p < 0.05$.**Table 2. General characteristics of participants by group at baseline (n=138)**

Characteristics	Category	Intervention (n=69)		Control (n=69)		Total (n=138)		p-value
		N	%	N	%	N	%	
Education	Primary Education	25	36.2	23	33.3	48	34.8	0.625
	Secondary Education	36	52.2	34	49.3	70	50.7	
	Tertiary Education	8	11.6	12	17.4	20	14.5	
	Total	69	100	69	100	138	100	
Income	Above District Minimum Wage	19	27.5	15	21.7	34	24.6	0.553
	Below District Minimum Wage	50	72.5	54	78.3	104	75.4	
	Total	69	100	69	100	138	100	
Occupation	Employed	26	37.7	21	30.4	47	34.1	0.475
	Unemployed	43	62.3	48	69.6	91	65.9	
	Total	69	100	69	100	138	100	
Birth Weight	Low	6	8.7	12	17.4	18	13.0	0.206
	Normal	63	91.3	57	82.6	120	87.0	
	Total	69	100	69	100	138	100	
Chronic Infection	Yes	24	34.8	20	29.0	44	31.9	0.584
	No	45	65.2	49	71.0	94	68.1	
	Total	69	100	69	100	138	100	

Notes:

Chi-Square test with Significant at $p < 0.05$ and non-statistically significant at $p > 0.05$

including local stakeholders, healthcare providers, and mother–toddler dyads. Findings indicated low participation in existing stunting education programs, limited access to information, low animal protein intake (particularly fish), and limitations of paper-based education; participants preferred interactive and audio-visual learning formats. Based on these findings, the application content and prototype were developed by the research team with IT and multimedia experts. Content validation was then conducted by nutrition, education, and fisheries experts, and revisions were made based on their feedback to improve content accuracy, clarity, and usability (Appendix 3). The application content and prototype were subsequently developed and validated by nutrition, education, and fisheries experts using the Content Validity Index (CVI). The

validation demonstrated excellent content validity (I-CVI = 1.00; S-CVI/Ave = 1.00)”

The completed mobile learning prototype was subsequently tested on a limited scale of samples and revised prior to the full implementation phase (Figure 1). Functionality was assessed through black-box testing involving 36 users in Sukasenang and Wanasigra villages, with a 100% success rate—above the 80% usability threshold. Usability testing via the System Usability Scale (SUS) returned an average score of 74.8, exceeding the acceptable threshold of 68, signifying that the application is appropriate for use as a nutritional intervention tool. According to the limited trial results that were reported in Table 1, this application may positively improve knowledge, attitudes, and practice related to toddler nutrition.

Table 3. Comparison of the pre- and post- test results within intervention and control group (n=138)

Group	Dependent Variables	N	MeanSD	Min-Max	CI 95%
Knowledge					
Intervention	Pre-Test	69	13.071.834	9.00-18.0	12.63-13.51
	Post-Test	69	18.721.870	14.0-20.0	18.28-19.71
Control	Pre-Test	69	13.071.192	11.0-16.0	12.79-13.36
	Post-Test	69	17.031.150	14.0-19.0	16.75-17.31
Attitude					
Intervention	Pre-Test	69	60.125.279	43-69	58.85-61.38
	Post-Test	69	85.965.481	73-100	84.64-87.27
Control	Pre-Test	69	68.102.462	63-75	67.51-68.69
	Post-Test	69	75.103.7111	68-85	74.21-75.99
Practice					
Intervention	Pre-Test	69	55.254.710	44-65	54.11-56.38
	Post-Test	69	77.063.552	66-80	76.20-77.91
Control	Pre-Test	69	55.063.086	45-61	54.32-55.80
	Post-Test	69	70.092.092	64-74	69.58-70.59
Height-for-Age (HFA)					
Intervention	Pre-Test	69	-3.250.434	-4.00-(-3.00)	-3.35-(-3.14)
	Post-Test	69	0.700.912	-1.00-2.00	0.48-0.91
Control	Pre-Test	69	-1.001.043	-3.00-1.00	-1.25-(-0.75)
	Post-Test	69	1.770.926	0.00-3.00	1.55-1.99
Development					
Intervention	Pre-Test	69	6.670.834	6.00-8.00	6.47-6.87
	Post-Test	69	9.540.655	8.00-10.00	9.38-9.69
Control	Pre-Test	69	6.670.834	5.00-8.00	6.37-6.97
	Post-Test	69	9.540.657	8.00-10.00	9.38-9.49

Abbreviations:

HFA: Height-for-age. CI: Confidence Interval

Table 4. Comparison between intervention and control group results for the variables of interest (n=138)

Variable	Group	N	Mean±SD	Mean Dif- ference	95% CI	df	p-val- ue
Knowledge	Intervention	69	18.721.870	1.69	18.28-19.71	69	0.001*
	Control	69	17.031.150		16.75-17.31	69	
Attitude	Intervention	69	85.965.481	10.86	84.64-87.27	69	0.001*
	Control	69	75.103.7111		74.21-75.99	69	
Behaviour	Intervention	69	77.063.552	6.97	76.20-77.91	69	0.001*
	Control	69	70.092.092		69.58-70.59	69	
Height/Age	Intervention	69	0.700.912	1.07	0.48-0.91	69	0.001*
	Control	69	1.770.926		1.55-1.99	69	
Development	Intervention	69	9.540.655	0.00	9.38-9.69	69	0.001*
	Control	69	9.540.657		8.00-10.00	69	

Notes:

Chi-Square test with Significant at $p < 0.05$ and non-statistically significant at $p > 0.05$

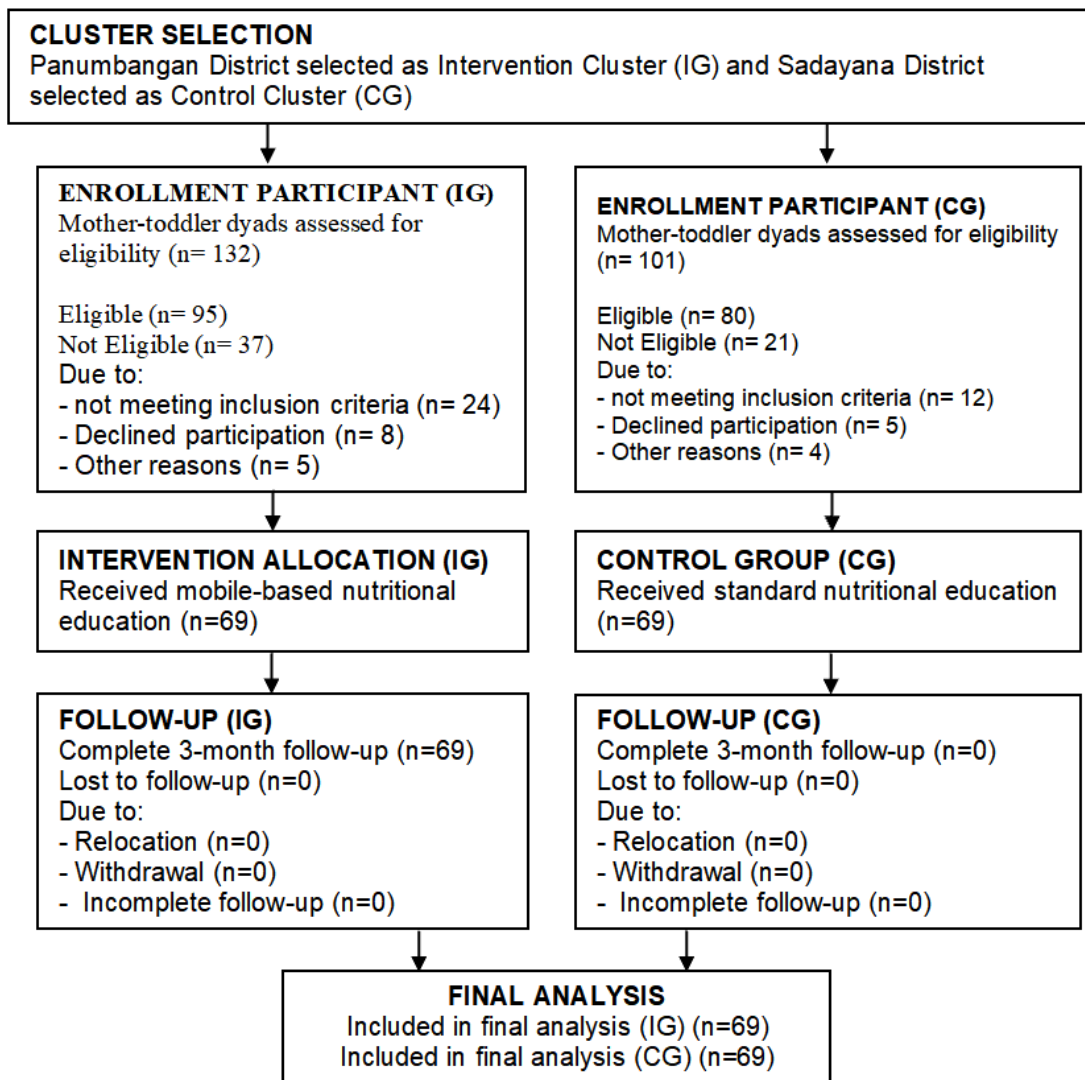


Figure 1. TREND Flow Diagram of Participant Selection, Allocation, Follow-up, and Analysis

Population, Sampling Technique, and Sample

A total of 138 mother–toddler dyads were recruited through a multistage sampling approach. Clusters were defined based on community health center service areas in Ciamis Regency, a predominantly agricultural region with moderate human development and ongoing socioeconomic challenges affecting household nutrition and child health (Central Statistics Agency of Ciamis Regency, 2025). Panumbangan District was assigned as the intervention group, while Sadananya District served as the control group. Both districts were selected through cluster sampling due to their high stunting prevalence in Ciamis Regency and comparable socioeconomic conditions and access to health services. Eligible participants within each cluster were then selected using simple random sampling and equally allocated to the intervention (n = 69) and control (n = 69) groups. Panumbangan was designated as the intervention cluster based

on program implementation readiness, support from community health centers and cadres, and feasibility of monitoring the MENU MIS STUNTING application, whereas Sadananya was assigned as the control group to provide a comparable setting and minimize potential selection bias.

Sample size was determined using the Lemeshow formula at a 95% confidence level, resulting in 138 respondents (including a 20% buffer for dropout) (Appendix 4). The study had included mothers whose children had been identified as at risk of stunting through screening at local community health centers and who had demonstrated adequate literacy skills and the ability to operate a smartphone. Mothers of toddlers with congenital or chronic health conditions (e.g. tuberculosis, other chronic respiratory infections, congenital heart disease, chronic otitis media, metabolic disorders, and genetic abnormalities) had been excluded to ensure participant safety and to avoid potential confounding factors.

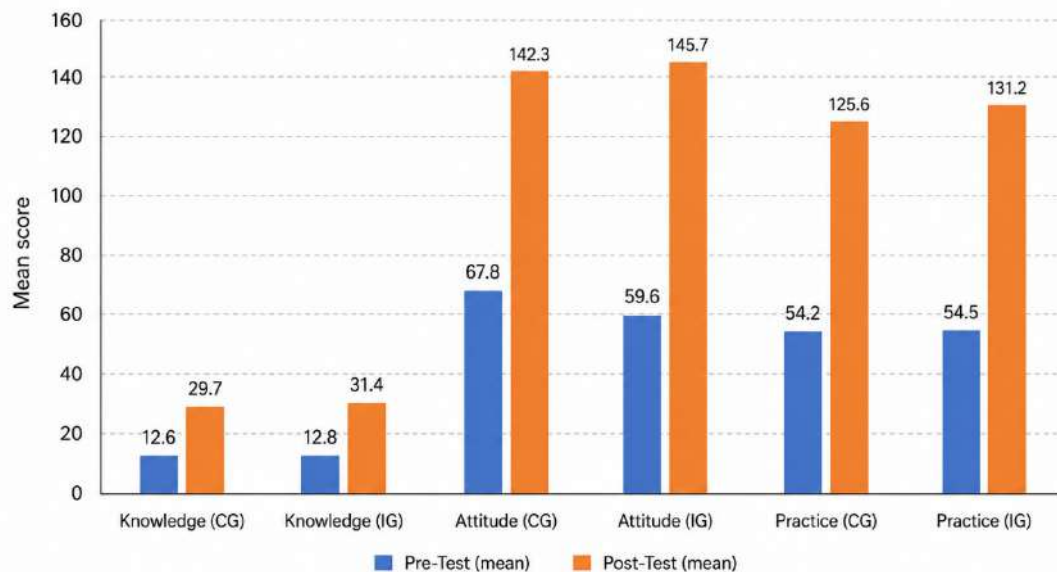


Figure 2. Comparison of Mean Pre- and Post-Test Scores Between Control Groups (CG) and Intervention Groups (IG)

Abbreviations:

IG: Intervention Group, CG: Control Group

Instrument

In this study, primary outcomes, including maternal knowledge, attitudes, and practice, were measured using a structured questionnaire consisting of three domains, each comprising 20 items. The knowledge questionnaire was developed by the researchers based on theories of stunting, toddler nutrition, and local food utilization and aligned with the study objectives. The knowledge, attitude, and behavior questionnaires employed in this study were developed by the researchers specifically for the study and were not adapted from previously published instruments. The development process was informed by relevant literature, theoretical frameworks, and indicators corresponding to each variable under investigation. Before data collection, the instrument underwent content validation to ensure its relevance, clarity, and adequacy in measuring the intended constructs. Before implementation, all instruments' items were re-tested for validity and reliability among 36 mothers of stunted toddlers from Sukamanah and Sukaraja villages in Ciamis Regency. The validity test showed that all items were valid (r calculated $> r$ table = 0.329). Reliability testing demonstrated high internal consistency, with Cronbach's alpha values of 0.898 for knowledge, 0.946 for attitudes, and 0.947 for behavior. Meanwhile, toddler growth as a secondary outcome was measured using the Kuesioner Pra Skrining Perkembangan (KPSP; Developmental Pre-Screening Questionnaire), a national standardized tool for assessing child development in Indonesia. The KPSP evaluates four domains: gross motor, fine motor, language, and personal-social development. Each age-specific questionnaire contains 10 items scored as

1 ("yes") or 0 ("no"), with total scores interpreted as follows: 9–10 = age-appropriate development, 7–8 = questionable development, and ≤ 6 = suspected developmental delay requiring further assessment.

Data Collection and Analysis

The research data were collected through a self-reported questionnaire using pre-test and post-test design to quantitatively assess maternal knowledge, attitudes, and practices before and after the mobile-app intervention. This process was conducted by trained field enumerators. Prior to the study, the research team provided briefing and training sessions to standardize study procedures and ensure consistency in field implementation. Both mother and toddler assessments were conducted prior to the intervention and re-evaluated three months afterwards. This study applied a single-blind approach at the participant level, whereby mothers were not informed of their allocation to either the intervention or control group to reduce the risk of the Hawthorne effect. Full double-blinding was not feasible due to geographical constraints and the cluster sampling design. To minimize observer bias, separate enumerator teams were assigned to each district, and enumerators in the control area were not given access to the educational application materials used in the intervention group. Quantitative data from pre- and post-intervention questionnaires and toddler growth was analyzed using SPSS version 26. Descriptive statistics were applied to summarize respondent characteristics and outcome variables. For group comparisons, non-parametric tests (Wilcoxon signed-rank test for paired samples and Mann-Whitney U test for independent samples) were conducted due to the non-normal distribution

of data.

Ethical Considerations

This study obtained ethical clearance from The Research Ethics Committee of Faculty Medicine Universitas Sebelas Maret with registration number 192/UN27 06 11/KEP/EC/2024. Prior to data collection, participants were thoroughly informed about the study's objectives, procedures, potential risks, and anticipated benefits. Involvement in the study was voluntary, and participants were assured they could withdraw their participation at any point without any consequences. To protect participant privacy, all identifying information was anonymized and stored in a secured, password-protected database accessible solely to the research team. Given that the research involved stunted toddlers and their mothers—a vulnerable population, additional care was taken to ensure their safety. Pilot testing of the mobile learning application was conducted beforehand to ensure its usability, ease of access, security, and potential benefits for participants. Given that the intervention was educational in nature, it was categorized as minimal risk. Throughout the study period, no significant issues associated with the application or educational materials were observed. In accordance with the policy the ICMJE data sharing guidelines, the authors declare that individual deidentified participant data underlying the results reported in this study on nutrition and education interventions will be available upon reasonable request. The shared data will include participant demographic information, pre- and post-intervention measurements, and survey responses.

Results

Study Characteristics

The demographic profiles of participants in each group are reported in [Table 2](#). Most respondents had secondary education, while fewer attained primary or higher education. The majority were unemployed and household incomes below the regional minimum wage. Most toddlers were born with normal birth weight and did not experience chronic infections. Baseline comparison of key demographic profiles between intervention and control groups showed no statistically significant differences ($p > 0.05$), indicating that both groups were homogenous prior to the intervention ([Table 2](#)).

Implementation

The within-group comparisons of pre-test and post-test outcomes for both groups are presented in [Table 3](#). Baseline values were comparable between the intervention and control groups, indicating similar initial conditions. Improvements were most pronounced in the primary outcomes—knowledge, attitude, and practice—suggesting favorable changes in maternal cognitive and behavioral domains following exposure to the intervention ([Table 3](#)). Toddler growth and developmental scores

also increased over time in both groups.

[Table 4](#) presents the between-group comparison of post-intervention outcomes. The intervention group demonstrated significantly higher mean scores for knowledge, attitude, and practice, with corresponding mean differences, 95% confidence intervals, and p-values indicating statistically significant effects ([Table 4](#)). These findings confirm that the observed improvements in maternal outcomes were attributable to the intervention rather than to time-related changes alone ([Figure 2](#)). Toddlers in the intervention group also exhibited significantly greater improvements in height-for-age (HFA), suggesting a beneficial effect of the intervention on linear growth. In contrast, there is no statistically significant difference that was observed in child developmental outcomes, as both groups showed comparable improvements.

Discussion

This quasi-experimental study evaluated the impact of mobile-app nutritional intervention program on maternal knowledge, attitude, practice (KAP) as primary outcomes, and toddler height-for-age (HFA), and toddler development score as secondary outcome. The adaptation of the PRECEDE-PROCEED framework in this study provides deeper contextual insights in formulating educational formats that suit mothers' needs and facilitates sustainable behavioral changes. An application called MENUMIS STUNTING (Menu Regarding Healthy Nutrition for Stunting Children), consisting of 12 weekly nutrition education modules on the processing and preparation of Nile tilapia-based meals, was successfully developed and demonstrated positive results both in limited trials and actual implementation.

Although most toddlers were born with normal birth weight and did not experience chronic infections ([Table 2](#)), the risk of stunting remains high. This is largely associated with the participants' sociodemographic characteristics, as most mothers had only moderate education, were unemployed, and lived below the regional minimum wage ([Table 2](#)). Mothers with low levels of education tend to have limited knowledge about health and nutrition, which impacts their ability to understand the importance of proper nutrition for child growth and development ([Syah & Yuniarti, 2024](#)). This phenomenon was supported by recent study in Ciamis Regency found that most of mothers have moderate knowledge of child nutrition ([Rahayu et al., 2023](#)). In addition, qualitative findings indicate that families with stunted toddlers often neglect fish consumption, even though fish is a primary source of protein for growth. Lower level of education often leads to a lack of information about healthy eating patterns, the importance of exclusive breastfeeding, and child growth and development, which can affect children's physical growth and cognitive development in the long term period ([Laksono et al.,](#)

2022). Current study suggest that mothers with only primary or secondary education have greater odds of having stunted children compared to those with tertiary education (Laksono et al., 2022; Yunitawati et al., 2025). In this case, health education efforts regarding maternal education can help reduce this risk, as previous study shows that maternal education negatively correlates with the incidence of stunting among toddlers (Rahayu & Khairiyati, 2014).

Apart from the education and support provided to mothers, socioeconomic factors also play an important role in stunting prevention efforts. According to prior study, the risk of stunting increases as household wealth decreases (Tamir et al., 2024). Compared to children from the wealthiest households, children from rich, middle, poor, and poorest households have a higher likelihood of being stunted. Similar study also reported that identifying low household income as a stunting risk factor (Kassaw et al., 2020). Low income is often associated with limited access to nutritious and sufficient food necessary for child growth (Ijaiya et al., 2024). In addition, maternal employment status also plays a significant role in stunting risk. While working mothers may contribute to household income, time constraints can compromise childcare and diet quality, thereby increasing vulnerability to stunting (Supadmi et al., 2024). Conversely, unemployed mothers often face financial barriers that limit access to nutritious food and health services (Supadmi et al., 2024). Therefore, interventions to address stunting cannot focus solely on providing nutrition, but also address obstacles related to sociodemographic aspects.

Effect of mobile-app intervention on Maternal Knowledge, Attitude, and Practice (KAP)

A mobile-based nutritional intervention utilizing locally available food resources (e.g., Nile tilapia) was reported to significantly improve maternal knowledge, attitudes, and practices (KAP) among mothers of toddlers. Although both groups demonstrated score improvement, the intervention group showed more consistent and pronounced improvements across all variables. These findings are consistent with previous studies reporting the effectiveness of mobile-app intervention in enhancing maternal KAP (Fitriami & Galaresa, 2022; Nurhidayah et al., 2024; Pantiawati et al., 2025). This improvement should be interpreted within the local context of existing community-based stunting management programs in Ciamis Regency, where routine health services, nutritional counseling, growth monitoring, and supplementary feeding are already implemented. Despite these ongoing programs, previous evidence from the same setting showed that maternal nutritional knowledge remained moderate and feeding practices were still constrained by socioeconomic barriers, food access limitations, and established

dietary habits. Therefore, the greater improvement observed in the intervention group suggests that mobile-based education may complement existing services by providing more accessible, continuous, and engaging learning opportunities.

Repeated exposure to information through these medium supports knowledge retention and comprehension (Dissieka et al., 2019), while interactive and visual features enhance engagement and facilitate understanding of complex information (Ahmed et al., 2025). Despite some mixed evidence, tailoring delivery methods and content to audience needs can improve knowledge uptake among mothers of diverse educational backgrounds (Daly et al., 2018; Knop et al., 2024). Moreover, mothers of young children often face time constraints in attending health education programs due to caregiving and household duties (Acharya et al., 2022). In this context, mobile-app interventions offers flexibility, allowing mothers to learn at their own pace and schedule, access information anytime, and review unfamiliar materials without time pressure (Sisouvang & Pasanchay, 2024). The use of locally available food resources may also explain the observed behavioral improvement. Considering that socioeconomic conditions are recognized determinants of maternal feeding practices, the intervention intentionally promoted affordable and accessible local foods. In Ciamis Regency, Nile tilapia is widely available and represents a practical source of high-quality protein and essential micronutrients that support child growth. Integrating locally relevant nutritional recommendations may have reduced implementation barriers and increased the likelihood of adopting recommended feeding practices. Furthermore, these findings align with a recent systematic review which concluded that video and online counseling delivered via mobile applications positively impact maternal nutritional literacy (Hasan et al., 2024). In this study, once mothers better understood appropriate food combinations and preparation techniques, their feeding practices improved.

In contrast to knowledge, improvements in attitudes are shaped by complex factors, including beliefs, cultural norms, personal experiences, and socioeconomic conditions (Abdulahi et al., 2021; Bashir et al., 2023). As reported by several studies, greater knowledge does not necessarily translate into more positive attitudes (Abdulahi et al., 2021; Bashir et al., 2023). However, present study shows that utilization of mobile-based intervention in maternal education is effective in improving both knowledge and attitudes (Table 4). Discussion forums and nutrition chatbots features in the application enabling mothers to ask questions and receive immediate feedback, which proven effectively enhanced engagement in the learning process (I. Nurhidayah et al., 2018). Emotional engagement strengthens motivation for mother to adopt new behaviors in childcare and nutritional practices (Wu & Yu, 2022). User interaction within

discussion forums not only reinforces social norms but also enhances maternal confidence in applying acquired knowledge and strengthens their commitment to child development and well-being. Consequently, mothers feel more assured in implementing what they have learned. Through this mechanism, mobile application functions as an effective tool for changing mothers' attitudes and even practices regarding toddler nutrition and development.

Maternal behavior improvement in this study aligns with the PRECEDE-PROCEED model (Porter, 2016), where enhanced maternal knowledge, attitudes, and practices (KAP), practical nutritional guidance, and support from discussion forums acted as key drivers of positive behavioral change. Recognizing that behavioral changes are also influenced by socio-economic barriers, community support, and cultural context, the study not only provided mothers with flexible and engaging learning opportunities but also sought to mitigate socio-economic barriers by promoting the use of local food resources. As a commonly consumed freshwater fish in Sundanese communities and widely cultivated in household ponds (balong), Nile tilapia is affordable, accessible, and familiar to local households. Recipe modules were adapted to local cooking practices while modifying texture and nutritional content to suit the dietary needs of stunted toddlers, which may have supported greater maternal acceptance and implementation. Data from the Fisheries Department in Ciamis Regency indicates that Nile Tilapia is a widely cultivated freshwater fish in this area, offering considerable potential as an affordable and accessible source of animal protein. This fish is abundant in protein, essential fatty acids, iron, and other micronutrients vital for child development and growth, and its regular consumption may contribute to optimal growth, enhanced nutritional status, and a reduced risk of stunting (Wibowo et al., 2024). Recent evidence shows that providing local food-based food has a positive impact on nutritional status among toddlers aged 6–36 months in Indonesia, particularly in rural settings (Susanto et al., 2017), which also reflects the characteristics of most participants in the present study (Table 3). However, there is contrasting evidence that shows application-based education is not always sufficient to change behavior unless accompanied by direct interaction with healthcare professionals (Rufaindah & Patemah, 2021). Therefore, mobile-based learning interventions should be used as a complement rather than a replacement for direct interactions between mothers and healthcare providers.

Effect of mobile-app intervention on toddler nutritional outcomes

Assessing the sociodemographic profile of participants in this study indicates an elevated risk of stunting among children, underscoring the urgent need for targeted nutritional interventions. The main barriers identified were poor dietary habits, limited

participation in health programs, and the absence of engaging, contextually appropriate educational materials for mothers. To address this, the present study evaluated the impact of a mobile-based learning intervention on toddler nutritional outcomes as part of stunting reduction efforts, focusing on Height-for-Age (HFA) and developmental indicators. The findings demonstrated that the intervention improved toddlers' HFA and developmental scores after participation (Table 3). However, cross-group comparisons revealed that while HFA significantly improved in the intervention group compared to controls, no significant effects were observed on developmental outcomes (Table 4).

This study supports evidence that technology-based nutrition education can improve children's anthropometric indicators, although significant changes in growth may not be observed due to insufficient intervention duration or the need for longer follow-up (Hojati & Farhangi, 2025; Mousavi Ezmareh et al., 2024; Seyyedi et al., 2020). In the first 3–6 months of an intervention, anthropometric measures such as weight and height (or length) are particularly responsive indicators of nutritional improvement (Garenne et al., 2013). This may explain why increases in HFA scores are observed earlier than developmental scores. In addition, toddler development is shaped by the interplay of biological, parenting, environmental, and socio-economic factors, which adds further complexity (Rocha et al., 2021). According to prior study, maternal education combined with stimulation sessions improved children's motor, cognitive, and language development (Muhoozi et al., 2018). Despite some evidence on the contrary, certain findings indicate that toddler development may also improve through adequate nutritional fulfilment, even in the absence of structured stimulation programs (M. M. Black et al., 2017). There is strong evidence that highlights the importance of stimulation in supporting toddler growth and development. Combining early stimulation with nutrition programs enhanced child development outcomes, underscoring the value of integrated interventions (Andrew et al., 2020). Early child stimulation was positively associated with linear growth and improvements in cognitive, motor, and language development even among low birth weight infants (Upadhyay et al., 2022). Therefore, it is important to include child stimulation in maternal education programs.

Nursing Implications

Nurses play a vital role in delivering health education, promoting preventive behaviors, and improving maternal caregiving practices in community settings (Kappi, 2026). However, nurses often face barriers such as limited time, heavy workload, inadequate educational resources, insufficient communication skills, and low community health literacy (Shadadi et al., 2018; Wang et al., 2024). These challenges may reduce the effectiveness and sustainability of maternal and child health education programs.

Mobile-based nutritional interventions provide an innovative approach to extending health education beyond conventional face-to-face methods through continuous support, flexible learning schedules, and wider outreach (Umeano, 2025). Community health nurses may utilize this platform to deliver education, monitor participant engagement, and facilitate interactive discussions efficiently. This intervention may also enable broader participation and expand the outreach coverage of community healthcare facilities. Therefore, the findings of this study offer practical implications for developing sustainable, accessible, and community-based nutritional education strategies, particularly in low-resource settings.

Limitations of This Study

This study has several methodological limitations. The non-randomized design may have reduced statistical precision and increased the risk of selection bias and residual confounding, potentially affecting the internal validity of the findings. The study was also conducted in selected community health center areas in Ciamis Regency, which may limit the generalizability of the findings to regions with different social and economic characteristics. In addition, the relatively short intervention and lack of long-term follow-up restricted the evaluation of sustained behavioral and nutritional changes. The intervention also focused on menu variations from a single local food source, which may not represent the broader range of affordable and culturally relevant foods. In addition, the application did not include a log-in system or user-monitoring features, limiting the assessment of participant engagement, intervention adherence, and usage patterns. Future studies should employ larger samples, stronger methodological designs, longer follow-up periods, multiple local food sources, and enhanced digital monitoring systems to strengthen the evidence base and improve generalizability.

Conclusions

This present study suggests the potential impact of mobile-app nutritional intervention and utilization of local food source on maternal knowledge, attitudes, and practices (KAP), as well as contributing to early improvements in height-for-age (HFA). Although the three-month intervention was relatively short to assess growth and developmental outcomes, it was sufficient to capture early behavioral changes and weight responses, supporting evidence that mobile-app interventions may positively influence toddler nutritional outcomes. This study underscores the importance of engaging diverse stakeholders including academic institutions, healthcare providers, community health cadres, and local fisheries department while leveraging local food resources to address nutritional needs in affordable and contextually relevant ways, particularly for low-income communities. Cross-sectoral collaboration

may facilitate the development of standardized maternal health education formats, strengthen the training of community health cadres, and support the integration of this intervention within the national stunting prevention program. Further research with longer intervention periods and extended follow-up is necessary to evaluate the impact of mobile-app interventions on children's nutritional status and reductions in stunting.

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Declaration of Conflicting Interests

The authors had no conflicts of interest in this research.

Data Availability Statement

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

Declaration of AI Use in Assisted Technologies

The authors used artificial intelligence–assisted technologies (specifically ChatGPT by OpenAI) to improve the clarity and language of the manuscript. The authors reviewed and edited all AI-assisted content and took full responsibility for the accuracy, integrity, and originality of the final manuscript.

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'The point is family involvement on caring cardiac patient' lived experience nurses and family caregivers on collaboration in Indonesian Hospital Care: A phenomenology study

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Abstract

Background: Chronic diseases including heart disease have a significant impact due to demographic shifting, especially in low-mid income countries like Indonesia. Nurses have vital roles on chronic disease management, such as prevention, early detection, and effective treatment. However, the global nurse's shortage poses a challenge for healthcare collaboration nowadays.

Purpose: To explore the experience of collaboration between nurses and family caregivers in disease patients in an Indonesian hospital.

Methods: A phenomenological approach in qualitative study was applied in this study. The data collection involved eight semi-structured interviews with PKU Muhammadiyah Gamping hospital nurses in Yogyakarta, Indonesia. Data was analysed thematically, using six steps from Braun and Clarke and Atlas.ti software.

Results: Data analysis revealed four themes: (1) Nurse's role and tasks; (2) Family caregiver roles & tasks; (3) Positive impacts collaboration with family; and (4) Negative impacts collaboration with family.

Conclusion: The family caregiver's role during patient hospitalization primarily involves assisting with activities of daily living (ADL) and participating in family-focused education for discharge planning. Nurses highlight the significance of family engagement in monitoring fluid balance, supported by guidance on recording intake and output. Although errors may occur, caregivers believe that their involvement results in improved patient outcomes, such as enhanced calmness and adherence to treatment.

Keywords: family integrated care; family engagement; healthcare collaboration; collaboration on nurse-family caregiver

Introduction

Globally, aging population is very rapidly when compared to the younger group where significant growth is in individuals aged 65 and above, which is projected to increase faster from 10% in 2022 to 16% by 2050 (United Nations Department of Economic and Social Affairs Population Division, 2022). Ageing causes progressive tissue damage that negatively impacts on vital organs, making it a significant risk factors for chronic diseases, particularly ischemic heart disease (Guo et al., 2022; World Health Organization, 2020a). In the upcoming decades, hospital employees will have more workload due to an aging population and a rise in chronic illness.

World Health Organization Global Status Report that chronic disease are on the rise and their impact is uneven, especially countries with low-and middle-incomes, where almost 75% of chronic disease-related global deaths (World Health Organization, 2025). Significant demographic and

epidemiological changes have occurred in Indonesia in recent decades, making it the third most populous low-mid income country after China and India. It is estimated that a quarter will be 65 of age and older by 2070, potentially increasing the threat of chronic disease (Marthias et al., 2021).

Early detection, screening, efficient treatment and preserving access to palliative care are all essential components of management chronic diseases (World Health Organization, 2025). In a patient-centered healthcare system, nurses are crucial in play assisting people in changing their lifestyle to live long, happy and healthy life. However, they present significant obstacles due to nurses shortage globally, which hinders collaborative and inhibits efforts in disease to prevention and health promotion (International Council of Nurses, 2024). The differences in nursing duties between nations highlight how crucial it is to modify healthcare planning in order to maximize nurses' contributions to population health objectives (World Health Organization, 2020b).

The Netherlands is addressing the shortage of nurses by involving families in patient care. The Bachelor of Nursing 2030 framework highlights the importance of collaborative care and family engagement (van Merode et al., 2024). However, a research reveals that family involvement in patient files research is still limited (Hagedoorn et al., 2021). Another study shows that Dutch focus more on involving families in information gathering and discharge preparation, as well as emphasizing the role in the care process, but they are less involving in providing active care (Woldring et al., 2023). These findings suggest that the role and support of family in hospital care in the Netherlands is less reflected in the behavior of nurses, in contrast to Eastern countries where family involvement is more integrated in care practices (Park et al., 2022).

Gotong Royong, an Indonesian cultural principle that dates back to 117-45 B.C, emphasizes mutual help among community members, as well as reflecting cohesion, solidarity and togetherness (Nelson, 2024; Simarmata et al., 2020). The ethos of care in Indonesia includes volunteering in caring for sick families and communities, both at the home and in hospitals, in contract to Western countries where such care is not always expected (Widayanti et al., 2020). Families, including caregivers, have an important role to play in supporting stroke survivors in Java, where Javanese proverbs are very influential (Purdani & Rungreangkulkij, 2024).

Considering that family engagement is a cultural standard and value in Indonesia, and there are limitations in documentation of family involvement in patient files as well, this research seeks to explore the collaboration between family members and professional caregivers (nurses) within the healthcare process on the cardiac units in Indonesian hospitals.

Materials and Methods

Design

The study uses phenomenological approach to explore the various personal experiences of nurses. Qualitative design was chosen due to allow for an in-depth dive into participants' individual experiences, arguments, and motives (Verhoeven, 2022).

Participants and Setting

The research focused on nurses in the cardiac unit at PKU Muhammadiyah Gamping hospital in Yogyakarta, Indonesia selected for their roles due to the high fatality of ischemic heart disease and their frequent interactions with family caregivers. No relationship between the researchers and participants.

Recruitment

Theoretical sampling was determined in advance. The number of participants was determined based on data saturation to ensure comprehensive exploration and understanding of the phenomenon. Data saturation refers to the point in qualitative research where new data ceases to provide additional insights or information relevant to the research question (Verhoeven, 2022). Data saturation was chosen, because it provides the researchers with a complete set of data that can be analyzed to draw necessary conclusions (Saunders et al., 2018). After eight interviews from one hospital, data saturation on the major subjects was reached, and no further insights could be found.

Inclusion and exclusion criteria

This study's inclusion criteria were focused on nurses regularly employed at a cardiac unit, as their experiences are most relevant and specific. Flex workers from other departments were excluded to avoid incorporating unrelated experiences. To improve outcome reliability, nurses with less than a year of experience on the cardiac unit were excluded from the study since they require support during their transition period to a new work environment. This criterion ensures that participants have sufficient experience as professional nurse.

Data collection instrument

The researchers are the tool used in qualitative research. Semi-structured interviews guidance was used to gather data. Beside this, the researcher also provide field note to capture participants behaviour in the natural contexts. It is promoting participant input while permitting flexibility with predetermined questions. The researchers, an Indonesian interpreter, and a participant attended each interview, which focused on how nurses and family caregivers divided up the workload. The main ideas discussed were cooperative roles and patient problems. This study additionally explored the reasons behind of current role divisions, emphasizing the issues, unfulfilled needs, and

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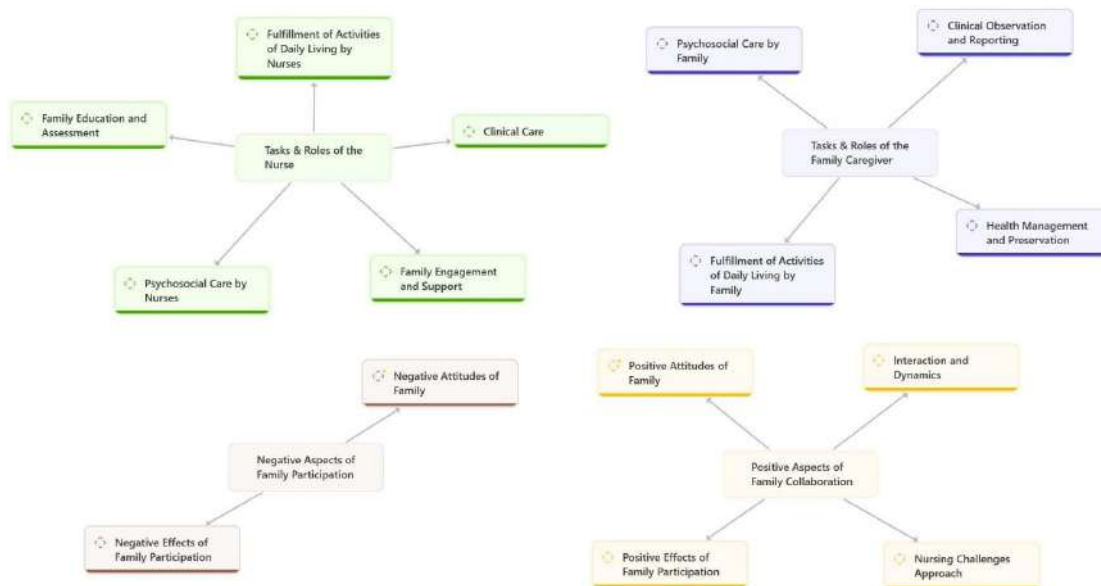


Figure 1. Thematic analysis process

expectations of nurses, as well as their interactions with patients and the surrounding environment.

Collecting the data

Within a period of two and a half weeks, both researchers conducted interviews concurrently. The data collection involved Indonesian interviewer with the qualification of professional nurses who experience in clinical area and qualitative research with PhD degree and fluent in English. In order to reduce the possibility of misunderstandings and lost meanings during translation, the interviewer has a role as an interpreter due to most of the participants speak in Indonesian language. The interviews took place in a quiet, private area in the hospital and lasted between 45 to 60 minutes. Minor disturbances during interview such as the adhān (Islamic calls to prayer) and participant's phone ringing. After the eighth participant, data has reached saturation.

Translation Processes

The researcher conducted meeting to make same perception with Indonesian interviewer. Furthermore, the English interview guideline was translated into Indonesian language then it was tested into two nurses for gain the understanding of the list of questions, deepen of the question, and developing the probing. After the interview guideline revision, data collection was applied to all the participants using Indonesian language. The researchers individually recorded and transcribed in English. Since numerous participants statements were incompletely mentioned during the interviews, the interpreter was supplied the audio recordings for additional translations.

Data analysis

The interviews were subjected to a six-step process

(Braun & Clarke, 2022) for thematic analysis in order to interpret the results and address the research question: (1) familiarization with data, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) writing the report. Researchers initially familiarized themselves with the data by reviewing interview transcripts to identify key details. During the second step, Atlas.ti software was used to generate initial codes. In the third step, significant patterns were collated to identify broader themes. Fourth step is the reviewing of themes entailed eliminating unrelated ones and conforming their credibility. Four main themes and 15 subthemes were ultimately defined and named in the step fifth. Lastly, the process concluded with writing a report that emphasizes meaningful data interpretation and connects findings to existing literature while ensuring methodological transparency.

Trustworthiness

In this study, criteria for ensuring trustworthiness known as rigor recently that included reliability/dependability, validity/credibility, and generalizability/transferability (Kakar et al., 2023). Validity was ensured through observation of facial expression, member-checking with participants and peer the briefing with the supervisors. Generalizability was ensured through detailed descriptions of study settings, methods and participants. Reliability was enhanced through member-checking and using Atlas.ti's software for storage and manage the data. Lastly, conformability was ensured using double devices for audio recording through mobile phone and recorder. The researchers followed COREQ (Consolidated Criteria for Reporting Qualitative) study (Tong et al., 2007).

Ethical consideration

The PKU Muhammadiyah Gamping Hospital review board has granted ethical approval for this study (No. 087/KEP-PKU/IV/2024). All participants provide written consent prior to data collection and can withdraw at any time if they feel uncomfortable. The confidentiality and anonymity of data collection were also explained to the participants. Participants are required to sign an consent from prior to the interview, which includes the purpose, the rights of participants, how personal data is used, and other conditions that must be agreed.

Results

Finding analysis broke down the nurses' perspectives on collaborating with family caregivers in cardiac unit care into four main themes and 15 subthemes (Figure 1).

Theme 1: Nurse's role & tasks

Subtheme 1.1 Nurses' completion of activities of daily living

Participants shared diverse views on their daily ward tasks, noting that the integration of Activities of Daily Living (ADL) into nursing varies by department, patient type, and family involvement. Family members often assist with ADL when available, while nurses assume full care responsibilities for VIP admissions, ICCU patients, and those requiring total care.

Subtheme 1.2 Clinical care

Participants indicated that clinical care mainly consists of preparing and administering oral and injectable medications in the morning, including teaching families to self-administer insulin. Pain management incorporates relaxation techniques, while other responsibilities involve interventions and assessments related to cardiac disease, such as performing ECGs and monitoring vital signs.

Subtheme 1.3 Family education and assessment

Participants emphasize their educational roles while engaging in patient-centered activities, dedicating time to teach family caregivers, particularly focusing on older patients. Education includes a variety of instructional activities relevant to daily living, mobilization, and monitoring fluid charts, with the goal of enhancing self-reliance after discharge and minimizing readmission risks. Participants also gather insights about the patient's home environment to offer tailored advice for ongoing care at home, addressing essential aspects like lifestyle changes, disease management, and caregiving practices.

"At this time, perhaps we really have to make patients and families independent, so when the patient is able to carry out activities and the family can also help. I think the family and patient can coordinate to do that. So, not all nurses, but we

educate how families and patients can do that." – Participant 2

Subtheme 1.4 Family engagement and support

Participants highlight the importance of collaborating with family caregivers and involving the family in care, focusing on post-discharge self-reliance. Nurses often ask patients which family member they prefer for care, leading to trust training for both the patient and the selected family member. Additionally, some participants take on a mediating role during conflicts between patients and caregivers.

"I think it's (family involvement) important, because when we take care of the patient, it's not just about the patient. We take care of the family. The family can take care of the patient when the patient forgets about the medication, the food, the life. So, besides in the hospital, the family is very important when at home, it's a very important role." – Participant 2.

Subtheme 1.5 Psychosocial care by nurses

Participants highlight the use of psycho social care in various situations, especially for recovering patients who may experience frustration due to limitations, such as restrictions on straining. Caregivers focus on calming these patients, as they tend to express frustration towards family caregivers. This calming approach is also applied in cases of pain and discomfort. Furthermore, RS PKU Gamping provides spiritual care, allowing patients to pray according to their own beliefs, regardless of the hospital's Islamic affiliation.

Theme 2: Family caregiver roles & tasks

Subtheme 2.1 Family's completion of activities of daily living

Family caregivers play an essential role in assisting patients with activities of daily living (ADL), particularly when patients are not bedridden. They often take on responsibilities such as bathing, feeding, and mobilizing patients. Some patients express a preference for receiving care from family members over nurses. Additionally, family caregivers may also administer oral medications prescribed by nurses and verify medication administration.

Subtheme 2.2 Clinical observation and reporting

Participants reported that the family caregiver was given guidance to maintain fluid balance and the nurse explained fluid intake limits for patients. In addition to monitoring intake and discharge, fluids, families also monitored the status of intravenous infusions, just as one participant had reported. Two participants reported their observations to the nursing staff in both different scenarios.

Subtheme 2.3 Psychosocial care by family

Family caregivers play a crucial role in patient care, helping to calm patients during pain or discomfort and enhancing their independence in managing

complications. The absence of sufficient nursing staff and overwhelming workloads accentuates the importance of family caregivers in supporting patient care.

"The point is that if there is a family involved, he will be calmer about his readiness. Like that. It's different if they don't get involved, for example if they have chest pain, you'll (the patient) definitely be scared." – Participant 4.

Subtheme 2.4 Health management and preservation

As mentioned earlier, significant time is dedicated to preparing family caregivers for post-discharge care, which includes supervising the patient's lifestyle, medication, and safety. Caregivers are also guided to limit harmful behaviors. Participants observed that patients with family support have fewer readmissions, attributed to factors like intrinsic motivation and medication adherence. Thus, family members not only supervise but also provide crucial encouragement. Forgetfulness and other age-related ailments also contribute to the importance of family participation.

"There are some patients whose families care so much that the medicine is packaged in small pieces, given a date, given the time, and it is confirmed whether the medicine will be taken or not. While being reminded, at this time it's time to eat, it's time for snacks." – Participant 5

Theme 3: Positive impacts of collaboration with family

Subtheme 3.1 Interaction and dynamics

Participants noted that families play a crucial role in bridging communication gaps for elderly patients in the cardiac ward, who may show signs of senility. These patients tend to comply more with family members than with nursing staff and prefer family involvement in their care.

"That's where we start to play our role in how to include the family. Sometimes we ask the family to convey it to the patient, uh... in family language." – Participant 1

Subtheme 3.2 Nursing challenges approach

The participants underline how important family engagement is because the heavy workload makes it impossible to give patients the care and attention they require. They determined that the main causes of this heavy workload were the scarcity of nurses, the numerous responsibilities they have to perform because there isn't enough administrative staff, and the excessive volume of paperwork. The participants stated that without family engagement, handling the matter would become a "hassle".

"Taking care of patients who will be going home, entering visits, we document them in the EMR, visiting doctors sometimes 3 at the same time, so it's like... It seems like we have to divide ourselves, face everything." – Participant 5

Subtheme 3.3 Positive attitudes of family

The positive attitude of the family caregiver that has been conveyed by the participants focuses on the motivation to take care of the sick member. One participant noted that caregivers are allowed to take on assignments if they are willing. In addition, other participants also revealed that nurses feel happy when providing family-applied nursing education. In addition, other participants also said that caregivers also often help other patients even though they do not know the patient in situations where the patient has no family relatives to take care of them.

"For VIP, usually most of the nurses do the action, but for class 3, 'I'll just do it' because they have been given education or given an example." – Participant 6

Subtheme 3.4 Positive effects of family participation

Family presence significantly supports patient recovery, as participants noted that patients retain their autonomy despite family involvement. Participants expressed positive views on this involvement, stating it aids nurses and contributes to a calmer environment. The lack of family caregivers negatively impacts outcomes, leading to slower recovery and higher readmission risks.

"When an elderly patient has family, he will use good medicine, and for other things he is good, so re-hospitalization usually rarely happens." – Participant 2

"If we can collaborate with the family, InsyaAllah (God willing – Islamic terms) it will be easier." – Participant 4

Theme 4: Negative impacts of collaboration with family

Subtheme 4.1 Negative attitude of family

Some participants observed that family members may occasionally refuse to assist in patient care, believing it to be the nurses' responsibility or due to a lack of awareness about the patient's condition. Nurses often try to encourage family involvement, but frustration can arise when family members, especially distant relatives, feel detached from the responsibility of care. This reluctance is notably prevalent among families of VIP patients. Furthermore, impatience from family members can lead to demands for immediate medical action, such as questioning why a patient remains in pain despite medication administration.

"If you do good to your parents, insyaAllah, your children will do good to you" – Participant 4

"In terms of feelings, sometimes there are feelings of anger, annoyance, but sometimes it's human. Well, then, it disappears. At least 'nggondok' (holding back anger – Javanese) in the pantry, right?" – Participant 4

Subtheme 4.2 Negative Effects of Family Participation

Family participation in patient care can negatively impact treatment due to errors made by relatives, such as feeding patients post-surgery against protocol or failing to monitor fluid balances. Family members may withhold information from nurses and suggest alternative remedies that conflict with standard treatments. Some relatives also lack motivation to assist in care, believing it is the nurses' responsibility. This lack of engagement is often more prominent among distant relatives of VIP patients. Additionally, families can exhibit impatience, pressuring healthcare staff for care updates even when treatment is ongoing.

A negative impact on nurses is that family members overhear their conversations, hindering open communication. This is tied to the department's layout. Furthermore, nurses' privacy is compromised when family members take photos during procedures, causing discomfort. The presence of family members may also infringe on patient privacy.

"Sometimes not all patient families are honest about what their illness is, sometimes the family says 'don't tell them that'." – Participant 7

Discussion

The study focused on understanding the duties and responsibilities of caregivers and family caregivers, with findings that are in line with other studies on the function of the family caregivers. Study findings align with those of the other study, particularly in terms of the roles undertaken by family caregivers (Park et al., 2022). The main difference from two studies lies in the perception of education, with this study emphasizing the importance of family caregiver education, which contributes to a decrease in readmissions. The Park et al. study was conducted in a district level hospital, whereas PKU Muhammadiyah is a provincial hospital, hence differences at the hospital level may account for the discrepancy in this finding. In addition, although it involved nurses and family caregivers, Park et al.'s study focused only on caregivers, so a lack of input from family caregivers could lead to bias in outcomes.

Important findings suggest that the engagement of family members in monitoring the fluid balance of heart patients is crucial. Participants indicated that family support helped maintain the accuracy of fluid balance graphs, given the challenges nurses faced in this task, which was supported by the Leinum et al. study (Leinum et al., 2023). A systematic review revealed the quality of fluid balance monitoring in medical, surgical, and intensive care units, found that the personnel, time, and training shortages frequently result in incomplete mapping data. Half of the studies showed less than 50% of fluid balance graphs were completed accurately, presenting challenges in fluid balance documentation. Correct documentation is critical to clinical decisions and

patient safety, while poor documentation can result in incorrect conclusions. Causes of inadequate mapping underscore the importance of engaging family caregivers

However, research indicates that using visual evaluation to estimate fluid volume can be incorrect (Leinum et al., 2023). If nurses wrongly estimate quantities based on their visual assessment while having training and expertise in fluid balance monitoring, one could ask if family members might do the same even more. The quality of patient care may be adversely affected by these disparities as well as the sporadic failure of family members to record fluid intake or output. Based on the study, it might be hazardous and counterproductive to interpret fluid balance charts incorrectly. These errors may result in either an excessive or insufficient prescription of fluids, which could have detrimental effects on patient outcomes. Long hospital stays, greater rate of morbidity rates, and higher rates of mortality may follow from this (Leinum et al., 2023). As long as the graph is appropriately completed, involving families in fluid balance monitoring can assist overcome nurses' time constraints. Family members' participation in this process is enhanced by the nurse's absence from the patient.

The statement that family involvement improves patient outcomes is supported by the literature, including the impact of family caregivers on the self-care of heart failure patients associated with the risk of hospital hospitalization (Bloemberg et al., 2026). A study in Lebanon, with a collectivist culture similar to Indonesia, compared family education interventions with a control group for 30 days. The findings showed significant reductions in readmission, better maintenance and confidence, as well as a reduction in major vascular events and healthcare use in the intervention group. It emphasizes the success of family involvement in the self-care of heart failure patients

A randomized controlled trial study showed that patients with caregivers who received educational interventions experienced longer time to cardiac resuscitation compared to patients without intervention, supporting the view that family involvement can improve patient outcomes (Clements et al., 2023).

Conclusions

Nurses perceive family caregivers' roles for taking care Cardiac patients—such as assistance with activities of daily living, supervision, and discharge tasks. Nurses are responsible for educating caregivers to enhance post-discharge self-reliance and reduce readmissions. Also, nurses perceive their education efforts positively. The findings provide insights that could inform further research and contribute to developing a more systematic approach to integrating families into care. The study recommends including family caregivers' perspectives in future research to validate findings

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and improve understanding of the educational dynamics in caregiver collaboration.

Declaration of Interest

Each authors affirms that they have no conflicts of interest.

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Data Availability

The corresponding author can provide derived data supporting the study's upon request.

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Factors influencing coping mechanisms for premenstrual syndrome among adolescents in Indonesia

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Abstract

Background: Premenstrual syndrome (PMS) is a common reproductive health problem experienced by adolescent girls and can impact physical, psychological, and social well-being. Despite the high prevalence of PMS, research in Indonesia specifically examining factors influencing adolescents' coping mechanisms in dealing with PMS is still limited.

Purpose: This study aims to analyze social factors (social support), psychological factors (depression, anxiety, stress), and menstrual characteristics that influence the coping mechanisms of premenstrual syndrome in adolescent girls in Indonesia.

Methods: This is an observational analytical study with a cross-sectional design in 321 adolescent girls aged ≥ 12 years using a purposive sampling technique. Data were collected using the PMS-COPE questionnaire, the Multidimensional Scale of Perceived Social Support, the DASS-21, and demographic data. Data analysis was performed using logistic regression.

Results: The analysis showed that social support ($p < 0.001$) and menstrual cycle regularity ($p = 0.035$) were factors that significantly influenced PMS coping mechanisms in adolescents. Adolescents tended to use coping strategies based on social and enjoyable activities.

Conclusion: Social support and the menstrual cycle play important roles in shaping adolescents' coping mechanisms for PMS. Nursing interventions that emphasize strengthening social support and menstrual health education are needed to improve adolescents' adaptive coping.

Keywords: adolescent; coping mechanisms; menstrual cycle; premenstrual syndrome; social support

Introduction

Menstruation is a natural biological process in the female reproductive cycle that is influenced by hormonal changes and may be accompanied by various physical and psychological responses (Siegel et al., 2024). In some adolescent girls, the hormonal changes that occur before menstruation trigger physical, emotional, and behavioral symptoms known as premenstrual syndrome (PMS), which can potentially disrupt daily activities and an individual's well-being (Nappi et al., 2022). Premenstrual syndrome occurs cyclically during the luteal phase of the menstrual cycle and is characterized by symptoms such as abdominal pain, headaches, breast tenderness, fatigue, mood swings, anxiety, and disturbances in sleep and appetite (Modzelewski et al., 2024). In moderate to severe cases, PMS can reduce quality of life, hinder social functioning, and negatively impact academic performance in adolescent girls

(Allegranzi et al., 2021). This situation makes PMS a health issue that is not only an individual concern but also has an impact on public health. Factors that can influence premenstrual syndrome (PMS) include

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psychological, physiological, and social aspects. From a psychological perspective, high stress levels can exacerbate PMS symptoms, while maladaptive coping strategies can worsen the emotional and physical effects. Physiological factors, such as imbalances in estrogen and progesterone levels during the menstrual cycle, also contribute to the severity of symptoms. In addition, poor sleep patterns, lack of physical activity, and deficiencies in certain nutrients—such as magnesium and vitamin B6—can also worsen symptoms. Social factors, including support from family and friends, play a role in helping adolescents manage PMS symptoms more effectively; those with a supportive social environment tend to use more adaptive coping mechanisms (Kaiser et al., 2018).

A study conducted by Jasim & Alzubaidi (2024) found that activities such as sleeping, getting a massage, listening to music, getting enough rest, and drinking coffee in moderation are the most effective ways to manage premenstrual symptoms. In addition, according to (Huew et al., 2024) mindfulness techniques or counseling can help adolescents manage their stress and emotions. The methods a person uses to deal with stress and problems, including premenstrual symptoms, are known as coping mechanisms (Keten Edis & Keten, 2023). According to a study conducted by Parveen et al., (2024), mild symptoms such as fatigue or irritability can prevent a person from using simple adaptive coping techniques, such as distraction or exercise. Factors such as diet, physical activity, and stress levels can affect how effective a particular method is in managing PMS (Wochekaw et al., 2024).

Adolescents who experience premenstrual syndrome (PMS) tend to use at least one coping mechanism to manage their symptoms. Coping strategies are used by individuals to face and manage PMS symptoms. Research shows that adaptive coping mechanisms, such as relaxation techniques, physical activity, and stress management, can help reduce the impact of PMS. Conversely, ineffective coping mechanisms, such as avoidance or the use of medications without medical supervision, can worsen symptoms and increase discomfort (Aperribai & Alonso-Arbiol, 2020). Previous research has examined the factors contributing to stress among college students, the levels of stress they experience, and the coping mechanisms they use to manage it. This study identifies several major causes of stress among college students, such as academic pressure, tight deadlines, challenging exams, and social issues with peers. Additionally, the study found that students who use more adaptive coping mechanisms, such as time management and relaxation techniques, are able to reduce their stress levels and cope with stress more effectively. Conversely, those who rely on unhealthy coping mechanisms, such as alcohol or drug abuse, experience increased stress and negative effects on their mental health (Alkhawaldeh et al., 2023).

A previous study showed that 49.4% of college students did nothing to manage PMS; 41% took pain relievers, and 17.7% exercised to manage the pain. These findings indicate that many adolescents lack effective coping strategies for dealing with PMS (Shippy & Ulland, 2020). In addition, a study by Davison et al. (2021) conducted among adolescent girls found that 67% of respondents experienced PMS, and the majority (65%) of them used maladaptive coping mechanisms, such as denial and avoidance. Furthermore, Eshetu et al. (2022) at Wolkite University in Ethiopia found that of 591 respondents, 37.9% experienced premenstrual symptoms and used coping mechanisms such as sleep and rest. Meanwhile, a study by Pradana (2020) found that 64.2% of adolescent girls in Indonesia used adaptive coping mechanisms to manage primary dysmenorrhea. This situation highlights the importance of raising public awareness and developing more organized interventions to address PMS as a public health issue (Gao et al., 2021). Research on coping mechanisms during menstruation remains limited in Indonesia, particularly among adolescent girls, and there are significant variations in prevalence. Consequently, it is difficult to generalize the findings of this study (Kumbeni et al., 2021). Therefore, it is crucial to conduct research in Indonesia to provide scientific evidence that can serve as a foundation for developing effective interventions.

Premenstrual syndrome (PMS) is a condition experienced by most adolescent girls and can affect their physical, emotional, and social well-being. However, in Indonesia, understanding of effective strategies for managing PMS remains limited, while the factors influencing it have not been extensively studied within specific cultural and social contexts.

In Indonesia, research on PMS in adolescent girls is still dominated by studies on prevalence and physical symptoms, such as primary dysmenorrhea (Pradana, 2020). Research specifically examining the mechanisms underlying the management of PMS, as well as the physiological, psychological, and social factors that influence it, remains limited; therefore, the available scientific evidence is insufficient to support the development of comprehensive nursing interventions and health promotion programs (Kumbeni et al., 2021). A lack of understanding and education about PMS, as well as effective coping strategies, has the potential to increase the risk of psychological disorders, decreased academic productivity, and barriers to social interaction among adolescent girls. These limitations result in suboptimal approaches to managing PMS in adolescents, which tend to be symptomatic in nature. Therefore, research analyzing PMS coping mechanisms and the factors influencing them within the Indonesian social and cultural context is urgently needed as a foundation for developing promotive and preventive interventions tailored to adolescents' needs. This study aims to identify coping mechanisms and factors influencing

premenstrual syndrome among adolescents in Indonesia. The uniqueness of this study lies in its comprehensive analytical approach to PMS coping mechanisms, taking into account the local cultural context; therefore, this study is expected to make a tangible contribution to the development of more effective adolescent health interventions and public health policies.

Materials and Methods

Design

An observational analytical study with a cross-sectional design was conducted on 321 female adolescents aged 12-24 years using purposive sampling.

Examples and settings

The sample size for this study was determined using the G-POWER statistic, which yielded a minimum of 71 participants. Considering a 20% dropout rate, the required sample size was 321 participants. Overall, the total number of participants in this study was 321.

Inclusion Criteria: 1. Teenage girls (12-24 years); 2. Able to use verbal communication; 3. There is no limit to the menstrual cycle; 4. Have no history of mental and gynecological illness.; 5. Do not take antidepressants, etc.; 6. Teenage girls who have experienced menstruation.

Exclusion Criteria: 1. Pregnant and breastfeeding women; 2. Menopausal women.

Variables

This study includes two categories of variables: independent variables and dependent variables. The independent variables in this study include demographic characteristics, social support, psychological factors, and menstrual characteristics. The dependent variable is coping mechanisms for premenstrual syndrome.

Instrument

Premenstrual Change Coping Inventory Questionnaire (PMS-Cope)

This study used a coping mechanism instrument for premenstruation created by Kaiser et al., (2018), namely the Premenstrual Change Coping Inventory (PMS-Cope). This instrument consists of 17 questions consisting of 3 subscales. The subscale for seeking positive impact behavior consists of 7 questions, namely numbers 1-7, the subscale for seeking support consists of 5 questions, namely numbers 8-12, and the subscale for using health services consists of 5 items, namely numbers 13-17. The assessment on the PMS-Cope uses a Likert scale consisting of: disagree (1), doubt (2), agree (3), and strongly agree (4).

Multidimensional Perceived Social Support Questionnaire (MPSS)

This study used a social support instrument, namely the Multidimensional Perceived Social Support (MPSS) developed by Zimet et al., (1988). This instrument consists of 12 questions consisting of a Partner Subscale with a total of 4 items (1, 2, 5, & 10), a Family Subscale with a total of 4 items (3, 4, 8, & 11), and a Friend Subscale with a total of 4 items (6, 7, 9, & 12). The MPSS is a tool to measure how much a person feels socially supported by family members, friends, and romantic partners. This questionnaire consists of twelve items divided into three main dimensions: social support (4 items), emotional support (4 items), and instructional support (4 items). Each dimension measures a different aspect of social support, such as feeling valued and cared for (emotional), practical help and information provided (instructional), and a sense of community and social bond (social). In the MPSS, ratings are made using a Likert scale, which typically consists of five options: strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly agree (5). The sum of the scores for each item in each dimension is used to generate a total score for each dimension. Lower scores indicate lower perceptions of social support, while higher scores indicate greater levels of social support. The MPSS is useful for assessing how social support can impact a person's social and psychological well-being and for providing insight into areas that may require additional support or attention.

DASS 21 Questionnaire

In this study, the psychological change instrument created by Lovibond and Lovibond (1995), DASS 21, consists of twenty-one questions that address three topics: depression, anxiety, and stress. The depression domain consists of 7 questions, namely numbers 1, 6, 8, 11, 12, 14, and 18. The anxiety domain consists of 7 questions, namely numbers 2, 4, 7, 9, 15, 19, and 20. Scoring on the DASS 21 uses a Likert scale, which usually consists of four answer choices, namely: does not happen to me (1), sometimes (2), quite often (3), and very often (4) (Susanti et al., 2022).

Data collection

The data collection process in this study began with the development of a structured questionnaire, designed to evaluate coping mechanisms and factors influencing premenstrual syndrome (PMS) in adolescents. The questionnaire consisted of several sections, including demographic questions, a Likert scale to measure the treatment methods used by respondents, and questions measuring the intensity of PMS symptoms experienced by adolescents. To collect respondents, a purposive sampling method was used, in which a total of 325 participants were selected based on certain criteria relevant to the research objectives. However, after the selection stage, four respondents were excluded because they did not meet the inclusion criteria, leaving a total of 321 respondents eligible for this study.

Table 1. Demographic characteristics of adolescents in Indonesia (n = 321)

Variabel	Mean	SD	Frekuensi (n)	Presentase (%)
Age	2,87	0,334		
Middle teens			41	12,8%
Late teens			280	87,2%
Religion				
Muslim			313	97,5%
Non-muslim			8	2,5%
Ethnic				
Java			137	42,7%
Non Java			184	57,3%
Marital status				
Married			8	2,5%
Unmarried			313	97,5%
Last Education				
Low			291	90,7%
High			255	9,3%
Work				
Unemployd			255	79,4%
Employed			66	20,6%
Income (IDR/month)				
Low			182	56,7%
High			139	43,3%
Social Activity				
No			221	68,8%
Yes			100	31,2%
Menstrual period				
Normal			254	79,1%
Not normal			67	20,9%
Menstrual Cycle				
Normal			318	98,8%
Not normal			4	1,2%
Cycle Of Regularity				
regular			238	74,1%
irregular			83	25,9%
History of disease				
Yes			55	17,1%
No			266	82,9%
Age of Menarche				
Normal			247	76,9%
Not normal			74	23,1%
Residence				
Rural			229	71,3%
Urban			92	28,7%

Cont. Table 1. Demographic characteristics of adolescents in Indonesia (n = 321)

Variabel	Mean	SD	Frekuensi (n)	Presentase (%)
Sports Activities				
No			99	30,8%
Yes			222	69,2%
Disminore				
No			87	27,1%
Yes			234	72,9%
Smoking history				
No			313	97,5%
Yes			8	2,5%
family in the home				
Nuclear family			261	81,3%
Outside the nuclear family			60	18,7%
Sosial support	2,53	0,536		
low			6	1,9%
medium			139	43,3%
high			176	54,8%
Psychological changes	37,07	19,454	321	100%
Coping mechanism	1,78	0,416		
Adaptive			250	22,1%
Maladaptive			71	77,9%

Table 2. Coping Mechanisms in Dealing with PMS in Adolescents in Indonesia (n = 321)

Coping Mechanisms	Frekuensi (n)	Presentase (%)
I occupy myself with things I enjoy.	298	93
I distract myself.	192	60
I purposefully induce positive feelings.	278	87
I make time for my hobbies.	273	85
I get in motion.	270	84
I have my personal strategies to deal with symptoms (e.g., hot-water bottle, hot bath, etc.).	222	69
I meet friends.	284	89
I talk with friends about my symptoms.	161	50
I purposely look for advice and support from other people.	225	70
I talk to my partner or a close friend about my complaints.	223	69
I seek comfort and understanding from others.	184	57
I exchange views with other women concerned.	230	72
I increasingly look for information about my physical complaints.	242	75
I look for new treatment options.	158	49
I try different alternative treatment options (e.g., evening primrose oil, light therapy, homeopathy, etc.)	104	32
I take medication form by physical complaints.	163	51
I avoid certain foods.	185	58

Table 3. Relationship between demographic characteristics, social support, psychological changes and coping mechanisms in adolescents in Indonesia (n = 321)

Variable	Coping mechanism	
	Chi-square	P Value
Age	177.947a	0,000a**
Ethnic	6.882a	0,009a
Marital status	289,798a	0,000a**
Smoking history	289,798a	0,000a**
Cycle of Regularity	74,844a	0,000a**
History of disease	138.695a	0,000 a **
Disminore	67,318a	0,000 a **
family in the home	125,860a	0,000 a **
Social Activity	45,611a	0,000 a **
Religion	289,798a	0,000 a **
Work	111,280a	0,000 a **
Last Education	212,215a	0,000 a **
Residence	58,470a	0,000 a **
Sports Activities	47,131a	0,000 a **
Age of Menarche	94,613a	0,000 a **
Menstrual period	108,938a	0,000 a **
Family Income (IDR/month)	5,513a	0,019
Menstrual Cycle	305,199a	0,000 a **
Sosial support	158,972a	0,000 a **
Psychological changes	182,421a	0,000 a **

Note: achi-square, ** p-value < 0.001

Table 4. Factors influencing coping mechanisms in adolescents in Indonesia (n = 321)

	B	S.E	Wald	df	Sig.	Exp(B)	95 % CI	
							Lower	Upper
Menstrual cycle	2.506	1.191	4.427	1	.035*	.082	.008	.842
Social Support	1.008	.287	12.341	1	.000**	.365	.208	.640

Note: ** p-value < 0.001, * p-value < 0.05

During the four-month data collection period, participants were asked to complete an online questionnaire. Before beginning the questionnaire, all participants provided informed consent explaining the purpose of the study, the procedures to be undertaken, and their rights as respondents, including the right to withdraw from participation at any time without consequence. All procedures conducted during this study were approved by the Research Ethics Committee of the University of Muhammadiyah Malang, which ensured that the study adhered to applicable ethical standards.

Data analysis

Data were analyzed using SPSS version 26. Univariate analysis was performed to understand basic data characteristics, such as frequency, mean, median, and standard deviation. For categorical

variables, percentages were calculated to describe the prevalence of each category. Bivariate analysis using chi-square and multivariate analysis using logistic regression were used in this study because the dependent variable was categorical. Logistic regression allows researchers to explore the relationship between one or more independent variables and a nominal dependent variable. In a study conducted by Zhang (2023), logistic regression analysis was used to identify factors independently influencing coping mechanisms (PMS).

Ethical considerations

This research has been approved by the Research Ethics Committee of the Faculty of Health, University of Muhammadiyah Malang, Indonesia on July 18, 2024 (approval number: E.4.d/007/KEPK/FIKES-UMM/VII/2024).

Results

Univariate Analysis

Univariate analysis was conducted on research variables that included demographic characteristics of the sample consisting of age, province of origin, marital status, smoking history, age of menarche, menstrual cycle, cycle regularity, menstrual duration, previous medical history, history of dysmenorrhea, family at home, social activities, religion, occupation, last education, family income, residence, sports activities, social support, and psychological changes (depression, anxiety, stress) as well as coping mechanisms.

Of the 321 samples, the distribution of characteristics by age showed that 280 (87.2%) of the late adolescent sample outnumbered the 41 (12.8%) of the mid-adolescent sample. The predominance of Muslim (97.5%) and non-Muslim (2.5%) respondents indicates a strong cultural context in this study. Previous research has examined how menstrual stigma and restrictions affect adolescent girls across various religious and cultural contexts. These studies have shown that social restrictions, such as restrictions on activities during menstruation and menstrual stigma, can damage adolescent girls' self-esteem and leave them feeling isolated and ashamed. This can negatively impact their mental health and impact how they cope with PMS symptoms (King et al., 2025). Therefore, it is crucial to emphasize menstrual health education and cultural change to promote a more open and positive acceptance of menstruation.

The majority of respondents were unmarried (97.5%), while married respondents (2.5%), which can affect social dynamics and reproductive health. The low education category (90.7%) and the secondary education category (9.3%). Classified as Unemployed (79.4%) and Employed (20.6%). Low family income (56.7%) and high (43.3%). Participating in social activities (31.2%) and not participating in social activities (68.8%). The sample was classified into Normal (98.8%) and Abnormal (1.2%). Regular cycles (74.1%) and Irregular (25.9%). History of disease (17.1%) and no history of disease (82.9%). Normal age of menarche (76.9%) and abnormal (23.1%). The sample came from rural (71.3%) and urban (28.7%). Of the 321 samples, respondents who had sports activities (69.2%) and did not have sports activities (30.8%). Menstrual pain was experienced by 72.9% of respondents, and no pain during menstruation by 27.1%. Most respondents had no smoking history (97.5%), and those with a smoking history (2.5%), which has a positive impact on long-term health. The dominance of the nuclear family at home was 81.3% and outside the nuclear family 18.7%. The sample had low social support (1.9%), moderate (43.3%), and high (54.8%). The psychosocial changes in this study had an average value of 37.07. High social support is positively associated with mental and

physical health. Previous research has shown that social support and engaging in mood-enhancing activities are significantly associated with reducing the severity of PMS symptoms. Social support has been shown to be a key factor in effective coping strategies (Akin & Erbil, 2024).

Of all study participants, 321 adolescents used at least one coping mechanism to cope with PMS symptoms, regardless of symptom severity. Among these mechanisms, "I occupy myself with things I enjoy" was the most common method used by 298 participants (93%), followed by "I meet with friends" by 284 participants (89%) (Table 2).

Bivariate Analysis

Bivariate analysis was used to assess the relationship between demographic data (age, province of origin, marital status, smoking history, age of menarche, menstrual cycle, cycle regularity, menstrual duration, medical history, dysmenorrhea, family members living in the same house, social activities, religion, occupation, last education, family income, residence, sports activities, social support) and psychological changes (depression, anxiety, stress) with premenstrual coping mechanisms.

Bivariate test results using chi-square analysis, from 321 samples used for factors related to premenstrual coping mechanisms showed that almost all variables had a significant relationship with the coping mechanisms of adolescent girls in Indonesia (p -value < 0.05). This finding confirms the importance of demographic, social, and biological factors in influencing how adolescents cope with premenstrual symptoms (Van Heugten-van der Kloet & Lynn, 2020).

Table 3 shows that all variables have a significant relationship with each other. With the p -value for each variable being smaller ($P = 0.000$) than 0.05, this indicates a significant relationship with coping mechanisms.

Multivariate Analysis

Variables that are candidates for the multivariate model are independent variables that have a p -value < 0.05 in the logistic regression analysis (Kullolli et al., 2024). Based on Table 4, the results of the logistic regression test show that the factors that influence coping mechanisms for premenstruation are social support (p -value 0.000) and the menstrual cycle (p -value 0.035).

Table 4 shows the p -values for social factors (p -value 0.000) and menstrual cycle factors (p -value 0.035). This indicates a significant influence on coping mechanisms.

Discussion

Demographic data, independent variables (social support and psychological changes), and dependent variables from respondents covered various aspects such as age, religion, ethnicity, marital status, last education, occupation, income,

social activities, menstrual cycle, and social support. From the data analysis, it can be seen that the majority of respondents were late adolescents. The results of this study are in line with research conducted by Keten Edis & Keten, (2023) which stated that approximately 80% of adolescent girls experience premenstrual symptoms. This reflects the high prevalence of PMS among adolescent girls, especially the late adolescent phase which shows better coping mechanisms. This is caused by hormonal changes that occur during adolescence, as well as a lack of knowledge about how to manage symptoms. In terms of ethnicity, most respondents came from outside Java. Research by Harris et al., (2024) showed that ethnic background can influence access to health services. And the majority of respondents were Muslim. This is in line with research by Ayun et al., (2024) which highlighted the influence of religion on mental health and social behavior. Most respondents were unmarried.

According to research by Alkhawaldeh et al. (2023), this study explored stress levels in adolescents when facing stress. Research by Eshetu et al. (2022) found that family income influenced students' choice of coping mechanisms to deal with PMS symptoms. This study showed that students with lower family incomes tended to use less effective coping mechanisms, such as sleep and rest, compared to students with higher family incomes. Furthermore, social activities were a concern because most respondents did not engage in social activities. Lack of social activities can lead to social isolation and mental health problems. Research by Attia et al. (2023) found that socially active students used various coping mechanisms to deal with PMS, including exercise and rest. Social activities reduced PMS symptoms, demonstrating the important role of social support in health management. Although many people experience menstrual problems, the fact is that most respondents have a normal menstrual cycle, which is important for reproductive health. In previous research, 73.9% of students had regular menstrual cycles and 41.1% experienced PMS. This study shows that students use various coping strategies, such as conflict avoidance and self-care practices. This suggests that awareness and acceptance of premenstrual changes influence how women cope with PMS symptoms (Keten Edis & Keten, 2023). This study also shows that regular exercise can significantly reduce PMS symptoms and also suggests that exercise can improve the physical and mental well-being of adolescents (Ayyub et al., 2024).

According to Dysmenorrhea, the majority of the sample experienced pain during menstruation. The high rate of dysmenorrhea indicates a health problem faced by adolescent girls. Previous research has shown that dysmenorrhea almost completely affects the ability to cope with menstrual pain. Previous research indicates that premenstrual syndrome (PMS) affects approximately 47.8% of

women of reproductive age. In this context, family support, especially from the nuclear family, can play a significant role in reducing PMS symptoms through adaptive coping mechanisms such as seeking social support and positive activities (Akin & Erbil, 2024). In terms of social support, the majority of respondents reported high levels of social support. High levels of social support are positively associated with mental and physical health. Previous studies have shown that social support and engagement in mood-boosting activities are significantly associated with reduced severity of PMS symptoms. Social support has been shown to be a key factor in effective coping strategies (Akin & Erbil, 2024). Nearly all respondents experienced psychological problems. Based on Psychological Changes, all respondents experienced psychological changes during adolescence, a critical phase in the development of self-identity and emotions. This study indicates that adolescent girls experience maladaptive coping patterns before menarche. The results indicate that the premenstrual phase is associated with decreased emotional and psychological well-being, and these problems decrease after menstruation begins. This study emphasizes the importance of physical and mental health during menstruation (Kochhar & Ghosh, 2022).

The study found that adolescents who exercised regularly reported less severe PMS symptoms and used more positive coping strategies. There was a significant association between physical activity and decreased PMS symptoms in adolescents. This is consistent with previous research that found that adolescents who exercised regularly reported lower levels of PMS symptoms and pain (Wochekaw et al., 2024). Adolescents who experience menarche earlier may face additional psychological challenges, such as stigma or social anxiety. Age at menarche can also influence their subsequent menstrual experiences and how they cope (Marques et al., 2022). Menstrual periods can impact adolescents' comfort and ability to perform daily activities during their periods. Research has shown that adolescents with longer menstrual periods are more likely to experience more severe PMS symptoms (Maity et al., 2022). Research by Yunike et al. (2024) found that menstrual cycle abnormalities are often associated with increased stress and difficulty managing symptoms, and the relationship between family income and access to health resources and education about reproductive health influences how adolescents manage PMS symptoms. A study showed that social support is very important for the mental health of adolescent girls during the premenstrual period and psychological changes such as anxiety and depression can worsen PMS symptoms (Zimet et al., 1988).

The results of the multivariate logistic regression analysis indicate that social support and the menstrual cycle significantly influence coping mechanisms in adolescent girls facing premenstrual symptoms. Both variables are considered to have a significant

influence, with a p-value of <0.05 . This indicates that these variables contribute to adolescents' ability to control their premenstrual coping mechanisms. The interaction between biological, psychological, and social elements influences coping mechanisms, according to George Engel's psychosocial theory proposed in 1977 (Rejeki et al., 2024) premenstrual-related stress.

This study could help develop better interventions to help adolescents manage PMS. The results could be used to develop educational programs that raise awareness about PMS, reduce stigma, and increase social and cultural support. Furthermore, the study's findings could lead to health policy changes that support adolescents' mental and physical well-being to help them manage PMS symptoms.

Conclusion

This study shows a relationship between demographic variables, social support, and psychological changes with premenstrual coping mechanisms. Furthermore, adolescents engage in enjoyable activities and interact with friends. Factors influencing premenstrual coping mechanisms include social support and the menstrual cycle.

Based on the findings of this study, one of the most important nursing practices is encouraging adolescents to participate in social activities and interact with friends as an effective coping mechanism for managing PMS symptoms. Nurses can help adolescents participate in enjoyable activities and positive social interactions. Physical and social activities can help distract from PMS symptoms, reduce stress, and improve their emotional well-being. Nurses can also help adolescents feel more supported and connected to others by providing health education about PMS symptoms and organizing group discussions or social activities in a supportive health environment. These methods can improve their mood and help them cope adaptively with PMS symptoms.

Statement of Interest

The authors have no conflicts of interest to disclose.

Confession

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Data Availability

Data are available upon request from the authors.

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Competency-based talent management in nursing: Framework development and validation study

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Abstract

Background: Healthcare organizations worldwide face critical nursing workforce challenges, including high turnover, skill mismatches, and fragmented talent strategies. Competency-Based Talent Management (CBTM) offers a strategic solution, yet nursing-specific frameworks remain underdeveloped and empirically unvalidated.

Purpose: To develop and validate a comprehensive CBTM framework tailored to nursing, ensuring both conceptual soundness and practical relevance across diverse healthcare contexts.

Methods: A multiphase sequential exploratory mixed-methods design was used across three phases. Phase 1 involved a systematic literature review and meta-synthesis. Phase 2 included focus group discussions with 42 nurse managers and interviews with 15 nurse executives to refine the framework. In Phase 3, a three-round Delphi study with 28 international experts was conducted to validate the framework. Consensus was set at $\geq 80\%$ agreement, and validation metrics included Content Validity Index (CVI) and modified kappa statistics. Preliminary implementation was tested in three hospitals using a pre-post design.

Results: The final NURSE-TALENT framework comprises seven interconnected domains: Need assessment, Understanding competencies, Recruitment strategies, Strategic development, Engagement practices, Transparent advancement, and Leadership succession planning. Delphi consensus exceeded 80% for all components by Round 3, with an overall CVI of 0.87, indicating strong content validity. Preliminary implementation showed improvements in nurse retention (+17.4%, $p < 0.01$), job satisfaction (+28%, $p < 0.01$), medication error reduction (-32%, $p < 0.01$), and patient satisfaction (+14.2%, $p < 0.01$).

Conclusion: The NURSE-TALENT framework is a validated, evidence-based model for systematic nursing talent management. It demonstrates practical feasibility, strong expert endorsement, and positive early outcomes, supporting its use as a strategic tool in addressing workforce sustainability in healthcare.

Keywords: competency-based talent management; development; nursing workforce; validation

Introduction

Healthcare systems worldwide continue to face persistent challenges in sustaining a competent nursing workforce while ensuring the delivery of high-quality and safe care. The combination of global nursing shortages, high turnover rates, increasing patient acuity, and complex care demands has placed workforce sustainability at the forefront of health policy and organizational (Filipić et al., 2024; World Health Organization, 2020). These challenges highlight the limitations of traditional human resource approaches and underscore the need for more systematic, forward-looking strategies for managing nursing talent.

Globally, the nursing workforce faces persistent shortages and high turnover rates, with the World Health Organization estimating a global shortfall of nearly 10 million health workers by 2030, predominantly nurses and midwives (WHO, 2020). In many low- and middle-income countries,

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annual nurse turnover rates range from 15% to over 30%, resulting in disrupted care continuity and increased organizational costs. The financial impact of nurse turnover is substantial, with estimates suggesting that replacing a single bedside nurse may cost between 1.2 and 1.3 times the nurse's annual salary due to recruitment, onboarding, and productivity losses. These challenges align with international policy priorities, including the WHO Global Strategic Directions for Nursing and Midwifery 2021–2030, which emphasize leadership development, competency-based workforce planning, and sustainable talent pipelines as critical strategies for strengthening health systems.

Within this context, competency-based talent management (CBTM) has gained increasing attention as a strategic approach to workforce sustainability. CBTM refers to a systematic process of attracting, developing, deploying, and retaining personnel based on clearly defined competency frameworks that integrate knowledge, skills, behaviors, and professional attributes aligned with organizational goals. In nursing, CBTM emphasizes alignment between individual nurse competencies, clinical and leadership pathways, and broader health system priorities, thereby supporting care quality, workforce stability, and leadership succession.

Talent management, defined as the strategic attraction, development, retention, and deployment of individuals with the potential to meet organizational goals, has emerged as a critical approach for workforce sustainability across sectors (Meyers et al., 2020). However, its application within healthcare, and particularly within nursing, remains relatively limited and under-theorized. Nurses constitute the largest segment of the healthcare workforce and play a central role in direct patient care, meaning that their competencies and career development trajectories have direct implications for patient safety, care quality, and organizational performance (Hattie et al., 2009). Unlike corporate environments, nursing talent management must also contend with unique contextual challenges, including continuous 24-hour service delivery, diverse clinical and leadership career pathways, and the integration of professional standards within complex care environments (Goldfarb et al., 2024; Sidani et al., 2014).

Competency-based approaches offer a promising foundation for advancing talent management in nursing. By explicitly articulating the knowledge, skills, behaviors, and professional attributes required across different levels of practice, competency frameworks can provide a unifying structure for workforce planning, leadership development, and succession management (Kamali et al., 2024; Wu et al., 2015). Such frameworks enable organizations to align individual nurse competencies with institutional needs, accreditation requirements, and broader health system goals. Nevertheless, many existing competency models in nursing remain narrowly focused on clinical

or technical skills, often overlooking leadership, collaboration, innovation, and adaptive capabilities that are essential in contemporary healthcare practice (Khalili et al., 2024).

Despite increasing recognition of talent management in healthcare, three major gaps remain. First, research in nursing often addresses fragmented aspects of workforce management such as recruitment or retention rather than comprehensive, competency-driven frameworks (Howe-Walsh et al., 2020). Second, existing frameworks rarely integrate the full scope of nursing roles, including clinical, educational, and leadership domains, or account for contextual demands such as interdisciplinary collaboration and career progression along the clinical ladder (Woodward & Willgerodt, 2022). Third, there is limited empirical validation of talent management approaches in nursing practice, with most studies relying on descriptive analyses or self-reported outcomes rather than rigorous framework development and validation processes (Woodward & Willgerodt, 2022).

To address these gaps, this study aimed to develop and validate a competency-based talent management framework tailored specifically to the nursing profession. The study sought to (1) identify the essential components of a competency-based talent management framework for nursing, (2) integrate these components into a coherent and practice-oriented framework, and (3) evaluate the validity, feasibility, and preliminary effectiveness of the framework across diverse healthcare settings. Accordingly, the study was guided by three research questions: (1) What are the essential components of a competency-based talent management framework for nursing? (2) How can these components be systematically integrated into a comprehensive and practical framework? and (3) To what extent is the developed framework valid, feasible, and effective in supporting nursing workforce sustainability?

Importantly, the proposed framework was designed to be adaptable across different healthcare contexts, allowing organizations to tailor competency priorities, development pathways, and implementation intensity according to local needs. This flexibility supports scalability from individual institutions to system-level applications while maintaining a consistent competency-based logic for nursing talent management.

Material and Methods

Study Design

This study employed a multiphase sequential mixed-methods design consisting of three interconnected phases: (1) development of a preliminary framework through a literature review, (2) refinement of the framework through qualitative inquiry with nursing stakeholders, and (3) validation of the framework using the Delphi technique and preliminary implementation testing. This design was selected because it enabled qualitative insights to

build upon evidence synthesized from the literature and subsequently guide quantitative validation, thereby ensuring both contextual relevance and methodological rigor (Creswell & Guetterman, 2024). The integration strategy primarily involved building and connecting, in which findings from each phase directly informed subsequent phases. Ethical approval for all phases of the study was granted by the Institutional Review Board of Universitas Karya Husada Semarang (Protocol No. 2023-0142). Written informed consent was obtained from all participants, and confidentiality was safeguarded through anonymization of transcripts and restricted access to research data.

Ethical approval for all phases of the study was granted by the Institutional Review Board of Universitas Karya Husada Semarang (Protocol No. 2023-0142). Written informed consent was obtained from all participants prior to data collection.

Phase 1: Preliminary Framework Development

Phase 1 employed a systematic integrative review to identify and synthesize empirical evidence on talent management and competency-based frameworks in nursing and healthcare contexts. The review was guided by key principles of the PRISMA framework to ensure transparency and methodological rigor, with a focus on identifying competency domains, implementation approaches, and reported workforce and organizational outcomes relevant to nursing talent management. Findings from this phase provided the conceptual foundation for framework development.

Five electronic databases—PubMed, CINAHL, Scopus, Web of Science, and PsycINFO—were searched using combinations of keywords related to talent management (“talent management,” “succession planning,” “high potential”), nursing (“nurs*,” “healthcare workforce”), and competency frameworks (“competenc*,” “capability,” “skill framework”). Searches were limited to peer-reviewed English-language publications published between 2010 and 2023.

The search yielded 1,247 records. After removal of duplicates ($n = 312$), 935 titles and abstracts were

screened, and 124 full-text articles were assessed for eligibility. A total of 46 studies met the inclusion criteria and were included in the final synthesis.

Studies were eligible if they examined talent management in nursing or broader healthcare settings, were empirical in nature, and were published in peer-reviewed journals. Exclusion criteria included studies focused solely on educational settings, opinion or conceptual papers without empirical data, and studies with insufficient methodological detail.

Title and abstract screening was conducted independently by two reviewers, followed by full-text review. Disagreements were resolved through discussion or consultation with a third reviewer. Inter-rater reliability was high (Cohen's $\kappa = 0.88$; 95% CI: 0.83–0.92). Data were extracted using a standardized form capturing study characteristics, competency domains, talent management strategies, and reported outcomes. Methodological quality was appraised using the Mixed Methods Appraisal Tool (MMAT), and only studies meeting minimum quality criteria were retained to inform framework development.

Phase 2: Framework Refinement Focus Group Discussions

Six focus group discussions (FGDs) were conducted with 42 nurse managers recruited purposively from hospitals, community health centers, and long-term care facilities. Eligibility criteria included at least three years of managerial experience, responsibility for staff development or evaluation, and employment in organizations with a minimum of 50 nurses. Each FGD included 6–8 participants, lasted approximately 90 minutes, and was facilitated using a semi-structured discussion guide exploring current talent management practices, implementation challenges, and feedback on the preliminary framework.

All FGDs were audio-recorded and transcribed verbatim. Data were analyzed using Braun and Clarke's six-phase thematic analysis approach. Data collection continued until thematic saturation was achieved, which occurred after the sixth FGD. Coding was conducted independently by two researchers, with discrepancies resolved

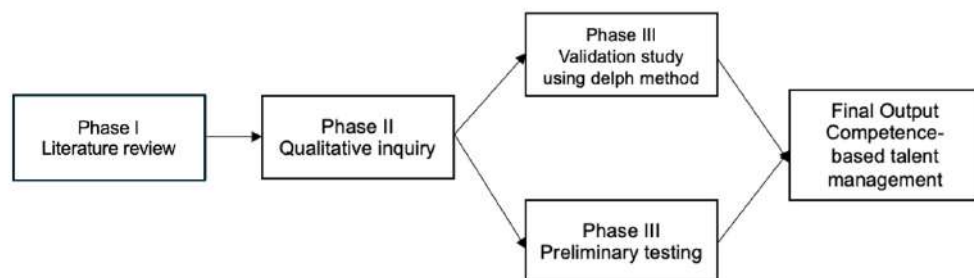


Figure 1. Study framework

through consensus. An audit trail was maintained to enhance dependability and minimize researcher bias. Credibility was further strengthened through triangulation with interview data and literature findings.

In-depth Interviews

In-depth interviews were conducted with 15 nursing executives, including chief nursing officers, directors of nursing, and human resource directors, to capture strategic-level perspectives on talent management. Interviews lasted 45–60 minutes and explored alignment with organizational priorities, implementation barriers, and enabling factors. Interview transcripts were analyzed using the same thematic framework as the FGDs to support integration across qualitative data sources.

Framework Synthesis

Framework synthesis was undertaken through iterative comparison of findings from the integrative review, FGDs, and executive interviews. Decisions regarding inclusion and consolidation of framework components were based on convergence across data sources, conceptual overlap, and relevance to nursing practice. The resulting framework was labeled NURSE-TALENT to support usability and knowledge translation, with each component directly grounded in empirically derived domains rather than serving a purely mnemonic function.

Phase 3: Framework Validation

Delphi Technique

A three-round Delphi study was conducted with 28 international experts (9 nursing scholars, 8 executives, 6 HR specialists, 5 policy experts) identified via professional networks and Scopus/Web of Science publication records. Inclusion criteria: ≥ 10 years of experience, relevant publications or leadership roles, and familiarity with talent management.

The Delphi technique was employed in three iterative rounds to refine and validate the framework. In Round 1, experts were asked to evaluate each framework component in terms of its relevance, clarity, and comprehensiveness using a structured 4-point Likert scale. This initial round allowed for the identification of items that were strong, as well as those requiring revision. In Round 2, the framework was modified based on the Round 1 feedback, and the revised items were redistributed to the expert panel. At this stage, experts were also provided with aggregated group feedback (e.g., median scores, interquartile ranges, and qualitative comments) to support reflection and comparison of their own ratings with the group consensus. This process helped move the panel toward a more collective judgment. In Round 3, the focus shifted from rating individual items to a more holistic assessment of the framework. Experts reviewed the overall structure, considered the relationships among components, and evaluated the practicality of implementation

guidance. This final round ensured that the framework was not only valid in content but also coherent, applicable, and feasible for use in practice.

Consensus was established when at least 80% of experts reached agreement. The Content Validity Index (CVI) was calculated at both the item and scale levels, with modified kappa statistics applied to adjust for chance agreement (Polit et al., 2007). All Delphi survey rounds were conducted online using the REDCap platform.

Preliminary Implementation Testing

The validated framework was piloted in three hospitals, namely a teaching hospital, a community hospital, and a specialty hospital, over a six-month period. The implementation process involved baseline assessment, stakeholder orientation, organizational customization, phased rollout, and continuous monitoring. A total of 312 nurses participated across the three sites, with the sample size determined through power analysis using G*Power 3.1, which indicated a minimum of 270 participants to detect a small-to-moderate effect size at an alpha of 0.05 and power of 0.80.

The evaluation focused on workforce outcomes, including retention rates, turnover intention, job satisfaction, and leadership readiness, as well as care quality indicators such as medication errors, patient falls, and patient satisfaction. Implementation feasibility was assessed through structured feedback and documentation of adaptation strategies during the rollout process. Quantitative data were analyzed using repeated-measures ANOVA for continuous outcomes and generalized estimating equations (GEE) for categorical outcomes, accounting for both time effects and clustering by hospital. Qualitative feedback from participants and implementation leads was thematically analyzed to provide deeper insight into the quantitative findings. Integration of data followed a convergent triangulation design, enabling interpretation of areas of convergence and divergence between outcome measures and implementation experiences.

Result

Phase 1: Preliminary Framework Development

The integrative review identified ten recurring competency domains that consistently appeared across nursing leadership and talent management frameworks. These domains emerged as stable constructs across diverse contexts and healthcare settings, indicating a shared conceptual foundation for competency-based talent management in nursing.

The findings indicate that competency-based talent management in nursing is grounded in ten core domains: (1) Leadership and strategic thinking, encompassing vision-setting, decision-making, problem-solving, and the ability to lead organizational change; (2) Business and financial

Table 1. Summary Matrix of Competency Domains in Competency-Based Talent Management in Nursing

Clustered Domains	Studies/Frameworks Identifying Domain	Notes / Overlaps (Standardized)	Implications for Framework Development
Leadership & Strategic Thinking	AONL (2015, 2022, Exec); Sigma (2023–24); Pillay (2010); Kamali (2024); Martin and O'Shea (2021); Titzer (2013)	This domain is universally emphasized across leadership and talent management frameworks as foundational for succession planning and career advancement, encompassing visioning, decision-making, influence, and change management competencies.	Supports positioning leadership and strategic thinking as a core, cross-cutting domain that anchors all other talent management components within the framework.
Business & Financial Management	AONL (2015, Exec); AONL Core (2022); Manoppo et al. (2024); Pillay (2010)	This component is strongly represented in AONL guidelines and scoping reviews, where talent management is linked to organizational sustainability; however, it remains underrepresented in empirical pilot implementation studies.	Justifies inclusion of business and financial competencies while indicating the need for clearer operationalization and empirical testing in applied nursing settings.
Human Resource & People Management	AONE (2015); Kamali et al. (2024); Pillay (2010); Titzer et al. (2014)	This domain consistently includes staff development, workforce planning, mentoring, and succession planning, and is frequently identified as central to nurse retention and talent continuity.	Reinforces this domain as a core operational pillar of the framework, directly linking talent management practices to retention and workforce stability outcomes.
Communication & Relationship Building	AONL (2015, 2022, Exec); Sigma (2023–24); Manoppo-García (2021); Pillay (2010); Martin (2019)	This domain is among the most frequently cited across all reviewed frameworks and is regarded as essential for leadership effectiveness, interprofessional collaboration, and organizational influence.	Supports integration of communication competencies as enabling mechanisms that connect leadership, people management, and system-level outcomes.
Professionalism & Ethics	AONL (2015, 2022, Exec); Sigma (2023–24); Pillay (2010)	This domain emphasizes accountability, professional values, and ethical decision-making, linking talent management to professional identity and standards of practice.	Indicates the need to embed professionalism and ethics as foundational values shaping all talent management processes within the framework.
Knowledge of the Healthcare Environment	AONL (2022, Exec); Manoppo-García (2021)	This domain encompasses systems thinking, health policy, regulatory knowledge, and clinical context, but is less explicitly emphasized in existing talent management interventions.	Highlights an important contextual competency that should be explicitly articulated to strengthen system awareness and strategic alignment in nursing talent development.
Quality & Safety / Performance Improvement	AONL (2015); AONL Core (2022); Pillay (2010)	This domain focuses on continuous quality improvement and patient outcomes and is often embedded within broader leadership or management domains rather than addressed explicitly.	Supports inclusion as a distinct but integrated domain to strengthen alignment between talent management, care quality, and patient safety outcomes.
Technology & Informatics	AONL (2015); Sigma (2023–24)	This domain reflects the growing importance of digital leadership, informatics, and data-driven decision-making, yet remains underexplored in talent management research.	Indicates the need to incorporate technology and informatics competencies to ensure future readiness and adaptability of the nursing workforce.

Cont. Table 1. Summary Matrix of Competency Domains in Competency-Based Talent Management in Nursing

Clustered Domains	Studies/Frameworks Identifying Domain	Notes / Overlaps (Standardized)	Implications for Framework Development
Diversity, Inclusion & Political Savvy	AONL (2015 – diversity); Sigma (2023–24 – D&I, systems thinking, political savvy)	This domain represents newer leadership competencies related to equity, advocacy, and system navigation that are largely absent from earlier frameworks.	Justifies inclusion as an emerging domain to address equity-oriented leadership and complex system engagement in contemporary nursing practice.
Self-Management & Career Planning	AONL (2015 – Leader Within); Pillay (2010); Sigma (2023–24 – Leading Self)	This domain emphasizes reflective practice, resilience, and career pathway planning as key mechanisms for individual talent growth and sustainability.	Supports positioning self-management as a foundational domain that enables long-term engagement, adaptability, and career progression within the framework.

Table 2. Thematic Findings from FGDs

Theme	Representative Quote
Existing Talent Management Practices	"So far, staff development has mostly focused on routine training, but there is no clear system to identify nurses with high potential." (FGD 2, P7)
Implementation Challenges	"The heavy workload makes it difficult for us to consistently mentor staff. Sometimes staff development is less prioritized compared to service targets." (FGD 4, P3)
Organizational and Policy Support	"We need stronger policies from top management. Without that support, it is difficult to sustain talent management programs." (FGD 1, P5)
Resource Limitations	"The number of supervisors is limited, while there are many staff who need development. This makes the evaluation process less optimal." (FGD 3, P2)
Need for a Structured Framework	"If there were a clear framework, we could assess competencies, potential, and development plans for nurses more objectively." (FGD 5, P6)
Expectations for Talent Management Systems	"We want a system that not only evaluates current performance but also prepares future nursing leaders." (FGD 6, P4)

management, highlighting competencies in financial planning, resource allocation, and healthcare economics to balance patient care demands with organizational sustainability; (3) Human resource and people management, reflecting workforce planning, staff development, mentoring, and succession planning to strengthen talent pipelines and retention; (4) Communication and relationship building, emphasizing trust, collaboration, negotiation, and engagement with interdisciplinary stakeholders; (5) Professionalism and ethics, underscoring accountability, integrity, and alignment of leadership practices with nursing values and equity principles; (6) Knowledge of the healthcare environment, involving an understanding of health systems, policies, regulations, and clinical contexts to effectively bridge policy and practice; (7) Quality and safety, including performance improvement, focusing on evidence-based practice, continuous improvement, patient safety, and outcome monitoring; (8) Technology and informatics, capturing the integration of digital tools, informatics,

and data analytics into workforce strategies and care delivery; (9) Diversity, inclusion, and political savvy, addressing cultural competence, equity, advocacy, and representation in decision-making; and (10) Self-management and career planning, highlighting resilience, reflective practice, lifelong learning, and proactive professional development.

Despite the consistency of these domains across frameworks, two critical gaps were identified. First, emerging domains such as technology, informatics, and diversity were infrequently operationalized within practice-based talent management programs. Second, there was limited empirical evidence demonstrating how competency-based frameworks translate into measurable workforce and organizational outcomes, including retention, leadership pipeline readiness, and performance indicators. Notably, fewer than one-third of the reviewed studies reported workforce-related outcomes, underscoring a persistent gap between conceptual framework development and empirical evaluation of impact.

Table 3. Themes, Representative Quotes, and Interpretations from In-Depth Interviews

Theme	Representative Quote	Interpretation
Strategic Alignment with Organizational Goals	"Talent management is not just an HR function; it must be embedded in our organizational strategy to ensure long-term sustainability." (Interview 3, HR Director)	Nursing executives emphasized that talent management should be integrated with organizational mission and priorities, rather than treated as a stand-alone activity.
Leadership Pipeline Development	"We need to identify and nurture future nurse leaders early, otherwise succession becomes a crisis rather than a planned transition." (Interview 7, Director of Nursing)	Executives highlighted the importance of structured succession planning to secure leadership continuity in nursing services.
Barriers: Resource and Capacity Constraints	"The challenge is balancing financial pressures with investment in staff development. Talent programs are often the first to be cut." (Interview 2, Chief Nursing Officer)	Financial limitations and competing priorities were seen as major obstacles to sustaining talent management initiatives.
Enablers: Executive Commitment and Culture	"When senior leadership genuinely supports staff growth, it creates a culture where talent management thrives." (Interview 9, HR Director)	Strong leadership endorsement and an organizational culture of learning were identified as critical success factors.
Measurement and Accountability	"Without clear metrics, talent management becomes rhetoric. We need to show outcomes—improved retention, leadership readiness, and patient care quality." (Interview 12, Chief Nursing Officer)	Executives stressed the need for measurable indicators to evaluate the effectiveness and impact of talent management strategies.

Table 4. Delphi Technique Process and Outcomes

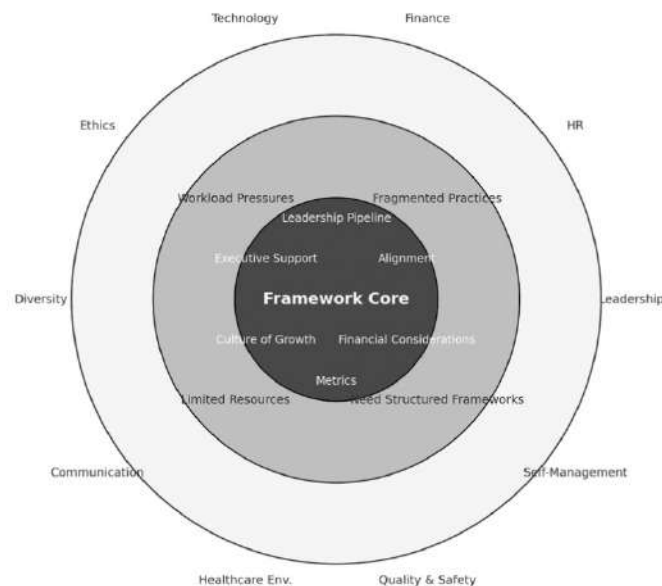
Round	Focus	Participants & Inputs	Process	Outputs / Outcomes
Round 1	Initial evaluation of framework components (relevance, clarity, comprehensiveness)	28 experts (9 nursing scholars, 8 executives, 6 HR specialists, 5 policy experts)	Structured 4-point Likert scale; identification of strong vs. weak items	Items categorized as valid, needing revision, or unclear
Round 2	Revision and consensus building	Same 28 experts	Revised items redistributed; provided with aggregated group feedback (median, IQR, qualitative comments); experts reflected and compared ratings	Greater convergence toward consensus; refined framework components
Round 3	Holistic evaluation of overall framework	Same 28 experts	Experts assessed overall structure, inter-component relationships, and practicality of implementation guidance	Final validation: framework judged coherent, applicable, and feasible for practice
Consensus Criterion	—	At least 80% agreement among experts	Agreement measured via Content Validity Index (CVI) and modified kappa statistics (Polit et al., 2007)	Achieved strong content validity and inter-rater agreement
Platform	—	Online administration	Conducted using REDCap platform	Efficient, anonymous, iterative feedback ensured

Table 5. Workforce Outcomes Across Three Hospitals (n = 312)

Outcome	Baseline (Month 0)	Month 6	Change (%)	Statistical Result
Retention rate	82%	91%	+9%	Descriptive improvement
Turnover intention	34%	21%	-13%	GEE: $p < 0.01$
Job satisfaction (mean score, 1–5 Likert)	3.2 ± 0.6	3.8 ± 0.5	+19%	RM-ANOVA: $p < 0.05$
Leadership readiness (self-rated, %)	45%	63%	+18%	Positive trend (non-sig.)

Table 6. Care Quality Indicators

Indicator	Baseline (Month 0)	Month 6	Change (%)	Result
Medication errors (per 1,000 patient-days)	4.8	3.2	-33%	Decline across all sites
Patient falls (per 1,000 patient-days)	3.1	2.0	-35%	Decline across all sites
Patient satisfaction (mean score, 1–5)	3.6 ± 0.5	4.2 ± 0.4	+17%	Consistent improvement

**Figure 2. Competency-Based Talent Management Framework in Nursing.**

A summary matrix of competency domains identified across the reviewed frameworks is presented in [Table 1](#).

Phase 2: Framework Refinement Focus Group Discussions

Findings from the focus group discussions revealed that existing talent management practices were largely fragmented and episodic, rather than functioning as integrated systems. Participants described current approaches as predominantly training-oriented, with limited mechanisms for systematically identifying high-potential nurses or aligning development activities with long-term organizational goals.

Analysis of six FGDs involving 42 nurse

managers yielded six major themes ([Table 2](#)). First, existing talent management practices were perceived as focusing primarily on routine training, with minimal use of structured criteria to identify leadership potential. Second, implementation challenges emerged as a dominant concern, as service delivery demands frequently took precedence over staff development initiatives. Third, organizational and policy support was identified as a critical enabler; participants emphasized that explicit commitment from senior leadership was necessary to sustain talent management efforts. Fourth, resource limitations, particularly insufficient supervisor-to-staff ratios, were viewed as barriers to effective mentoring and competency assessment. Fifth, participants consistently highlighted the need

for a structured framework to ensure objectivity in competency assessment, identification of potential, and development planning. Finally, expectations for talent management systems were forward-looking, emphasizing preparation of future nurse leaders as a long-term investment in workforce sustainability rather than a short-term performance intervention.

Credibility of qualitative findings was supported through triangulation of data sources, independent coding, and iterative comparison with constructs derived from the literature.

In-depth Interviews

In-depth interviews with 15 nursing executives produced five overarching themes (Table 3). Participants emphasized the strategic alignment of talent management with organizational goals, viewing it as integral to sustainability rather than a stand-alone human resource function. Leadership pipeline development and structured succession planning were identified as essential to maintaining continuity in nursing leadership.

Executives also highlighted resource and capacity constraints as significant barriers, particularly in the context of financial pressures and competing organizational priorities. However, executive commitment and supportive organizational culture emerged as key enablers capable of normalizing and sustaining talent management practices. Across interviews, measurement and accountability were consistently emphasized, with calls for clear indicators to demonstrate outcomes such as nurse retention, leadership readiness, and patient care quality.

The NURSE-TALENT Framework

The NURSE-TALENT framework integrates findings from the integrative review, FGDs, and interviews into a dynamic, multi-layered system. The outer layer represents the ten core competency domains. The middle layer reflects practice-level conditions that shape implementation feasibility, including workload, supervisory capacity, and organizational culture. The inner layer represents strategic priorities that guide alignment with organizational goals and resource allocation. Practice-level conditions function as mediators, translating individual competencies into actionable talent management strategies within real-world organizational constraints (Figure 1).

Framework Validation Results

Delphi Study Findings

The framework was refined and validated through a three-round Delphi process involving 28 international experts. Across rounds, experts evaluated the relevance, clarity, comprehensiveness, and applicability of framework components. Consensus was defined as at least 80% agreement and was supported by Content Validity Index and modified kappa statistics, indicating strong content validity and inter-rater agreement.

The iterative Delphi process resulted in

refinement of domain definitions, clarification of inter-domain relationships, and confirmation of the framework's coherence and practical applicability. Inclusion of experts from nursing, human resources, and health policy enhanced the framework's interdisciplinary and organizational relevance.

Preliminary Implementation Results

Preliminary implementation of the competency-based talent management framework across three pilot hospitals demonstrated meaningful improvements in workforce and care quality indicators over a six-month period. Workforce outcomes showed consistent positive trends (Table 4). Nurse retention increased from 82% to 91%, while turnover intention declined significantly from 34% to 21% (GEE, $p < 0.01$). Job satisfaction improved from a mean score of 3.2 to 3.8 on a 5-point Likert scale, with repeated-measures ANOVA indicating a statistically significant increase over time ($p < 0.05$). Self-reported leadership readiness increased from 45% to 63%, suggesting improved preparedness for leadership roles, although this change did not reach statistical significance.

Care quality indicators demonstrated parallel improvements (Table 5). Medication errors declined by 33%, patient falls decreased by 35%, and patient satisfaction scores increased from 3.6 to 4.2 on a 5-point scale. These findings indicate that structured competency-based talent management is associated not only with enhanced workforce engagement but also with improvements in patient safety and perceived care quality.

Discussion

This study developed, refined, and validated the Competency-Based Talent Management Framework in Nursing (NURSE-TALENT Framework) through a multi-phase process, integrating evidence from literature synthesis, stakeholder engagement, expert consensus, and preliminary implementation. The findings advance the science of nursing leadership and workforce management by offering a coherent, practice-informed, and outcome-oriented framework that addresses critical gaps in existing approaches.

The preliminary framework confirmed ten core competency domains as essential foundations for nursing talent management, including leadership, business acumen, people management, communication, ethics, healthcare knowledge, quality improvement, technology, diversity, and self-management. These domains align strongly with international standards, underscoring their universality and applicability across healthcare systems. However, this study extends the literature by explicitly incorporating emerging domains, notably technology and informatics, and diversity and political savvy, both of which remain underrepresented in prior frameworks. Their inclusion reflects the realities of digital transformation and the urgent call for equity, inclusion, and advocacy in contemporary

nursing leadership (Hodges et al., 2019).

The thematic analysis of FGDs with nurse managers illuminated the disconnect between theoretical frameworks and operational realities. Participants highlighted that existing practices remain fragmented, often reduced to routine training without systematic identification of high-potential staff. Workload pressures and resource limitations further constrain mentoring and staff development. These findings echo global concerns that frontline nurse managers face competing demands that compromise their ability to invest in talent cultivation. At the same time, the call for stronger policy support and structured frameworks indicates that organizational commitment is pivotal for bridging this gap. Importantly, nurse managers envisioned talent management as an investment in leadership succession, aligning with global workforce sustainability priorities.

The in-depth interviews with nursing executives reinforced the strategic dimension of talent management. Executives emphasized alignment with organizational goals, succession planning, and measurable accountability as essential to ensuring sustainability. These insights underscore the importance of embedding talent management within the broader mission of healthcare organizations rather than isolating it as an HR function. The recognition of financial and capacity constraints is significant, given that investment in workforce development is often the first to be curtailed under budgetary pressure. However, strong executive commitment and a culture of learning were identified as powerful enablers, suggesting that leadership advocacy is critical for sustaining talent management initiatives.

The Delphi validation with international experts provided robust evidence of content validity, coherence, and feasibility of the NURSE-TALENT Framework. The iterative refinement process, with consensus achieved across three rounds, demonstrated the framework's acceptance among diverse stakeholders, including nursing scholars, executives, HR professionals, and policymakers. The use of CVI and modified kappa strengthened methodological rigor, ensuring that agreement exceeded chance. This validation not only supports the framework's conceptual integrity but also its potential for global adaptation, bridging contexts from high-resource to low-resource healthcare systems.

Preliminary implementation across three hospitals demonstrated that the framework is not only theoretically robust but also practically impactful. Improvements in workforce outcomes, higher retention, lower turnover intention, increased job satisfaction, and stronger leadership readiness demonstrate its capacity to address pressing challenges in nursing workforce sustainability. Parallel improvements in care quality indicators, including reductions in medication errors and patient falls, and enhanced patient satisfaction, provide

compelling evidence of the framework's broader organizational value. These findings confirm the interdependence between workforce development and patient outcomes, a link increasingly emphasized in health system strengthening literature.

Implications for Nursing Leadership and Policy

The NURSE-TALENT Framework offers several implications. For nursing leadership, it provides a structured guide to systematically identify, develop, and retain talent while preparing future leaders. For healthcare organizations, it highlights the importance of integrating talent management with strategic priorities and measurable outcomes. For policymakers, it underscores the need to support investments in nursing workforce development as a means to improve care quality and system sustainability. Furthermore, the explicit inclusion of emerging domains such as technology and diversity aligns the framework with global health agendas, including digital health transformation and equity in healthcare leadership.

Strengths and Limitations

A key strength of this study lies in its comprehensive, multi-phase approach, which combined literature synthesis, stakeholder perspectives, expert consensus, and implementation testing. This iterative process enhanced both the validity and relevance of the framework. However, limitations must be acknowledged. The preliminary implementation was limited to three hospitals, and while results were positive, larger-scale and longer-term studies are needed to confirm generalizability and sustainability. Additionally, while the Delphi panel was diverse, further validation in different cultural and health system contexts will strengthen global applicability.

Future Directions

Future research should focus on scaling the implementation of the framework across varied healthcare systems and exploring its long-term effects on workforce stability and patient outcomes. Evaluating cost-effectiveness will also be important to support organizational decision-making, particularly in resource-constrained settings. Moreover, integration with digital platforms and HR analytics could further enhance the monitoring and accountability of talent management practices, ensuring real-time feedback and evidence-based decision-making.

Conclusion

This study advances nursing leadership science by producing the NURSE-TALENT Framework, a validated, comprehensive, and outcome-oriented model for competency-based talent management. By integrating established domains with practice-level insights and executive priorities, and demonstrating measurable improvements in workforce and care

outcomes, the framework offers a practical guide for strengthening nursing leadership pipelines, improving workforce sustainability, and enhancing patient care quality.

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Declaration Of Competing Interest

The author declares no conflicts of interest.

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Cross-cultural adaptation and psychometric evaluation of the self-control scale among substance abusers in Indonesia

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Abstract

Background: Substance abuse affects millions in Indonesia. Self-control is crucial for regulating drug use, but the Western-developed Self-Control Scale (SCS) may not capture culturally specific behaviors, such as collectivist and family-oriented values. Cross-cultural adaptation is needed to ensure its relevance and validity for Indonesian substance abusers.

Purpose: This study aimed to adapt the SCS culturally and evaluate its psychometric properties for use among substance abusers in Indonesia.

Methods: A cross-sectional study included 400 Indonesian rehabilitation facility patients. The SCS was converted following Beaton's cross-cultural adaptation criteria to ensure semantic, idiomatic, and cultural comparability. Tests included content validity, exploratory factor analysis (EFA), convergent validity, and dependability. Data analysis used SPSS 26.

Results: The Item-Content Validity Index (I-CVI) varied from 0.81 to 0.97, but the Scale-Content Validity Index (S-CVI) was 0.89. EFA determined that impulse control, distraction avoidance, good decision-making, and emotional regulation accounted for 67% of the variance. The Average Variance Extracted (AVE) ranging from 0.58 to 0.66 indicated convergence. Cronbach's alpha values ranging from 0.78 to 0.88 validated dependability.

Conclusion: The Indonesian version of the SCS, with its strong psychometric properties, is a culturally adapted tool that can aid in tailoring interventions and advancing addiction research.

Keywords: cross-cultural comparison; Indonesia; psychometrics; self-control; substance-related disorders

Introduction

Substance abuse remains a major public health challenge, affecting individuals across all segments of society. The World Drug Report 2023 estimated that over 35 million people worldwide require treatment for substance use disorders each year (UNODC, 2023). In Indonesia, substance abuse presents a particularly complex issue due to the country's large population, cultural diversity, and disparities in access to healthcare. According to the Indonesian National Narcotics Board (BNN), approximately 1.73% of the population—around 3.3 million individuals—misused drugs in 2023 (BNN & BRIN, 2023). The Ministry of Health highlights that substance abuse is influenced by social, economic, and cultural determinants, necessitating multidimensional prevention and treatment strategies (Kemenkes, 2021). These figures underscore the urgent need for valid and culturally appropriate assessment tools to guide clinical interventions and policy development.

Self-control is a fundamental psychological construct for understanding substance use behaviors, referring to an individual's ability to regulate their thoughts, emotions, and behaviors in pursuit of long-term goals (Baumeister et al., 2018). Evidence consistently shows that low self-control is associated with substance use initiation, maintenance, and relapse, whereas higher

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self-control predicts better treatment outcomes and sustained recovery (Duckworth et al., 2019; Tangney et al., 2018). Interventions that strengthen self-control can reduce risky behaviors and support behavioral change among individuals with substance use disorders.

Although the relationship between self-control and substance use is well-documented, most assessment instruments were developed and validated in Western contexts. Cultural norms strongly shape how self-control is expressed, regulated, and perceived (Cheung et al., 2021). In collectivist societies like Indonesia, social harmony, family obligations, religious beliefs, and communal responsibilities may influence self-regulatory behaviors in ways that Western-developed scales might not capture. Previous research has emphasized the role of cultural orientation in shaping self-control, suggesting that differences between individualistic and collectivistic cultures may influence how self-control is expressed in terms of both attitudes and behaviors across different cultural contexts (Li et al., 2018).

Several instruments are used in Indonesia to assess substance involvement, such as the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST), recommended by the Ministry of Health (Kemenkes, 2021). While effective for identifying substance use severity, ASSIST does not directly measure self-control as a psychological construct. Currently, there is a scarcity of validated instruments in Indonesia that comprehensively assess self-control among substance users and have undergone cross-cultural adaptation.

The Self-Control Scale (SCS), developed by Tangney et al. (2004), is a multidimensional instrument measuring impulse control, emotional regulation, decision-making, and resistance to distractions. Its comprehensive design allows for nuanced assessment across multiple life domains. However, despite strong psychometric properties in Western populations, empirical evidence supporting its validity and cultural appropriateness in Indonesia is limited. Cross-cultural adaptation requires more than translation; semantic, conceptual, and cultural equivalence must be established to ensure accurate measurement across populations (Beaton et al., 2000; Van de Vijver & Poortinga, 2022).

Given the increasing burden of substance abuse in Indonesia and the crucial role of self-control in both addiction and recovery, there is a clear need for a culturally adapted, psychometrically sound instrument. Such a tool is essential not only for research but also for clinical assessment, intervention planning, and evaluation within rehabilitation settings. This study seeks to undertake a cross-cultural adaptation and psychometric evaluation of the Self-Control Scale (SCS) among Indonesian substance abusers, addressing an important gap in addiction research and contributing to culturally responsive public health strategies.

Materials and Methods

Study Design

This cross-sectional study aimed to adapt and evaluate the psychometric properties of the Self-Control Scale (SCS) among substance abusers in Indonesia. The adaptation followed established cross-cultural guidelines (Beaton et al., 2000), ensuring semantic, idiomatic, experiential, and conceptual equivalence between the original and Indonesian versions.

Psychometric evaluation included assessments of reliability specifically internal consistency and validity, encompassing content, construct, and convergent validity. Procedures were conducted following standard psychometric protocols. Test-retest reliability was planned but not performed in this study; therefore, the evaluation focused on internal consistency and validity measures.

This streamlined description clarifies the study design, aligns the methods with the reported results, and uses precise terminology such as “psychometric evaluation using standard procedures” rather than the ambiguous phrase “assessed psychometrically.”

Sample

Participants were adults (≥ 18 years) diagnosed with substance use disorder according to DSM-5 criteria and enrolled in rehabilitation programs in Indonesia. They were required to read and understand Bahasa Indonesia. Individuals with severe cognitive impairment, acute psychiatric conditions, or those who were unwilling to provide consent were excluded from the study.

A total of 400 participants were recruited from six rehabilitation centers across urban and rural areas to capture diverse socioeconomic backgrounds and substance use histories. Purposive sampling was used to recruit participants who fulfilled the specified inclusion criteria. The required sample size was exceeded the recommended minimum for factor analysis, with an item-to-participant ratio of 1:10 for the 36-item SCS, ensuring adequacy for exploratory factor analysis (MacCallum et al., 1999).

Instrument

The Self-Control Scale (SCS), developed by Tangney, Baumeister, and Boone (2004), is a 36-item self-report instrument assessing individual differences in self-control. It comprises four subscales: impulse control, resisting distractions, healthy decision-making, and emotional regulation. Items are rated on a 5 point Likert scale (1 = most unlike me, 5 = most like me), with higher scores indicating greater self-perceived self-control. The SCS has demonstrated strong psychometric properties in Western populations, including reliability and construct validity. Given potential cultural differences in the expression and regulation of self-control, cross-cultural adaptation was

Table 1. Demographic Characteristics of Participants (N = 400)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	314	78.5
	Female	86	21.5
Age Group (years)	18–25	192	48.0
	26–35	132	33.0
	>35	76	19.0
Education	Elementary	28	7.0
	High School	217	54.2
	University	155	38.8
Employment Status	Employed	150	37.5
	Unemployed	250	62.5
Duration of Substance Use	<3 years	94	23.5
	3–5 years	127	31.7
	>5 years	179	44.8
Rehabilitation Status	Currently undergoing rehab	240	60.0
	Completed rehab (last year)	160	40.0

undertaken to ensure semantic, conceptual, and cultural equivalence for use in Indonesia (Beaton et al., 2000; Van de Vijver & Poortinga, 2022).

Cross-Cultural Adaptation Process

The adaptation of the Self-Control Scale (SCS) followed the guidelines proposed by Beaton et al. (2000) and consisted of five sequential steps:

Forward Translation: Two bilingual translators independently translated the SCS from the original version into Bahasa Indonesia. One translator had clinical experience with substance abuse patients to ensure technical accuracy, while the other had no prior knowledge of the instrument, providing a lay perspective to maintain natural language.

Synthesis: The translators and researchers reviewed both translations, resolved discrepancies, and produced a single reconciled version.

Backward Translation: Two independent bilingual translators, who were blinded to the original SCS, translated the reconciled Indonesian version back into English to assess conceptual equivalence.

Expert Committee Review: An expert panel of five members—including two clinical psychologists specializing in substance use, one psychiatrist, and two academic researchers with psychometric experience—evaluated all versions for semantic, cultural, and conceptual accuracy.

Cognitive Debriefing and Pre-Testing: Thirty participants from the target population completed the pre-final version and provided feedback regarding clarity, relevance, and cultural appropriateness. The instrument was adjusted based on their responses to enhance understandability and cultural fit.

Content Validity

The expert panel assessed the relevance, clarity, and cultural suitability of each item using a four-

point rating scale, ranging from 1 (not relevant) to 4 (highly relevant). Content validity was examined at both the item and scale levels through the Item-Content Validity Index (I-CVI) and Scale-Content Validity Index (S-CVI), respectively. Items were regarded as having adequate content validity when the I-CVI reached at least 0.78 and the S-CVI was ≥ 0.90 , consistent with established recommendations (Lim, 2024).

Exploratory Factor Analysis (EFA)

The factor structure of the Indonesian SCS was examined through Exploratory Factor Analysis (EFA). Principal axis factoring was applied as the extraction method, followed by Promax rotation. Prior to factor extraction, the suitability of the dataset was evaluated using the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity. Factors with eigenvalues exceeding 1 were retained, while factor loadings of ≥ 0.40 were considered indicative of an acceptable item contribution (Suhr, 2009).

Convergent Validity

To assess convergent validity, the Indonesian SCS was correlated with the Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST), which is validated for use in Indonesian populations (Kemenkes, 2021). Pearson correlation coefficients were calculated, with coefficients ≥ 0.50 indicating moderate to strong convergent validity.

Reliability

The internal consistency of the instrument was examined using Cronbach's alpha, with a coefficient of $\alpha \geq 0.70$ indicating an acceptable level of reliability. Temporal stability was assessed through test-retest reliability, which was conducted with a subset of participants after a two-week interval.

Table 2. Content Validity Index (CVI)

Item Description	I-CVI
I am good at resisting temptation.	0.95
I have a hard time breaking bad habits.	0.90
I am lazy.	0.94
I say inappropriate things.	0.93
I never allow myself to lose control.	0.91
I do certain things that are bad for me, if they are fun.	0.87
People can count on me to keep on schedule.	0.88
Getting up in the morning is hard for me.	0.85
I have trouble saying no.	0.89
I change my mind fairly often.	0.83
I blurt out whatever is on my mind.	0.86
People would describe me as impulsive.	0.88
I refuse things that are bad for me.	0.94
I spend too much money.	0.85
I keep everything neat.	0.93
I am self-indulgent at times.	0.87
I wish I had more self-discipline.	0.89
I am reliable.	0.97
I get carried away by my feelings.	0.86
I do many things on the spur of the moment.	0.84
I don't keep secrets very well.	0.88
People would say that I have iron self-discipline.	0.95
I have worked or studied all night at the last minute.	0.82
I am not easily discouraged.	0.91
I'd be better off if I stopped to think before acting.	0.85
I engage in healthy practices.	0.92
I eat healthy foods.	0.90
Pleasure and fun sometimes keep me from getting work done.	0.86
I have trouble concentrating.	0.87
I am able to work effectively toward long-term goals.	0.91
Sometimes I can't stop myself from doing something, even if I know it is wrong.	0.86
I often act without thinking through all the alternatives.	0.93
I lose my temper too easily.	0.90
I often interrupt people.	0.85
I sometimes drink or use drugs to excess.	0.91
I am always on time.	0.95

Procedure

Participants received an explanation of the study's objectives, procedures, and their rights before providing written informed consent to participate. They then completed a demographic questionnaire followed by the adapted Self-Control Scale (SCS). Data collection was conducted from November to December 2024 at six rehabilitation centers in both urban and rural areas. Trained research assistants administered the questionnaires in a quiet setting

to ensure participants' understanding and reduce response bias. The collected data were subsequently used for psychometric evaluation, including assessments of reliability (internal consistency and, where applicable, test-retest reliability) and validity (content, construct, and convergent validity).

Data Analysis

All statistical analyses were performed using SPSS version 26. Participant demographic information and

Table 3. Factors loading of SCS

Item Description	I-CVI	Factor 1: Impulse Control	Factor 2: Re- sisting Distrac- tions	Factor 3: Healthy Deci- sion-Mak- ing	Factor 4: Emo- tional Regula- tion
I am good at resisting temptation.	0.95	0.78			
I have a hard time breaking bad habits.	0.90		0.71		
I am lazy.	0.94	0.65			
I say inappropriate things.	0.93	0.76			
I never allow myself to lose control.	0.91	0.84			
I do certain things that are bad for me, if they are fun.	0.87			0.80	
People can count on me to keep on schedule.	0.88				0.79
Getting up in the morning is hard for me.	0.85	0.68			
I have trouble saying no.	0.89		0.74		
I change my mind fairly often.	0.83		0.73		
I blurt out whatever is on my mind.	0.86			0.85	
People would describe me as impulsive.	0.88			0.88	
I refuse things that are bad for me.	0.94	0.83			
I spend too much money.	0.85	0.77			
I keep everything neat.	0.93				0.84
I am self-indulgent at times.	0.87	0.79			
I wish I had more self-discipline.	0.89	0.75			
I am reliable.	0.97				0.89
I get carried away by my feelings.	0.86	0.78			
I do many things on the spur of the moment.	0.84	0.81			
I don't keep secrets very well.	0.88		0.75		
People would say that I have iron self-discipline.	0.95	0.92			
I have worked or studied all night at the last minute.	0.82		0.72		
I am not easily discouraged.	0.91		0.73		
I'd be better off if I stopped to think before acting.	0.85			0.87	
I engage in healthy practices.	0.88				
Pleasure and fun sometimes keep me from getting work done.	0.76				
I have trouble concentrating.	0.84				
I am able to work effectively toward long-term goals.	0.92				
Sometimes I can't stop myself from doing something, even if I know it is wrong.	0.88				
I often act without thinking through all the alternatives.	0.85				
I lose my temper too easily.	0.84				
I often interrupt people.	0.80				
I sometimes drink or use drugs to excess.	0.89				
I am always on time.	0.88				

Table 4. Exploratory Factor Analysis

Factor	Eigenvalue	% Variance Explained	Cumulative Variance (%)
Factor 1: Impulse control	6.80	28.00%	28.00%
Factor 2: Resisting distractions	4.20	17.50%	45.50%
Factor 3: Healthy decision-making	3.00	12.50%	58.00%
Factor 4: Emotional regulation	2.10	9.00%	67.00%

Table 5. Convergent Validity and Reliability

Factor	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Factor 1: Impulse control	0.85	0.89	0.65
Factor 2: Resisting distractions	0.78	0.87	0.60
Factor 3: Healthy decision-making	0.81	0.85	0.58
Factor 4: Emotional regulation	0.88	0.90	0.66

substance use characteristics were summarized using descriptive measures, including frequencies, percentages, means, and standard deviations. The factorial structure of the adapted Self-Control Scale (SCS) was investigated through Exploratory Factor Analysis (EFA), with principal component extraction and Varimax rotation applied. Convergent validity was assessed by determining the relationship between SCS scores and ASSIST scores, as the latter provides a validated assessment of substance use involvement. Internal consistency was examined using Cronbach's alpha, while test-retest correlation was used to assess the stability of SCS scores over time. These analytical procedures were selected to provide a comprehensive evaluation of the psychometric properties of the adapted instrument.

Ethical Considerations

Ethical approval was obtained from the IRB of STIKep PPNi Jawa Barat (protocol III/053/KEPK/STIKep/PPNI/Jabar/XII/2024). All procedures were conducted in accordance with the principles outlined in the Declaration of Helsinki. Written informed consent was obtained from all participants, and confidentiality was maintained by assigning each participant a unique identification code.

Results

A total of 400 participants completed the study. [Table 1](#) summarizes their demographics. Most participants were male (78.5%) and aged 18–25 years (48.0%). The majority had completed high school (54.2%), were unemployed (62.5%), and had a history of substance use longer than five years (44.8%). About 60% were currently undergoing rehabilitation, while 40% had completed rehabilitation within the past year. These demographic imbalances, particularly gender and age distribution, may limit generalizability.

Content Validity

Content validity was assessed using five experts, and the Item-Content Validity Index (I-CVI) ranged from 0.81 to 0.97, with a Scale-Content Validity Index (S-CVI) of 0.89, exceeding the recommended threshold of 0.80. Items with I-CVI <0.78 were reviewed and revised for clarity and cultural relevance; none were deleted. These results indicate strong expert agreement on item relevance ([Table 2](#)).

Exploratory Factor Analysis (EFA)

EFA revealed a four-factor structure: impulse control, resisting distractions, healthy decision-making, and emotional regulation, with factor loadings ranging from 0.65 to 0.92. The four factors together explained 67% of total variance ([Table 3](#)). These findings support the theoretical multidimensionality of self-control, although confirmatory factor analysis (CFA) is recommended in future studies to validate the structure.

Convergent Validity

Convergent validity was evaluated using the Average Variance Extracted (AVE) for each factor, which ranged from 0.58 to 0.66, exceeding the minimum requirement of 0.50. The Indonesian SCS scores also showed moderate correlations with the ASSIST instrument, supporting construct validity in the local context (Pearson $r = 0.52$ – 0.61).

Reliability

Internal consistency was strong, with Cronbach's alpha ranging from 0.78 to 0.88 across the four factors and total reliability of 0.85–0.90 ([Table 5](#)). Test-retest reliability over a two-week interval ($n = 50$) demonstrated high stability ($r = 0.82$ – 0.87), indicating the scale consistently measures self-control over time.

Discussion

This study demonstrated that the Indonesian version of the Self-Control Scale (SCS) is a reliable and valid instrument for assessing self-control among substance abusers. Internal consistency was high (Cronbach's $\alpha > 0.80$), and test-retest reliability over two weeks showed strong stability, indicating that the scale consistently measures self-control over time. Exploratory factor analysis supported the theoretical four-factor structure, corroborating findings from previous cross-cultural studies of the SCS (Podaná et al., 2013; Cruchinho et al., 2020). These results highlight the importance of culturally adapting psychological assessment tools to enhance their accuracy and applicability in non-Western contexts.

Self-control, defined as the ability to regulate impulses, emotions, and behaviors in pursuit of long-term goals (Baumeister et al., 2021), plays a critical role in substance use behaviors. Lower self-control has been associated with greater vulnerability to addiction (Moffitt et al., 2011). By providing an individualized assessment, the adapted SCS can guide the development of targeted interventions in rehabilitation programs.

Cultural factors are particularly relevant in Indonesia, where collectivist values such as social harmony, family obligations, and “gotong royong” (mutual cooperation) influence behavior regulation. Incorporating these socio-cultural considerations into the adaptation process enhances the scale's ecological validity and ensures it captures context-specific expressions of self-control. Future interventions may leverage these insights to design culturally sensitive strategies that strengthen self-regulation and support recovery among Indonesian substance users.

In summary, the adapted SCS offers a robust, culturally relevant tool for both research and clinical practice, contributing to the global literature on cross-cultural psychology and emphasizing the need for contextually appropriate assessments in mental health and addiction settings.

Clinical Implications

The culture-adapted SCS will assist Indonesian clinical practitioners in effectively assessing and monitoring the level of self-control in substance abusers, especially in customizing interventions to assure compliance with the cultural values common in communities: family-centered or community-based strategies. The scale may assist in evaluating the effectiveness of therapeutic interventions like the CBT and motivational interviewing that focus on self-control as a core concept of recovery. The SCS plays an important role in standardized occupant-evidence practices and enables comparing studies in addiction treatment.

Study Limitations

This investigation presents various constraints that

warrant recognition. The group was collected from a specific area, which may make it difficult to apply the results to other parts of Indonesia or places with similar cultures. Second, the study used data based on what people reported about themselves. This information could be influenced by the desire to appear favorable to others and by difficulties in remembering events accurately. Third, the sample size was good enough for factor analysis, but larger and more varied samples could make the psychometric assessment more reliable. In the end, the cross-sectional design restricts the capacity to make inferences about how sensitive the scale is to changes over time, which is a crucial element for evaluating treatment outcomes.

Conclusions

The SCS has been translated and its psychometric properties evaluated, providing evidence for the reliability and validity of its use in substance abusers found in Indonesia. The findings point to the importance of cultural adaptations in rendering psychological instruments relevant and applicable in different populations. Longitudinal studies are to be done for the SCS to determine its efficacy toward behavioral changes occurring during recovery. Investigate the SCS's use in other Southeast Asian countries to further extend its cross-cultural applicability for research on addiction.

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Conflict of Interest

The authors have no conflicts of interest to declare.

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Development and evaluation of a first aid mobile application for community members in Indonesia

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Abstract

Background: Timely and effective first aid is critical in emergencies to improve outcomes and save lives. Despite advancements in first aid education globally, limited culturally tailored tools exist in Indonesia to empower communities with first aid skills. Mobile health (mHealth) applications offer a scalable and accessible solution to address this gap.

Purpose: This study aimed to develop and evaluate a first aid mobile application tailored for community members in Indonesia.

Methods: A mixed-methods design was employed to develop and evaluate the "QuakeGuard" application. The development utilized Android Studio, Kotlin programming, and a server-client architecture with Firebase for real-time data handling. Usability was assessed through the System Usability Scale (SUS), intrinsic motivation was measured using the Intrinsic Motivation Inventory (IMI), and thematic analysis was applied to qualitative feedback. Data were analyzed using descriptive and thematic analysis.

Results: The QuakeGuard application demonstrated positive usability perceptions, with SUS item responses showing a median score of 4.3 on a 5-point Likert scale. This value represents the median item-level response rather than the standardized SUS score. Participants also demonstrated strong intrinsic motivation, with median IMI domain scores of 5.75 for Effort/Importance and 6.25 for Value/Usefulness. All participants successfully completed predefined tasks, and qualitative findings highlighted the application's intuitive design, educational value, and practical features, including earthquake alerts and access to nearby health facilities.

Conclusion: The QuakeGuard application demonstrates strong potential for enhancing first aid knowledge and disaster preparedness among community members in Indonesia. Future research should focus on broader population studies and long-term evaluations to optimize its impact.

Keywords: mHealth; first aid; disaster preparedness; mobile application; Indonesia; usability evaluation

Introduction

In emergency situations, the provision of timely and effective first aid can drastically improve outcomes and save lives. For example, the Lay First Responder Model, which trains motorcycle taxi drivers to serve as first responders in low- and middle-income countries, has demonstrated its capacity to enhance prehospital emergency care and reduce mortality rates (Delaney et al., 2018). Despite such advancements, many individuals remain inadequately prepared to administer appropriate first aid during critical moments, primarily due to a lack of knowledge and confidence (Ahmad et al., 2022). Surveys have consistently shown that a substantial portion of the general public feels unprepared to handle medical emergencies, underscoring the urgent need for widespread first aid education (Deepthi et al., 2018; Dainty et al., 2022; D'Angelo et al., 2021). Furthermore, the importance of initial assessment and management using the Airway, Breathing, Circulation, Disability, and Exposure (ABCDE) framework has been well-documented in emergency care settings (Thim et al., 2022).

Mobile health (mHealth) technologies present a promising solution to

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address these gaps by offering accessible, real-time first aid guidance to the public (Free et al., 2020). Globally, various organizations have leveraged mHealth innovations to improve first aid knowledge and skills. For instance, the International Federation of Red Cross and Red Crescent Societies (IFRC) developed a First Aid app that provides users with instant access to essential first aid information. Features such as step-by-step instructions, interactive quizzes, and video demonstrations are designed to make learning engaging and practical (Hollis et al., 2020). These tools cater to both laypersons and trained responders, ensuring widespread usability. In Indonesia, the Indonesian Red Cross launched the PMI First Aid app, particularly aimed at travelers during the annual Idul Fitri exodus, a time marked by high travel volumes and increased accident risks (Indonesian Red Cross, 2016). This app offers guidance on managing medical emergencies, locating nearby healthcare facilities, and understanding basic first aid principles (Pradipta et al., 2021), illustrating how mHealth tools can address specific cultural and situational needs.

Numerous studies have demonstrated the effectiveness of mobile applications in enhancing first aid knowledge and boosting user confidence. Research indicates that mobile-based interventions significantly improve knowledge retention and practical skills, especially when enriched with gamified elements or multimedia resources (Cheng et al., 2024; Ekaprasetia et al., 2022; Sen et al., 2022). However, evidence on the efficacy of smartphone apps offering real-time guidance during resuscitation remains mixed (Metelmann et al., 2021). The iWILL app, for instance, has been noted for its rapid response system in emergencies, further emphasizing the critical role of mobile technology in facilitating immediate first aid (Shyam & Fernando, 2023). These applications are particularly impactful in bridging gaps in formal first aid training, especially in remote or underserved areas where access to conventional training programs is limited (Maita et al., 2024).

Despite their potential, several challenges persist in ensuring the usability, cultural relevance, and linguistic accessibility of first aid apps. Research highlights the need to tailor app content to meet the unique needs of target populations. For example, Ab Rahman et al. (2022) emphasized that culturally sensitive app designs significantly enhance user engagement and adoption. In the Indonesian context, the absence of a culturally and linguistically tailored first aid mobile application may impede the effective dissemination of vital first aid knowledge and skills. This gap underscores the necessity for a user-friendly, context-specific mobile application to empower Indonesian communities to respond effectively during emergencies.

This study aims to design and evaluate a first aid mobile application specifically tailored for community members in Indonesia. Unlike previously developed first aid applications that primarily focus

on general emergency education, QuakeGuard integrates culturally adapted first aid content, earthquake preparedness features, educational multimedia, interactive quizzes, and access to nearby health facilities within a single platform. Furthermore, this study contributes to the field by evaluating the application using a mixed-methods approach that combines usability assessment, intrinsic motivation measurement, task performance evaluation, and qualitative user experiences. By addressing cultural, linguistic, and contextual needs of Indonesian communities, this research provides evidence regarding the potential role of mHealth technology in strengthening community-based disaster preparedness and nursing practice.

Materials and Methods

Design

This study employed a mixed-methods design combining quantitative and qualitative approaches to develop and evaluate a mobile application named "QuakeGuard" aimed at enhancing a first aid knowledge and skill in Indonesia. The development and evaluation phases were carried out in collaboration with information technology experts.

Sample

The study focused on engaging community members who were actively involved in disaster preparedness initiatives. Participants were selected using a purposive sampling method, targeting individuals with prior experience or a strong interest in disaster preparedness activities. For the evaluation phase, a total of 30 participants were recruited. The sample size for the study was determined based on established usability testing guidelines, which suggest a minimum of 20 to 30 participants to effectively identify significant usability issues (Kjeldskov & Stage, 2003).

The inclusion criteria specified that participants had to be at least 18 years old, actively involved in disaster preparedness programs, possess an Android-compatible smartphone, and willingly provide informed consent to participate in the study. Exclusion criteria included individuals with no prior experience using mobile applications or those unable to operate a smartphone due to physical or cognitive impairments.

Mobile application development

The QuakeGuard mobile application was meticulously developed to provide an innovative and user-friendly solution for earthquake preparedness and response. The development process utilized Android Studio as the integrated development environment and Kotlin as the primary programming language, ensuring compatibility and robust functionality. A server-client architecture was implemented, leveraging HTTP and Web API to facilitate seamless communication between the server and client devices. Firebase was employed

as the database management system to enable real-time data handling, ensuring the application's responsiveness and reliability. To enhance security, user authentication and session management features were integrated, safeguarding user data and ensuring secure access.

The application was equipped with a range of features designed to support users during emergencies. It included comprehensive first aid materials, such as CPR guidelines and evacuation procedures, providing essential knowledge for immediate response. Engaging video animations and educational games were incorporated to make learning interactive and accessible. Quizzes offered users the opportunity to test their knowledge, while an online forum facilitated community interaction and information sharing. Furthermore, the application integrated earthquake warning systems, linked to nearby primary health facilities, to provide timely alerts and guidance in critical situations. This holistic approach ensured that the QuakeGuard app served as a reliable tool for disaster preparedness and community resilience (Figure 1).

Evaluation Instruments

The evaluation process incorporated three key instruments to ensure comprehensive data collection and analysis. Each instrument was selected for its relevance to the study objectives and its proven reliability and validity in assessing the desired constructs. These instruments included the System Usability Scale (SUS), the Intrinsic Motivation Inventory (IMI), and a customized survey tailored to specific research needs.

The System Usability Scale (SUS), originally developed by Brooke in 1986, served as a standardized tool to evaluate the usability of the application. This instrument comprises 10 items, each rated on a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Its widespread application in usability studies underscores its credibility, with the original version demonstrating a high reliability score of Cronbach's $\alpha = 0.91$. To ensure cultural and contextual appropriateness for this study, the SUS was validated in Bahasa Indonesia, yielding a slightly lower but still robust reliability score of Cronbach's $\alpha = 0.88$. The Indonesian adaptation process followed a cross-cultural adaptation procedure involving forward translation, backward translation, expert review, and pilot testing to ensure semantic clarity and contextual appropriateness among Indonesian users.

The Intrinsic Motivation Inventory (IMI), developed by Plant and Ryan in 1985, was employed to measure the intrinsic motivation of participants. This instrument comprises seven items assessed on a 7-point Likert scale, where 1 represents Strongly Disagree and 7 represents Strongly Agree. The IMI has a well-documented history of reliability, with the original version achieving a Cronbach's α of 0.86. Its use in this study aimed to provide insight into

participants' internal drive and engagement with the intervention.

Additionally, a customized survey was designed to capture demographic information, participants' prior experience with mobile applications, and their perceptions related to disaster preparedness. This instrument was developed to address specific study objectives that were not covered by standardized tools. To ensure the survey's validity, its content underwent rigorous evaluation by a panel of experts in the field. This review process aimed to establish content validity, ensuring that the questions were relevant, clear, and aligned with the study goals.

Data collection

The application was developed through an iterative process that carefully integrated user needs alongside technical hardware and software requirements. The development cycle included meticulous coding and rigorous testing phases, all executed within a server-client architecture to ensure a robust and scalable system. To ensure effective engagement with the application, participants underwent comprehensive training. This training encompassed key functionalities of the app, including navigation and practical procedures such as first aid, enabling participants to use the application confidently and effectively.

Usability testing was conducted to evaluate the application in real-world contexts. This testing employed the Think Aloud (TA) method, allowing researchers to gather real-time insights into user experiences and potential usability challenges. Participants also completed the System Usability Scale (SUS) and Intrinsic Motivation Inventory (IMI) questionnaires. Each participant carried out six specifically designed tasks that tested the core features of the application.

Qualitative feedback was an essential component of the evaluation process. Participants were invited to share their experiences and perceptions of the application through open-ended questions and a structured survey. This feedback provided valuable insights into usability, engagement, and the relevance of the content offered by the application.

Data collection spanned two weeks, during which participants interacted with the application twice weekly. Quantitative data derived from the SUS, IMI, and survey responses were systematically analyzed using descriptive statistics and median score calculations to identify trends and patterns. Concurrently, qualitative feedback was subjected to thematic analysis, allowing researchers to identify recurring themes and insights that could inform future improvements to the application.

Data analysis

For the quantitative data, descriptive statistics were utilized to summarize the usability metrics, focusing on aspects such as functionality, engagement, and visual appeal. The results were reported in terms of median values accompanied by interquartile

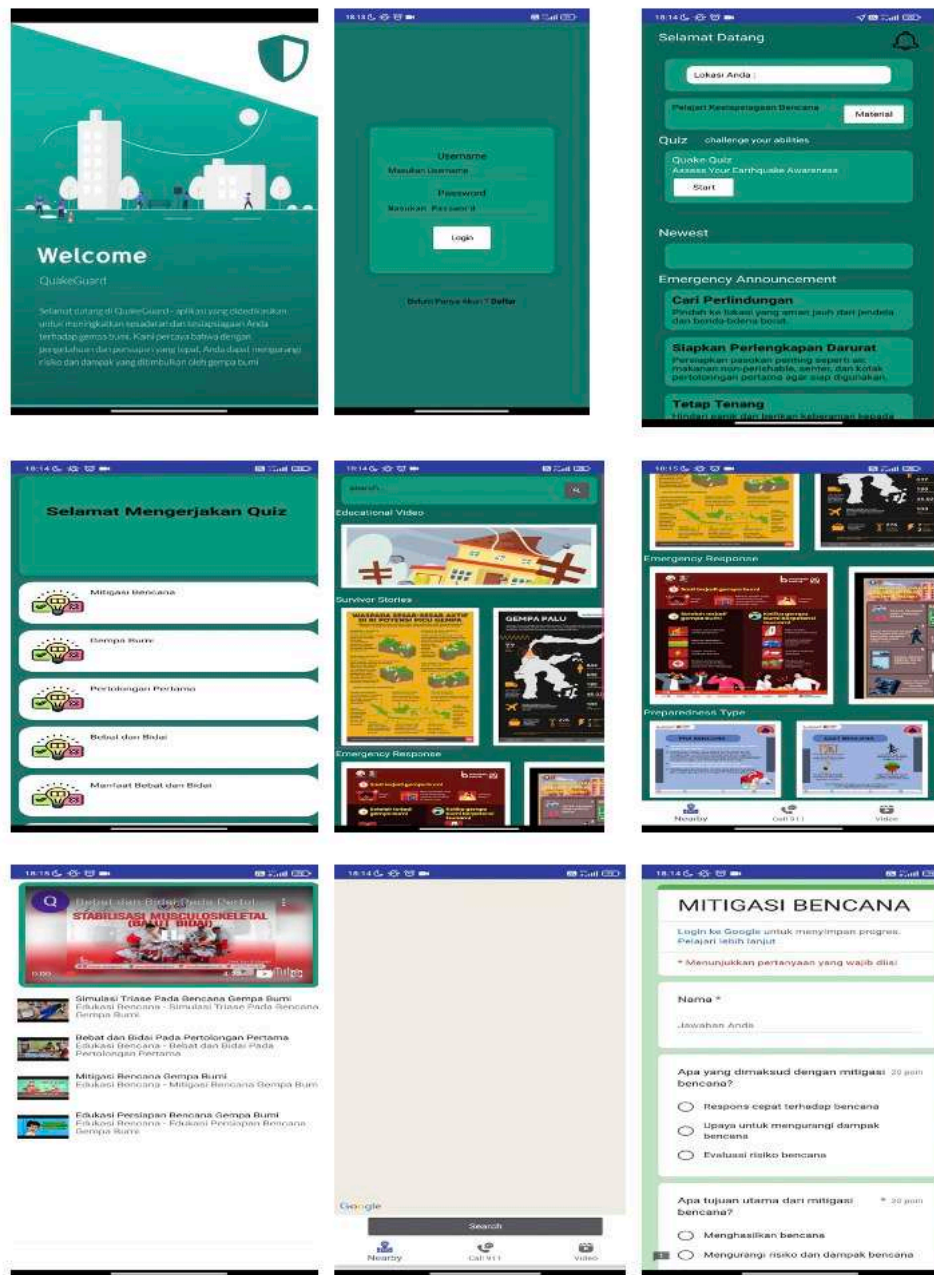


Figure 1. QuakeGuard mobile application

ranges (IQR) to provide a clear understanding of the data distribution. For the qualitative data, a thematic analysis was conducted to examine user feedback obtained through the Think Aloud method and responses to open-ended survey questions. This approach allowed for the identification of recurring patterns and themes in user experiences, offering deeper insights into their interactions with the system. All data analyses were carried out using SPSS software, Version 26, ensuring accuracy and reliability in processing both quantitative and qualitative datasets.

Ethical consideration

Ethical approval for the study was granted by

the Institutional Review Board (IRB) at STIKes Sukabumi (ETIK.012/III/2024). Prior to participation, all individuals provided informed consent, ensuring their understanding of the study's purpose, procedures, and their rights as participants.

Results

Demographic Characteristics of Participants

The study included 30 participants actively involved in disaster preparedness programs. The majority were female (63.3%), with a median age of 35 years (IQR = 28–43). Most participants held a bachelor's

Table 1. Demographic Characteristics of Participants

Variable	n (%)
Gender	
Male	11 (36.7%)
Female	19 (63.3%)
Age (years)	
Median (IQR)	35 (28–43)
Education Level	
High School	6 (20.0%)
Bachelor's Degree	18 (60.0%)
Master's Degree	6 (20.0%)
Prior Experience with Apps	
Yes	26 (86.7%)
No	4 (13.3%)

Table 2. Detailed results of SUS item analysis

SUS Item	Mean	SD	Strongly Agree (%)	Agree (%)	Neutral (%)	Dis-agree (%)	Strongly Disagree (%)
I think that I would like to use this system frequently.	4.2	0.7	50	40	7	3	0
I found the system unnecessarily complex.	1.8	0.9	5	10	20	50	15
I thought the system was easy to use.	4.5	0.6	60	30	5	5	0
I think that I would need technical support to use this system.	2.0	1.1	10	15	25	40	10
I found the various functions in this system well integrated.	4.3	0.8	55	35	5	5	0
I thought there was too much inconsistency in this system.	2.1	1.0	8	12	20	45	15
I would imagine that most people would learn to use this system very quickly.	4.6	0.5	65	30	3	2	0
I found the system very cumbersome to use.	1.7	0.8	3	7	10	60	20
I felt very confident using the system.	4.4	0.7	58	35	5	2	0
I needed to learn a lot of things before I could get going with this system.	2.2	1.2	12	18	20	35	15

Table 3. Intrinsic Motivation Inventory (IMI) Scores by Domain and Item

Domain	Mean	SD	Min-Max
Interest/Enjoyment	4.43	0.8	2.6–6.7
Perceived Competence	4.43	0.75	2.3–6.6
Effort/Importance	5.75	0.9	3.5–6.5
Pressure/Tension	3.45	1.25	2–6
Value/Usefulness	6.25	0.75	4.5–7

Table 4. Task Performance of QuakeGuard Application (n = 30)

Task	Number of Participants Attempted (n)	Number of Participants Completed (n)	Completion Rate (%)	Median Completion Time (minutes)	IQR (minutes)
Accessing First Aid Materials	30	30	100	4.5	4–5
Completing First Aid Quizzes	30	30	100	6.0	5–7
Navigating Interactive Content	30	30	100	5.5	5–6
Viewing Educational Videos	30	30	100	4.0	3–5
Submitting Feedback Through App	30	30	100	5.0	4–6
Accessing Emergency Contact Info	30	30	100	5.5	4–6

degree (60%) and reported prior experience with mobile applications (86.7%). Table 1 provides detailed demographic characteristics.

Usability testing

The SUS findings indicated positive user perceptions regarding the usability of QuakeGuard. Participants reported that the application was easy to use, well-integrated, and required minimal technical support. Detailed SUS item responses are presented in Table 2.

The Intrinsic Motivation Inventory (IMI) results indicate varying motivation levels across its domains. Both the Interest/Enjoyment and Perceived Competence domains have moderate mean scores of 4.43, reflecting balanced intrinsic engagement and perceived ability. The Effort/Importance domain shows the highest commitment with a mean score of 5.75, while the Pressure/Tension domain has a lower mean of 3.45, suggesting minimal stress or pressure. The Value/Usefulness domain stands out with the highest mean score of 6.25, emphasizing participants' strong perception of the tasks' importance and relevance (Table 3).

Task performance

All tasks in the study were successfully attempted and completed by all 30 participants, resulting in a 100% completion rate for each activity. The median completion time for tasks varied slightly, with accessing first aid materials being the quickest (4.5 minutes, IQR: 4–5), followed by viewing educational videos (4.0 minutes, IQR: 3–5). Completing first aid quizzes required the longest time (6.0 minutes, IQR: 5–7). Navigating interactive content, submitting feedback, and accessing emergency contact information had median completion times of 5.5, 5.0, and 5.5 minutes respectively, with narrow interquartile ranges indicating consistent performance across participants (Table 4).

Qualitative Feedback

Ease of Use

Participants consistently praised the application's

ease of use, emphasizing its intuitive interface and user-friendly design. Key aspects that contributed to this perception included clear navigation menus, well-organized content, and aesthetically pleasing visuals. The engaging design elements, such as icons and interactive buttons, made it accessible even to individuals with minimal technological literacy. Participants also noted that the app required little to no instruction to begin using, reflecting the simplicity and thoughtfulness of its design.

"I didn't need any guidance to use the app—it was straightforward. Everything was labeled clearly, and the navigation was very intuitive."

"The design is clean and simple, which makes it easy to focus on the content without feeling overwhelmed."

"Even though I'm not very tech-savvy, I could figure out how to use the app on my own, which was a relief."

Educational Value

Users highlighted the application's educational features as a significant benefit. The app offered comprehensive first aid materials, interactive quizzes, and video animations, which were particularly appreciated for their ability to enhance understanding. The diverse learning modalities catered to different learning preferences, ensuring that users could gain practical knowledge effectively. Many participants mentioned that the interactive features made learning enjoyable and retained their attention, while the detailed explanations in the first aid materials instilled confidence in applying the skills.

"The video animations were very helpful in demonstrating first aid techniques. It's much easier to understand than just reading instructions."

"I learned so much from the interactive quizzes—they tested my knowledge and gave me instant feedback, which was motivating."

"The app provides detailed explanations for every scenario, which gave me confidence that I could handle emergencies better."

Practical Application

Participants emphasized the practical relevance of the app in real-world disaster situations. Features like earthquake alerts and links to nearby health facilities were described as vital tools that added a sense of security. Users appreciated that the app not only provided information but also actionable resources that could be used during emergencies. They felt the app bridged the gap between knowledge and real-life application, empowering them to respond effectively in crisis scenarios.

"The earthquake alert feature is brilliant—it gives us timely updates and helps us stay prepared during emergencies."

"I liked how the app showed nearby health facilities. Knowing where to go in a disaster is a huge relief."

"This app isn't just about learning; it's about applying what you know when it matters most, which is exactly what we need."

Discussion

The findings of this study demonstrate that the QuakeGuard application is a highly effective, engaging, and user-friendly tool for enhancing disaster preparedness and first aid skills among community members in Indonesia. This research adds to the growing evidence supporting the utility of mobile applications as innovative tools to bolster community resilience and disaster readiness. Numerous prior studies have emphasized the significant role of mobile applications in improving disaster preparedness. For instance, [Dufty \(2020\)](#) highlighted the importance of intuitive digital tools in fostering community awareness and readiness for natural disasters. Such tools often employ interactive and easily accessible features to enhance engagement, learning, and actionable outcomes. Similarly, [Prasetyo et al. \(2022\)](#) found that mobile applications designed for first aid education significantly improve users' knowledge retention and learning outcomes, largely due to their multimedia-based and interactive design. These findings align closely with the results of this study, where the QuakeGuard application significantly improved participants' disaster-related knowledge and practical skills.

The high usability and motivation scores observed in this study align with existing literature emphasizing the impact of well-designed interfaces on user satisfaction and continued use. [Reuter et al. \(2020\)](#) demonstrated that mobile applications with intuitive navigation, engaging content, and clear instructions are more likely to gain user acceptance and consistent utilization. These design elements are crucial in promoting the sustained adoption of technology, especially in areas such as disaster preparedness, where proactive behavior is essential. Participants' qualitative feedback in this study further underscored the importance of customizing applications to address local cultural needs and

community contexts. This finding aligns with [Hermanto et al. \(2021\)](#), who reported that disaster preparedness tools tailored to cultural nuances and community-specific needs foster greater trust and user engagement. In Indonesia, where diverse cultural practices and geographical vulnerabilities significantly influence disaster preparedness, the cultural adaptability of the QuakeGuard application likely contributed to its success.

The educational efficacy of the QuakeGuard application aligns with research emphasizing the role of interactive technology in fostering behavioral change and skill acquisition. [Smith et al. \(2020\)](#) noted that mobile applications incorporating gamification, scenario-based learning, and real-time feedback are particularly effective in reinforcing knowledge and facilitating the development of practical skills. The inclusion of such features in the QuakeGuard application likely contributed to its positive impact on disaster preparedness and first aid capabilities. Additionally, the participatory development approach employed in this study supports best practices in technology design for disaster management. [Baldwin et al. \(2021\)](#) emphasized that iterative design processes incorporating user feedback are critical for developing applications that meet user needs and achieve desired outcomes. The integration of participant input during the design phase of QuakeGuard likely played a pivotal role in its high usability and positive reception among users.

The QuakeGuard application has significant potential to advance disaster management and community health initiatives, particularly in disaster-prone regions like Indonesia. By equipping users with practical first aid skills and comprehensive disaster preparedness knowledge, the application addresses both immediate and long-term challenges associated with disasters. This capability is especially valuable in areas with limited access to emergency medical services, where timely first aid interventions and adequate preparation can reduce the severity of injuries and increase survival rates during critical events. Furthermore, embedding the QuakeGuard application within community health programs could extend its reach and effectiveness. This integration could foster a culture of resilience and proactive risk management, enabling individuals and communities to better respond to disasters. Additionally, the educational modules within the application can supplement formal training programs for healthcare workers and community volunteers. In resource-limited settings, where access to comprehensive training is constrained, QuakeGuard provides scalable and practical learning tools to bridge critical gaps in disaster response capabilities.

From a community nursing perspective, QuakeGuard provides an innovative approach to extending the role of nurses beyond conventional health education activities. Community nurses can utilize the application as a supporting medium for disaster preparedness training, health promotion,

Budhiana, J., et al. (2026)

and empowerment of individuals and families. The integration of first aid education into digital platforms may strengthen community capacity to respond effectively during emergencies and support the principles of disaster nursing, particularly in prevention, preparedness, and community resilience building. Therefore, the contribution of this study extends beyond technological development by providing evidence for the application of mHealth in strengthening community-based nursing interventions.

Despite its promising outcomes, this study has several limitations. Firstly, the sample size was limited to a specific community, which may restrict the generalizability of the findings to broader populations or other regions. Secondly, reliance on self-reported data introduces potential biases, such as social desirability and recall errors, which could affect the accuracy of the results. Lastly, the study's short-term evaluation period limits the ability to assess the application's long-term usability and effectiveness. To address these limitations, future research should focus on larger, more diverse populations and adopt longitudinal study designs to evaluate the sustained impact of the application. Additionally, incorporating objective outcome measures and expanding the scope of evaluation to include diverse geographical and cultural contexts would provide a more comprehensive understanding of the application's effectiveness. By addressing these limitations and expanding its reach, the QuakeGuard application has the potential to become a transformative tool in disaster preparedness, significantly improving individual and community resilience in disaster-prone regions.

Conclusions

The QuakeGuard application marks a notable leap forward in utilizing digital technology for disaster preparedness and first aid education. The integration of quantitative and qualitative findings underscores its excellent usability, engaging interface, and educational impact, positioning it as a vital resource for strengthening community resilience in disaster-prone regions. By catering to local requirements and incorporating user feedback, the application holds the potential to become a pivotal component of disaster management strategies in Indonesia and comparable contexts. Future studies should focus on broadening its reach, assessing its long-term effectiveness, and examining its integration with existing disaster management frameworks. Future implementation should consider integrating QuakeGuard into community health programs, disaster preparedness initiatives, and nursing-led health education interventions to maximize its contribution to public health services.

Declaration of Interest

The author declares no conflict of interest.

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Data Availability

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

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Extended Reality (XR) technologies in nursing education: A systematic review

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Abstract

Background: Extended reality (XR), as a learning and teaching method in higher nursing education, has been gradually applied over the years. Despite the increasing adoption of XR technologies in nursing education, there remains limited comprehensive evidence synthesizing their effectiveness across learning outcomes.

Purpose: This review aims to examine the effectiveness of utilizing XR technology in nursing education pedagogy

Methods: A systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). Five databases: Cochrane, ProQuest, PubMed, Scopus, and Web of Science were searched using predefined keywords. The PICOS framework guided study selection. Included studies were assessed for quality using the Joanna Briggs Institute (JBI) Critical Appraisal Tools and the Mixed Methods Appraisal Tool (MMAT).

Results: A total of 17 studies were included, involving 2,403 nursing students. XR interventions, particularly Virtual Reality (VR), were the most commonly used type across studies. These interventions improved students' knowledge, skills, and confidence, including their understanding of the social determinants of health, and were highly satisfying due to their immersive features. However, physical discomfort, such as motion sickness, headaches, and eye strain, was reported. The methodological quality of the included studies ranged from fair to good.

Conclusions: Extended reality, particularly VR-based, has significant positive effects on nursing students. Adverse impacts were also found in the application of this technology in the learning system. Addressing these issues is critical to optimizing the application of XR in nursing education. By integrating XR into nursing curricula, educators potentially foster critical thinking, decision-making, and procedural accuracy-key competencies.

Keywords: digital innovation; extended reality; immersive technology; mixed reality; nursing education

Introduction

The advancement of technology applied in the field of education has undergone significant transformations. Technology-based utilization has been rising, with extensive integration of innovative technologies to facilitate student learning (Chang et al., 2024). Millennials and subsequent generations are generally comfortable using online platforms and electronic devices for educational purposes. Therefore, experts argue that universities should be aware of the Internet's influence on students and adapt their learning processes and implement practices to meet students' expectations (Christodoulou et al., 2015; O'Connor et al., 2017). In addition, the use of electronic devices in education is growing rapidly and is expected to be integral to facilitating knowledge acquisition and fostering students' motivation to learn (Chang et al., 2022; Hardie et al., 2020). Technological advancements have reshaped

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education, necessitating that universities adapt their teaching methods to align with students' growing use of online platforms and electronic devices, thereby enhancing motivation and learning outcomes.

Extended Reality (XR) is an umbrella term encompassing immersive technologies that integrate physical and virtual environments, including Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR) (Drees et al., 2020; Hardie et al., 2020). VR creates a fully computer-generated environment, AR overlays digital elements onto the real world, and MR combines physical and virtual objects that interact in real time, using technologies such as head-mounted displays (HMDs) (Brigham, 2017). As part of XR, virtual reality (VR) has proven to be an invaluable tool in healthcare education, facilitating skill practice and reducing the incidence of medical negligence and errors (Rushton et al., 2020). The utilization of VR for educational purposes offers diverse and immersive learning experiences, allowing students to interact with diverse learning content (Chang et al., 2022). Over the past decade, there has been a concerted effort to integrate this technology into health education, driven by its potential advantages, including scalability, increased motivation, and cost savings (Hu et al., 2025; Moro et al., 2019). However, the application of these technologies in health education did not always result in the expected benefits (Garcia et al., 2025; Hu et al., 2025). Therefore, it is important to ensure that potential advantages translate into better learning (Suh & Prophet, 2018; Zhu et al., 2015). XR technologies, including VR, AR, and MR, offer immersive and cost-effective tools for healthcare education, but their effectiveness depends on their ability to support meaningful improvements in learning.

In healthcare education, MR has been increasingly used for anatomy instruction and for simulating complex surgeries or clinical procedures because it enhances interaction between physical and virtual elements and increases the sense of presence (Zhu et al., 2015). MR simulation is a new educational tool that combines the advantages of virtual reality (VR) and augmented reality (AR) (Kim et al., 2021; Zhu et al., 2015). It can offer an immersive experience that allows students to actively participate in complicated clinical situations and help enhance the learning process. Through interactive three-dimensional environments, MR simulations can improve students' skills, knowledge, and clinical reasoning abilities (Kim et al., 2021).

New learning methods in nursing education are inspired by rapid advances in information technology, including extended reality (Zhao et al., 2022). This technique eliminates the need for live patients while creating immersive, interactive nursing encounters that closely simulate real clinical scenarios. This not only saves valuable time for clinical nursing professionals but also reduces the predictors associated with patient interaction in conventional learning curricula (Choi et al., 2022).

Consequently, it addresses the shortage of clinical education resources. Nursing students interact with virtual reality through simulating clinical scenarios in the real world. Using specialized extended reality equipment, such as headsets or sensor-equipped gloves, nursing students can interact with virtual patients, medical equipment, and healthcare environments (Iwanaga et al., 2021). This allows them to practice their clinical skills, make decisions in simulated patient care situations, and study various medical scenarios.

In addition, the interactive nature of virtual reality (VR) enhances the educational process by offering nursing students a more engaging and accessible learning experience (Iwanaga et al., 2021; Liu et al., 2023). Nursing students can enhance their understanding of theoretical concepts and receive hands-on training in a safe, controlled environment using virtual technology. Meanwhile, technologies effectively eliminate the drawbacks of conventional teaching and rigid teaching methodologies, enhance nursing students' scientific enthusiasm, and markedly improve their operational skills (Ahmed et al., 2020). Most recently, VR, MR, and AR have helped nursing students feel more confident. In addition, nursing students' intrinsic drive to learn actively is reinforced by interactive learning (Lange et al., 2020; Liu et al., 2023). This naturally encourages nursing students to explore knowledge independently, increase their sense of commitment to their duties, and enhance their curiosity.

Past studies have examined perceptions and acceptance of technology use in nursing education, including VR, AR, and MR, from a general perspective (Aebbersold et al., 2018; Liu et al., 2023; Moon et al., 2024). Recent systematic reviews have also examined MR technologies in nursing education, the effectiveness of immersive VR, and AR applications in healthcare education (Evgenikos et al., 2025; Guillen-aguinaga et al., 2025; Wei et al., 2025). However, existing evidence remains fragmented, as previous reviews (Jannin et al., 2019; Choi et al., 2021) mainly focused on specific XR modalities, limited outcome domains, or broader healthcare populations rather than nursing education specifically. Furthermore, limited evidence has comprehensively synthesized both the strengths and weaknesses of XR implementation, including educational benefits, usability challenges, and potential adverse effects in higher nursing education settings. Therefore, there is a need for a systematic review that integrates and analyzes evidence regarding VR, MR, and AR interventions in higher nursing education. This study aimed to review and synthesize the strengths and weaknesses of XR technologies in higher nursing education to improve teaching and learning strategies ultimately.

Materials and Methods

Design

The systematic review was conducted in accordance

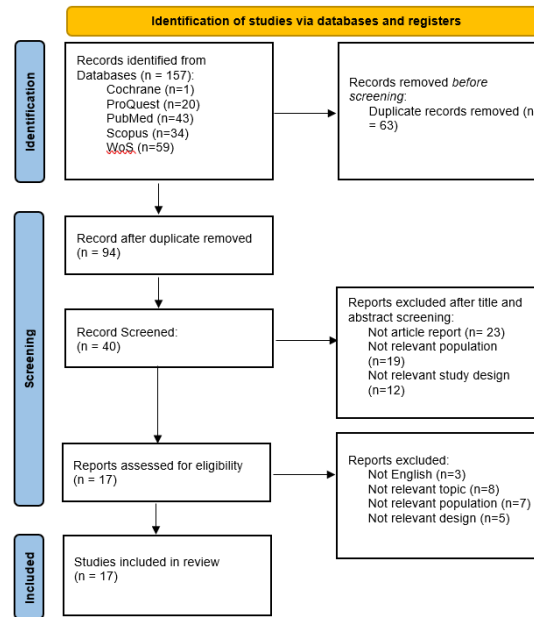


Figure 1. Article selection process: flowchart used in selecting studies using PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analyses)

with the updated Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Page et al., 2021). The official registration of the review methodology is available in the International Prospective Register of Systematic Reviews (PROSPERO). The study protocol was registered under the identification number CRD42024604595

Search methods

A comprehensive computer-based search was conducted in Cochrane, ProQuest, PubMed, Scopus, and Web of Science up to October 13, 2024. The search aimed to identify studies related to the use of extended reality (XR) technologies in higher nursing education. Search strategy included Medical Subject Headings (MeSH), free terms, and word variations for three primary topics: "extended reality," "augmented reality," and "nursing education." Specific keywords included variations such as "Virtual Reality," "Reality, Virtual," "Augmented Reality," "Mixed Reality," "Nursing Education," and "Educational Activities." Boolean operators (OR/AND) were used to combine these terms systematically to enhance retrieval accuracy. In addition, manual searches of relevant systematic reviews and inspection of reference lists were performed to ensure the comprehensiveness of the findings. The full version of the search strategy can be found in Supplementary Document 1.

Inclusion and exclusion criteria

This study's criteria were developed following the Population, Intervention, Comparison, Outcome, and Study Design (PICOS) approach to define the key elements of the study (Amir-Behghadami & Janati, 2020). The inclusion criteria were as

follows: the population included nursing students at various levels, such as diploma, undergraduate, and graduate programs, while individuals from other majors were excluded. The intervention focuses on the use of extended reality (XR), which includes augmented reality (AR), virtual reality (VR), and mixed reality (MR), integrated into nursing education methods. Comparisons are made against traditional teaching methods, such as lectures, simulations, and hands-on clinical training without the use of XR. The outcomes of interest include measures of clinical competency, knowledge, attitude, skills performance, self-efficacy, and professional identity. Eligible study designs include quantitative, qualitative, and mixed-methods studies. However, non-original research, books, and proceedings are excluded from the criteria.

Data extraction

Two researchers (VA and FT) conducted independent searches for relevant literature and separately selected articles for inclusion and data extraction. Any discrepancies in the selection or extraction process were resolved through discussion or, if necessary, by involving a third party (TP). The screening process adhered closely to the PRISMA guidelines. Initially, articles were excluded based on a thorough review of their titles and abstracts if they clearly did not meet the inclusion criteria. Following a full-text review, some articles initially considered were subsequently excluded. The entire data selection process was managed using Mendeley reference management software.

Quality appraisal

Reviewers (VA and TPH) separately evaluated the

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risk of bias in each included study using the JBI risk of bias tool for randomized controlled trials (RCTs), quasi-experiments, and cross-sectional studies, as well as the Mixed Methods Appraisal Tool (MMAT). The included studies consisted of 1 randomized controlled trial (RCT), 2 quasi-experimental studies, and 2 cross-sectional studies, while the remaining studies were assessed using the Mixed Methods Appraisal Tool (MMAT). The scoring values are derived from the following percentages: 75% (Good), 50-75% (Fair), and less than 50% (Poor) (Monnaatsie et al., 2021). The quality appraisal results were used to assess the methodological quality of the included studies and were not applied as criteria for study inclusion or exclusion. Discrepancies were resolved through a discussion.

Results

Study Selection

A systematic review identified 157 studies on VR in higher nursing education across five major databases, including Cochrane, ProQuest, PubMed, Scopus, and Web of Science. After removing 63 duplicates, 94 studies were initially screened based on titles and abstracts using the Population, Intervention, Comparison, Outcome, and Study Design (PICOS) criteria. Of these, 54 studies were excluded for non-article reports (23), irrelevant populations (19), and irrelevant study designs (12). The remaining 40 studies underwent full-text screening, and a further 23 were excluded for reasons including non-English language (3), irrelevant topics (8), irrelevant populations (7), and non-relevant designs (5). This rigorous process resulted in 17 studies meeting the inclusion criteria for the final review (Adhikari et al., 2021; Aebersold et al., 2018; Y. Chang et al., 2024; Cheung et al., 2024; Fontenot et al., 2024; Foronda et al., 2018; Hoffman et al., 2023; Jallad et al., 2024; Kiegaldie & Shaw, 2023; Kim & Ahn, 2021; Lee et al., 2020; Moon et al., 2024; Park & Kim, 2022; Plotzky et al., 2023; O'Hare et al., 2020; Yang et al., 2024; Yeo et al., 2024). The study selection process can be found in Figure 1 below.

Study Characteristics

All 17 studies were conducted between 2018 and 2024. A total of 2,403 higher nursing students from undergraduate and graduate programs were involved. The demographic characteristics of study participants were dominated by undergraduate students, who accounted for 16 of 17 studies (94.1%). In terms of study design, the majority of studies employed a Mixed Method Study approach (64.7%) (Adhikari et al., 2021; Aebersold et al., 2018; Y. Chang et al., 2024; Fontenot et al., 2024; Foronda et al., 2018; Hoffman et al., 2023; Kiegaldie & Shaw, 2023; Y. Lee et al., 2020; Plotzky et al., 2023; O'Hare et al., 2020; Yang et al., 2024; Yeo et al., 2024), followed by Quasi-Experiment (17.6%) (Jallad et al., 2024; Moon et al., 2024), Cross-sectional

(11.8%) (Kim & Ahn, 2021; Park & Kim, 2022), and only one study applied a randomized controlled trial (RCT) design (5.9%) (Cheung et al., 2024). Geographically, the studies were distributed across several countries, with South Korea contributing the largest proportion (29.4%) (Kim & Ahn, 2021; Lee et al., 2020; Moon et al., 2024; Park & Kim, 2022; Yeo et al., 2024), followed by the United States (23.5%) (Aebersold et al., 2018; Fontenot et al., 2024; Foronda et al., 2018; Hoffman et al., 2023), China (11.8%), and smaller contributions from Scotland (Adhikari et al., 2021), Taiwan (Chang et al., 2024), Palestine (Jallad et al., 2024), Australia (Kiegaldie & Shaw, 2023), Germany (Plotzky et al., 2023), and the United Kingdom (O'Hare et al., 2020) (each at 5.9%).

Regarding the type of XR technology, Virtual Reality (VR) was predominantly used (88.2%) (Adhikari et al., 2021; Aebersold et al., 2018; Chang et al., 2024; Cheung et al., 2024; Fontenot et al., 2024; Foronda et al., 2018; Hoffman et al., 2023; Jallad et al., 2024; Kiegaldie & Shaw, 2023; Kim & Ahn, 2021; Lee et al., 2020; Park & Kim, 2022; Plotzky et al., 2023; Yang et al., 2024; Yeo et al., 2024), with only a small representation from Mixed Reality (MR) (11.8%) (Moon et al., 2024; O'Hare et al., 2020), and no studies applied Augmented Reality (AR). When looking at the type of nursing lessons covered in these studies, Critical and Emergency Care Nursing was the most common focus (41.2%) (Adhikari et al., 2021; Aebersold et al., 2018; Foronda et al., 2018; Moon et al., 2024; Plotzky et al., 2023; O'Hare et al., 2020), followed by Community and Mental Health Nursing (29.4%) (Cheung et al., 2024; Fontenot et al., 2024; Hoffman et al., 2023; Lee et al., 2020; Park & Kim, 2022), Fundamental Nursing (23.5%) (Chang et al., 2024; Jallad et al., 2024; Kiegaldie & Shaw, 2023; Kim & Ahn, 2021; Monnaatsie et al., 2021), and a smaller emphasis on Pediatric Nursing (5.9%) (Yeo et al., 2024). In terms of time duration for XR interventions, 7 studies (41.2%) reported interventions lasting ≤30 minutes (Adhikari et al., 2021; Aebersold et al., 2018; Chang et al., 2024; Jallad et al., 2024; Lee et al., 2020; Plotzky et al., 2023; Yeo et al., 2024), one study (5.9%) reported a duration of 31–60 minutes (Moon et al., 2024), while no studies reported interventions exceeding 60 minutes. However, the duration was not identified (NI) in 9 studies (52.9%) (Cheung et al., 2024; Fontenot et al., 2024; Foronda et al., 2018; Hoffman et al., 2023; Kiegaldie & Shaw, 2023; Kim & Ahn, 2021; Park & Kim, 2022; O'Hare et al., 2020; Yang et al., 2024). Detailed characteristics of the included studies are provided in Supplementary Document 2.

Risk of Bias in Studies

The methodological quality of the 17 studies included in this systematic review was assessed using the Joanna Briggs Institute (JBI) and Mixed Methods Appraisal Tool (MMAT) critical appraisal frameworks. Of the 12 studies evaluated using the MMAT,

88.23%- 94.12% were rated "Good," indicating high research quality. The remaining 5 studies, evaluated using the JBI framework, were rated as "Fair" (50%-75%), reflecting a moderate level of research quality. The quality appraisal results were used to describe the methodological quality and risk of bias of the included studies and were not applied as criteria for study inclusion or exclusion. Therefore, no studies were excluded based on the JBI or MMAT scores. A detailed summary of the critical evaluations can be found in Supplementary document 3.

Results Synthesis

All included studies were synthesized. Although this review examined extended reality (XR) technologies broadly, most of the included studies focused on virtual reality (VR) interventions, with limited evidence on mixed reality (MR) and no eligible studies investigating augmented reality (AR). Considering both the positive and negative impacts of XR utilization in higher nursing education, the findings are summarized as follows:

The strengths of XR utilization in higher nursing education

Enhanced knowledge and skills

XR significantly improved students' knowledge and practical skills, such as intravenous injection knowledge (Chang et al., 2024) and NGT placement accuracy (Aebersold et al., 2018). Students experienced significant improvements in clinical judgment, confidence, and self-efficacy after XR-based interventions (Moon et al., 2024; Yang et al., 2024).

Increased engagement and satisfaction

High satisfaction rates and immersive experiences were reported, with XR boosting learning motivation, realism, and student engagement (Jallad et al., 2024; Kim & Ahn, 2021). XR was praised for its cost-effectiveness and realistic simulation environments, making it a valuable supplement for traditional teaching methods (Fontenot et al., 2024; Kiegaldie & Shaw, 2023).

Confidence and emotional resilience

XR increased confidence in clinical practice and stress resilience by providing immersive and engaging scenarios (Adhikari et al., 2021; O'Hare et al., 2020).

The weakness of XR utilization in higher nursing education

Technical and practical limitations

Students reported challenges with image clarity, navigation, and device comfort, which sometimes detracted from the learning experience (Fontenot et al., 2024; Lee et al., 2020). Lack of haptic feedback and fine motor control limited the realism and applicability of XR simulations in some scenarios (Plotzky et al., 2023).

Boundaries in empathy development

Cheung et al., (2024) found that traditional methods outperformed XR in fostering empathy, with narrative videos yielding higher empathy scores. Some participants experienced sensory overload, which reduced emotional connection and hindered their ability to engage fully in immersive settings (O'Hare et al., 2020).

Discussion

This systematic review highlights XR's potential to enhance students' knowledge, skill proficiency and confidence. Although this review focused broadly on XR technologies, current evidence in nursing education remains predominantly VR-based, with limited studies examining MR and no eligible AR studies identified. Quantitative results of the included studies showed significant improvements, such as confidence for sepsis care post-intervention (Adhikari et al., 2021) and knowledge of intravenous injection techniques (Chang et al., 2024). Qualitative findings further highlighted XR's strength in realism, interactivity, and capacity to effectively reinforce learning objectives (Fontenot et al., 2024; Lee et al., 2020). Additionally, MR, with its ability to integrate real-world elements into virtual simulations, provides unique opportunities to simulate collaborative and spatially dynamic clinical scenarios (Moon et al., 2024). These processed findings clearly indicate that XR offers a valuable supplement to traditional higher nursing education methods.

The findings align with Kolb's experiential learning theory, emphasizing the importance of active and immersive engagement in skill development. As evidenced in previous research, XR enhances student engagement, motivation, critical thinking, and knowledge retention (Logeswaran et al., 2021). Studies have shown that XR complements, rather than replaces, traditional education methods, especially for pre-registration nursing students (Ota et al., 2024). Instructors' roles in optimizing learner participation in XR-based simulations were also emphasized (Liaw et al., 2021). Additionally, XR-based training, such as training in intravenous therapy using infusion pumps, demonstrated significant improvements in learning motivation, self-efficacy, transfer learning, and performance confidence (Kim & Seo, 2024).

The positive outcome aligns with Kolb's experiential learning theory, which emphasizes the importance of active, immersive engagement in skill development and posits that change occurs when concrete emotional experiences are integrated with cognitive processes (Lee & Kumar, 2023). VR's full immersion and MR's real-time blending of physical and digital environments allow learners to apply theoretical knowledge to practical tasks in a controlled, risk-free setting (Damaševičius & Sidekerskienė, 2024). Furthermore, VR offers a more immersive learning experience, allowing educators to scale their curriculum to make learning

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more enjoyable (Zhao et al., 2022). The observed improvement in knowledge and confidence demonstrates XR's ability to provide repeatable exposure to important but improbable clinical scenarios to prepare for states of emergency and to access otherwise impossible views of medical procedure (Bracq et al., 2019; Sweller, 2020).

By contrast, this review also highlights the drawbacks of XR, such as motion sickness, cognitive overload, and the lack of haptic feedback for fine motor skill training. Additional limitations less frequently discussed in earlier studies include sensory overload, feelings of isolation during solo VR simulations, and technical constraints such as low image resolution and device discomfort. Broader challenges noted in previous studies include reduced face-to-face communication, high costs, user attitudes, and concerns regarding safety, evaluation, and validation of VR applications (Baniasadi et al., 2020). These issues are particularly relevant for MR applications, where collaborative tasks are often emphasized. The tension between XR's strengths as an innovative educational tool and its limitations highlights the importance of addressing these barriers to maximize its potential in higher nursing education.

According to Cognitive Load Theory (CLT), the challenges in XR utilization stem from the limitations of human cognitive architecture, particularly working and long-term memory (Sweller, 2020; Sweller et al., 2019). XR technologies, including VR and AR are designed to create immersive and interactive learning environments (Bautista et al., 2023; Czok et al., 2023; Huang et al., 2022; Nurjanah & Retnowati, 2024). However, continuous shifts in attention, complex visual stimuli, and the integration of multisensory information can lead to cognitive overload, reducing the efficiency of knowledge retention and skill acquisition (Bautista et al., 2023; Czok et al., 2023; Omobolanle et al., 2024).

Cognitive Load Theory emphasizes the importance of managing three types of cognitive load: intrinsic, extraneous, and germane load (Brunken et al., 2003; Dabor et al., 2019). Intrinsic load refers to the inherent difficulty of the material being learned, while extraneous load arises from poorly designed instructional materials or unnecessary complexity in the learning environment (Bautista et al., 2023; Czok et al., 2023; Omobolanle et al., 2024). Germane load, on the other hand, focuses on optimizing cognitive resources to support learning and schema development (Brunken et al., 2003; Dabor et al., 2019). In XR-based education, excessive extraneous load can arise from poorly designed interfaces, frequent shifts in attention between virtual and real environments, or overly complex visual elements. These issues underscore the need for intentional instructional design strategies that minimize extraneous cognitive load while enhancing germane cognitive load to support meaningful learning outcomes (Jadallah et al., 2024; Omobolanle et al., 2024).

Considering both the strengths and weaknesses of XR utilization in higher nursing education, this review reinforces XR's role in reshaping educational frameworks by integrating immersive and interactive technologies into experiential learning. XR supports critical thinking, decision-making, and procedural accuracy, all of which are essential competencies in nursing practice. Addressing challenges associated with XR use is crucial, including improvements in ergonomics, the incorporation of haptic feedback, and strategies to reduce sensory and cognitive fatigue. Additionally, cost-effective measures are needed to increase XR accessibility, especially in resource-limited institutions. MR holds particular promise for fostering teamwork and communication skills, suggesting its broader application in interprofessional settings.

All the above strengths and weaknesses of XR utilization in higher nursing education are evident; several limitations warrant consideration. First, the included studies were conducted predominantly in developed countries, such as South Korea (5 studies), the United States (4 studies), China (2 studies), Scotland, Taiwan, Australia, Germany, and the United Kingdom (1 for each). This geographical focus limits the generalizability of the findings to broader, particularly resource-constrained, settings. Second, methodological characteristics of the included studies might bias the results; for example, five of 17 included studies were of moderate methodological quality, which might introduce bias. Finally, this review included only studies published in English, due to a lack of translation resources. This limitation may have excluded significant findings from studies published in other languages.

Nursing Implications

The use of XR in nursing education opens up exciting possibilities for how we design our curriculum and help students develop essential skills. Rather than seeing technologies like VR as replacements for traditional teaching methods, such as lectures and hands-on training, we should think of them as valuable tools that can enhance the learning experience. By incorporating XR, nursing programs can offer students safe opportunities to practice in high-pressure situations or rare clinical scenarios, such as managing emergencies or sepsis. This approach not only deepens their knowledge and sharpens their skills, like performing IV injections, but also boosts their overall clinical judgment and confidence.

Importantly, nursing instructors should be mindful of how they design these learning experiences. It is crucial to consider Cognitive Load Theory to ensure that students are not overwhelmed by information or technology. Keeping sessions to about 30 minutes helps prevent fatigue and discomfort, such as motion sickness or eye strain. Additionally, using MR can encourage teamwork and collaboration among students by blending real-world elements into virtual learning. Finally, schools need to tackle

the technical and financial challenges that come with these advancements, looking for budget-friendly solutions and improving the comfort of the devices used to ensure that XR-based learning is accessible and successful for everyone.

Limitation of study

This systematic review has several limitations that should be considered when interpreting the findings. First, although the review focused on extended reality (XR) technologies, the available evidence was heavily dominated by virtual reality (VR) interventions, with only a small number of mixed reality (MR) studies and no eligible augmented reality (AR) studies. Consequently, the findings primarily reflect the effectiveness of VR and cannot be generalized to all XR modalities. Second, considerable heterogeneity existed across the included studies regarding study design, educational settings, intervention characteristics, duration of exposure, XR devices, and outcome measures. This methodological diversity precluded quantitative synthesis and limited direct comparisons between studies. Third, most studies were conducted in developed countries, particularly South Korea and the United States, which may limit the transferability of the findings to low- and middle-income countries where technological infrastructure, educational resources, and curriculum implementation differ substantially. Fourth, the methodological quality of the included studies ranged from fair to good, and several studies employed non-randomized or mixed-methods designs, increasing the potential risk of bias. Finally, only English-language publications were included, introducing the possibility of language bias and the omission of relevant evidence published in other languages. Future systematic reviews should include a broader range of languages, examine all XR modalities more evenly, and consider conducting meta-analyses when sufficient homogeneous evidence becomes available.

Conclusions

This systematic review highlights the transformative potential of extended reality (XR), particularly virtual reality (VR) and mixed reality (MR), in higher nursing education. XR technologies effectively enhance nursing students' knowledge, clinical skills, confidence, and engagement by providing immersive and interactive learning environments that complement traditional pedagogical approaches. However, this review also identifies several challenges, including physical discomfort, cognitive overload, limited haptic feedback, and high equipment costs, which may affect user experience and limit widespread implementation. Addressing these challenges is essential to optimizing the integration of XR into higher nursing education. Practical strategies, such as improving device ergonomics, minimizing sensory fatigue, incorporating realistic haptic feedback, and

adopting cost-effective implementation approaches, are needed to maximize the educational benefits of XR. By integrating XR into nursing curricula, educators can promote critical thinking, clinical decision-making, and procedural accuracy—key competencies required for contemporary nursing practice. Furthermore, MR's unique capability to facilitate collaborative and dynamic clinical scenarios offers promising opportunities for interprofessional education. Future research should focus on developing evidence-based XR interventions, evaluating their long-term educational effectiveness, and identifying strategies to enhance experiential learning and engagement among nursing students, educators, and technology developers.

Declaration of Interest

Authors declare no competing interests.

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Data Availability

Not applicable

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