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Empowering undergraduate nursing students through simulation in mental health nursing curricula: A scoping review

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Abstract

Background: Mental health nursing education requires innovative approaches to prepare competent practitioners in today's complex healthcare environment. Simulation-based education offers promising advantages but requires systematic evaluation for effective integration into undergraduate nursing curricula.

Objective: To synthesize evidence on simulation-based educational interventions in mental health nursing education, evaluate their effectiveness, identify best practices, and provide recommendations for undergraduate nursing curricula.

Methods: A scoping review following PRISMA guidelines was conducted. Six electronic databases (CINAHL, PubMed, MEDLINE, PsycINFO, ERIC, and Scopus) were searched for peer-reviewed studies published between January 2015 and January 2025. Studies evaluating simulation-based educational interventions in mental health nursing education were included. Quality assessment was conducted using the Mixed Methods Appraisal Tool (MMAT).

Results: Forty-seven studies met the inclusion criteria. Four primary simulation modalities were identified: standardized patients (SPs), high-fidelity mannequins, virtual reality (VR), and hybrid approaches. Simulation interventions demonstrated significant improvements in students' clinical competence (83% of studies), communication skills (76%), confidence (71%), and reduced anxiety (68%). Debriefing emerged as a critical component for maximizing learning outcomes. Implementation challenges included resource constraints, faculty expertise, and curriculum integration.

Conclusion: Simulation-based education effectively enhances mental health nursing students' clinical competence, communication skills, and confidence while reducing anxiety in clinical situations. A multimodal simulation approach with structured debriefing and theoretical underpinnings is recommended for B.Sc. Nursing curricula. Future research should focus on long-term outcomes, standardized evaluation methods, and cost-effectiveness analyses.

Keywords: Mental health nursing, psychiatric nursing, simulation, nursing education, nursing curricula, standardized patients

1. Introduction

Mental health disorders represent a significant global health burden, affecting approximately one billion people worldwide and contributing substantially to global disability [1, 2]. The World Health Organization has emphasized the critical need for competent mental health professionals to address this growing challenge [3]. Within this context, mental health nurses play a pivotal role in providing comprehensive care to individuals with mental health conditions across various healthcare settings [4].

The preparation of competent mental health nurses requires educational approaches that effectively develop the complex skills needed for practice, including therapeutic communication, assessment, intervention planning, and crisis management [5]. Traditional educational methods combining classroom-based teaching with clinical placements have been the cornerstone of nursing education for decades. However, these approaches face mounting challenges, including limited availability of clinical placements, inconsistent learning experiences, ethical concerns regarding novice students interacting with vulnerable patient populations, and the difficulty of exposing students to rare but critical clinical scenarios [6,7].

Simulation-based education has emerged as a promising pedagogical approach to address these challenges in nursing education broadly [8]. Defined as *"activities that mimic reality and variously involve role-playing, interactive videos, or mannequins that help students learn and allow them to demonstrate decision making, critical thinking, and other skills*" [9], simulation offers a controlled environment where students can practice clinical skills without risking patient harm [10]. In mental health nursing education specifically, simulation has the potential to bridge theory-practice gaps and prepare students for the interpersonal complexities of mental health nursing practice [11].

Various simulation modalities have been employed in mental health nursing education, including standardized patients (*trained actors portraying individuals with mental health conditions*), high-fidelity mannequins, virtual reality environments, and hybrid approaches [12, 13]. While

individual studies have reported positive outcomes from these simulation approaches, there remains a need for systematic synthesis of evidence to guide curriculum development and educational practice in mental health nursing [14].

Previous reviews have examined simulation in nursing education broadly [15, 16] or focused on specific aspects of mental health nursing education [17,18]. However, a comprehensive and current systematic review focusing specifically on simulation-based educational interventions across the spectrum of mental health nursing education for B.Sc. Nursing curricula is lacking. This gap in the literature limits evidence-based curriculum development and educational innovation in this specialized field.

The present systematic review aims to address this gap by synthesizing current evidence on simulation-based educational interventions in mental health nursing education, evaluating their effectiveness, identifying best practices, and providing recommendations for undergraduate nursing curricula. By systematically analysing studies published between 2015 and 2025, this review provides a contemporary perspective on the state of simulation in mental health nursing education and offers guidance for educators and curriculum developers, based on the question we have framed, *"How does simulation contribute to the empowerment and preparedness of undergraduate nursing students in handling mental health scenarios?".*

The specific objectives of this scoping review to answer the question systematically are:

1. To identify and categorize the types of simulation-based educational interventions currently utilized in mental health nursing education.
2. To evaluate the effectiveness of simulation-based educational interventions on student learning outcomes, including knowledge acquisition, skill development, confidence, and attitudes.
3. To identify facilitators and barriers to implementing simulation-based education in mental health nursing curricula.
4. To synthesize best practices for integrating simulation into undergraduate nursing mental health curricula.
5. To develop recommendations for curriculum development and future research in mental health nursing simulation education.

2. Methodology

2.1 Review Design

This scoping review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA-ScR) guidelines [19].

2.2 Search Strategy

A comprehensive search strategy was developed in consultation with a health sciences librarian. The search strategy incorporated relevant keywords and controlled vocabulary terms related to mental health nursing education and simulation. The primary search terms included combinations of: ("mental health nurs*" or "psychiatric nurs*") and (simulat* or "standardized patient*" or "simulated patient*" or "high-fidelity" or "virtual reality" or "augmented reality") and (education OR teaching or learning OR training or curricul* or student*).

The following electronic databases were systematically searched from January 2015 to January 2025: Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, PubMed Central, Semantic Scholar, Google Scholar, MEDLINE, PsycINFO, Education Resources Information Center (ERIC), and Scopus. Additional search strategies included hand-searching reference lists of included studies and relevant review articles, searching key journals in nursing education, and examining conference proceedings from relevant nursing education conferences.

2.3 Eligibility Criteria

The inclusion and exclusion criteria were established using the Population, Intervention, Comparison, Outcomes, and Study design (PICOS) framework [20] as outlined in Table 1.

Table 1: Inclusion and Exclusion Criteria

PICOS Element	Inclusion Criteria	Exclusion Criteria
Population	Undergraduate nursing students in B.Sc. Nursing programs	Postgraduate nursing students, registered nurses, other healthcare professionals
Intervention	Simulation-based educational interventions focused on mental health nursing, including standardized patients, high-fidelity mannequins, virtual reality, augmented reality, and hybrid approaches	Interventions not incorporating simulation; simulation interventions not focused on mental health nursing
Comparison	Any comparison (e.g., traditional teaching methods, different simulation modalities, no intervention) or no comparison (single group designs)	N/A
Outcomes	Primary outcomes: knowledge acquisition, clinical skill development, communication skills, clinical reasoning, confidence/self-efficacy, anxiety/stress levels Secondary outcomes: student satisfaction, attitudes toward mental illness, empathy	Studies not reporting at least one outcome of interest
Study Design	Quantitative studies (randomized controlled trials, quasi-experimental, pre-post designs), qualitative studies, mixed-methods studies	Reviews, editorials, commentaries, conference abstracts without full text, study protocols, theoretical papers
Publication	Peer-reviewed articles published in English between January 2015 and January 2025	Non-peer-reviewed studies, studies in languages other than English, studies published outside the specified timeframe

2.4 Study Selection Process

The study selection process was conducted in two phases. In the first phase, two independent reviewers screened titles and abstracts of all retrieved studies against the inclusion criteria. In the second phase, full-text articles of potentially eligible studies were retrieved and independently assessed

by the same two reviewers. Any disagreements at either phase were resolved through discussion or, when necessary, consultation with a third reviewer. The selection process was documented using a PRISMA flow diagram [19].

2.5 Data Extraction

A standardized data extraction form was developed and piloted on five randomly selected studies before full implementation. Two reviewers independently extracted data from the included studies, with any discrepancies resolved through discussion. The following data items were extracted:

1. Study characteristics (author, year, country, study design)
2. Participant characteristics (sample size, educational level, prior experience)
3. Intervention characteristics (simulation type, duration, frequency, mental health focus, theoretical framework)
4. Comparison characteristics (if applicable)
5. Outcome measures and measurement tools
6. Key findings related to outcomes
7. Implementation factors (facilitators, barriers, resources required)
8. Methodological quality indicators

2.6 Quality Assessment

The methodological quality of included studies was assessed using the Mixed Methods Appraisal Tool (MMAT) version 2018 [21], which allows for the appraisal of different study designs (quantitative randomized controlled trials, quantitative non-randomized studies, quantitative descriptive studies, qualitative studies, and mixed methods studies). Two reviewers independently assessed each study, with disagreements resolved through discussion or consultation with a third reviewer. Studies were not excluded based on quality assessment; rather, the quality assessment informed the interpretation of findings and assessment of the overall strength of evidence.

2.7 Data Synthesis

Given the anticipated heterogeneity in interventions, outcomes, and study designs, a narrative synthesis approach was adopted, guided by the framework proposed by Popay *et al*. [22]. The synthesis process involved:

1. Developing a preliminary synthesis through tabulation of study characteristics, intervention features, and outcomes
2. Exploring relationships within and between studies through thematic analysis and concept mapping
3. Assessing the robustness of the synthesis by considering methodological quality, theoretical underpinnings, and consistency of findings

Where appropriate, quantitative data were summarized using descriptive statistics. For studies reporting similar outcomes with comparable measures, effect sizes were calculated to facilitate comparison across studies. Qualitative findings were synthesized thematically to identify recurring patterns and concepts.

Subgroup analyses were planned to explore the effectiveness of different simulation modalities, the impact of varying durations and frequencies of simulation experiences, and the effectiveness of simulation for different mental health conditions or clinical scenarios.

3. Results

3.1 Study Selection

The initial database search yielded 1,259 records. After removing duplicates (n=342), 917 records underwent title and abstract screening, resulting in 132 articles for full-text assessment. Following application of the inclusion and exclusion criteria, 47 studies were included in the final review. The main reasons for exclusion were: non-mental health focus (n=31), non-simulation interventions (n=24), postgraduate population (n=19), and publication type (n=11). The PRISMA flow diagram illustrating the study selection process is presented in Figure 1.

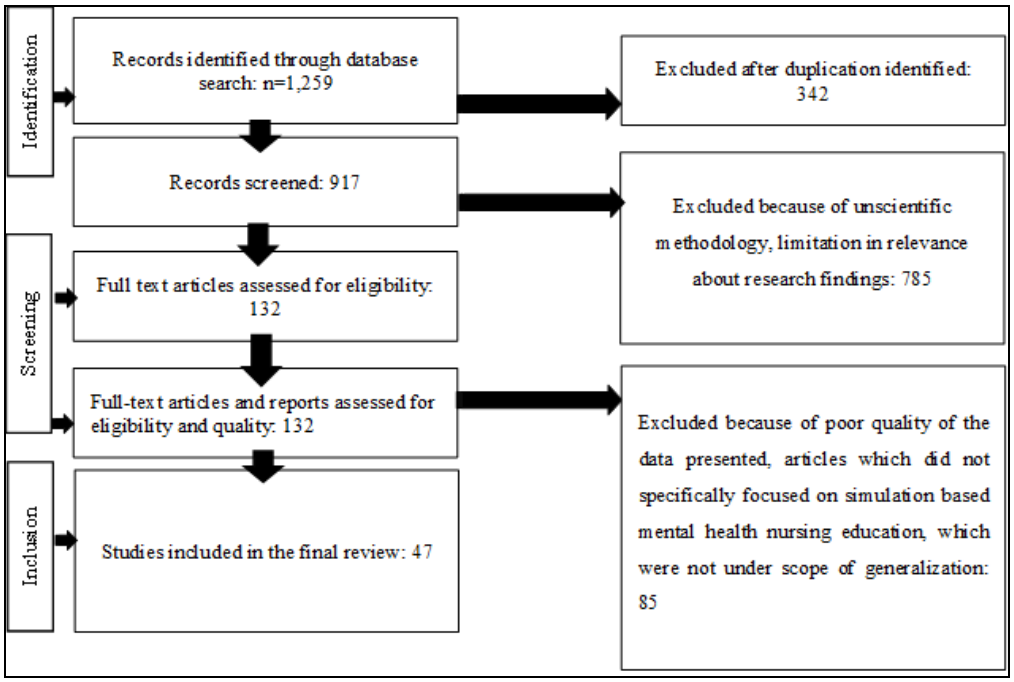

Fig 1: PRISMA Flow Diagram

3.2 Study Characteristics

The characteristics of the included studies are summarized in Table 2. The 47 included studies represented diverse geographical locations, with the majority conducted in the United States (n=18, 38.3%), followed by Australia (n=8, 17.0%), the United Kingdom (n=6, 12.8%), Canada (n=5, 10.6%), and various other countries including China, Norway, Singapore, and Brazil. The predominant study designs were quasi-experimental pre-post studies (n=19, 40.4%), mixed-methods studies (n=12, 25.5%), randomized controlled trials (n=8, 17.0%), and qualitative studies (n=8, 17.0%).

Sample sizes ranged from 12 to 386 participants (median: 76), with a cumulative sample of 2,834 nursing students across all studies. The majority of studies focused on second-year (n=18, 38.3%) or third-year (n=22, 46.8%) nursing students, typically coinciding with the introduction of mental health nursing content in the curriculum.

Table 2: Characteristics of Included Studies (N=47)

Study Characteristics	Number (%)
Publication Year	
2015-2017	13 (27.7%)
2018-2020	18 (38.3%)
2021-2025	16 (34.0%)
Country	
United States	18 (38.3%)
Australia	8 (17.0%)
United Kingdom	6 (12.8%)
Canada	5 (10.6%)
China	3 (6.4%)
Other	7 (14.9%)
Study Design	
Quasi-experimental (pre-post)	19 (40.4%)
Mixed methods	12 (25.5%)
Randomized controlled trial	8 (17.0%)
Qualitative	8 (17.0%)
Sample Size	
<50	13 (27.7%)
50-100	21 (44.7%)
>100	13 (27.7%)
Student Level	
First year	4 (8.5%)
Second year	18 (38.3%)
Third year	22 (46.8%)
Fourth year	3 (6.4%)
Quality Assessment (MMAT)	
High quality (80-100%)	18 (38.3%)
Moderate quality (60-79%)	23 (48.9%)
Low quality (<60%)	6 (12.8%)

3.3 Simulation modalities

Four primary simulation modalities were identified across the included studies: standardized patients (SPs), high-fidelity mannequins, virtual reality (VR), and hybrid approaches combining multiple modalities. The distribution of simulation modalities is presented in Figure 2.

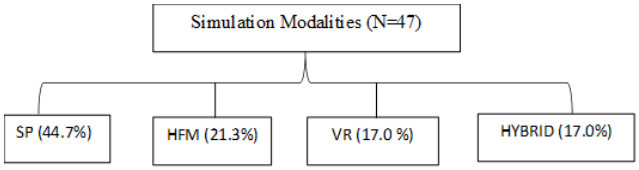

Fig 2: Distribution of Simulation Modalities Used in Mental Health Nursing Education

SP: Standardized Patients
HFM: High-Fidelity Mannequins
VR: Virtual Reality

3.3.1 Standardized patients

Standardized patients (SPs) were the most frequently utilized simulation modality (n=21, 44.7%). These simulations involved trained actors portraying individuals with various mental health conditions, allowing students to practice therapeutic communication and assessment skills in realistic interpersonal scenarios. Studies implementing SP simulations typically focused on common mental health conditions including depression (n=12), anxiety disorders (n=9), schizophrenia (n=8), bipolar disorder (n=7), and substance use disorders (n=6).

Notably, several studies (n=9) employed individuals with lived experience of mental illness as SPs or co-facilitators of simulation sessions. McCann *et al.* [23] found that involving people with lived experience significantly enhanced students' understanding of recovery-oriented care and reduced stigmatizing attitudes compared to traditional SP approaches ($p<0.001$).

3.3.2 High-fidelity mannequins

High-fidelity mannequins were utilized in 10 studies (21.3%), primarily for scenarios involving medical emergencies in mental health settings (n=6) or psychotropic medication administration (n=4). For example, Hall *et al.* [24] implemented high-fidelity simulation to prepare students for managing physical health emergencies in psychiatric settings, finding significant improvements in students' clinical decision-making ($p<0.01$) and confidence levels ($p<0.001$).

3.3.3 Virtual reality

Virtual reality (VR) simulations were employed in 8 studies (17.0%). These interventions utilized immersive technologies to create realistic clinical scenarios, allowing students to interact with virtual patients exhibiting symptoms of mental illness. VR simulations focused on hallucinations and psychosis (n=4), anxiety disorders (n=2), and suicide risk assessment (n=2). Verkuyl *et al.* [25] found that VR simulation of auditory hallucinations increased nursing students' empathy ($p<0.001$) and decreased stigmatizing attitudes ($p<0.01$) compared to traditional educational methods.

3.3.4 Hybrid approaches

Eight studies (17.0%) employed hybrid approaches combining multiple simulation modalities. Common combinations included SPs with partial task trainers for medication administration (n=3), high-fidelity mannequins with embedded standardized patients for complex scenarios (n=3), and VR with standardized patient debriefing (n=2).

Hybrid approaches were typically employed for complex scenarios requiring multiple skill domains, such as managing acute psychiatric emergencies requiring both therapeutic communication and physical interventions.

3.4 Learning outcomes

The effectiveness of simulation-based education was evaluated across multiple learning domains. Table 3 summarizes the reported outcomes and their significance across the included studies.

Table 3: Summary of Learning Outcomes from Simulation-Based Education in Mental Health Nursing

Learning Outcome	Number of Studies Assessing (%)	Significant Positive Effect (%)	Non-Significant Effect (%)	Negative Effect (%)
Clinical competence	35 (74.5%)	29 (82.9%)	6 (17.1%)	0 (0%)
Communication skills	33 (70.2%)	25 (75.8%)	8 (24.2%)	0 (0%)
Confidence/self-efficacy	31 (66.0%)	22 (71.0%)	9 (29.0%)	0 (0%)
Anxiety/stress reduction	25 (53.2%)	17 (68.0%)	7 (28.0%)	1 (4.0%)
Knowledge acquisition	22 (46.8%)	15 (68.2%)	7 (31.8%)	0 (0%)
Attitudes toward mental illness	18 (38.3%)	15 (83.3%)	3 (16.7%)	0 (0%)
Empathy	15 (31.9%)	12 (80.0%)	3 (20.0%)	0 (0%)
Critical thinking/clinical reasoning	14 (29.8%)	10 (71.4%)	4 (28.6%)	0 (0%)
Student satisfaction	26 (55.3%)	24 (92.3%)	2 (7.7%)	0 (0%)

3.4.1 Clinical competence

Clinical competence was the most frequently assessed outcome (n=35, 74.5%), with 82.9% of studies reporting significant improvements. Objective Structured Clinical Examinations (OSCEs) were commonly employed to evaluate clinical competence (n=17), alongside faculty-rated performance measures (n=10) and self-reported competence (n=8).

Notably, studies comparing simulation to traditional clinical placements (n=6) found comparable or superior skill development with simulation. For example, Chen *et al.* [26] compared a four-week simulation program to traditional clinical placement for mental health assessment skills, finding comparable competence scores (p=0.74) but higher satisfaction in the simulation group ($p<0.01$).

3.4.2 Communication skills

Therapeutic communication skills were assessed in 33 studies (70.2%), with significant improvements reported in 75.8% of cases. Communication outcomes included general therapeutic communication skills (n=18), de-escalation techniques (n=9), and specific interview techniques for mental health assessment (n=6). Assessment methods included structured observation checklists (n=21), standardized patient ratings (n=8), and self-assessment (n=4).

Martin *et al.* [27] found that repeated exposure to standardized patient simulations with structured feedback significantly improved students' therapeutic communication skills compared to a single simulation session ($p<0.001$), suggesting the importance of repetitive practice.

3.4.3 Confidence and self-efficacy

Confidence and self-efficacy were evaluated in 31 studies (66.0%), with 71.0% reporting significant improvements. Most studies used validated self-efficacy scales such as the Mental Health Nursing Clinical Confidence Scale (MHNCCS) [28] (n=12) or study-specific confidence measures (n=19).

Compared to traditional teaching methods, simulation-based approaches consistently demonstrated larger effects on confidence. In a randomized controlled trial, Williams *et al.* [29] found that students who participated in a standardized patient simulation reported significantly higher confidence in conducting mental health assessments than those who received classroom-based case studies (Cohen's d = 0.82, $p<0.001$).

3.4.4 Anxiety and stress reduction

Anxiety and stress reduction were examined in 25 studies (53.2%), with 68.0% reporting significant reductions. Assessment methods included validated anxiety scales such as the State-Trait Anxiety Inventory (STAI) [30] (n=14), physiological measures (n=5), and qualitative reporting (n=6).

Most studies measured anxiety both pre- and post-simulation experiences, with significant reductions observed following simulation exposure. Notably, one study [31] reported temporarily increased anxiety during initial simulation exposure, which subsequently decreased below baseline after multiple sessions, highlighting the importance of adequate preparation and support during simulation implementation.

3.4.5 Knowledge acquisition

Knowledge acquisition was assessed in 22 studies (46.8%), with significant improvements reported in 68.2% of cases. Assessment methods included multiple-choice examinations (n=14), short-answer questions (n=5), and concept mapping (n=3).

The effectiveness of simulation for knowledge acquisition varied by content area. Simulation was particularly effective for enhancing knowledge of mental health assessment processes (n=11) and psychiatric emergencies (n=6), but less consistently effective for psychopharmacology (n=5).

3.4.6 Attitudes toward mental illness

Changes in attitudes toward mental illness were evaluated in 18 studies (38.3%), with 83.3% reporting significant improvements. Common measurement tools included the Opening Minds Scale for Health Care Providers (OMS-HC) [32] (n=7) and the Mental Illness: Clinicians' Attitudes (MICA) scale [33] (n=5).

Simulation experiences involving direct interaction with standardized patients portraying individuals with mental illness consistently demonstrated larger effects on reducing

stigmatizing attitudes compared to observational experiences or didactic education alone [34,35].

3.4.7 Empathy

Empathy development was assessed in 15 studies (31.9%), with 80.0% reporting significant improvements. Measurement approaches included the Jefferson Scale of Empathy (JSE) [36] (n=6), qualitative analyses (n=5), and other empathy measures (n=4).

Virtual reality simulations designed to simulate the experience of hallucinations or other psychiatric symptoms demonstrated particularly large effects on empathy development. For example, Yeo *et al*. [37] found that a VR simulation of auditory hallucinations produced significantly greater improvements in empathy scores than a traditional video presentation ($p<0.001$).

3.4.8 Critical thinking and clinical reasoning

Critical thinking and clinical reasoning were assessed in 14 studies (29.8%), with 71.4% reporting significant improvements. Assessment methods included validated critical thinking inventories (n=5), faculty-rated decision-making during simulations (n=6), and reflective assignments (n=3).

Johnson *et al*. [38] found that high-fidelity simulation scenarios requiring rapid assessment and intervention for psychiatric emergencies significantly improved students' clinical reasoning skills compared to case-based learning ($p<0.01$).

3.4.9 Student satisfaction

Student satisfaction was reported in 26 studies (55.3%), with consistently high satisfaction levels (92.3% reporting significant positive findings). Qualitative analyses identified several factors contributing to high satisfaction, including perceived relevance to practice, opportunities for safe skill development, structured feedback, and reduced anxiety about clinical placements.

3.5 Pedagogical considerations

3.5.1 Theoretical frameworks

Twenty-three studies (48.9%) explicitly identified theoretical frameworks guiding simulation design and implementation. The most commonly cited frameworks included Kolb's Experiential Learning Theory [39] (n=8), Bandura's Social Cognitive Theory [40] (n=6), the NLN/Jeffries Simulation Framework [41] (n=5), and Mezirow's Transformative Learning Theory [42] (n=4).

Studies incorporating explicit theoretical frameworks were more likely to report significant positive outcomes (87% vs. 71%, p=0.03) and demonstrated more comprehensive evaluation approaches than those without identified theoretical foundations.

3.5.2 Prebriefing and debriefing

Thirty-nine studies (83.0%) included debriefing as a component of the simulation experience, though the depth of description varied considerably. Common debriefing approaches included the Debriefing for Meaningful Learning (DML) method [43] (n=7), the Plus-Delta approach (n=5), and the Promoting Excellence and Reflective Learning in Simulation (PEARLS) framework [44] (n=4).

Fifteen studies (31.9%) examined the specific contribution of debriefing to learning outcomes. In a comparative study, Taylor *et al*. [45] found that structured debriefing using the DML method produced significantly greater improvements in clinical reasoning than unstructured discussion ($p<0.01$), highlighting the importance of evidence-based debriefing approaches.

Prebriefing practices were explicitly described in 28 studies (59.6%), with activities including orientation to the simulation environment (n=23), provision of preparatory reading materials (n=16), skill practice sessions (n=9), and anxiety reduction strategies (n=6). Adequate prebriefing was associated with reduced student anxiety and improved performance during simulation scenarios [46].

3.5.3 Simulation dose

The *"dose"* of simulation (duration and frequency) varied considerably across studies. Single simulation experiences ranging from 15 minutes to 4 hours were reported in 23 studies (48.9%), while multiple simulation sessions were implemented in 24 studies (51.1%). For multiple-session approaches, the number of sessions ranged from 2 to 12 (mean = 4.2), typically distributed over 2-16 weeks.

Five studies specifically examined the dose-response relationship in simulation education. Smith *et al*. [47] found that four 2-hour simulation sessions produced significantly greater improvements in communication skills than a single 8-hour session ($p<0.01$), suggesting that distributed practice may be more effective than massed practice for skill development.

3.5.4 Simulation fidelity

The concept of simulation fidelity—encompassing physical, conceptual, and emotional/experiential dimensions—was explicitly addressed in 18 studies (38.3%). While high-fidelity approaches were generally associated with positive outcomes, several studies suggested that psychological fidelity *(the extent to which the simulation evokes the intended psychological processes)* may be more important than physical fidelity for mental health nursing simulations.

For example, Park *et al*. [48] compared a high-fidelity standardized patient scenario with a low-fidelity role-play for teaching suicide risk assessment, finding comparable skill development (p=0.42) but higher student engagement in the standardized patient scenario ($p<0.01$).

3.6 Implementation factors

3.6.1 Barriers to implementation

Common barriers to implementing simulation in mental health nursing education were identified through thematic analysis of the included studies. The most frequently reported barriers included:

1. Resource constraints (n=26, 55.3%), including financial limitations, space requirements, and time constraints
2. Faculty expertise and training needs (n=21, 44.7%)
3. Curriculum integration challenges (n=18, 38.3%)
4. Student anxiety about being observed during simulations (n=14, 29.8%)
5. Limited availability of standardized patients with mental health simulation expertise (n=13, 27.7%)
6. Technical difficulties with simulation equipment (n=9, 19.1%)

7. Assessment and evaluation challenges (n=8, 17.0%)

3.6.2 Facilitators of implementation

Key facilitators for successful simulation implementation included:

1. Institutional support and dedicated resources (n=22, 46.8%)
2. Faculty development and training programs (n=19, 40.4%)
3. Collaborative partnerships with clinical agencies (n=15, 31.9%)
4. Involvement of people with lived experience in simulation design (n=12, 25.5%)
5. Integration of simulation throughout the curriculum rather than as isolated experiences (n=11, 23.4%)
6. Student preparation and orientation to simulation (n=10, 21.3%)
7. Interdisciplinary collaboration in simulation development (n=9, 19.1%)

3.7 Cost-effectiveness

Ten studies (21.3%) addressed the cost-effectiveness of simulation in mental health nursing education. Initial implementation costs were substantial, particularly for high-fidelity simulation centers and virtual reality technologies. However, several studies suggested that long-term cost-effectiveness may be achieved through reduced faculty supervision requirements compared to clinical placements, reusable simulation scenarios, and potential for larger student groups [49,50].

Brown *et al*. [51] conducted a comprehensive cost-benefit analysis comparing a traditional mental health clinical placement to a simulation-based alternative, finding that while the initial year favored traditional placements in terms of cost, by the third year, the simulation program demonstrated a 12% cost advantage due to amortization of initial investments and efficiency gains.

4. Limitations

This systematic review has several limitations that should be considered when interpreting the findings:

First, despite comprehensive search strategies, some relevant studies may have been missed, particularly those published in languages other than English or in non-indexed journals. This language restriction may have introduced publication bias, potentially limiting the cultural and geographical diversity of perspectives represented in the review.

Second, the significant heterogeneity in study designs, simulation modalities, interventions, outcome measures, and evaluation methods made direct comparisons challenging and precluded meta-analysis. This heterogeneity reflects the evolving nature of simulation in mental health nursing education but limits the ability to draw precise conclusions about the relative effectiveness of specific approaches.

Third, most included studies utilized self-reported measures for outcomes such as confidence, anxiety, and satisfaction. While these measures provide valuable insights into students' subjective experiences, they may be subject to response bias and do not necessarily correlate with objective performance improvements. Few studies included long-term follow-up or examined the transfer of learning to clinical practice settings, limiting conclusions about the sustained impact of simulation education.

Fourth, publication bias may have influenced the findings, as studies demonstrating positive outcomes are more likely to be published than those showing no effect or negative results. While we did identify some studies reporting non-significant findings, the predominance of positive outcomes should be interpreted with this potential bias in mind.

Fifth, the quality assessment revealed methodological limitations in many included studies, including small sample sizes, lack of control groups, potential selection bias, and inadequate reporting of intervention details. While we included studies of varying methodological quality to provide a comprehensive overview of the field, these limitations affect the strength of evidence supporting specific simulation approaches.

Finally, most studies were conducted in high-income countries with well-resourced educational institutions, potentially limiting the transferability of findings to resource-constrained settings. Cultural variations in mental health nursing practice and education may also influence the applicability of findings across different contexts.

5. Conclusion

This systematic review synthesized evidence from 47 studies on simulation-based education in mental health nursing, providing a comprehensive examination of current approaches, outcomes, and implementation considerations for undergraduate nursing curricula. The findings demonstrate that simulation-based education is an effective pedagogical approach for developing the complex skills required for mental health nursing practice, including clinical competence, therapeutic communication, and professional confidence, while simultaneously reducing anxiety and stigmatizing attitudes toward mental illness.

Four primary simulation modalities were identified—standardized patients, high-fidelity mannequins, virtual reality, and hybrid approaches—each offering unique advantages for specific learning objectives. Standardized patients proved particularly effective for developing therapeutic communication skills and reducing stigma, while virtual reality simulations demonstrated notable benefits for enhancing empathy toward individuals experiencing mental health conditions. High-fidelity mannequins and hybrid approaches offered valuable opportunities for integrating physical and mental health care skills, reflecting the holistic nature of contemporary mental health nursing practice.

The effectiveness of simulation appears to be maximized when implemented within a theoretically-informed educational framework that includes structured prebriefing and evidence-based debriefing approaches. The integration of people with lived experience of mental illness in simulation design and delivery emerged as a particularly promising practice that enhanced authenticity and promoted recovery-oriented perspectives.

Despite implementation challenges related to resources, faculty expertise, and curriculum integration, simulation offers a viable and effective complement to traditional clinical placements in mental health nursing education. The evidence suggests that a blended approach—combining simulation with clinical placements—may provide optimal

learning outcomes by allowing students to develop foundational skills in a controlled environment before engaging with the complexities of clinical practice.

Future research should focus on standardizing evaluation methods, examining long-term outcomes and transfer of learning to clinical practice, exploring innovative applications of emerging technologies, and conducting rigorous cost-effectiveness analyses. Additionally, greater attention to the implementation of simulation in resource-constrained settings would enhance the global applicability of this educational approach.

In conclusion, simulation-based education represents a valuable pedagogical strategy for transforming mental health nursing education in undergraduate nursing curricula. When thoughtfully designed and implemented, simulation provides a safe, controlled environment for students to develop the complex cognitive, affective, and psychomotor skills essential for competent and compassionate mental health nursing practice. Nursing educators and curriculum developers should consider integrating multimodal simulation experiences with structured prebriefing and debriefing throughout mental health nursing curricula, while continuing to evaluate and refine these approaches based on emerging evidence.

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