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# Embracing Artificial Intelligence (AI) in Nursing Education through Wearable Technology: Innovation-Driven Teaching

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Editorial



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## Embracing Artificial Intelligence (AI) in Nursing Education through Wearable Technology: Innovation-Driven Teaching

In the era of technology, forward-thinking educators are critical in advocating for curriculum changes to advance nursing education. As the world becomes increasingly technological, educators must rethink their roles as change agents to meet the evolving needs of contemporary learners. Artificial Intelligence (AI) has emerged as a disruption in educational environments, yet a significant gap remains in scientific evidence regarding the most effective strategies for integrating AI into nursing education. Still, there are a number of challenges faced by students, educators, and universities in using AI. As digital natives, students are continuously exposed to novel technologies but are not adequately guided on the ethical and responsible use of AI. Meanwhile, educators, who are not digital natives, must continually develop their own competencies through specialized training to prepare the next generation of nurses. Simultaneously, universities often lack institutional policies to support the structured incorporation of AI, hindering improvements in learning outcomes. In all instances, resistance to innovation can further delay transformation. As an educational tool built on prompts and language models, AI requires complementary technologies for integration into any context, including nursing education. With the anticipated technological future of healthcare systems, it is essential to explore how AI can be integrated into nursing education through emerging technologies to better prepare the future workforce, with wearables representing a key pathway for leveraging AI.

As technology advances, AI will continue to shape nursing education. However, educators are still unfamiliar with AI, showing a limited understanding of its tools and capabilities.<sup>(1)</sup> To understand, interact, and translate AI into education, nurse educators should develop AI literacy. When equipped with the competencies

required, they can choose the intelligent systems that best meet students' needs and preferences, establish clear guidelines, and prepare students to navigate ethical dilemmas in technology-driven health systems. It can support the development of nursing students' professional identity values, maximizing students' retention. Since professional identity is a critical factor that influences nursing student retention,<sup>(2)</sup> fostering positive faculty-student relationships becomes essential for shaping students' professional self-concept and commitment.<sup>(3-4)</sup> They can also leverage AI to bridge the theory-practice gap, fostering an educational environment where students feel empowered to engage deeply and adapt skillfully to evolving challenges.<sup>(5-7)</sup> By providing personalized learning experiences,<sup>(8-9)</sup> AI in nursing education is well positioned to enhance learning outcomes,<sup>(5,10)</sup> leading to improved student's satisfaction and academic performance.<sup>(11)</sup> Yet, its integration raises significant ethical and privacy concerns that require careful consideration by academic decision-makers. A central concern is the ethical management of sensitive data, as nursing education often involves using personal and patient-related information, requiring strict adherence to privacy standards. Furthermore, biased AI algorithms reinforce existing inequalities in education, making it challenging to ensure equitable learning opportunities. Addressing these issues requires institutions to incorporate ethical principles, such as autonomy, nonmaleficence, beneficence, justice, and explainability into the curriculum, which not only ensures compliance with cyber ethics but also promotes the responsible use of AI.<sup>(8,12)</sup> While AI promises to transform various aspects of educational, academic, and clinical environments, many educators remain unaware of the benefits of other emerging technologies also shaping nursing education, such as wearable technology.

Wearables are electronic devices designed to be worn as accessories, including smart glasses, smartwatches, and smart clothing. These devices offer a range of functionalities, with health

monitoring being particularly notable. They can track sleep quality, monitor physical activities, provide protection, initiate actions (calling emergency services in dangerous situations, for instance), and assist in managing personal tasks.

<sup>(13)</sup> In nursing education, wearable devices provide real-time monitoring, simulation of patient scenarios, and hands-on training for students to develop skills in a safe and controlled environment.

<sup>(14)</sup> Integrating wearable technology into nursing education requires alignment with student needs and nursing curriculum outcomes. When combined with other realist pedagogical approaches (e.g., simulation labs), wearable technology promises a transformation in how students engage with their learning environments.<sup>(14)</sup> Wearables offer an immersive, hands-on approach that aligns with the learning preferences of digital-native students who expect interactive technology-driven experiences.<sup>(14-15)</sup> This alignment is critical, as it suggests that wearable technology in education is not merely a novel addition but a response to shifting expectations and cognitive habits shaped by a digitally integrated world. By embedding wearables in the educational experience, students are encouraged to actively participate, apply knowledge in real-time contexts, and develop professional skills with a nuanced understanding of their applicability in clinical environments. Although these devices cannot be incorporated into supervised practices or internships in a hospital environment due to the risk of contamination,<sup>(16)</sup> they can be incorporated into simulated scenarios, providing a practical educational strategy to enhance nursing students' competencies before their immersion in the clinical setting.<sup>(14)</sup> Simulated scenarios in nursing education are a valuable approach to developing competencies,<sup>(17)</sup> which can be further enhanced through the use of wearables.<sup>(14)</sup> Wearables can serve as a bridge between theory and practice,

fostering personalized and immersive learning experiences, and ultimately pivoting nursing education: driving change in educational strategy while maintaining the foundations of nursing education.

Education must continuously evolve by adopting new pedagogical approaches and incorporating AI-driven tools.<sup>(18)</sup> Embracing AI in nursing education through wearable technology does not go against nursing education's core values. Instead, it enables students' new forms of knowledge acquisition, bridging the gap between theory and practice in nursing education. AI-driven wearables can optimize teaching resources and enhance human interaction, representing an emerging strategy for leveraging AI. Although AI represents a key pathway forward in nursing education, there are considerable barriers rooted in cultural resistance to innovative teaching methods. While challenges are still faced by students, educators and universities in integrating AI in nursing education, decision-makers can contribute to the establishment of institutional policies that can strengthen the curriculum to prepare nursing students to meet the demands of technology-driven healthcare systems, where technology and patient care are increasingly intertwined. With a significant gap in scientific evidence regarding the most effective strategies for integrating AI into nursing education, further research is required to explore the role of wearable technology in developing competencies among nursing students, ensuring a comprehensive understanding of its impact on educational outcomes.

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# Health Literacy in People with Diabetes: An Evolutionary Concept Analysis Using Rodgers' Approach

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**Descriptors:** Concept Formation; Health Literacy; Diabetes Mellitus.

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Original Article



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## Health literacy in individuals with diabetes: an evolutionary concept analysis using Rodgers Approach

### Abstract

**Objective.** To analyze the evolution of the concept of health literacy (HL) in people with diabetes mellitus (DM) according to the Rodgers approach. **Methods.** The Rodgers approach was used, based on a scoping review that followed the steps of the JBI. Only methodologically clear studies that Only studies (articles) that clearly addressed HA in DM were included. Primary sources from health databases (e.g. PubMed, Scopus, Web of Science, SciELO, LILACS and BDNF) and grey literature (e.g. theses, dissertations and guides) were analysed via university repositories, Google Scholar, the Brazilian Digital Library of Theses and Dissertations and the CAPES Journal Portal (a Brazilian research support agency). The protocol was registered on the Open Science Framework (DOI: <https://doi.org/10.17605/OSF.IO/Y2T3R>). **Results.** A total of 197 studies were selected, identifying seven key attributes of health literacy (HA): understanding, application, seeking, communication, critical appraisal, and sociocultural competencies related to diabetes. A total of 197 studies were selected to identify seven key attributes of health literacy (HA), such as understanding, application, seeking, communication, critical appraisal, and sociocultural competencies related to diabetes. Background factors (e.g., educational level and age) and outcomes (e.g., self-care, adherence, and glycemic control) were also examined. **Conclusion.** HA has evolved from basic literacy to digital and multidimensional competence, which presents challenges in vulnerable populations. HA is essential for the autonomy and effective management of diabetes mellitus (DM), highlighting the need for personalized educational interventions, primarily in primary care.

**Descriptors:** concept formation; health literacy; diabetes mellitus.

## Alfabetización en Salud en individuos con diabetes: un análisis conceptual evolutivo utilizando el enfoque de Rodgers

### Resumen

**Objetivo.** Analizar la evolución del concepto de alfabetización en salud (AS) en personas con diabetes mellitus (DM) según el enfoque de Rodgers. **Métodos.** Se utilizó el enfoque de Rodgers, basado en una revisión de alcance que siguió los pasos del JBI. Solo se incluyeron estudios metodológicamente claros (artículos) que abordaran la AS en DM. Se analizaron fuentes primarias en bases de datos de salud (PubMed, Scopus, Web of Science, SciELO, LILACS, BDNF) y literatura gris (tesis, disertaciones, guías) a través de repositorios universitarios, Google Scholar,

Biblioteca Digital de Tesis y Disertaciones de Brasil, y el Portal de Periódicos de la CAPES, (agencia brasileña de apoyo a la investigación). El protocolo fue registrado en Open Science Framework (DOI <https://doi.org/10.17605/OSF.IO/Y2T3R>).

**Resultados.** Se seleccionaron 197 estudios, identificándose siete atributos clave de AS, como comprensión, aplicación, búsqueda, comunicación, evaluación crítica y competencias socioculturales relacionadas con la diabetes. También se observaron antecedentes (nivel educativo, edad) y consecuencias (autocuidado, adherencia, control glucémico). **Conclusión.** La AS ha evolucionado de alfabetización básica a competencia digital y multidimensional, presentando desafíos en poblaciones vulnerables. Es esencial para la autonomía y el manejo eficaz de la DM, destacando la necesidad de intervenciones educativas personalizadas, principalmente en atención primaria.

**Descriptor:** formación de concepto; alfabetización en salud; diabetes mellitus.

## Letramento em saúde em pessoas com diabetes: uma análise de conceito evolucionário usando a abordagem de Rodgers

### Resumo

**Objetivo.** Analisar a evolução do conceito de letramento em saúde (LS) em pessoas com diabetes mellitus (DM) segundo o enfoque de Rodgers. **Métodos.** Utilizou-se o enfoque de Rodgers, baseado em uma revisão de escopo que seguiu os passos do JBI. Foram incluídos apenas estudos metodologicamente claros (artigos) que abordassem o LS em DM. Foram analisadas fontes primárias em bases de dados de saúde (PubMed, Scopus, Web of Science, SciELO, LILACS, BDNF) e literatura cinzenta (teses, dissertações, guias) por meio de repositórios universitários, Google Scholar, Biblioteca Digital de Teses e Dissertações do Brasil e o Portal de Periódicos da CAPES (agência brasileira de apoio à pesquisa). O protocolo foi registrado no Open Science Framework (DOI <https://doi.org/10.17605/OSF.IO/Y2T3R>). **Resultados.** Foram selecionados 197 estudos, identificando-se sete atributos-chave do LS, tais como compreensão, aplicação, busca, comunicação, avaliação crítica e competências socioculturais relacionadas à diabetes. Também foram observados antecedentes (nível educacional, idade) e consequências (autocuidado, adesão, controle glicêmico). **Conclusão.** O LS evoluiu do letramento básico para a competência digital e multidimensional, apresentando desafios em populações vulneráveis. É essencial para a autonomia e manejo eficaz da DM, destacando a necessidade de intervenções educativas personalizadas, principalmente na atenção primária.

**Descritores:** formação de conceito; letramento em saúde; diabetes mellitus.

## Introduction

**D**iabetes Mellitus (DM) is a chronic disease resulting from ineffective insulin production or absorption, leading to elevated glycemic levels and systemic repercussions that can culminate in death.<sup>(1)</sup> Considered a public health issue, it is estimated that over 62 million people live with DM in the Americas, a significant proportion of whom remain unaware of their condition. DM ranks as the sixth leading cause of mortality and is the primary cause of blindness among individuals aged 40 to 74 years.<sup>(2)</sup> The effectiveness of treatment for people living with DM depends on various factors, including patient education, age, personal beliefs, treatment complexity, and the daily impact of insulin therapy.<sup>(3)</sup> The term health literacy (HL) refers to the set of cognitive and social skills necessary to understand health information for self-care or the care of others. The concept of HL first emerged in the United States in the 1970s. HL levels significantly influence treatment adherence, lifestyle modifications, and adverse clinical outcomes related to DM.<sup>(4-7)</sup>

In Brazil, the term has evolved over time, also being referred to as health literacy, health literacia, or health education.<sup>(7)</sup> Regardless of terminology, HL is recognized by the World Health Organization (WHO) as a social determinant of health and has been widely promoted as a valuable tool for supporting health promotion strategies and patient-centered educational interventions.<sup>(8-10)</sup> Concept analyses play a crucial role in refining and clarifying ambiguous concepts with multiple applications or limited definitions in the literature.<sup>(11)</sup> While prior studies<sup>(12-16)</sup> have analyzed the concept of HL and its relationship with DM,<sup>(17-19)</sup> no research to date has focused explicitly on HL among people living with DM, particularly from Rodgers' evolutionary perspective.

Health literacy has been widely applied in studies involving individuals with chronic conditions such as diabetes mellitus, cardiovascular diseases, and hypertension, especially in the contexts of self-care, disease management, and treatment adherence.<sup>(1)</sup> Research indicates that the most frequently studied populations include older adults, individuals with lower educational levels, and those with low socioeconomic status—groups generally more vulnerable to the consequences of limited health literacy.<sup>(2,3)</sup> Adequate health literacy is associated with several facilitating factors, such as access to health services, higher education, social support, and effective communication with healthcare professionals. These factors contribute to improved self-care, treatment adherence, and health Outcomes.<sup>(4)</sup>

Despite the growing number of studies, there remains a lack of conceptual clarity and consistency in the definitions, attributes, and frameworks used to describe health literacy in people with diabetes. This fragmentation underscores a gap in the literature that justifies the need for a rigorous concept analysis.<sup>(1,4)</sup>

Additionally, as this is a scoping review, no quality assessment of the included studies was performed, in accordance with methodological recommendations prioritizing evidence mapping over critical appraisal.<sup>(5,6)</sup>

The rationale for employing Rodgers' evolutionary method lies in its ability to facilitate a comprehensive understanding of a concept.<sup>(20)</sup> Rodgers' method was chosen for this research because it focuses on how HL concepts evolve over time and across different settings, making it particularly suitable for examining the dynamic and multidimensional nature of health literacy in diabetes. Clarifying the concept of HL in this context is essential for a deeper understanding of the phenomenon, as well as for exploring its evolution across historical, political, and cultural dimensions. Given the influence of HL on health outcomes, a contemporary global understanding of this concept can provide theoretical foundations for its application in clinical practice. Such an analysis also differentiates HL in DM from other HL frameworks, allowing for the development of personalized interventions.

In line with the first and second steps of Rodgers' evolutionary concept analysis, this study identifies health literacy in people living with diabetes mellitus as the central concept. The analysis is situated within the context of chronic disease management, with a specific focus on primary health care and patient education. This domain was selected due to the growing relevance of HL as a determinant of self-care capacity and treatment outcomes in chronic conditions such as DM. For nursing, this study provides guidance for professional practice aimed at health promotion, DM prevention, and the effective management of educational interventions through strengthened HL. This study aimed to analyze the evolution of the concept of HL among people living with DM using Rodgers' evolutionary approach.

The concept analysis guided by Rodgers' evolutionary approach views concepts as continuous cycles that evolve over time.<sup>(20)</sup> According to this model, six complementary and interdependent stages were followed: (1) identify the concept of interest; (2) select an appropriate domain for material selection; (3) analyze the extracted data to determine the attributes and contextual basis of the concept; (4) explore the data, distinguishing the characteristics of the concept, its antecedents, and consequences; (5) characterize substitute terms, related concepts, and a model case of the concept; and (6) formulate hypotheses and implications for the concept's future development through discussion.

To investigate the concept of interest, a scoping review was conducted in accordance with the methodological recommendations of the JBI<sup>(21)</sup> and reported following the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews) checklist.<sup>(24)</sup> Notably, a preliminary search on the Open Science Framework, Database of Abstracts of Reviews of Effects (DARE), and The Cochrane Library did not identify any scoping reviews on a similar topic. Consequently, the research protocol was registered on OSF.

The mnemonic PCC was employed to guide the scoping review: P (Population) – people living with diabetes; C (Concept) – health literacy; and C (Context) – not restricted to a specific context to allow for a comprehensive analysis of the concept across various scenarios. Based on this framework, the guiding research question was formulated: “How has the concept of health literacy evolved in people with Diabetes Mellitus according to Rodgers' evolutionary approach?”.

Regarding eligibility criteria. Included were: (1) studies addressing the concept of health literacy in the context of people living with diabetes mellitus; (2) full-text availability in Portuguese, English, or Spanish; (3) publication between 1970 and 2024; and (4) any study design, including quantitative, qualitative, mixed-methods, and review articles, as well as theses, dissertations, and official guidelines. The exclusion criteria were: (1) studies that did not explicitly address the concept of health literacy in relation to diabetes mellitus; (2) duplicate records; and (3) letters to the editor, abstracts without full text, and opinion pieces without methodological clarity.

Although the inclusion of studies in all languages is ideal to ensure maximum comprehensiveness, this review included only studies published in Portuguese, English, and Spanish. This decision was based on the language proficiency of the research team, which ensured accurate screening and interpretation of the selected materials. In line with JBI guidance, restricting the search to languages in which the reviewers are fluent is an accepted practice in scoping reviews, as it helps maintain methodological rigor and reliability of the analysis.<sup>(21)</sup> Additionally, these three languages cover the majority of scientific output on the topic in the databases searched. The search focused on publications about health literacy from 1970

to 2024, reflecting the first documented use of the term.<sup>(22)</sup>

The databases used for the search were: Scopus, Web of Science (WOS), MEDLINE (via PubMed), Scientific Electronic Library Online (SciELO), Latin American and Caribbean Health Sciences Literature (LILACS), and BDNF, accessed through the Virtual Health Library (VHL) and the CAPES Periodicals Portal via Federated Academic Community (CAFe Access). For gray literature, repositories such as the Scientific Open Access Repositories of Portugal (RCAAP), the CAPES Periodicals Portal, the Brazilian Digital Library of Theses and Dissertations (BDTD), and Google Scholar were utilized, capturing the first 200 results.<sup>(23)</sup> The search strategy was developed based on a preliminary exploration of the topic in two databases: MEDLINE (via PubMed) and LILACS. To ensure comprehensive searches, both controlled and uncontrolled descriptors were used following the PCC strategy. Controlled descriptors were extracted from the Health Sciences Descriptors/Medical Subject Headings (DeCS/MeSH), while uncontrolled descriptors included synonyms. These terms were combined using the Boolean operators OR and AND. Table 1 provides an overview of the initial search strategy, identified keywords, and the final search strategy implemented for each database. The search was carried out during the months of July to October 2024.

**Table 1. Terms and search strategies used in the study.**

MNEMONIC	DECS/MESH
<b>P</b> - People with Diabetes	Diabetes Mellitus; Diabete; Diabete Melito; Diabetes; Diabetes Melito
<b>C</b> - Health Literacy <b>C</b> - Health	Letramento em Saúde; Cultura em Saúde; Cultura sobre Saúde; Health Literacy; Alfabetización en Salud
<b>LANGUAGE/DATABASE</b>	
<b>INITIAL SEARCH STRATEGY</b>	
<b>Portuguese (LILACS)</b>	“Letramento em Saúde” OR “Cultura em Saúde” OR “Cultura sobre Saúde” AND “Diabetes Mellitus” OR Diabete OR “Diabete Melito” OR Diabetes OR “Diabetes Melito”
<b>English (PubMed/LILACS)</b>	“Health Literacy” AND “Diabetes Mellitus”
<b>Spanish (LILACS)</b>	“Alfabetización en Salud” AND “Diabetes Mellitus”
<b>IDENTIFIED TERMS FROM INITIAL SEARCH</b>	
-	Literacia em Saúde; Alfabetização em Saúde
<b>DATABASE / LANGUAGE</b>	
<b>FINAL SEARCH STRATEGY</b>	
<b>PUBMED</b> (English)	“Health Literacy” AND “Diabetes Mellitus”
<b>SCIELO</b> (Portuguese, English, Spanish)	“Letramento em Saúde” OR “Cultura em Saúde” OR “Cultura sobre Saúde” OR “Literacia em Saúde” OR “Alfabetização em Saúde” AND (“Diabetes Mellitus”) OR (Diabete) OR (“Diabete Melito”) OR (Diabetes) OR (“Diabetes Melito”)
	“Health Literacy” AND “Diabetes Mellitus”
	“Alfabetización en Salud” AND “Diabetes Mellitus”
<b>WOS</b>	“Health Literacy” (All Fields) and “Diabetes Mellitus” (All Fields)
<b>SCOPUS</b>	“Health Literacy AND “Diabetes Mellitus”
<b>BDEF</b> (via bvs) (Portuguese, English, Spanish)	“Health Literacy” AND “Diabetes Mellitus”
	“Alfabetización en Salud” AND “Diabetes Mellitus”
	“Letramento em Saúde” OR “Cultura em Saúde” OR “Cultura sobre Saúde” OR “Literacia em Saúde” OR “Alfabetização em Saúde” AND (“Diabetes Mellitus”) OR (Diabete) OR (“Diabete Melito”) OR (Diabetes) OR (“Diabetes Melito”)
<b>LILACS</b> (via bvs) (Portuguese, English, Spanish)	“Health Literacy” AND “Diabetes Mellitus”
	“Alfabetización en Salud” AND “Diabetes Mellitus”
	“Letramento em Saúde” OR “Cultura em Saúde” OR “Cultura sobre Saúde” OR “Literacia em Saúde” OR “Alfabetização em Saúde” AND (“Diabetes Mellitus”) OR (Diabete) OR (“Diabete Melito”) OR (Diabetes) OR (“Diabetes Melito”)
<b>CAPEJournals</b>	“Letramento em Saúde” OR “Literacia em Saúde” OR “Alfabetização em Saúde” AND “Diabetes Mellitus”
<b>BDTD</b>	“Letramento em Saúde AND “Diabetes Mellitus”
<b>GOOGLE SCHOLAR</b>	“Letramento em Saúde” OR “Literacia em Saúde” OR “Alfabetização em Saúde” AND “Diabetes Mellitus”
<b>RCAAP</b>	“Letramento em Saúde” AND “Diabetes Mellitus”

For the data analysis,<sup>(21)</sup> references were imported into the Rayyan software, where they were analyzed in duplicate and independently. A third reviewer was consulted to resolve any conflicts. The study selection process was carried out in three stages. The first stage involved reading titles and abstracts, the second stage comprised a full-text review of eligible content for concept analysis, and the third stage involved retrieving the selected materials for subsequent data extraction. The entire process was illustrated using a flowchart following the PRISMA-ScR recommendations (Figure 1). It is important to note that no critical appraisal of the included studies was performed, as this step is not mandatory in scoping reviews. This approach is consistent with the methodological guidance provided by the JBI, which emphasizes mapping the evidence rather than assessing study quality.<sup>(21)</sup>

Data extraction was conducted using an instrument divided into two parts. Part 1 focused on characterizing the selected studies, including the study title, authors, type of material (article, dissertation, thesis, or other document), year of publication, study design (type of research), and setting and location of the study. Part 2 addressed specific questions for the concept analysis, namely: “What are the antecedents?”, “What are the consequences?”, “What attributes/concepts were identified?”, “What substitute terms were identified?”, and “What related concepts were identified?” The results were presented using tables and figures, and the data were analyzed descriptively, following Rodgers’ framework,<sup>(20)</sup> to meet the research objectives.

In addition to the conceptual categorization aligned with Rodgers’ model, a descriptive quantitative

analysis was conducted to present the frequency and percentage of the attributes, antecedents, and consequences identified in the included studies. This allowed for the identification of the most recurrent elements of the concept. To illustrate the temporal evolution of the concept, a timeline was developed using extracted data about how the concept of HL in DM was addressed in each period. This tool helped synthesize conceptual changes and emerging dimensions between 1997 and 2024.

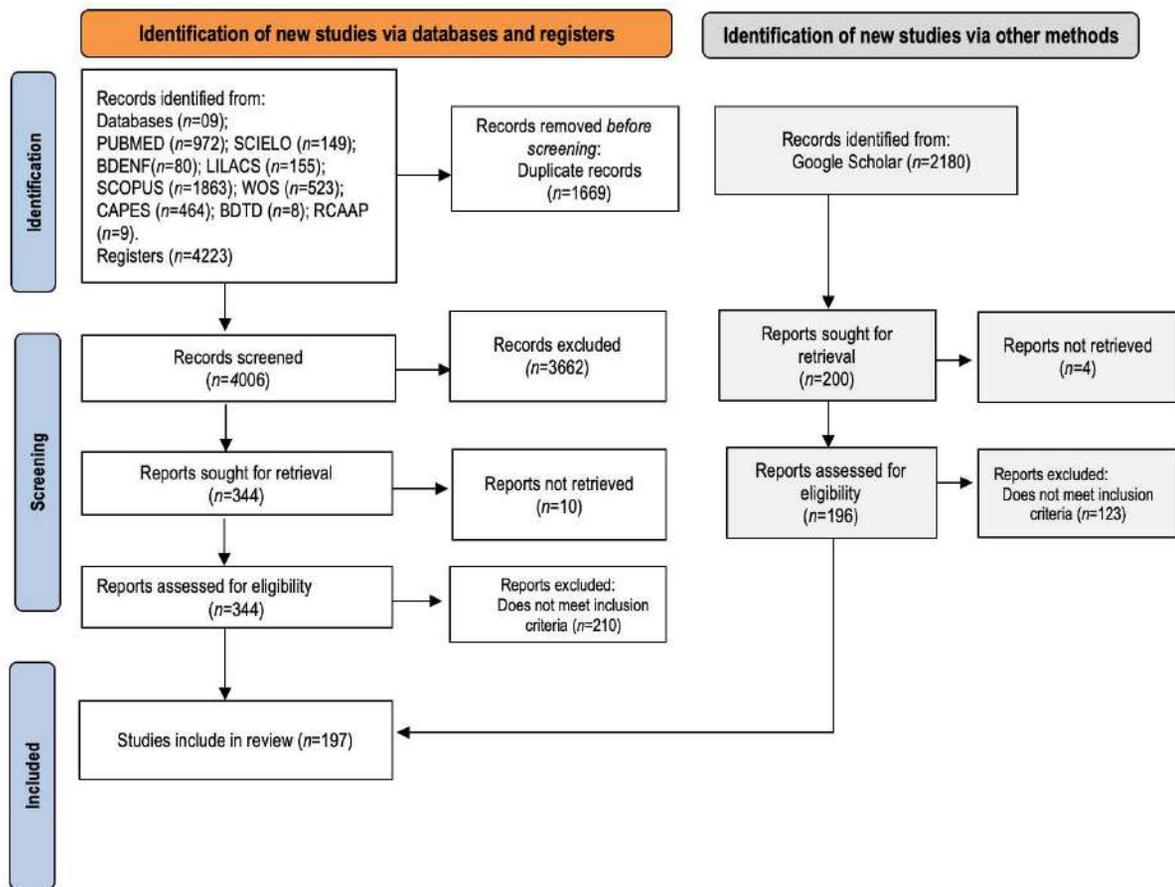
No critical appraisal of the included studies was performed, as this step is not required in scoping reviews. This decision aligns with the JBI methodological guidance, which emphasizes mapping existing evidence rather than evaluating study quality.<sup>(21)</sup>

## Results

This section will present the characteristics of the selected studies and the findings derived from Rodgers’ evolutionary method. Stages 1 and 2 have already been detailed in the introduction, objectives, and methods sections. Stage 6 will be addressed in the discussion.

### Sample characterization

The process of identifying materials from databases and gray literature, applying eligibility criteria, and obtaining the sample of studies included in this analysis can be visualized in the PRISMA-ScR flowchart,<sup>(24)</sup> presented in Figure 1.



**Figure 1. PRISMA Flowchart with the screening process for obtaining the sample**

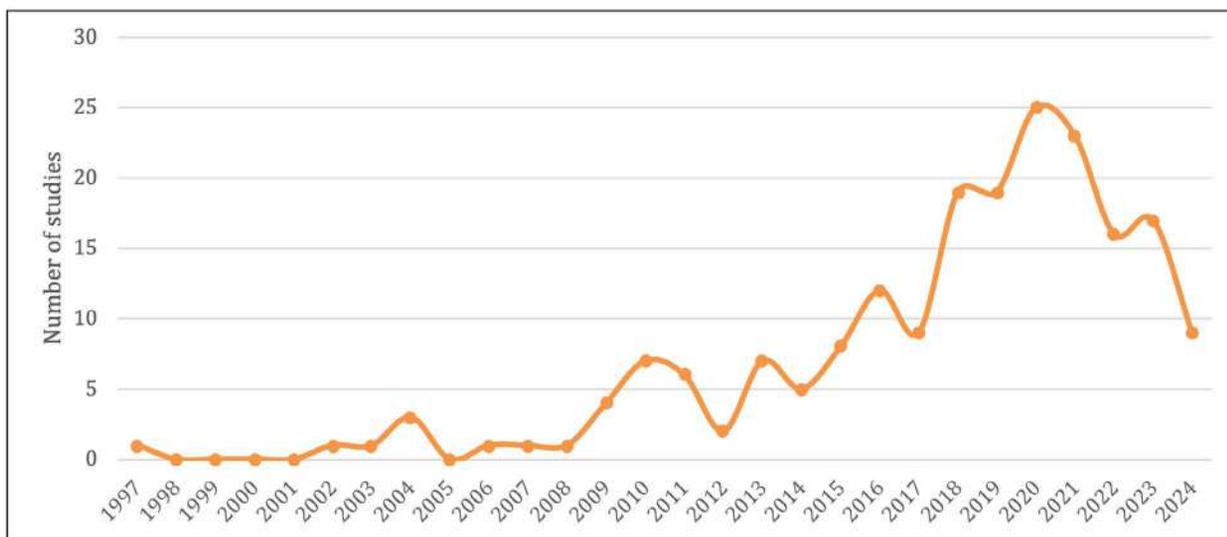
A total of 197 materials were included, of which 179 (90.86%) were articles, 11 (5.58%) were dissertations, four (2.03%) were conference proceedings, one (0.5%) was a thesis, one (0.5%) was a monograph, and one (0.5%) was a Ministry of Health guideline. Although 197 studies were included in the final sample, only 60 references are listed at the end of the article. This is because the analysis was carried out using a database developed by the research team, which compiled data extracted from all included studies. This approach allowed the authors to systematize the findings and present the synthesized results in tables and the discussion section. The references cited in the article correspond only to those directly used to support the theoretical

framework, discussion, and other central parts of the manuscript. Therefore, not all included studies are cited individually, although all contributed to the analyzed dataset.

Regarding the methods used, 153 (77.66%) were cross-sectional studies, mostly descriptive and some analytical; 28 (14.21%) were literature reviews, including integrative, scoping, systematic, and narrative reviews; six (3.05%) were longitudinal studies, referring to the temporal design but primarily using observational or cohort methods; two (1.02%) were experimental studies, including one randomized clinical trial and one quasi-experimental study; one (0.5%) was a quantitative-qualitative study, one (0.5%)

was a mixed methods study, one (0.5%) was an editorial, one (0.5%) was an opinion article, and one (0.5%) was a Ministry of Health guideline. The locations where the studies were conducted in Asia (36%) North América (26.2%), Europe (18%), South America (15.7%), Africa (2.3%) and Oceania (1.5%), being the three countries with the highest production: United States of America (21.32%), Brazil (12.69%) y Iran (7.11%).

Regarding the years of publication, the first record of the concept of health literacy in people living with DM was observed in 1997 ( $n=01$ ; 0.5%), and the highest number of materials found dates from the year 2020 ( $n=25$ ; 12.7%). The distribution of the remaining study quantities by year of publication can be seen in Figure 2.



**Figure 2. Distribution of the number of studies by year of publication**

Regarding health environments, the locations where people were attended to were standardized by levels of health care, in studies where this information was available. It was observed that there was a greater interest in using the concept of HL in people living with DM in the context of secondary care, described in 60 (30.46%) of the identified studies. Next was primary care, with 22 (11.17%) studies, and finally, 23 (11.7%) works in the context of tertiary care.

### Attributes of the concept

From the collected data, seven attributes that form the concept of Health Literacy in people living with DM were identified. Among these, the most prevalent were “the ability to understand information about DM” ( $n=122$ ; 61.9%) and “the ability to use knowledge to make appropriate health and DM-related decisions” ( $n=100$ ; 50.7%). The other attributes can be seen in Table 2.

**Table 2. Attributes of the health literacy concept related to people living with diabetes mellitus. (n=197)**

Attributes	N	%
Ability to understand information about DM	122	61.9
Ability to use knowledge in making appropriate decisions about health and DM	100	50.7
Ability to seek information about DM from different sources (print and/or electronic)	62	31.5
Functional, cognitive, mental, and social competence in people living with DM	48	24.4
Communicative competence in people living with DM, including reading, writing, seeing, speaking, and hearing	39	19.8
Ability to critically evaluate information about health and DM	18	9.1
Having cultural knowledge in people living with DM	02	1.0

### Antecedents and consequents

After the data standardization process, it became possible to observe 28 antecedents for the concept under study and 29 consequents. The most prevalent antecedents were “higher education level” (32.9%), “younger age group” (26.4%),

and “continuous educational interventions on DM” (17.26%). As for the most observed consequents, the following were noted: “better self-care related to DM” (56.85%), “adherence to treatments” (43.65%), and “better glycemic control” (32.9%). Others can be observed in Table 3.

**Table 3. Antecedents and consequents of the health literacy concept related to people living with diabetes mellitus (n=197)**

Antecedents	%
Higher education level	32.9
Younger age group	26.4
Continuous educational interventions	17.26
Better socioeconomic and demographic conditions	15.23
Belonging to ethnic groups	8.63
Being female	7.61
Social/family support	7.11
Effective communication with professionals and people with DM	6.09
Having a job/employment	4.57
Good mental health	4.06
Fewer years since diagnosis	3.55
Access to Information and Communication Technologies	3.05
Good cognitive function	3.05
Self-efficacy	3.05
Knowledge about DM	2.54
Fluency in the language of the country of residence	2.54

**Table 3. Antecedents and consequents of the health literacy concept related to people living with diabetes mellitus (n=197) (Cont.)**

<b>Antecedents</b>	<b>%</b>
Being married	2.54
Access to an environment sensitive to HL needs	2.03
Understanding the importance of self-management of DM	1.02
Qualified health professionals	1.02
Empowerment	1.02
Educational materials with clarity and organization, using short sentences and alternative titles divide the text	0.5
Fatigue	0.5
Access to healthcare	0.5
Perceived understanding to cope with the disease	0.5
Positive health beliefs	0.5
Having health insurance	0.5
Knowledge of HL competencies	0.5
<b>Consequents</b>	<b>%</b>
Better self-care related to DM	56.85
Adherence to treatments	43.65
Better glycemic control	32.9
Utilization of healthcare services	23.86
Reduced DM complications	17.77
Critical understanding of disease, treatment, and complication prevention information through printed, virtual, and/or oral materials	17.26
Adequate knowledge about DM	14.21
Better health outcomes related to DM	10.15
Better self-efficacy	9.64
Effective communication and interaction with healthcare professionals	9.64
Higher quality of life	9.14
Critical, adapted, and specific education for self-care about DM	6.6
Reduced healthcare costs	4.57
Improved health behaviors	4.57
Reduced hospitalization	3.55
Better self-perception of health status	3.05
Increased empowerment	2.03
Greater motivation to make health decisions	2.03
Applying mathematical skills related to DM needs	2.03
Improved memory	1.52
Health equity	1.02
Effective self-assessment	1.02

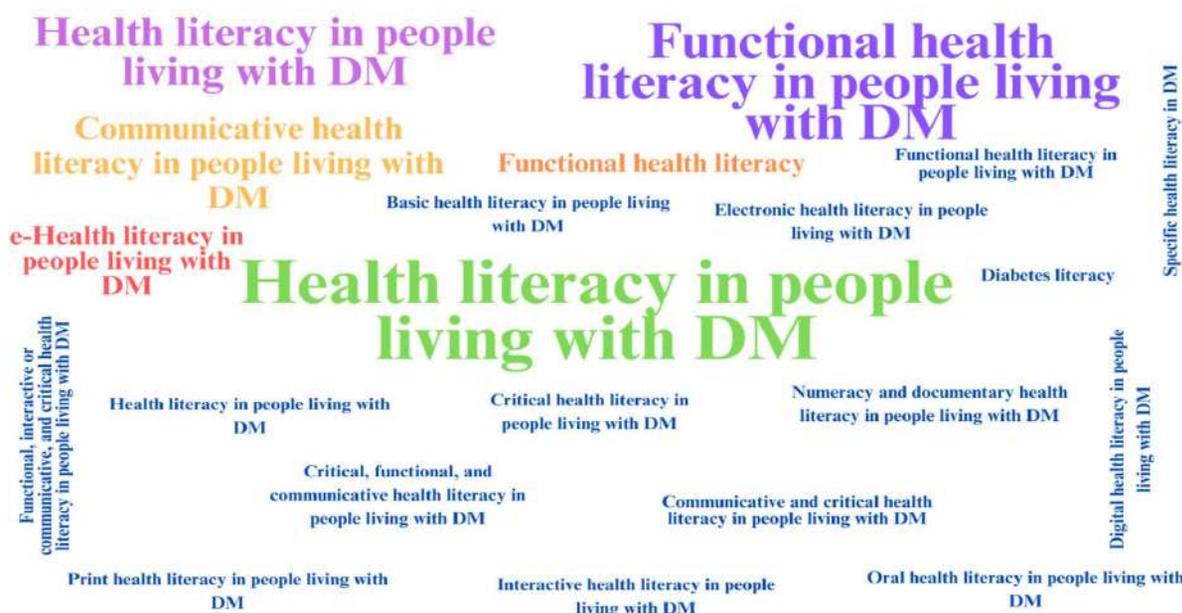
**Table 3. Antecedents and consequents of the health literacy concept related to people living with diabetes mellitus (n=197) (Cont.)**

Consequents	%
Reduced risk factors for complications	1.02
Care planning centered on the needs of people living with DM	1.02
Planned health behavior	1.02
DM rehabilitation therapy	0.5
Reduced mortality	0,5
Increased trust in professionals	0.5
Acceptance of the disease	0.5

**Substitute terms, related concepts, and model case of the concept**

Among the terms observed in the materials, the most prevalent was “Health Literacy” (n=64; 32.5%), followed by “Functional Health Literacy” (n=26; 13.20%), “Health Education” (n=12; 6.09%), and

“Communicative Health Literacy” (n=3; 1.5%). These terms, along with the others presented in Figure 3, emerge for people living with DM as synonyms of the central term “Health Literacy,” as their attributes interconnect and complement each other. This reflects the way the concept has evolved over time, despite its specificities.



**Figure 3. Substitute terms for the concept of health literacy related to people living with diabetes mellitus as identified in the literature (n=197)**

## Related concepts

Clearly, the materials present four concepts related to HL in people living with DM, These are:(i) *Health numeracy (10.66%)*: A component of health literacy, essential for acting on health care based on numerical instructions. It involves the ability to understand and use numbers in everyday situations such as calculating medication dosage intervals, interpreting medication and food labels, determining insulin proportions, deciphering graphs, and weighing the risks of actions in health decision-making; (ii) *Self-efficacy (2.03%)*: The people ability to trust and be motivated to make decisions about their health-related behaviors; (iii) *Self-care (0.5%)* : Problem-solving skills and disease management abilities, playing a crucial role in the successful management of diabetes; and (iv) *Empowerment (0.5%)*: A feeling of power, control, and self-esteem, which fosters the interest and desire to participate in decisions about one's own health.

## Model case of the concept

As proposed by Rodgers,<sup>(20)</sup> a fictitious model case was created to illustrate the application of this concept in a possible practical reality: *Maria, a 55-year-old woman with low education, has been living with type 2 diabetes for a decade. She attends a group at the primary health care unit focused on health education about diabetes and hypertension. With the support of the nurse at this service, Maria acquired the essential HL skills related to her health condition. These include accessing, interpreting, and applying information obtained through printed and digital materials such as apps, games, and videos. As a result, this brought improvements to her chronic condition, helping her gain autonomy for self-care. Now, Maria can monitor her blood glucose levels, understands the importance of a balanced diet, physical activity, and adherence to prescribed medications as ways to maintain her health and prevent complications. Over time, she became an informal educator in the community, sharing her knowledge and encouraging family*

*members and other participants in the primary care group to adopt healthy habits for improved quality of life and well-being.*

## Evolution of the health literacy concept in people living with diabetes based on Rodgers' approach

To illustrate how the concept of HL in people living with DM has evolved, a timeline was created. Firstly, it shows how the concept was addressed in the first three years of recorded data, as well as the emergence of the main related concept, numeracy. Next, the concepts are presented after the first and second decades since their emergence, along with the incorporation of digital/electronic media into this context. Given the larger number of publications in 2020 the need for data standardization was recognized to observe how the concept was addressed in that year. At the end of the timeline, a final synthesis is presented, reflecting the attributes acquired over time, up to the year 2024:

**1997 - First appearance of the concept.** Reading and understanding health materials related to DM.

**2002 – Second appearance of the concept.** Reading and understanding, and acting according to medical instructions.

**2003 – Third appearance of the concept and emergence of numeracy as a related concept.** Remembering, reading, understanding, and adhering to information about DM. *Numeracy: Acting in health care based on numerical instructions. The ability to understand and use numbers in everyday situations related to DM and assess the risks of actions when making health decisions.*

**2007 – Ten years after the first appearance of the concept.** The ability to obtain, process, and understand basic health information and make appropriate health decisions.

### **2017- Standardized concept after twenty years and emergence of electronic/digital competencies.**

The ability of individuals to obtain, read, understand, and evaluate information from various sources such as printed materials and/or the internet about diabetes to apply to their self-care.

### **2020 – Concept in the year with the most publications.**

The cognitive and social degree or capacity that determines the motivation individuals have to obtain, process, understand, communicate, evaluate, and apply health-related information to make assertive decisions about DM, reflecting on their self-care and the pursuit of prevention and treatment services.

### **2024 – Synthesis of the evolution of the concept until the current year.**

This is a determinant of health status and behaviors that goes beyond the competencies of common literacy. It is a set of communicative, functional, cognitive, and social skills in people living with diabetes. These skills include numeracy, reading, writing, speaking, and listening, as necessary tools to motivate access to, understanding of, critical evaluation, and utilization of information about the chronic condition. This is achieved through interpersonal contact, printed or electronic media in different contexts, with the purpose of improving self-care, resilience, individual and collective well-being, and disease management.

## Discussion

This study aimed to analyze the evolution of the concept of health literacy in people with diabetes using Rodgers' evolutionary approach.<sup>(20)</sup> The main findings identified seven core attributes, key antecedents such as higher education and younger age, and consequences like improved self-care, treatment adherence, and glycemic control. The analysis showed that the concept has evolved over time, expanding from basic literacy to a multidimensional construct that includes digital,

communicative, cognitive, and social competencies essential for managing diabetes effectively.

The identification of better glycemic control, improved self-care, and greater treatment adherence as key consequences of HL highlights its critical role in DM management. These outcomes are essential not only for preventing acute and chronic complications—such as cardiovascular events, kidney failure, and diabetic foot—but also for reducing hospital admissions and healthcare costs. Moreover, individuals with adequate HL are more likely to engage in proactive health behaviors, follow clinical recommendations, and maintain a higher quality of life. Therefore, strengthening HL can significantly contribute to more sustainable and effective chronic disease care.

This includes information processing, decision-making, and the use of digital and numerical skills to practice self-care effectively. The relevance of applying this concept to clinical practice is evident through its own attributes. According to the attributes identified in this study, people who are capable of accessing, understanding, and evaluating information about DM, regardless of the form of access, to make informed decisions about their chronic condition assertively, can become autonomous in managing their self-care. In parallel, when this self-management is not feasible, people will have the communicative skills to address health issues and seek solutions.

Nevertheless, it is essential to consider that not all individuals have the capacity to access, understand, or evaluate health information autonomously.<sup>(38)</sup> For these individuals, health literacy can still be developed through alternative pathways, such as relying on the support of healthcare professionals, family members, or community networks.<sup>(42)</sup> In such contexts, HL becomes a shared or supported process, emphasizing the importance of relational and communicative aspects. This perspective reinforces the need for inclusive educational strategies that accommodate diverse literacy levels and promote equitable participation in self-care and decision-making.<sup>(34,39,40,48)</sup>

The identified antecedents highlight factors that can influence the acquisition of HL competencies in people living with DM. Among the most prevalent, it was observed that people with higher levels of education and younger populations tend to more easily incorporate new health information into their routines, including the use of digital technologies. In contrast, it is believed that these findings indicate that educational interventions focused on HL should prioritize groups with lower education levels and older populations. These people likely face greater barriers to accessing educational and technological resources.<sup>(38-40)</sup> The identified consequences are directly linked to the antecedents of the concept. This inference can be observed as the exposure to educational programs dedicated to HL in DM leads to better disease management and a reduction in complications within this population. The findings further emphasize the need for clear, organized educational materials with short sentences, titles, and subtitles to divide the text, ensuring the efficiency of these programs.

The data revealed that people living with DM who have a higher HL index are, primarily, better able to understand self-care, which facilitates adherence to treatment recommendations and ultimately leads to improved glycemic control.<sup>(34,41)</sup> Another notable finding is the fact that this concept has been more explored in secondary care settings. This may indicate that patients receiving more specialized care are more exposed to educational interventions focused on HL for self-care in DM. Although the concept is relevant at all levels of care, it is important to emphasize the pivotal role of primary health care (PHC), which focuses on health promotion and disease prevention.<sup>(42,43)</sup> Due to its proximity to the community, PHC has the potential to offer more effective tailored education for self-care, empowering people to better manage their health and prevent complications.<sup>(44)</sup> For people living with DM, nurses in PHC play a key leadership role in managing the care provided.<sup>(45)</sup> As health educators, they have the opportunity to promote HL in relation to DM by using

intervention strategies that can take place through nursing consultations, group activities, home visits, and telephone follow-ups, for example.<sup>(46)</sup> In doing so, they provide users with the tools necessary for effective disease management, treatment adherence, symptom recognition, and understanding clinical parameters.<sup>(9,47)</sup>

Regarding substitute terms, it is important to highlight that, although they may be seen as synonyms, they may have distinct focuses depending on cultural contexts, environments, the time period in which they were used, and/or the intended theoretical focus. For example, health literacy in people living with DM may refer to a broader set of skills for accessing, understanding, evaluating, and applying health information,<sup>(48)</sup> while digital health literacy for the same population may be related to this skill set, but with an emphasis on virtual environments as the means of accessing information.<sup>(49)</sup>

As for the related concepts, self-efficacy and empowerment are fundamental factors that can support the application of HL skills in the daily lives of people living with DM. This is justified by the fact that, in addition to adequate HL, people with DM can gain the motivation needed to implement changes in their health behaviors when these factors are present.<sup>(50-51)</sup> Similarly, health numeracy skills play an especially important role in supporting better control of the chronic condition.<sup>(52)</sup> In the context of DM, numeracy functions as a component of HL and can influence peoples' ability to perform daily tasks, including insulin adjustments, proper glucose monitoring, and carbohydrate counting.<sup>(53)</sup> Additionally, it helps them understand food labels, medications, and reduce hyperglycemic effects.<sup>(54)</sup>

The analysis revealed that the evolution of the HL concept for people with DM reflects an expansion of skills, beginning in 1997 with the simple reading and understanding of health materials, and progressing to a broader set of integrated competencies by 2024. The predominance of

studies in 2020 may be associated with an increased awareness of HL in the context of self-care, largely due to the COVID-19 pandemic.<sup>(25,26)</sup> This period brought new health concerns, amplified by the spread of misinformation, which highlighted the importance of HL, particularly for people with chronic conditions, such as DM.<sup>(27)</sup>

The concentration of studies in developed countries, which generally have greater access to healthcare and education,<sup>(28,29)</sup> underscores the need to strengthen the assessment and research of health literacy in developing contexts. While education, information, and communication strategies may be implemented in many countries to improve self-care capacities among people with diabetes mellitus, the importance of measuring and studying these efforts has not been equally recognized or prioritized in all settings.<sup>(30,31)</sup> In this regard, health education activities tailored to people living with DM remain crucial for achieving favorable health outcomes.<sup>(32,33)</sup>

A systematic review, which examined studies conducted over 24 years, concluded that people with DM who have good levels of health literacy (HL), or who participate in educational activities focused on developing HL for self-care, are able to maintain better blood glucose control and adopt more appropriate behaviors regarding their health condition.<sup>(34)</sup> This reinforces the importance of health education, particularly with the nurse playing a participatory role in this process to promote a healthier and more balanced life for patients.<sup>(35,36)</sup> For both theoretical understanding and practical application, it is important to recognize that this concept extends beyond traditional literacy. A scoping review that evaluated domains, levels, and contexts of HL from the perspective of the general population, much like this analysis, showed that HL is a complex and multidimensional concept, and it is essential to consider the nuances of each specific context.<sup>(37)</sup>

It is recommended that the psychosocial involvement (self-efficacy and empowerment) of

people living with DM be assessed prior to the promotion of effective educational activities.<sup>(55,56)</sup> This, combined with the use of materials tailored to people with inadequate HL, positively impacts glycemic control, medication adherence, effective DM self-care, and an improved quality of life.<sup>(57-60)</sup>

The findings contribute to the understanding of HL in the management of DM; however, certain limitations should be addressed in future studies. To nursing knowledge and practice by clarifying the attributes, antecedents, and consequences of HL in people living with DM. This understanding supports the development of more effective educational strategies and tailored interventions that nurses can implement in clinical settings, particularly in PHC. By promoting HL, nurses empower individuals to manage DM more autonomously, enhance treatment adherence, and reduce complications, ultimately improving care quality and health outcomes. The predominance of cross-sectional studies limits the understanding of causal relationships and the evolution of the concept. Longitudinal, experimental, and qualitative studies are recommended to assess changes, test interventions, and deepen patients' perceptions. The language restriction may have excluded relevant materials from regions such as Asia and Africa, where DM is prevalent, and approaches to HL may vary, although data collected from all continents provides a global perspective.

**Conclusion.** This analysis shows that HL is vital for self-care and proper DM management. People with adequate HL have better glycemic control and adopt more effective management behaviors. The concept now includes digital skills for finding and evaluating information. Clarifying HL can guide health education tailored to people's HL levels, especially for those with limited access to health information. Integrating HL into health policies is key for self-care, preventing complications, and improving the quality of life for people with DM. Future research should include more languages, focus on primary health care for early interventions, and use interdisciplinary approaches with technology, psychology, education, and social support for culturally adapted and effective strategies.

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# Effectiveness of Acceptance and Commitment Therapy (ACT) in Mitigating Academic Procrastination and its Moderating Factors among nursing students

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## Effectiveness of Acceptance and Commitment Therapy (ACT) in Mitigating Academic Procrastination and its Moderating Factors among nursing students

### Abstract

**Objective.** To assess the effect of Acceptance and Commitment Therapy (ACT) on academic procrastination and its moderating factors among nursing students.

**Methods.** True experimental pre-test and post-test research design was adopted. The setting comprised of private nursing colleges of Punjab, India. A screening was done among 209 nursing students, 43 (20.57%) were procrastinators, which were assigned randomly to the intervention ( $n=19$ ) and control ( $n=24$ ) groups. The intervention was administered during six weeks, consisting of weekly one-hour modules that focused on the core components of ACT (Present Moment Contact, Defusion, Acceptance, Self as Context, Values, and: Commitment to Action). The effect of the intervention was measured after 6<sup>th</sup> week through the scales: (i) Procrastination assessment Scale, (ii) Acceptance and action questionnaire-II (AAQ-II) and (iii) Student time management scale (STMS). A session of ACT was scheduled for the control group following the post-test. Study has been registered under Clinical Trial Registry of India (REF/2022/12/061719). Data was analysed using descriptive and inferential statistics. **Results.** Post intervention assessment after 6 weeks revealed reduction in academic procrastination among the nursing students (mean difference -8.61, Standard error 0.35,  $p$ -value=0.01). Intervention also led to improvement in time management skills (mean difference 9.98, Standard error 0.32,  $p$ -value=0.001). Additionally, intervention results in improving psychological flexibility among the nursing students (mean difference -4.72, Standard error 0.49,  $p$ -value=0.02). **Conclusion.** The study found ACT can reduce academic procrastination, and in the clinical setting, can and improve the time management, psychological flexibility among nursing students.

**Descriptors:** procrastination; Acceptance and Commitment Therapy; self-concept; students, nursing.

## Eficacia de la Terapia de Aceptación y Compromiso (ACT) en la Mitigación de la Procrastinación Académica y sus Factores Moderadores entre estudiantes de enfermería

### Resumen

**Objetivo.** Evaluar el efecto de la Terapia de Aceptación y Compromiso (TAC) sobre la procrastinación académica y sus factores moderadores entre estudiantes de enfermería. **Métodos.** Se realizó una investigación experimental de pre-prueba y pos-prueba. El escenario fueron las escuelas de enfermería privadas de Punjab, India. Se realizó un cribado entre 209 estudiantes de enfermería, 43 (20.57%) eran procrastinadores, que fueron asignados aleatoriamente a los grupos de intervención ( $n=19$ ) y control ( $n=24$ ). La intervención se administró durante seis semanas, consistiendo en módulos semanales de una hora que se centraban en los componentes básicos de CAT (Contacto con el momento presente, Defusión, Aceptación, El yo

como contexto, Valores y: Compromiso para la acción). El efecto de la intervención se midió después de la 6ª semana a través de tres escalas diferentes. Se programó una sesión de ACT para el grupo de control tras la prueba posterior. El estudio se ha registrado en el Clinical Trail Registry de la India (REF/2022/12/061719). Los datos se analizaron mediante estadística descriptiva e inferencial. **Resultados.** La evaluación posterior a la intervención después de 6 semanas reveló una reducción de la procrastinación académica entre los estudiantes de enfermería (diferencia media -8,61, error estándar 0,35, valor  $p=0,01$ ). La intervención también mejoró las habilidades de gestión del tiempo (diferencia media: 9,98; error estándar: 0,32; valor de  $p$ : 0,001). Además, la intervención mejoró la flexibilidad psicológica de los estudiantes de enfermería (diferencia media: -4,72; error estándar: 0,49;  $p$ -valor = 0.01). **Conclusión.** El estudio mostró que el ACT puede reducir la procrastinación académica y, en el entorno clínico, puede mejorar el rendimiento y el bienestar de los estudiantes en los estudiantes de enfermería.

**Descriptor:** procrastinación; terapia de aceptación y compromiso; autoimagen; estudiantes de enfermería.

## Eficácia da Terapia de Aceitação e Compromisso (ACT) na Atenuação da Procrastinação Acadêmica e seus Fatores Moderadores

### Resumo

**Objetivo.** Avaliar o efeito da Terapia de Aceitação e Compromisso (ACT) na procrastinação acadêmica e seus fatores moderadores entre estudantes de enfermagem. **Métodos.** Um estudo experimental pré-teste / pós-teste foi conduzido. O cenário foram faculdades de enfermagem privadas em Punjab, Índia. Um total de 209 estudantes de enfermagem foram selecionados; 43 (20.57%) eram procrastinadores e foram aleatoriamente designados para os grupos de intervenção ( $n= 19$ ) e controle ( $n= 24$ ). A intervenção foi administrada por seis semanas, consistindo em módulos semanais de uma hora com foco nos componentes principais da ACT (Contato com o Momento Presente, Desfusão Cognitiva, Aceitação, Self como Contexto, Valores e Compromisso com a Ação). O efeito da intervenção foi medido após a 6ª semana por meio das escalas: (i) Escala de avaliação de procrastinação, (ii) Aceitação e ação questionário -II (AAQ-II) e (iii) Gestão do tempo do aluno escala (STMS). Uma sessão de TC foi agendada para o grupo controle após o pós-teste. O estudo foi registrado no Clinical Trilhas da Índia (REF/2022/12/061719). **Resultados.** A avaliação pós-intervenção após 6 semanas revelou uma redução na procrastinação acadêmica entre estudantes de enfermagem (diferença média -8.61, erro padrão 0.35,  $p=0.01$ ). A intervenção também melhorou as habilidades de gerenciamento de tempo (diferença média: 9.98; erro padrão: 0.32; valor de  $p<0.001$ ). Além disso, a intervenção melhorou a flexibilidade psicológica dos estudantes de enfermagem (diferença média: -4.72; erro padrão: 0.49;  $p= 0.01$ ). **Conclusão** O estudo demonstrou que o ACT pode reduzir a procrastinação acadêmica e, no contexto clínico, pode melhorar o desempenho e o bem-estar dos estudantes de enfermagem.

**Descriptor:** procrastinação; terapia de aceitação e compromisso; autoimagem; estudantes de enfermagem.

## Introduction

Procrastination refers to the individuals' behaviour of delaying or deferring tasks until the last moment or beyond established deadlines.<sup>(1)</sup> Academic procrastination is a procrastination related to learning. It's a tendency to postpone the completion of academic tasks without any personal justification.<sup>(2)</sup> It is a complex phenomenon that is dominant among the learners leading to delay in their educational activities. Academic procrastination is common among the students. Over 70% of students consistently struggle with procrastination and over half of them find it difficult to stop.<sup>(3)</sup> Some students procrastinate in most life situations while others procrastinate in specific situations. In China, nearly 40% of students are troubled by academic procrastination.<sup>(4)</sup> Procrastination is a biggest challenge in the college students of India, affecting 28.85% of student population. The habit of delaying tasks and assignments may stop or slow down the academic progress and productivity in the students.<sup>(5)</sup>

Academic procrastination can be caused by a variety of factors, such as personality traits, poor time management skills, unpleasant emotions, contextual factors like the nature of the task or the teacher, and a clinical perspective linking the behavior to personality disorders, anxiety, and depression. Most influencing factors associated with procrastination among students are task aversion, fear of failure and perfectionism.<sup>(6)</sup> Student procrastination in academics among nursing students can be influenced by a multitude of factors, including student characteristics, educator dynamics, assignment characteristics, institutional factors, and professional obligations. Extended classes/lectures and big clinical workload can be trigger of procrastination tendency. This reflective tendency of procrastination develops due to difficulty faced by students to manage the stress and pressure in real time. Atychiphobia and laziness are the frequent reasons for procrastination among female students while among male students it is rebellion against control.<sup>(7)</sup>

Academic procrastination exerts detrimental effects on students, resulting in underachievement, heightened psychological stress, diminished subjective well-being, negative emotional states such as anxiety, depression, and disappointment. Moreover, it can also impair physical health over time.<sup>(8)</sup> Considering the increased occurrence of mental health challenges among college undergraduates, moderating variables such stress, overwork, and procrastination must be addressed and minimised.<sup>(9,10)</sup> Research shows that the students who procrastinate have higher levels of anxiety. This impact both students' mental health and academic success.<sup>(11)</sup>

There are few interventions to reduce procrastination in the college students like emotional management, cognitive Behavioural therapy, didactical interventions, etc. Past researches has found support for reducing

procrastination using conventional cognitive behaviour approach among the students.<sup>(12)</sup> A novel approach to cognitive behavioural therapy called ACT has demonstrated encouraging results in lowering academic deficits. ACT constitutes six processes of adaptation like acceptance, defusion, self as a context, psychological flexibility, values and committed actions. It is based on the psychological flexibility that helps an individual to confront the present situation and change his actions to fulfil the desired actions. Studies have reported that ACT is effective in reducing the cognitive dissonance, anxiety and depression.<sup>(13)</sup> Studies indicate that ACT effectively reduces the inclination to procrastinate on academic task and enhances psychological flexibility. Moreover, ACT had better long-term effect in reducing academic procrastination among students than other interventions. A few ACT based interventions has shown effectiveness for academic procrastination but literature so far is minimal.

The study examined the feasibility and impact of ACT on academic procrastination, time management, and psychological adaptability within the nursing student population. Furthermore, study also tests the correlation between academic procrastination, time management and psychological flexibility. The study hypothesized that a) there is a significant difference between post-academic procrastination scores of students in intervention group and control group. b) There is a significant relationship between academic procrastination, time management, psychological flexibility among students in intervention and control group.

## Methods

**Research design and setting.** An experimental approach and true experimental research (pre-test/post-test) design was opted to achieve the objectives of study. The selected settings of study were private nursing colleges of Punjab, India. These settings were at appropriate distance to avoid the contamination of subjects. Both settings

were co-educational institutions and the medium of teaching was English. The settings were affiliated to Punjab Nurses Registration Council and Indian Nursing council.

**Participants and Sampling.** The initial screening was carried out on 209 nursing students from two nursing colleges of, Punjab, India. There was total 43 students who met the cut off score of procrastination scale ( $\geq 48$ ). These students were divided into clusters on the basis of their college and each cluster was randomly allocated to control and intervention groups. There were 19 students in an intervention cluster and 24 were in control group cluster.

**Instruments.** Feasibility and acceptability of the study was assessed using the feasibility of Intervention measure (FIM) and acceptability of intervention measure (AIM). In the investigation following tools were used to collect the data from the participants: (i) **Socio-demographic questionnaire**- It comprised of information like age, gender, program, year of study, residential background and birth order of the students; (ii) **Procrastination assessment Scale- students (Solomon and Rothblum)** was used to measure the academic procrastination among nursing students.<sup>(14)</sup> This scale has 2 components, *Frequency of Academic Procrastination* ( $n=18$ ) evaluates the frequency of academic procrastination -examination preparation, term paper writing, reading assignments compliance, academic administration responsibilities, attendance, and activities in general-; and second component focuses on *its reasons* ( $n=26$ ) -aversion to the task, lack of time management, lack of personal initiative and lack of sincerity-. Frequency of academic procrastination was measured in terms of six domains and items were rated on a 5-point scale, ranging from strongly agree [5] to strongly disagree [1]. The factors contributing to students procrastination outlines on a scale ranging from 19-44 items. These reasons were rated on 5 point rating scale with a higher the score indicating a greater tendency towards a

particular reason for procrastination. The internal consistency of the scale is 0.82(Cronbach alpha). (iii) **Acceptance and action questionnaire-II (AAQ-II)**: measures students' psychological flexibility <sup>(15)</sup>. The scale consists of 7-items to be rated on a 7-point rating scales varying from never true (1) to always true (7). Higher the score, more is the psychological inflexibility and lesser score means more psychological flexibility. The reliability coefficient of the AAQ-II is 0.957 and it has strong construct and predictive validity. (iv) **Student time management scale (STMS)**:<sup>(16)</sup> measures the time management skills of the students. It has 28 items to be rated on 6-point scale ranging from strongly agree [1] to strongly

disagree [6]. The scale demonstrates a Cronbach alpha's alpha reliability of 0.78.

**Intervention.** ACT Intervention was subdivided into 6 modules. Each module was administered weekly and the duration of each session was one hour. The small groups were organised as 8-10 participants for the therapy (ACT). All the modules had a common goal i.e. to minimize the academic procrastination. These modules consisted of six core processes of the ACT. The sequence of the modules was fixed and the modules were supported by visual materials (diagrams, cartoons, etc), metaphors, homework and use of Socratic questioning. (Table 1)

**Table 1. Details of the sessions on Acceptance and Commitment Therapy**

Week	Module	Objective	Activities
1 <sup>st</sup> week	Module 1: Contacting the present moment	Participants will develop the conscious awareness of the present moment and will be able to perceive what is happening due to their procrastinatory behaviour.	-Dropping the anchor -Mindful eating
2 <sup>nd</sup> week	Module 2: Defusion	Participants will decrease their attachment from inner self and use defusion to manage the procrastinatory behaviour.	-Hands as thoughts -Leaves on a stream
3 <sup>rd</sup> week	Module 3: Acceptance	Participants will be able to make room for their procrastinatory thoughts and feelings instead of running away from them.	-Passengers on a Bus, -Turn off the Struggle switch
4 <sup>th</sup> week	Module 4: Self as context	Participants will be able to connect with their sense of self.	-Thinking self & observing self- -The sky and the weather -There go your thoughts
5 <sup>th</sup> week	Module 5: Values	Participants will be able to understand the important of educational values for a meaningful life.	-Working with values -Visualizing values Imagine your eightieth birthday
6 <sup>th</sup> week	Module 6: Committed Action	Participants will be able to understand and make actions and set goals that really matters to them with personal values.	-Setting goals -Reason giving

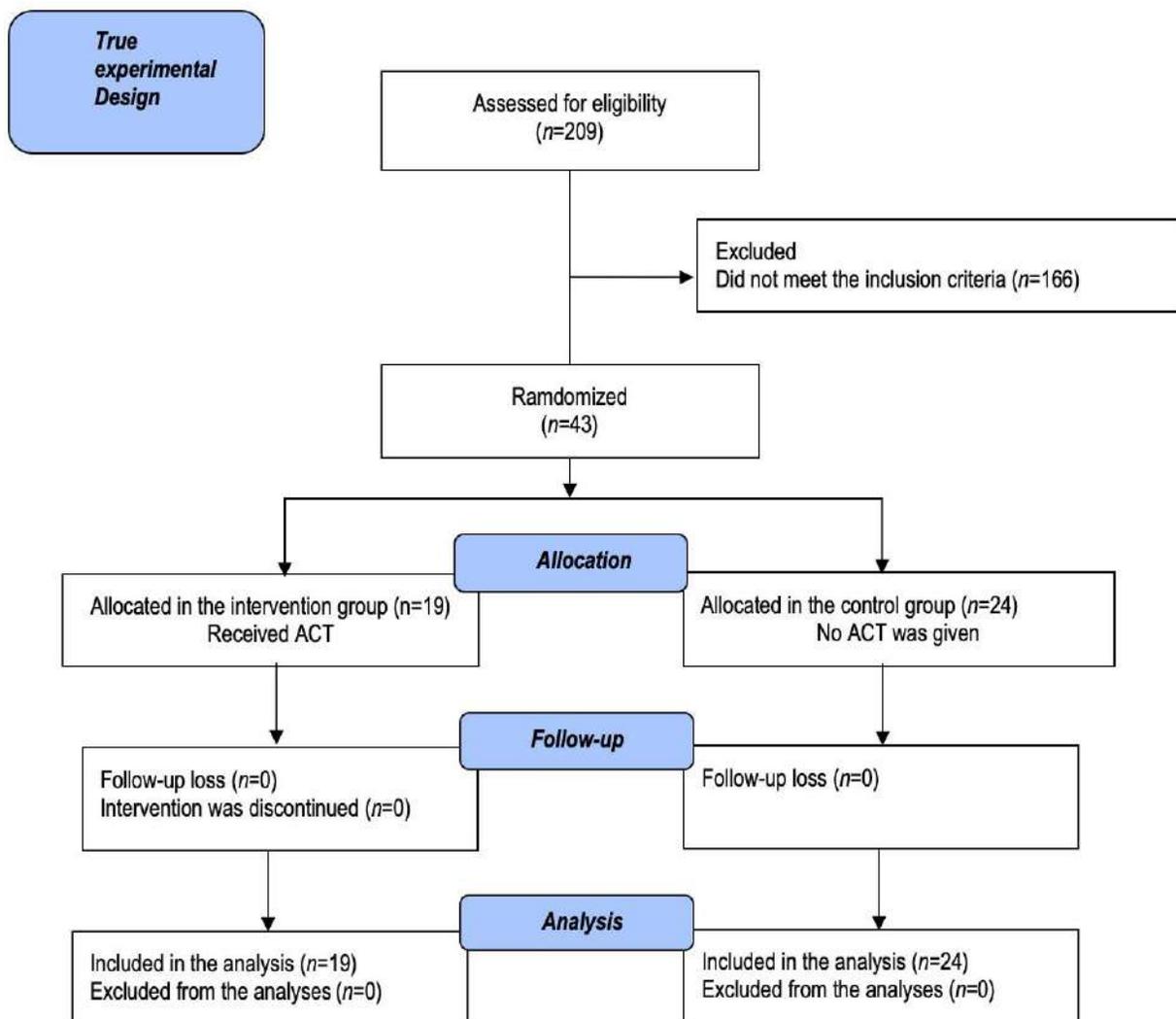
**Reliability of the research instruments.** The reliability of the instruments was checked by Cronbach's alpha (internal consistency). The reliability of the tools was 0.82, 0.78 and 0.957 respectively for Procrastination assessment scale for students, Student time management scale, and Acceptance & action questionnaire-II.

**Procedure.** The data was collected in two phases following the permissions obtained from the principals of selected nursing colleges of Punjab, India. In Phase I, the student list was maintained with the assistance of class coordinators. The purpose of this investigation was explained to the concerned participants and written consent was obtained. A google form -PASS questionnaire was communicated via email to the selected students to record their responses on procrastination. Students were classified into procrastinators ( $\geq 48$ ) or non-procrastinators ( $< 48$ ) on the basis of cut-off scores. In the phase II, socio demographic sheet, time management scale and the acceptance and action questionnaire II were given to selected students for baseline assessment. The selected colleges were randomly allocated in control and intervention groups as clusters. The structured intervention, ACT was given to the intervention group for six weeks, consisting of weekly one hour module. These modules (Table 2) focus on six core components of ACT and a worksheet for practicing the specific skills i.e. visual material, metaphors, homework,

and Socratic questionnaire. No intervention was given to the control group until the post-test and ACT sessions were planned for the students in control group after the post-test. The study was conducted using the guidelines outlined in the CONSORT (Consolidated Standards of Reporting Trials) statement. (Figure 1)

**Statistical Analysis.** Analysis of the data was done using the statistical analysis software SPSS 24 version. Data was reviewed for outliers and missing values. For descriptive statistics- mean, standard deviation and percentage was used. Normal distribution of data was checked by using Kolmogorov-Smirnov test and data was distributed normally ( $p > 0.05$ ). For inferential statistics, adjusted Chi-square test was applied to check the homogeneity between the groups. The differences between the groups were measured by paired t-test, independent t-test and ANOVA.

**Ethics.** The study received approval from Institution Ethics committee of Chitkara University, Punjab (IHEC/DHR/CU/PB/22/112 dated 16th November, 2022). Permissions were taken from the selected colleges of nursing and informed consent was taken from the participants involved in the study. Confidentiality of the information was maintained. Study has been registered under Clinical Trial Registry of India (REF/2022/12/061719 dated 25<sup>th</sup> April, 2023).



**Figure 1. CONSORT DIAGRAM**

## Results

**Screening.** The screening was done among 209 nursing students, majority of the students 166 (79.43%) were non procrastinators and one-fourth 43 (20.57%) were procrastinators. Study results revealed that 24.88%, 38.2%,

29.19%, 39.22%, 28.22% and 20.57% of the students always procrastinate in the six domains of procrastination (i.e. studying for exams, writing term papers, keeping up with weekly reading assignments, academic administrative tasks, attendance tasks, school activities in general respectively).

**Demographic characteristics.** To check the homogeneity between the two groups, adjusted chi-square test was used and no difference was found between the groups. All the variables were

matched i.e. age ( $p=0.077$ ), gender ( $p= 0.059$ ), year of study ( $p=0.279$ ), residential background ( $p=0.652$ ), birth order ( $p=0.346$ ). (Table 2)

**Table 2. Demographic characteristics of students in Intervention and control groups**

Variables	Intervention Group n (%)	Control group n (%)	df	$\chi^2$	p Value
<b>Age (in years)</b>			1	3.132	0.077
18-21	14 (73.7)	7 (29.2)			
22-25	05 (26.3)	17(70.8)			
<b>Gender</b>			1	0.277	0.599
Male	08 (42.1)	7 (29.2)			
Female	11(57.9)	17 (70.8)			
Others	0	0			
<b>Program Name</b>			-	-	-
B.Sc. Nursing (Basic)	19 (100)	24 (100)			
B.Sc. Nursing (Post Basic)	0	0			
<b>Year of Study</b>			5	14.356	0.279
1 <sup>st</sup> year/semester	1 (5.26)	4 (16.8)			
2 <sup>nd</sup> semester	0	1 (4.1)			
3 <sup>rd</sup> semester	4 (21.05)	1 (4.1)			
2 <sup>nd</sup> year	0	6 (25)			
3 <sup>rd</sup> year	10 (52.64)	0			
4 <sup>th</sup> year	4 (21.05)	12 (50)			
<b>Residential background</b>			2	0.854	0.652
Hostel	8 (42.1)	8 (33.3)			
Home	9 (47.37)	15 (62.5)			
P.G	0	0			
Rented accommodation	2 (10.53)	1 (16.8)			
<b>Birth Order</b>			2	2.122	0.346
1st	11 (57.9)	11 (45.8)			
2nd	8 (42.1)	11 (45.8)			
3 <sup>rd</sup>	0	0			
4 <sup>th</sup> & more	0	2 (8.4)			

**Reasons of Academic procrastination.** Aversiveness of the task and lack of personal initiative had positive effect on academic procrastination. For each 1% increase in aversiveness of task there is an increase of

4.37% of academic procrastination and for every 1% increase in lack of personal initiatives there is increase of 2.84 % of academic procrastination. (Table 3)

**Table 3. Multiple linear regression analysis between academic procrastination and reasons of procrastination**

Variables	Unstandardized Coefficient		Standardized coefficient	t- stat	p- value
	B	Standard error	Beta		
Academic procrastination (Constant)	1.584	0.85		1.21	0.275
Aversiveness of the task	0.437	0.42	0.75	4.76	0.001
Poor time management	0.249	0.63	0.37	1.39	0.241
Lack of Sincerity	0.552	0.57	0.53	0.78	0.182
Lack of personal Initiative	0.284	0.49	0.87	5.46	<0.001

**Dependent variable:** academic procrastination. **Predictors:** Aversiveness of task, poor time management, lack of sincerity and lack of personal initiatives

**Acceptability and feasibility of intervention.** In acceptability of intervention measure, 78% of the nursing students agree that the ACT intervention meets my approval and 83 % of nursing students completely agree that ACT intervention was appealing to them. In feasibility of intervention measure, 84.1% of nursing students completely agree that ACT intervention is a valuable measure and 86.4 % of them

would recommend this to their friends dealing with academic procrastination

**Effectiveness of Acceptance and commitment therapy.** Post intervention assessment after 6 weeks revealed that ACT intervention effectively reduced academic procrastination among the nursing students, while also enhancing their time management skills and psychological flexibility. (Table 4)

**Table 4. Post-test scores of academic procrastination, time management and psychological flexibility in the Intervention and Control groups**

Variables	Groups	Mean Score	S. D	Mean difference	Standard error	df	t-value	p-value
Academic procrastination	Intervention	38.68	2.750	-8.61	0.35	41	11.903	0.01
	Control	47.29	1.916					
Time management	Intervention	107.69	9.093	9.98	0.32	41	8.548	0.001
	Control	97.71	7.215					
Psychological flexibility	Intervention	16.21	3.823	-4.72	0.49	41	6.179	0.02
	Control	20.93	4.620					

**Correlation Academic procrastination, psychological flexibility, time management.** Results depicted significant moderate positive correlation of academic procrastination with psychological flexibility ( $r=0.519$ ,  $p=0.02$ ) i.e.

higher the academic procrastination score, lower is the psychological. There was significantly negative relationship between academic procrastination and time management. ( $r=-0.652$ ,  $p<0.04$ ) i.e. higher the academic procrastination, lower

was the time management score. No statistically significant association was found between psychological flexibility and time management ( $r=0.212$ ,  $p=0.3845$ )

### ***Association of academic procrastination, time management and psychological flexibility with demographic variables***

Association of academic procrastination, time management and psychological flexibility scores with selected variables of the nursing students (i.e. age (in year), gender, program name, year of study, residential background, and birth order), was calculated using t-test/F-test. There was significant association of the pretest academic procrastination score and residential background in the intervention group. Academic procrastination was more in the students living in the hostel. There was no significant association of academic procrastination scores with their other demographic variables in intervention and control group.

There was no association of time management and psychological flexibility scores with the selected demographic variables in intervention and control group.

## Discussion

The primary findings of study described the prevalence of procrastination among nursing students. This current study assessed that the prevalence of procrastination was 20.57% in nursing students. These findings exhibit a high prevalence of academic procrastination in literature among nursing students, with 45.72% experiencing moderate to severe procrastination.<sup>(17)</sup> 29.25% in medical students had academic procrastination.<sup>(18)</sup> The difference can be due to the use of different research instruments. The most common reason for academic procrastination among the students was task aversion. These findings align with the study conducted in 2022 in Iran that task aversion is the reason of procrastination.<sup>(19)</sup>

Another major aspect explored through the study was to find the effect of ACT on academic procrastination. Study results concluded that ACT demonstrated efficacy in reducing academic procrastination among nursing students. The results concurs with research studies appraising the efficacy of ACT and found medium effect size for procrastination among college students in India and elsewhere.<sup>(20)</sup> ACT leads students towards values and worthwhile life objectives by teaching them to recognize and identify their judgements and to present them as the internal mind and world and their defusion and lack of fusion with them.

The results indicated that the ACT intervention led to an improvement in the psychological flexibility scores among the nursing students. These findings are in line with the studies that showed the ACT intervention can improve wellbeing<sup>(21)</sup> and psychological flexibility.<sup>(22)</sup> Findings suggested that Acceptance and commitment therapy may promote the wellbeing, behaviour modification and psychological flexibility of the nursing students. Values are one of the main core components of ACT, and values serve as the cornerstone for developing psychological flexibility. ACT can assist the students in becoming aware of their values and recognizing the important things in their lives.

Academic procrastination results from interaction of multiple components like behavioral, cognitive and affective. Many factors are associated academic procrastination. A negative relationship found between academic procrastination and time management.<sup>(23)</sup> The results align with the present study. Students who procrastinate their academic tasks tend to have lower time management skills. The relationship between academic procrastination and psychological flexibility aligns with the findings, psychological inflexibility may lead to academic procrastination leads among the students.<sup>(24)</sup> Therefore ACT practitioners focus on psychological flexibility when working with students impacted by procrastination.

The study reported association of residential background with pretest academic procrastination scores in the intervention group. None of the other demographic variables exhibited association with pretest academic procrastination scores in either group. Indeed, the results are consistent with a study in which academic procrastination happen irrespective of gender and it is more common among the students living in the hostel.<sup>(25)</sup> The strength of study is that ACT intervention modules and the tools used for data collection were standardized and validated before the use for Indian students from the clinical psychiatrist practicing ACT.

**Conclusion.** The study highlights the significant impact of ACT on academic procrastination, time management, and psychological flexibility among nursing students. ACTs strong treatment of academic problems through acceptance of difficult cognitions and valuing action can be infused into nursing curriculum, support services and staff development for enhancing student performance and well-being. The application of ACT within the clinical setting is able to assist nursing students to manage stress and prevent burnout.

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# Dialectical nursing care: a concept analysis

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## Dialectical nursing care: a concept analysis

### Abstract

**Objective.** To analyze how the concept of dialectical nursing care is introduced in the scientific production of nursing.

**Methods.** It is a concept analysis based on Rodgers' evolutionary model. An integrative literature review was carried out for the identification and selection of articles, in January 2022 and updated in March 2024, limited to the period between January 2010 and December 2023. The search was conducted in six databases: PubMed, Web of Science, Embase, Science Direct, Scopus and LILACS, combining the descriptors Dialectics, Health and Care.

**Results.** Based on Rodgers' evolutionary model, it was possible to identify the attributes of the concept, which are: dialectical sensitivity, dialectical attitude, ambience and social determinants. The antecedents: The being and its social relationships, Health services, Work processes and Formative paradigm. The consequents: The being who cares for and the being cared for in their relationships,

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Work process and Formative paradigm. **Conclusion.** This study contributed to the clarification of the concept that proposes the analysis of dialectics in the social production of illness and health, operating syntheses and new syntheses, in order to overcome the contradictions that historically cross people, macrostructure and area of nursing knowledge.

**Descriptors:** nursing care; nursing; concept formation; social determinants of health; practice patterns, nurses; nurses.

## Cuidado dialéctico de enfermería: un análisis conceptual

### Resumen

**Objetivo.** Analizar cómo se presenta el concepto de cuidados dialécticos de enfermería en la producción científica enfermera. **Método.** Se trata de un análisis conceptual basado en el modelo evolutivo de Rodgers. Se realizó una revisión bibliográfica integradora para identificar y seleccionar los artículos en enero de 2022 y actualizada en marzo de 2024, limitada al periodo comprendido entre enero de 2010 y diciembre de 2023. La búsqueda se realizó en seis bases de datos: PubMed, Web of Science, Embase, Science Direct, Scopus y LILACS, combinando los descriptores Dialéctica, Salud y Cuidados. **Resultados.** A partir del modelo evolutivo de Rodgers, fue posible identificar los atributos del concepto: sensibilidad dialéctica, actitud dialéctica, ambiente y determinantes sociales. Los antecedentes: el ser y sus relaciones sociales, los servicios de salud, los procesos de trabajo y el paradigma de formación. Los consecuentes: el ser que cuida y el ser cuidado en sus relaciones, el proceso de trabajo y el paradigma de formación. **Conclusión.** Este estudio ha sido un aporte significativo al esclarecimiento del concepto que propone el análisis de la dialéctica en la producción social de la enfermedad y de la salud. El estudio ha mostrado que es posible producir nuevas síntesis que logran superar las contradicciones que atraviesan históricamente a las personas, la macroestructura y al área de conocimiento de enfermería.

**Descriptor:** atención de enfermería; enfermería; formación de concepto; determinantes sociales de la salud; pautas de la práctica en enfermería; enfermeros.

## Cuidado dialético de enfermagem: uma análise de conceito

### Resumo

**Objetivo.** Analisar como o conceito de cuidado dialético de enfermagem é apresentado na produção científica de enfermagem. **Métodos.** Trata-se de uma análise de conceito baseada no modelo evolucionário de Rodgers. Realizou-se uma revisão integrativa da literatura para a identificação e seleção dos artigos, em janeiro de 2022 e atualizado em março de 2024, limitada ao período entre janeiro de 2010 e dezembro de 2023. A busca foi realizada em seis bases de dados: PubMed, Web of Science, Embase, Science Direct, Scopus e LILACS, combinando-se descritores Dialética, Saúde e Cuidado. **Resultados.** Com base no modelo evolucionário de Rodgers foi possível identificar os atributos do conceito são: sensibilidade dialética, atitude dialética, ambiência e determinantes sociais. Os antecedentes: o ser e suas relações sociais, serviços de saúde, processos de trabalho e paradigma formativo. Os consequentes: o ser que cuida e o ser cuidado em suas relações, processo de trabalho e paradigma formativo. **Conclusão.** Este estudo contribuiu para o esclarecimento do conceito que propõe a análise da dialética na produção social do adoecimento e da saúde, operando sínteses e novas sínteses para superação das contradições que atravessam historicamente pessoas, macroestrutura e área de conhecimento da enfermagem.

**Descritores:** cuidados de enfermagem; enfermagem; formação de conceito; determinantes sociais da saúde; padrões de prática em enfermagem; enfermeiros.

## Introduction

The concept of care is broad, formulated and discussed in various contexts. This understood as an act of caring for oneself and the other shows the influence of hermeneutics as an opportunity for care dialogs among the subjects, as an ethical and shared expression of knowledge and experiences of the health process.<sup>(1)</sup> Concept analyses have helped nurses to understand care, deepening the reflection on looking at the other, such as the concept analysis of humanistic care in nursing. Research that adopted Rodgers' Evolutionary Model<sup>(2)</sup> highlighted some characteristics that translate a humanistic care environment, such as an environment capable of promoting healing, preserving human dignity, encouraging the development of talents and personal growth of the subjects. The concept of humanistic care in nursing proved to be useful in the construction of knowledge, instrumentation, planning and elaboration of guidelines and interventions for clinical management.

Contemporaneously, we are faced with a broadening of the conception of health and care of a social nature. Historically, public health is a field under reconstruction in which philosophical aspects need to be critically revisited in terms of technological and specialized advances in health care, which is insufficient in terms of the need to reduce vulnerabilities and promote health and surveillance, requiring renewal in health practices.<sup>(3,4)</sup> Thus, when considering the urgent need for the renewal of health practices, the concept of individual and collective, family and community care is influenced by historical dialectical conceptions, which are based on the paradigm of social production in health. Dialectical historical materialism, as a philosophical and theoretical framework, examines the work processes that display the conditions in which work develops in social life, as well as social relationships in the context of capitalism.<sup>(5)</sup>

Therefore, the mode of thought inscribed in dialectical historical materialism requires health professionals to pay attention to the events of the material reality of social life in a time frame, as each historical moment will reproduce a specific social history. It requires the professional to understand that social life is full of contradictions and that these contradictions are dynamic.<sup>(5)</sup> Thus, this understanding of the world and reality is particularly applicable to nursing, with regard to its own origin and historical structuring of its workforce and the social production of care, which are aligned with these concepts, since it is in the possibility of contextualizing the dialectical historicity intrinsic to the health and disease process that the potential paradigmatic change in the health model is glimpsed. This theoretical framework, which influences some health systems in their epistemological origin, justifies the formulation of dialectical nursing care. In this sense, the current study aimed to analyze how the concept of dialectical nursing care is introduced in the scientific production of nursing, using Rodgers' evolutionary method of conceptual analysis.

## Methods

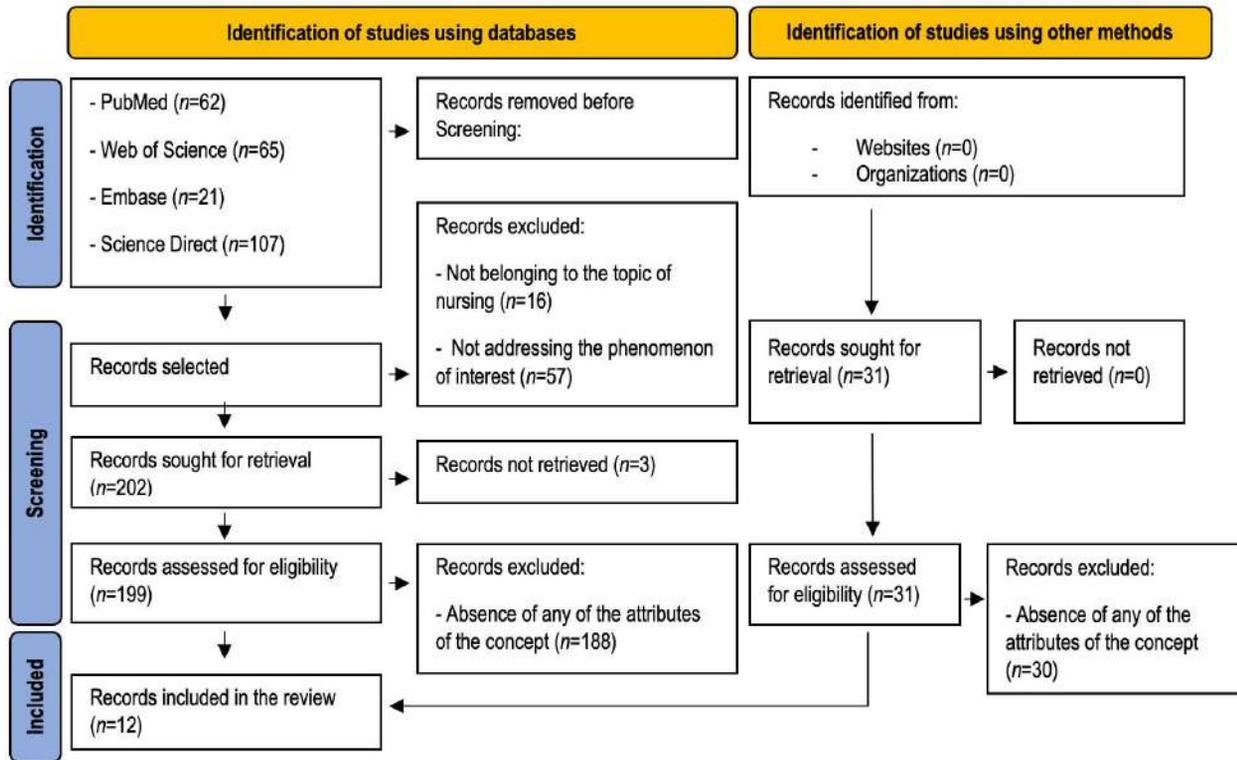
**Study design.** Concept analysis based on Rodgers' evolutionary method, which consists of an inductive and descriptive study to outline the knowledge constructed on a concept. The six methodological steps formulated by Rodgers<sup>(6)</sup> were used: 1) Definition of the concept of interest; 2) Identification and selection of the field for data collection; 3) Formulation of the attributes of the concept and contextual bases (antecedents and consequents); 4) Analysis of the characteristics of the concept (related concepts, for example); 5) Identification of an example concept (if appropriate); 6) identification of the implications for the development of new concepts.

**Data collection period.** The search was conducted in January 2022 and updated in March 2024, limited to the period between January 2010 and December 2023.

**Selection criteria.** Original articles, in Portuguese, English or Spanish, with different methodological approaches, were included. Conversely, articles that did not show the constituent elements of dialectical nursing care, publications outside the area of nursing knowledge, literature considered gray, editorials, letters to the editor, reflective and review studies were excluded.

### **Definition of the sample and instruments used.**

A total of 294 articles were identified: 62 in PubMed, 65 in Web of Science, 21 in Embase, 107 in Science Direct, 38 in Scopus and one in LILACS, and 31 references were identified in an unsystematic way, based on studies referenced in other articles. Accordingly, a total of 325 publications were selected. Two researchers, independently (first and last researcher), conducted the selection of studies through the Rayyan® platform.<sup>(7)</sup> The process was blinded, and then possible disagreements resolved by consulting a third reviewer. The identified records were uploaded to the platform and, after the removal of the duplicate studies, 275 were analyzed, based on the reading of the titles and abstracts. The selection criteria were applied, with 73 records excluded: 16 were not from nursing and 57 did not address the phenomenon of interest. A total of 199 records were chosen for the systematic search and 31 for the unsystematic search, which were analyzed in full; and, among these, 218 were excluded because they did not show some of the attributes of the concept and its contextual bases (antecedents and consequents). For the final synthesis, 12 studies were selected.<sup>(8-19)</sup> The PRISMA<sup>(20)</sup> flowchart describes the selection of studies included in the concept analysis, as displayed in Figure 1.



**Figure 1. Representative data collection flowchart for concept analysis**

**Data collection.** In order to identify the eligible studies in the area of nursing knowledge, an integrative review was carried out by two independent researchers.<sup>(21)</sup> The search strategy was developed by combining the terms of MeSH, Emtree and DeCS, such as Dialectics, Health and Care, as well as their synonyms and keywords, such as Dialog, Discussion, Well-being, Health Care, Prevention and Health Care, combined with the Boolean operators OR and AND.

**Data processing and analysis.** The MaxQDA® version 2020<sup>(22)</sup> software was used to determine the relationship between the contents that make up the concept, analyzing its characteristics from a broad perspective. The software allowed for a deeper study, exploring the extracted contents at two different levels of connected analyses: (1) the thematic area and its possible related themes: its

representation in quantitative terms (frequency of coded segments) and qualitative (meaning transmitted in the context of dialectical nursing care) and (2) the similarities and differences contained in the perspectives addressed in the articles. These characteristics allowed us to synthesize the attributes that make up the concept and its contextual bases (antecedents and consequents). Subsequently, the elements were analyzed through inductive thematic analysis.<sup>(23)</sup> Thematic analysis reports patterns among the data, allowing the grouping and interpretation of the various aspects of the concept. Thus, the themes representative of the antecedents, attributes and consequents of the concept were elaborated. It is noteworthy that this analysis process was not applied to the substitute and related terms.

## Results

Among the sets of analyzed evidence, six were published in Brazil,<sup>(8,10,11,14,15,18)</sup> two in the United Kingdom,<sup>(9,17)</sup> one in the USA,<sup>(13)</sup> one in Canada,<sup>(12)</sup> one in Norway<sup>(19)</sup> and one in Vietnam<sup>(16)</sup>, with one in 2010,<sup>(18)</sup> two in 2011,<sup>(14,19)</sup> one in 2012,<sup>(17)</sup> three in 2015,<sup>(9,15,16)</sup> one in 2016,<sup>(8)</sup> one in 2017,<sup>(12)</sup> two in 2018<sup>(10,11)</sup> and one in 2019.<sup>(13)</sup> The concept of dialectical nursing care is complex and surrounded by other interconnected terms.

Based on the analysis process, 11 themes were constructed, four related to antecedents, four to attributes and three to consequents, as follows:-

**Antecedents.** (i) *The being cared for and its social relationships*: Socio-historical conditions and contradictions that marginalize/segregate/stigmatize translate into social determinants of health that make individuals and groups vulnerable and affect their health status and social integration and the use of the health service structure;<sup>(15,21,42)</sup> (ii) *Health services* (Care supply structure): State of programmatic vulnerability that generates the need to change the service structure to offer care actions due to stressors, panopticons and contradictions, as well as the need to maintain safety in the face of the variability of care shown in health services;<sup>(5,19,20,34,42,59)</sup> (iii) *Work process* (work relationships/organization): Hegemony of the biomedical model in the current scenario, which is in contradiction with the expanded concept of health, generating an alienating and conflictive tendency in the work process that triggers professional dissatisfaction;<sup>(19,26,34,59)</sup> (iv) *Formative paradigmatic*: Disparity among health education, the reality of the service and the needs of the population that require formative, innovative, problematizing and significant practices.<sup>(49,52,53)</sup>

**Attributes:** (i) *Developing a dialectical sensitivity*: Ability to observe and integrate into the context of health care, being critically sensitive to vulnerabilities and overcoming tensions, in the face of the

process of communication and teaching, learning and care;<sup>(15,19,20,21,52)</sup> (ii) *Promoting a dialectical attitude*: An attitude of valuing and mediating the tensions and conflicts of the teaching, learning and care process, with clarifying and emancipatory communication, transcending the panoptic character and moral judgment;<sup>(5,15,19,20,21,59)</sup> (iii) *Promoting ambience*: It promotes the physical and psychological management of the environment for the promotion of care and the work process, compensating collective tensions dynamically to break bureaucratization;<sup>(20,34)</sup> (iv) *Analyzing the social determinants of health*: Valuing the historical, social and political context of illness, highlighting the asymmetries and identifying barriers to an ideal health situation, exposing the contradictions that involve social actors for the promotion of accessibility and active and qualified listening.<sup>(21,26,42,49,53)</sup>

**Consequents:** (i) *The being who cares for and the being cared for in their social relationships*: Dialectical care provides the caregiver with the development of criticality that leads to the overcoming of alienation, identifies vulnerabilities, favors equity and promotes social justice, putting him/her in a position to transform alienating social relationships. For the being cared for, it promotes inclusion, affective bonding and empowerment;<sup>(15,21,42)</sup> (ii) *Health services/Work process*: Valuing dialectics and overcoming vulnerabilities in the work process, promoting the professional's emotional balance and problem-solving capacity in care. It stimulates the appreciation of historicity and the users' life projects dialogically, as well as their personal narratives, resulting in individualized and safe care;<sup>(5,19,20,26,34,42,59)</sup> (iii) *Formative paradigmatic*: The teaching of dialectical care allows exposing the contradictions between the posture of liberation and the tendency of institutionalized processes by observing the objective reality and capturing the health needs of the being cared for with the possibility of materializing genuine holistic care.<sup>(49,52,53)</sup>

**Concept-related terms.** The related terms are those pertinent to the concept of interest, but they do not share the same attributes.<sup>(6)</sup> Both person-centered care<sup>(12)</sup> and holistic care<sup>(17)</sup> accompanied the concept of dialectical nursing care. Person-centered care refers to care that goes beyond the perspective of healing symptoms inscribed in the biomedical model. It is organized around the needs of the person, in a relationship of partnership between him/her, the family, the community and the health professionals. The person contributes with his/her experiences, knowledge, beliefs and preferences, while the professionals contribute with their scientific knowledge and care experiences, providing support and relevant information so that they are able to make decisions about his/her own health and manage his/her treatment.<sup>(24-26)</sup> Holistic care involves health practices with systemic and interdisciplinary approaches, which seek the balance of the totality of the being, since it recognizes and values the interdependence between biological, psychological, social, spiritual and cultural aspects in the health-disease process.<sup>(27)</sup> Therefore, the proposed dialectical nursing care advances beyond these two conceptions, based on the intentionally dialecticizing process, which guarantees the analysis of the health phenomenon in the social reality, where the patient moves in an alienating culture permeated by oppression, power relationships and social inequalities, in addition to proposing a synthesis for his/her overcoming and enabling transformations in himself/herself, in society and in nursing itself.

**The definition of the concept.** Dialectical nursing care is characterized by the interaction between the caregiver and the being cared for based on their system of care production, their social relationships and the way in which they are historically modulated, which aims to favor the analysis and understanding of the person about the social production of his/her suffering/illness and well-being/health, maximizing his/her leading role in making health-promoting decisions and consciously managing self-care in concrete (material) reality and expanding his/her resources

and social supports to overcome vulnerabilities. Dialectical nursing care has an interdisciplinary and multidimensional nature and operates in the nursing clinic through the systematic, attentive and intentional analysis of the multiple social, political and cultural contradictions that naturally cross the subject historically, in a process of problematization of reality with the being cared for, with dialectical sensitivity and attitude, which gives both the opportunity to react against the oppressions that surround him/her and to constitute syntheses and new syntheses, potentially capable of propelling him/her towards his/her relative emancipation, in the concreteness of his/her daily life, within his/her territory and to the extent of his/her desire. Its application places nursing as an articulator of an intersectoral and interprofessional care network.

**Example use of the concept (model case).** Without family ties, homeless and an abusive consumer of alcohol and marijuana, hypertensive and diabetic, AML refuses to undergo multidisciplinary clinical interventions, is unable to organize himself with pharmacological treatment and has committed crimes that result in interpersonal violence and periods of judicial incarceration, which aggravate his physical and mental health. This is the panorama in which hospitalizations play an important social role, temporarily reducing his exposure to harmful agents, reestablishing his state of health in the face of clinical complications and sparing the community from his infractions, while the social and judicial assistance system forces the responsibility of family members regarding the guardianship of AML, without success, given the absence of affective ties between them. The complexity of the case has led health teams to seek intersectoral collaborative strategies, but these tend to reproduce interventions focused on containing psychiatric symptoms and providing total abstinence from substances, with psychotropic drugs and hospitalizations. These measures are bureaucratic and burdensome to the social and health system and to society, and are clearly insufficient to bring about changes in the current situation. They also generate stress and

frustration among workers, who feel powerless in the face of relapses and have no social recognition for the product of their work process. Recently, a proposal for dialectical care was devised, with nursing taking the lead in intersectoral articulation, putting into perspective the social scenario and the infrastructure of the services through which AML moves, his daily life on the street and the narratives and expectations of the individual and professionals. In this context, during the shared consultation, the following items were identified: a) determinants of health: occasional support from the community for food, hygiene and protection of his movable property, cognitive condition to plan and take responsibility for the therapeutic project and agreement with the therapeutic proposal; and b) determinants of illness: stigmatization, segregation, lack of social protection, inefficiency of the technological health apparatus to meet psychosocial needs, obstruction of access to the health and social assistance system, psychiatric asylum culture, distrust of AML in the State, support from local businesses for alcohol consumption, complementary relationships with people who consume psychoactive substances, absence of structuring affective ties, clinical and psychiatric complications that reduce his availability to adhere to treatment. Thus, dialectical nursing care, based on comprehensive psychosocial strategies, which included strengthening support agreed upon in the local community and reducing harm resulting from substance consumption, recognized for its low level of demand on the person, and emphasizing the role of a family health unit, which received matrix support for technical qualification by the psychosocial care service, the intersectoral proposal restructured care in the context of the street, reaching other individuals in that vulnerable condition. Nursing has adopted new routines to facilitate access to that local audience, making examinations more flexible and allowing frequent clinical and psychological interventions, from an ethical and equitable position, adopting interpersonal communication capable of problematizing AML's personal experiences together with him and explaining how they can contribute to his conflicts.

The objectives included ensuring his protection, improving his health status and controlling comorbidities, thus increasing his level of knowledge to make decisions, facilitating his entry into the labor market compatible with his choices on the street, qualifying his social skills and expanding his circulation around the city, with greater contractual capacity. The actions agreed with AML began to concentrate on the street, focusing on support relationships that do not concern family members or consanguinity, such as an affective companion, a local religious leader who was responsible for the storage of AML medicines and a merchant to whom AML offered occasional general autonomous services. In partnership with a philanthropic temporary shelter, AML began to obtain protection in moments of greater vulnerability, even though he refused proposals for fixed housing. Other individuals in a similar situation began to benefit from this presence of the teams, which modified their authoritarian discourses into dialectical attitudes capable of welcoming the consumption of psychoactive substances and translating it into a language denouncing social inequality and human vulnerability. It was from this change in care logic that the real demands of that audience were accepted and adherence to the proposals was noticed. Relapses, hospitalizations and violence were minimized with access to health and social assistance, but they were also naturalized by the professionals as possible experiences, but re-editable in the continuum of the health-disease process. As the health or life situation of AML changed, new agreements were made and new reorganizations of the care structure were necessary.

## Discussion

According to Marx, the human way of existing, since the advent of capitalism, has been engendered in a conjuncture of class society that produces its culture from the transformation of nature through the work process and the construction of knowledge that can meet its demands, respond to

its questions, which are crossed by irremediable contradictions that demand new syntheses and new solutions, in an uninterrupted becoming.<sup>(28)</sup> Marx's method of analysis stands out by situating the phenomena sought historically and socially in real life, in order to glimpse their determinants and overcome appearances, as is the case of the complaint of the individual who seeks health care. It is in dialectical historical materialism, of a Marxist nature, that dialectical nursing care is based, a product of this concept analysis.

The formulation of dialectical nursing care is justified in view of the contradictions that arise between the discourse guided by the expanded conceptions of health and contemporary health practices, which are also revealed in their biomedical, interventionist and curativist nature, which focus on the disease, the diagnostic classifications and the extinction of suffering.<sup>(11, 29)</sup> The conventional readings that are made about the phenomenon shown by the patient are guided by appearance, the clinical sign, which does not reveal the core of his suffering and his personal searches.

The choice of a clinical case used to illustrate the dialectical nursing care is based on the clinical practice of the authors and reflects the complexity of the health-disease-care process, with people with mental disorders related to substance abuse, who are homeless. Nevertheless, it can be applied to other health contexts. Historically and socially sustained, the psychiatric institutional mechanism, which regulates human behavior, was legitimized by society to moralize and standardize the individual, and attributed to nursing a panoptic and executing function disguised as power, but which alienated it from its work process. As a result of this mechanism, we are faced with the disconnection among mental health, physical health and social services and interventions, with practices and theories strongly based on diagnostic classification systems that disregard the integration among genetic, environmental, social and neurobiological factors.<sup>(30)</sup>

The model case shows the social, cultural and clinical condition experienced by AML, which represents an effect of the capitalist model that governs Western relationships, capable of segregating and stigmatizing people. The case expresses an organic relationship between the health problem (mental disorder, its comorbidities and the harmful consumption of substances), as well as crime/conflict with the law, violence, class stratification/social inequalities implicit in the phenomenon of homelessness. Thus, nurses, in the search to implement the concept of dialectical nursing care in practice, are called upon to dialectically analyze the productivist organization in health and how it has shown a compromise in the well-being and plenitude of the population, at the same time that they are faced with the legal superstructure and how it consolidates a dialectics, by promoting a circuit of social moralization, when it penalizes delinquency and, concurrently, not reaching the determinants of social injustices, as reflected in the model case, which intends to illustrate the interface among the antecedents, attributes and consequents of dialectical nursing care.

## The antecedents of dialectical nursing care

The antecedent "The being cared for and its social relationships" indicates relationships of marginalization, segregation and stigmatization that oppress and make individuals and groups vulnerable, thus affecting their health status.<sup>(31)</sup> A social context thus constituted drives the revision of contemporary health practices, since the living conditions of the populations respond to social determinants of health (income, education, social protection, housing, employment, occupational safety, food safety, child development and access to quality health services) modulated by forces and systems of a political, economic and economic nature, as well as social and agreed development agendas, which entail unfair and avoidable differences in health conditions.<sup>(32)</sup>

The antecedent “Health services” denounces the incipience of the structure of the services in meeting the needs of the population and the inconsistency in the teaching-service relationship. Therefore, in the conceptions imbricated in dialectical nursing care, it is necessary to analyze the proportion in which the structure of these services compromises the provision of care, in the face of a global conjuncture of multifactorial and growing crisis and chronic and complex health conditions, which are reflected in high costs and low level of quality, with resources disproportionately allocated to demographic groups.<sup>(33)</sup>

As for the antecedent “Work process”, it reveals a prescriptive and linear care system, dictating parameters and norms that diverges from contemporary discourses on expanded conceptions of health.<sup>(34)</sup> This reality reinforces diagnoses, group classifications and the power of pharmacological measures, while at the same time burdening public resources, making health work more precarious, emotionally exhausting professionals, chronicizing health problems and potentiating dysfunctions, thus frustrating and limiting the autonomy of assisted individuals.<sup>(31)</sup> On the other hand, according to the Marxist perspective, the complex universe of exploitation by labor, inherent to the capitalist mechanism, generates experiences of powerlessness, estrangement and isolation, which translate into alienation.<sup>(35)</sup> Historically, nursing is faced with the estrangement of its social relationships and its work product, when it is oppressed by the dominating medical power and when it assumes an executing and technical function, in the face of a reality of continuous confrontation in which it loses control over its work process, a condition associated with the worker’s suffering.<sup>(11,29)</sup>

The antecedent “Formative paradigmatic” shows the panopticon character of nursing education and care, which means that the behavior and bodies of nurses and nurses in training are controlled by oppressive forces resulting from the neoliberal

transformation of the health system, from a sectorial education based on disciplinary curricula and hierarchical practices that symbolize dominant relationships that are expressed in society.<sup>(13)</sup>

### The attributes of dialectical nursing care

When analyzing the historical, social and political context of people in the care process, it is possible to observe and capture the asymmetries in force in the care realities, which make people respond in a unique and non-linear way to prescriptions and therapeutic projects. The attributes of dialectical nursing care intend to support the capture of the material reality of the phenomena and the nuances existing in the health context, which determine vulnerabilities of the being assisted.<sup>(36)</sup> They are experienced in the instance of social determinations that are established in a given society. Thus, the detection of the social determinants of illness, health and care is a core attribute, which will only be achieved by nursing professionals in the experimentation of dialectical sensitivity and attitude.

Dialectical sensitivity and attitude are attributes of the concept of dialectical nursing care, which are the basis for characterizing the analysis of contradictions in a historical moment in the lives of individuals in the care model. In order to examine these attributes, it is worth resorting to the study that analyzed the concept of being sensitive in nursing and defined this phenomenon as a cognitive process of perception, attention, awareness and self-awareness, maturity and empathy in the production of good communication in which interaction is determinant. This sensitivity can vary in degree and depth, when developed and influenced, and should generate a positive result in the sense of identifying and respecting the needs of the individuals cared for.<sup>(37)</sup> Accordingly, dialectical sensitivity is an intentional process through which nurses organize their thoughts, using the faculty of feeling and developing dynamic syntheses to favor the overcoming of contradictions that affect the health and disease process.<sup>(38)</sup>

In a complementary way, professional attitudes are mentally produced, at a conscious or unconscious level, culturally learned and organized by experience, and imply values, beliefs or feelings that predispose the professional to make decisions.<sup>(39-41)</sup> The dialectical attitude is an attribute loaded with values and conceptions guided by the historical and dialectical paradigm and by the social production of health, which impacts on nursing intervention,<sup>(42,43)</sup> intending to expand the clinic, by naturalizing for the professional a reading of society based on the relationships of production, consumption and power, which are determinants of the human way of living and that define its own consciousness,<sup>(28)</sup> where the being cared for is called to the scene as a protagonist, capable of dialectically analyzing his/her life context, making decisions and provoking transformations.

Ambience is another attribute of dialectical nursing care, functioning as a facilitator for the development of dialectical sensitivity and attitude. It is related to personnel management, well-being in the service, the physical area available for care, the necessary equipment and instruments, and the existence of indicators that allow the model that is being operated for care to be guided. The environment supports nursing care with structural elements of the services that strengthen the communicative act between nurses and the assisted individuals, and is unveiled as a correlational attribute with the work process.<sup>(44)</sup> Therefore, ambience is not reduced to the analysis of the material structure of services, as it provides individuals and the community with sensations that go beyond physical comfort, capable of developing psychological and social well-being.<sup>(45)</sup>

### The consequents of dialectical nursing care

As regards the consequent “The being who cares for and the being cared for in their social relationships”, it can be inferred that the insertion of the person, family and community in the social

fabric in a conscious way, visualizing how the social determinants of health appear and act in their habitat, allows forging possibilities of new responses that tend to affect their development and health status. In a model of care conducted in this way, individuals are instrumentalized to transcend processes of submission and alienation, thus overcoming contradictions based on renewable syntheses. The probable satisfaction in this experience opens up the possibility for the analysis of new contradictions and, so on, in a horizon of overcoming.<sup>(5)</sup>

The consequent “Health services/Work process” indicates the way to overcome the programmatic vulnerability of the health system, from the moment it makes explicit the organizational ambivalences and provides opportunities for resistance and protagonism of civil servants in the political sphere, thus enhancing structural changes. Accordingly, dialectical analysis promotes advances in the work process by inciting different interpretations of a material reality of the nursing category in constant movement, not imposed and immutable, taking into account health practices, the ideal and the possible, as well as different perspectives of workers’ health.<sup>(46)</sup>

The consequent “Formative paradigmatic” indicates that the conceptual development of a historical and dialectical care structure in nursing education proposes the revision of competencies, skills and attitudes necessary for the compatibility between service/professional and the needs of individuals/society, and that they focus attentively on multidimensional issues of the health-disease process. It refers to dialectical learning, which is based on the interaction between person and environment as fundamental element for the production of knowledge, which explores, during formative practice, the tensions and opposites that are constitutive of dynamic scenarios in real life.<sup>(47,48)</sup> The formative practice of a dialectical nature exposes educators and students to situations of resistance and changes, including the organizational nature of the curriculum in

its philosophical pedagogical references, which lead to alternations of results, assuming that one social arrangement gives way to another, successively.<sup>(48)</sup> In this field, the idea and ideal of care under the reference of the social production of health is permanently analyzed in terms of the interpenetration of opposites, that is, in terms of intertwining the elements of reality, which cannot be analyzed in isolation.<sup>(48)</sup>

The nursing interventions produced in the model case were formulated by considering the individual in his/her existence-suffering, and the dialectical historical materialist approach is a possibility to consider the human being in a changing historical context, in order to overcome the focus on the disease, the biological dimension and the medicalization of problems.<sup>(11)</sup>

Regarding the implications for nursing, what the praxis support of the concept of dialectical nursing care tends to operate in nursing professionals is resistance against dominating structures and forces and the freedom to direct their work process, in line with their ethics and deontology, bringing to the nursing professional's awareness the extensive range of dimensions belonging to care, from what the person and his/her environment reveal and from what he/she weaves, which unveils other problems and other possibilities of solution, in the continuum of the health-disease-care process. Historically, humanistic forms of care inscribed in psychosocial models expand in relation to biomedical practices and express values of the extended clinic, turning to the subject in suffering and valuing his/her surroundings in the care process, in actions chained in the territory and that integrate the subject into his/her culture.<sup>(11)</sup> The contribution of the concept of dialectical nursing care is to clarify and standardize a language about this approach to care, which highlights the ambivalences that are established in the scope of the social production of health, promoting careful investigation from the dialectical historical perspective, capable of sharpening the

caregiver's dialectical sensitivities and attitudes, which allow the development of dynamic care practices, renewable and surmountable with each care process.

As for the limitations, the current study was based on Rodgers' concept analysis method, which requires a literature review, without, however, having a review system. Nonetheless, an integrative review was chosen. In addition, the search for articles was restricted to the following languages: English, Portuguese and Spanish.

**Conclusion.** The production of the concept of dialectical nursing care was developed based on Rodgers' Concept Analysis and was based on antecedents captured in human and social relationships, in the functionality of health services and their work processes, as well as in training. In these analysis scenarios, the authors sought the motivations to rethink a care model. Both in the social determinations in health and in the promotion of the environment in health services, the attributes of dialectical care expose the driving elements of the dialectical sensitivity and attitude developed and improved in nursing professionals. The consequents resulting from dialectical nursing care are potential improvements in the response of services to the needs of the population and qualification of the relationship between the being cared for and society, in the structure of services and in the relationship between the latter and professionals. In addition, it tends to break educational paradigms. In this way, the analysis of the dialectic inscribed in the social production of suffering/illness and well-being/health is fostered, maximizing people's protagonism, in order to make health-promoting decisions compatible with the social reality and historical moment, operating syntheses and new syntheses. It is considered that this concept, based on evidence, drives nurses to overcome paradigmatic barriers and challenges, with a macrosocial, formative and procedural dimension of work. Ensuring healthy lives and promoting well-being for all, at all ages, is one of the challenging goals of the United Nations

and its member states to meet by the year 2030 in achieving the Sustainable Development Goals (SDGs). The concept of dialectical nursing care aims to respond to SDG 3, which intends to promote the mental health and well-being of all people, at all ages. New technologies for promoting care become fundamental to achieve this objective.

Furthermore, this concept was investigated from the perspective of the nursing literature; however, the social and interdisciplinary dimension of dialectical care foresees intersectionalities that suggest its multiprofessional incorporation.

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# Educational intervention to prevent postoperative complications and improve functional outcomes in patients with transurethral resection of the prostate

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Original Article



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## Educational intervention to prevent postoperative complications and improve functional outcomes in patients with transurethral resection of the prostate

**Objective.** To assess the effectiveness of an educational intervention in reducing post-operative complications and improve functional outcome patients undergoing Transurethral Resection of the Prostate -TURP-. **Methods.** A quasi-experimental nursing-led study (post-test only control design) was conducted among 60 TURP patients (intervention group  $n=30$  and control group  $n=30$ ). Face-to-face education on self-management strategies lasting 20-25 minutes, educational booklet and weekly telephone follow-up was administered to the intervention group; while control group received routine care. Data collection tool administered at 4th and 8th week post TURP included a post-operative checklist, IPSS (International Prostate Symptom Score), and IIEF (international index of erectile function). **Results.** Urinary incontinence rates were considerably reduced in the experimental group at 4 weeks ( $p<0.001$ ). Despite an 8-week reduction in differences, both groups Indicated effective care and no cases of trans-urethral resection syndrome or urinary tract infection. In the experimental group, IPSS scores were lower ( $9.9\pm 4.6$ ) than in the control group ( $15.6\pm 5.8$ ) indicating improved symptoms ( $p<0.001$ ). Additionally, IIEF scores were higher in the experimental Group ( $3.5\pm 1.2$ ) than in the control group ( $2.6\pm 1.2$ ), suggesting improved erectile function with nurse-led intervention ( $p<0.004$ ). **Conclusion.** The nurse-led educational intervention effectively improves functional outcomes and reduce post-operative complications in Benign prostatic hyperplasia patients following TURP. Integrating such interventions by healthcare professionals can further accelerate recovery and minimize complications.

**Descriptors:** nurses; transurethral resection of prostate; non-randomized controlled trials as topic; control groups.

## Intervención educativa para prevenir las complicaciones postoperatorias y mejorar los resultados funcionales en pacientes con resección transuretral de la próstata

**Objetivo.** Evaluar la efectividad de una intervención educativa para reducir las complicaciones postoperatorias y mejorar los resultados funcionales de los pacientes sometidos a Resección Transuretral de Próstata -RTUP-. **Métodos.** Se realizó un estudio cuasi-experimental liderado por enfermería , con grupo control solo en el post-test. Participaron 60 pacientes sometidos a RTUP (grupo intervención  $n=30$  y grupo control  $n=30$ ) en Rajasthan, India. Al grupo de intervención se le impartió educación por enfermería sobre estrategias de automanejo de 20-25 minutos de duración, un folleto educativo y seguimiento telefónico semanal; mientras que el grupo de control recibió atención rutinaria. La herramienta de recogida de datos fue administrada a la 4ª y 8ª semana tras la RTUP incluía una lista de comprobación postoperatoria IPSS (puntuación internacional de síntomas prostáticos) e IIFE (índice internacional de función eréctil). **Resultados.** Las tasas de incontinencia urinaria se redujeron considerablemente en el grupo experimental a las 4 semanas ( $p<0.001$ ). A pesar de que las diferencias se redujeron a las 8 semanas, ambos

grupos indicaron una atención eficaz y ningún caso de síndrome de resección transuretral o infección urinaria. En el grupo experimental, las puntuaciones del IPSS fueron más bajas ( $9.9 \pm 4.6$ ) que en el grupo de control ( $15.6 \pm 5.8$ ), lo que indica una mejoría de los síntomas ( $p < 0.001$ ). Además, las puntuaciones del IIEF fueron mayores en el grupo experimental ( $3.5 \pm 1.2$ ) que en el grupo de control ( $2.6 \pm 1.18$ ), lo que sugiere una mejora de la función eréctil con la intervención ( $p < 0.004$ ). **Conclusiones.** La intervención educativa dirigida por enfermeras mejora eficazmente los resultados funcionales y reduce las complicaciones postoperatorias en pacientes con hiperplasia benigna de próstata tras una RTUP. La integración de este tipo de intervenciones por parte de los profesionales sanitarios puede acelerar aún más la recuperación y minimizar las complicaciones.

**Descriptor:** enfermeras y enfermeros; resección transuretral de la próstata; ensayos clínicos controlados no aleatorios como asunto; grupos control.

### Intervenção educativa para prevenção de complicações pós-operatórias e melhora dos resultados funcionais em pacientes submetidos à ressecção transuretral de próstata

**Objetivo.** Avaliar a eficácia de uma intervenção educacional na redução de complicações pós-operatórias e na melhora dos resultados funcionais em pacientes submetidos à Ressecção Transuretral da Próstata (RTU). **Métodos.** Um estudo quase experimental (com um grupo controle apenas no pós-teste) foi conduzido por enfermeiros com a participação de 60 pacientes submetidos à RTU (grupo intervenção  $n = 30$  e grupo controle  $n = 30$ ). O grupo intervenção recebeu educação presencial sobre estratégias de autogestão com duração de 20 a 25 minutos, um folheto educativo e acompanhamento semanal por telefone; enquanto o grupo controle recebeu cuidados de rotina. A ferramenta de coleta de dados administrada em 4 e 8 semanas após a RTU incluiu uma lista de verificação pós-operatória, IPSS (*International Prostate Symptom Score*) e IIEF (*International Index of Erectile Function*). **Resultados.** As taxas de incontinência urinária foram significativamente reduzidas no grupo experimental em 4 semanas ( $p < 0.001$ ). Embora as diferenças tenham diminuído em 8 semanas, ambos os grupos relataram cuidados eficazes e nenhum caso de síndrome de ressecção transuretral ou infecção do trato urinário. As pontuações do IPSS foram menores no grupo experimental ( $9.9 \pm 4,6$ ) do que no grupo controle ( $15.6 \pm 5,8$ ), indicando melhora nos sintomas ( $p < 0.001$ ). Além disso, as pontuações do IIEF foram maiores no grupo experimental ( $3.5 \pm 1.2$ ) do que no grupo controle ( $2.6 \pm 1.18$ ), sugerindo melhora da função erétil com a intervenção liderada por enfermeiros ( $p < 0.004$ ). **Conclusões.** A intervenção educacional liderada por enfermeiros melhora efetivamente os resultados funcionais e reduz as complicações pós-operatórias em pacientes com hiperplasia prostática benigna após TURP. A integração dessas intervenções por profissionais de saúde pode acelerar ainda mais a recuperação e minimizar as complicações.

**Descritores:** enfermeiras e enfermeiros; ressecção transuretral da próstata; ensaios clínicos controlados não aleatórios como assunto; grupos controle.

## Introduction

**B**enign prostatic hyperplasia (BPH) is a common, noncancerous enlargement of the prostate gland that affects aging men, leading to urinary symptoms such as weak stream, urgency, frequency, hesitancy, and incontinence.<sup>(1,2)</sup> Its prevalence increases with age, affecting approximately 15% of men over 40 and up to 60% of men by the age of 90.<sup>(1)</sup> Treatment options include lifestyle modifications, pharmacological management, and surgical interventions, with transurethral resection of the prostate (TURP) being the gold standard for symptomatic relief.<sup>(2-5)</sup> While TURP is highly effective in improving urodynamic outcomes, it is associated with various complications, including early iatrogenic stress incontinence (30%–40%), urethral strictures (2.2%–9.8%), urinary retention, and erectile dysfunction (3.4%–32%).<sup>(3,6)</sup> Additionally, TURP may lead to ejaculatory dysfunction (53%–75%) and psychological distress related to sexual health.<sup>(5,7,8)</sup> Postoperative complications such as urinary tract infections, bleeding, catheter blockage, bladder discomfort, and TUR syndrome due to fluid overload further impact recovery and quality of life.<sup>(1,5,6)</sup> Given these challenges, comprehensive post-operative care is crucial to minimize complications and improve functional outcomes.

Nurse-led interventions, including structured patient education on self-care, activity modification, nutrition, hygiene, and symptom management, play a vital role in enhancing recovery and overall well-being.<sup>(1,10,11)</sup> However, limited research has been conducted in our country on the effectiveness of nursing education in reducing post-operative complications and optimizing functional outcomes following TURP.<sup>(9,10,12)</sup> This study aims to assess the impact of a nurse-led educational intervention on preventing post-operative complications and improving functional outcomes among patients undergoing TURP at a tertiary care centre. By addressing this research gap, the study seeks to highlight the essential role of nursing education in improving patient outcomes and advancing evidence-based nursing practices in surgical care.

## Methods

**Study design.** A quasi-experimental post-test control group study with experimental and control group was conducted from October 2023 to March 2024. The study was carried out in All India Institute of Medical Sciences, Jodhpur, India, and a sample size of 60 patients which accounted for a 10% dropout rate was established statistically. The consecutive sampling technique was used for selection of participant.

**Setting and Participants.** The criteria for inclusion used to find participants: older than 40 year, able to understand Hindi or English, and willing to provide

consent. Patients who were sexually inactive, had failed TURP, or were unable of understanding instructions were among the exclusion criteria.

**Measures.** Data were collected using a demographic with clinical variable sheet, international prostate symptom score, international index of erectile function questionnaire and self-develop post-operative checklist. (i) The International Prostate Symptom Score (IPSS), a validated tool with eight questions, evaluates BPH symptoms experienced in the past month such as incomplete bladder emptying and frequent urination. Scores ranging from 0 to 35 categorize symptom severity into mild (0-7), moderate (8-19), and severe (20-35); (ii) The International Index of Erectile Function (IIEF) questionnaire, a validated tool with 15 questions, is commonly used in clinical trials to evaluate treatment effects on erectile dysfunction. Each question, rated from 0 to 5, assesses four key domains of male sexual function: erectile function, orgasmic function, sexual desire, and intercourse satisfaction. Scores falling within specific ranges categorize patients' severity levels: severe (6–10), moderate (11–16), mild-to-moderate (17–21), mild (22-25) and no dysfunction (26-30); (iii) The self-developed post-operative checklist to asses UTI, urinary incontinent, hematuria, fever and TUR syndrome. This checklist gives us the information about how many patients underwent post-operative complications after TURP and checklist is validated by various medical experts.

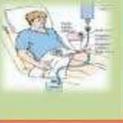
**Validity and reliability.** The tool, health education pamphlet underwent validation by medical and nursing experts. Furthermore, the tools were validated for Hindi by a Hindi literature expert. For reliability, the IPSS-and the IIEF questionnaire were pre-validated, demonstrating Cronbach's  $\alpha$  values of 0.91<sup>(13)</sup> and 0.828,<sup>(14)</sup> respectively.

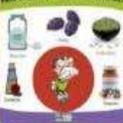
**Intervention.** Control group participants received routine care for undergoing TURP as per the protocols of the urology IPD. This included discharge teaching by a senior resident related to post-operative complications. Experimental group participants received the following nurse-

led intervention in addition to routine care for undergoing TURP: **(i) Health Education:** The Experimental group received health education on self-management strategies with help of PPT and face to face interview at 20-25 minute. These included recommendations to avoid strenuous activities, such as heavy lifting, for four to six weeks, refraining from moving heavy objects, abstaining from sexual activity for the last four to six weeks, and maintaining adequate hydration. Additionally, participants were advised on specific behavioural changes, such as bladder retraining (including pelvic floor exercises), double voiding, and urethral milking. Dietary changes were also recommended to prevent constipation; **(ii) Pamphlet distribution:** An educational pamphlet was provided to the experimental group patients immediately after the health education session. The pamphlet included the following components: definition of the procedure, benefits of the procedure, possible post-operative complications, all self-management strategies and specific changes in behavior explained above, and expected future complications. (Figure1); **(iii) Telephonic follow-up:** Telephonic confirmation and reinforcement were done once weekly to ensure the compliance of interventions taught to the patients during the nurse-led educational intervention.

**Post-intervention data collection.** At 4 week's post-intervention, post-operative complications were assessed in both the control and experimental groups. The IPS questionnaire was also administered to both groups. At 8 weeks post-intervention, post-operative complications were again assessed in both the control and experimental groups and the IIEF questionnaire. Both sets of data were collected through direct face-to-face interviews, utilizing a combination of self-report and interview methods.

**Data analysis.** Descriptive statistics (frequency, percentage, mean, and standard deviation) and inferential statistics (independent simple t-tests, chi-square and Fisher's exact test) were used to test hypotheses and compare groups during data analysis using SPSS v20. P value less than 0.05 was considered statistically significant.

WHAT IS PROSTATE?	INDICATION	POST TURP INTERVENTIONS
<ul style="list-style-type: none"> <li>Prostate is a gland which only men have.</li> <li>It is usually the size and shape of a walnut.</li> <li>It sits underneath the bladder and surrounds the urethra, which is the tube men urinate and ejaculate through.</li> </ul> 	<p><b>BENIGN PROSTATIC HYPERPLASIA</b></p> <p><b>INCIDENCE</b></p> <p>About 150 million men are affected. BPH typically begins after the age of 40. Half of males age 50 and over are affected. After the age 80, that figure climbs to as high as about 90% of males affected.</p>	<p><b>CONTINUOUS BLADDER IRRIGATION</b></p>  <p><b>OBSERVE DRAINAGE</b></p> 
<p><b>What is benign prostate hyperplasia?</b> An increase in the size of the prostate which isn't caused by cancer termed as benign prostatic hyperplasia</p> <ul style="list-style-type: none"> <li>Benign – not cancer</li> <li>Prostatic – to do with the prostate</li> <li>Hyperplasia- an increase in size</li> </ul> <p>Resulting into bladder outlet obstruction and restricted urine output</p>	<p><b>COMPLICATIONS OF TURP</b></p> <p><b>BLEEDING</b></p>  <p><b>ERECTILE DYSFUNCTION</b></p> 	<p><b>PREVENTION OF BLADDER SPASM</b></p> 
<p><b>TURP</b></p>  <p>Transurethral resection of the prostate is a surgery used to treat urinary problems that are caused by an enlarged prostate</p>	<p><b>ERECTILE DYSFUNCTION</b></p>  <p><b>DIFFICULTY URINATING</b></p> 	<p><b>PAIN MANAGEMENT</b></p> <p><b>ANALGESIC</b></p>  <p><b>DECREASE ACTIVITY</b></p> 
		<p><b>INCREASE FIBER DIET AND LAXATIVE</b></p> 

Fluid intake (ml/day)	Urine output (ml/day)	Any complication (remark)	HOW TO PREVENT POST-OPERATIVE COMPLICATIONS AND IMPROVE FUNCTIONAL OUTCOME	ALL INDIA INSTITUTE OF MEDICAL SCIENCES, JODHPUR
			<p><b>DRINK PLENTY OF FLUID</b></p>  <p><b>TAKE STOOL SOFTENERS</b></p> 	 
			<p><b>AVOID STRENOUS EXERCISE, LIFTING, AND BENDING</b></p>  	<p><b>TRANS-URETHRAL RESECTION OF PROSTATE</b></p> 
			<p><b>PELVIC FLOOR EXERCISES FOR 3-4 WEEK</b></p>  <p><b>AVOID SEXUAL ACTIVITY FOR 4-6 WEEK</b></p> 	<p><b>GUIDED BY</b> Mr. Nipin Kalal (Assistant Professor, CON, AIIMS Jodhpur)</p> <p><b>CO-GUIDED BY</b> Dr. Mahendra Singh (Associate Professor Department of Urology AIIMS, Jodhpur)</p> <p>Mr. Khias Sharma (Tutor, Clinical instructor, CON, AIIMS, Jodhpur)</p> <p>Prepared by : Mohd Parvez (Msc Nursing)</p>
<p>MOHD. PARVEZ (M.Sc Nursing) Contact number : (7727862304) ALL INDIA INSTITUTE OF MEDICAL SCIENCES JODHPUR</p>				

## Results

Table 1 presents the sociodemographic and clinical characteristics associated with the individuals who were part of the experimental and control groups. The distributions of all were comparable in both groups, suggesting homogeneity. Most participants were between 61–80 years in both groups; control (73.3%) and experimental (60%) ( $p=0.71$ ). 80% of the control and 70% of the experimental group were self-employed ( $p=0.28$ ) and 66.7% from rural areas in both groups ( $p=0.45$ ). 46.7% of the control group and 56.7% of the experimental group had no

comorbidities and above one third in both the groups were hypertensive ( $p=0.11$ ). Previous urethral surgery was reported in 13.3% of control and 20% of experimental group ( $p = 0.11$ ). 63.3% of the control group and 73.3% of the experimental group ( $p=0.95$ ) reported a normal PSA level ( $<4$  ng/ml). Uroflowmetry results were  $<10$ ml/sec in 73.3% of control and 56.7% of experimental group participants ( $p=0.26$ ). These results imply that the study's participant pool was well-matched, ensuring uniformity in the assessment of therapeutic results and enabling reliable comparisons between the experimental and control groups.

**Table 1. Sociodemographic and clinical variables of the participants by group**

Clinical Variables	Control group (n=30)	Experimental group (n=30)	Total (n=60)	p-value (chi-square)
<b>Sociodemographic variables</b>	<b>f (%)</b>	<b>f (%)</b>	<b>f (%)</b>	
<b>Age (Years)</b>				
40-60	8 (26.7)	12 (40)	20 (33.3)	0.71
61-80	22 (73.3)	18 (60)	40 (66.7)	
<b>Education</b>				
No formal education	15 (50)	13 (43.3)	28 (46.7)	0.97
Primary	2 (6.7)	10 (33.3)	12 (20.0)	
Secondary and senior secondary	7 (23.3)	4 (13.3)	11 (18.3)	
Graduation	6 (20)	3 (10.1)	9 (15.0)	
<b>Occupation</b>				
Unemployed	2 (6.7)	5 (16.7)	7 (11.7)	0.28
Self- employed	24 (80.0)	21 (70.0)	45 (75.0)	
Govt. service and other	4 (13.3)	4 (13.3)	8 (13.3)	
<b>Area of residence</b>				
Urban	10 (33.3)	10 (33.3)	20 (33.3)	0.45
Rural	20 (66.7)	20 (66.7)	40 (66.7)	
<b>Clinical variables</b>				
<b>Duration of symptom</b>				
< 6 months	9 (30.0)	8 (26.7)	17 (28.3)	0.72
> 6 months	21 (70.0)	22 (73.3)	43 (71.7)	
<b>Bowel habits (constipation)</b>				
No	12 (40.0)	9 (30.0)	21 (35.0)	0.71
Yes	18 (60.0)	21 (70.0)	39 (65.0)	
<b>Any comorbidities</b>				
No	14 (46.7)	17 (56.7)	31 (51.7)	0.11
Hypertension	10 (33.3)	9 (30.0)	19 (31.7)	
Diabetes Mellitus	6 (20.0)	4 (13.3)	10 (16.6)	

**Table 1. Sociodemographic and clinical variables of the participants by group (Cont.)**

Variables	Control group (n=30)	Experimental group (n=30)	Total (n=60)	p-value (chi-square)
<b>Previous intervention (per urethral surgery)</b>				
Yes	4 (13.3)	6 (20.0)	10 (16.6)	0.11
No	26 (86.7)	24 (80.0)	50 (83.3)	
<b>Prostate specific antigen (ng/ml)</b>				
<4	19 (63.3)	22 (73.3)	41 (68.3)	0.95
4-10	11 (36.7)	8 (26.7)	19 (31.7)	
<b>USG-KUB (prostate volume)</b>				
<20cc	4 (13.3)	5 (16.7)	9 (15.0)	0.44
20-40cc	13 (43.3)	10 (33.3)	23 (38.3)	
>40cc	13 (43.3)	15 (50.0)	28 (46.7)	
<b>Uroflowmetry (Qmax.ml/sec)</b>				
>15	3 (10.0)	2 (6.7)	5 (8.3)	0.26
10-15	5 (16.7)	11 (36.7)	16 (26.7)	
<10	22 (73.3)	17 (56.7)	39 (65.0)	
<b>BPH (grade)</b>				
1	5 (16.7)	9 (30.0)	14 (23.4)	0.14
2	16 (53.3)	15 (50.0)	31 (51.6)	
3	9 (30.0)	6 (20.0)	15 (25.0)	

USG-KUB: Ultrasound of the kidney, ureters and bladder

Table 2 shows that After four weeks; the experimental group exceeded the control group in terms of both quality of life and reduced intensity of symptoms. The experimental group exhibited a notable decrease with an average IPSS score of  $9.9 \pm 4.6$ , which was considerably lower than the control group's score of  $15.6 \pm 5.8$  ( $p < 0.001$ ). In addition, the IPSS-QOL index mean for the experimental group was  $1.6 \pm 0.9$ , significantly higher than the control group's  $2.7 \pm 0.9$  ( $p < 0.001$ ), indicating a much higher quality of life. These results highlight the experimental intervention's clinical value in improving participants' overall well-being and reducing symptoms of post-operative complications of TURP. The experimental group's erectile function

significantly improved when compared to the control group. At 8 weeks the control groups mean International Index of Erectile Function (IIEF) score was  $2.6 \pm 1.18$ , while the experimental group's score was higher at  $3.5 \pm 1.2$  ( $p < 0.004$ ). This demonstrates how well the nurse-led intervention improved erectile function. Post-operative complications after TURP are presented in Table 3 for both the experimental and control groups. Urinary incontinence rates were considerably reduced in the experimental group at 4 weeks ( $p = 0.001$ ). Despite an 8-week reduction in differences, both groups Indicated effective care and no cases of TUR (trans-urethral resection syndrome) or UTI (urinary tract infection)

**Table 2. Comparison the intervention effects on the International Prostate Symptom Score (IPSS) and International index of erectile function (IIEF) between the Control and Experimental groups.**

Variables	Control group (n=30) Mean ±SD	Experimental group (n=30) Mean ±SD	p-value*
IPSS score - After 4 weeks	15.6±5.8	9.9±4.6	<0.001
IPSS-QOL index - After 4 weeks	2.7±0.9	1.6±0.9	<0.001
IIEF score - After 8 weeks	2.6±1.18	3.5±1.2	<0.004

(\*) Independent sample t-test; IPSS (Min-Max score = 0 to 35); IPSS-QOL Index (Min-Max score = 0-6)

**Table 3. Comparison of post-operative complications among Control and Experimental groups after 4 and 8 weeks of TURP**

Variables	Control group (n=30) f (%)	Experimental group N(30) f (%)	p-value ( chi-square)	Control group (n=30) f (%)	Experimental group (n=30) f (%)	p-value (chi-square)
	After 4 weeks of TURP			After 8 weeks of TURP		
<b>Hematuria</b>						
Yes	8 (26.7)	3 (10.0)	0.09	10 (33.3)	7 (23.3)	0.39
No	22 (73.3)	27 (90.0)		20 (66.7)	23 (76.7)	
<b>Urinary incontinence</b>						
Yes	13 (43.3)	2 (6.7)	0.001	19 (63.3)	16 (53.3)	0.43
No	17 (56.7)	28 (93.3)		11 (36.7)	14 (46.7)	
<b>Fever</b>						
Yes	4 (13.3)	1 (3.3)	0.35	7 (23.3)	6 (20.0)	0.75
No	26 (86.7)	29 (96.7)		23 (76.7)	24 (80.0)	

## Discussion

The present study aimed to evaluate the impact of a nurse-led educational intervention on post-operative outcomes in patients undergoing Transurethral Resection of the Prostate (TURP). Demographic characteristics were comparable across the control and experimental groups. Most participants were aged 61–80 and had been experiencing symptoms of benign prostatic hyperplasia (BPH) for over six months. Similar

findings have been reported by Khalil *et al.*<sup>(1)</sup> and Begla *et al.*,<sup>(4)</sup> though the age range in their studies tended to be slightly younger. Prostate-specific antigen (PSA) levels were normal in over two-thirds of participants, aligning with Chaudhary *et al.*,<sup>(2)</sup> who found average PSA levels of 2.6 ng/ml and 1.4 ng/ml in their cohorts. In our study, 46.7% of participants had prostate volumes exceeding 40 cc, which contrasts with the 20–40 cc average noted in Chaudhary *et al.*,<sup>(2)</sup> suggesting that prostate volume alone may not directly correlate with symptom severity. Additionally, our

study found that most patients (65%) had a low maximum flow rate of urine (<10ml/sec), similar to Chaudhary *et al.*<sup>(2)</sup> reinforcing that BPH is often associated with decreased urinary flow and the subsequent need for TURP.

The study examined the occurrence of post-operative complications following TURP procedure, including haematuria (blood in urine), UTIs, urinary incontinence, fever, and TUR syndrome. In our study, we found no significant difference in post-operative TURP complications, except for the persistence of urinary incontinence after 4 weeks of intervention. Our findings indicated that haematuria was less frequent after four weeks in both the control and experimental groups compared to findings in a study by Khali *et al.*<sup>(1)</sup> Similarly, urinary incontinence was observed in the control group after four weeks; our findings contrasted with the result by Khali *et al.*<sup>(1)</sup> where it was not reported in either group. We also found that a nurse-led educational intervention effectively prevented fever and urinary incontinence incidence in the experimental group compared to the control group. Notably, we did not observe any UTIs or cases of TUR syndrome during the study period. The risk of UTIs could be minimized through prolonged use of prophylactic antibiotics, while advanced procedures and maintenance of electrolyte balance during the intervention could help reduce the risk of TUR Syndrome. In contrast to our findings, Rassweiler *et al.*<sup>(15)</sup> reported that certain complications, such as UTIs and haematuria, might occur after six weeks following TURP.

The mean IPSS score decreased in the experimental group ( $9.9 \pm 4.6$ ), suggesting a beneficial effect of the educational intervention. These findings are in line with Chaudhary *et al.*,<sup>(2)</sup> who also observed a significant reduction in the IPSS following a nurse-led intervention. The IPSS-QOL index and IIEF scores showed statistically significant improvements in the experimental group, further indicating the intervention's efficacy in improving quality of life and functional outcomes. Similar

results were observed by Bayat *et al.*,<sup>(3)</sup> who emphasized the benefits of pelvic floor exercises as part of post-operative care. The study findings suggest that a structured, nurse-led educational intervention positively affects both functional outcomes and post-operative complications. Moreover, the outcomes of our study align with those reported by Bayat *et al.*<sup>(3)</sup> However, no previous study has specifically examined the impact of nurse-led educational interventions on both post-operative complications and functional outcomes in patients undergoing TURP. This study demonstrates that such interventions can effectively improve functional outcomes and reduce post-operative complications in TURP patients.

**Conclusion.** In recent years, transurethral prostate resection (TURER) has been the gold standard treatment for benign prostatic hyperplasia (BPH). However, there have been significant changes in self-care practices, mainly due to the emergence of serious post-operative complications. Engaging in self-care and adopting a healthy lifestyle not only helps prevent post-operative complications, but also improves functional outcomes.

The results of this study underscore the benefits of a nurse-led educational intervention. However, it was found that concurrent nurse-led education further improved functional outcomes and reduced the incidence of postoperative complications. It is therefore strongly recommended that comprehensive health education is provided by health professionals. Such an approach may lead to more substantial improvements in a shorter period of time, reducing the severity of complications and improving functional outcomes for patients following TURP.

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# Knowledge, self-efficacy, satisfaction and self-confidence of nursing students for stoma care using active learning methodologies: a quasi-experimental study of three arms

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Original Article



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## Knowledge, self-efficacy, satisfaction and self-confidence of nursing students for stoma care using active learning methodologies: a quasi-experimental study of three arms

### Abstract

**Objective.** To assess knowledge about stoma care in relation to the level of learning methods and to measure students' self-confidence, satisfaction and self-efficacy with the training received using different learning methods including simulation. **Methods.** A quasi-experimental study of three arms, with pretest and post-test design in third-year nursing students during the academic year 2022-2023. Group A received traditional teaching methods and low-fidelity simulation, group B received traditional teaching methods and high-fidelity simulation, and group C received active learning methods and high-fidelity simulation. **Results.** Significant differences were found in 14 of the 15 NOC indicators measured between groups. Self-efficacy showed significant differences between the different groups ( $p < 0.001$ ) after the intervention. For satisfaction and self-confidence, there were significant differences ( $p < 0.001$ ) observed between the different fidelity groups). **Conclusion.** This study found that simulation improved the level of knowledge regarding ostomies and had a positive impact on satisfaction and self-confidence in all three intervention groups, with significantly higher results among participants in Group C (active learning methods and high-fidelity simulation).

**Descriptors:** active learning; nursing education; simulation; surgical stomas; virtual reality.

## Conocimientos, autoeficacia, satisfacción y autoconfianza de los estudiantes de enfermería para el cuidado de estomas utilizando metodologías de aprendizaje activo: un estudio cuasiexperimental de tres brazos

### Resumen

**Objetivo.** Evaluar los conocimientos sobre ostomías en relación con el nivel de los métodos de aprendizaje y medir la autoconfianza, satisfacción y autoeficacia de los estudiantes con la formación recibida usando diferentes métodos de aprendizaje, incluida la simulación. **Métodos.** Estudio cuasiexperimental de tres brazos, con diseño pretest y posttest en estudiantes de tercer curso de enfermería durante el curso 2022-2023. El grupo A recibió métodos tradicionales de enseñanza y simulación de baja fidelidad, el grupo B recibió métodos tradicionales de enseñanza y simulación de alta fidelidad, y el grupo C recibió métodos activos de aprendizaje y simulación

de alta fidelidad. **Resultados.** Se encontraron diferencias significativas en 14 de los 15 indicadores NOC medidos entre los grupos. Tras la intervención la autoeficacia mostró diferencias significativas entre los distintos grupos ( $p < 0.001$ ). En cuanto a la satisfacción y la autoconfianza, también se observaron diferencias significativas ( $p < 0.001$ ). **Conclusiones.** En este estudio se encontró que la simulación mejoró el nivel de conocimientos en relación con las ostomías, y tuvo un impacto positivo en la satisfacción y la autoconfianza en los tres grupos de intervención, siendo mucho más altos los resultados en los participantes del grupo C (métodos de aprendizaje activo y simulación de alta fidelidad).

**Descriptor:** aprendizaje activo; educación en enfermería; simulación; estomas quirúrgicos; realidad virtual.

## Conhecimento, autoeficácia, satisfação e autoconfiança de estudantes de enfermagem no cuidado com estoma utilizando metodologias ativas de aprendizagem: um estudo quase-experimental de três braços

### Resumo

**Objetivo.** Avaliar o conhecimento sobre ostomia em relação ao nível dos métodos de aprendizagem e mensurar a autoconfiança, a satisfação e a autoeficácia dos alunos com o treinamento recebido usando diferentes métodos de aprendizagem, incluindo simulação. **Métodos.** Um estudo quase experimental de três braços com delineamento pré-teste e pós-teste em alunos do terceiro ano de enfermagem durante o ano acadêmico de 2022-2023. O grupo A recebeu métodos de ensino tradicionais e simulação de baixa fidelidade, o grupo B recebeu métodos de ensino tradicionais e simulação de alta fidelidade e o grupo C recebeu métodos de aprendizagem ativa e simulação de alta fidelidade. **Resultados.** Foram encontradas diferenças significativas em 14 dos 15 indicadores NOC medidos entre os grupos. Após a intervenção, a autoeficácia apresentou diferenças significativas entre os diferentes grupos ( $p < 0.001$ ). Em relação à satisfação e à autoconfiança, também foram observadas diferenças significativas ( $p < 0.001$ ). **Conclusões.** Este estudo descobriu que a simulação melhorou o nível de conhecimento sobre ostomias e teve um impacto positivo na satisfação e autoconfiança em todos os três grupos de intervenção, com resultados significativamente maiores entre os participantes do Grupo C (métodos de aprendizagem ativa e simulação de alta fidelidade).

**Descriptor:** aprendizado ativo; educação em enfermagem; simulação; estomas cirúrgicos; realidade virtual.

## Introduction

An intestinal stoma is a surgical opening created in the abdominal wall to allow the passage of faeces from the intestine to an external collecting device, bypassing the usual route through the rectum and anus. Many diseases lead to its creation; however, colorectal cancer, the third most diagnosed cancer worldwide<sup>(1)</sup> is the main cause.<sup>(2)</sup> People with ostomies experience changes that result in impaired body image, depression, social isolation, etc.,<sup>(3)</sup> often requiring educational interventions to address them. The ability to perform stoma care can provide the competence of the ostomate to feel confident in the management of the ostomy and improve their quality of life. The stoma care nurses are the main provider of care to these people, offering them strategies to address their new reality, ensure continuity of care, minimize complications, and reduce costs and hospitalization time, among others.<sup>(2)</sup> Therefore, it is essential to integrate stoma care training as a fundamental competency for nursing students to ensure optimal care and support their professional, social, and familial adaptation.

Currently, there is a significant change occurring in the clinical learning experiences of graduate nursing students. However, stoma care training still relies largely on physical manikins<sup>(4)</sup> more than on active learning methods (ALMs), such as flipped classroom or virtual reality (VR). Among the major challenges posed by the European Higher Education Area ALMs stand out, where the student is the protagonist of his or her learning, adopting an active, creative, and autonomous role.<sup>(5)</sup> Integrating ALMs with traditional approaches in undergraduate nursing enhances the application of theoretical knowledge in clinical practice.<sup>(6)</sup> For their part, Information Technologies have replaced traditional teaching methods with new digital learning spaces, thereby helping in the integration of ALMs into teaching processes. Their enhances student motivation by achieving attractive, fun, and meaningful learning, ultimately improving the quality of the teaching-learning process.<sup>(7)</sup> These technomethodological changes have promoted new forms of knowledge transmission with great educational potential.<sup>(8)</sup> High-fidelity simulation, like augmented and VR are considered innovative and improve academic results.<sup>(9,10)</sup> VR allows clinical and decision-making skills to be practiced in a safe and controlled learning environment avoiding patient safety issues and ethical concerns.<sup>(11)</sup> The use of ALMs in nursing has been associated with the development of key student competencies, such as Evidence-Based Practice<sup>(12)</sup> or perceived clinical and cultural competencies,<sup>(13)</sup> all of which are essential to professional practice. To date, no studies have assessed the impact of ALMs and VR simulation on knowledge, self-confidence, satisfaction, and self-efficacy in the context of ostomy care education. Thus, the results of this study could shed light on future educational modes for developing clinical competencies in ostomy care-related content. Therefore, the aims of this study are a) to assess knowledge about stoma care regarding level of learning methods; and b) to

measure students' self-efficacy, satisfaction and self-confidence with the training received from the level of fidelity, including simulation. We propose the following hypothesis: (H1) The use of active learning and simulation methods with virtual reality improves the knowledge, self-efficacy, satisfaction and self-confidence of nursing students in the care of people with ostomies compared to traditional methods.

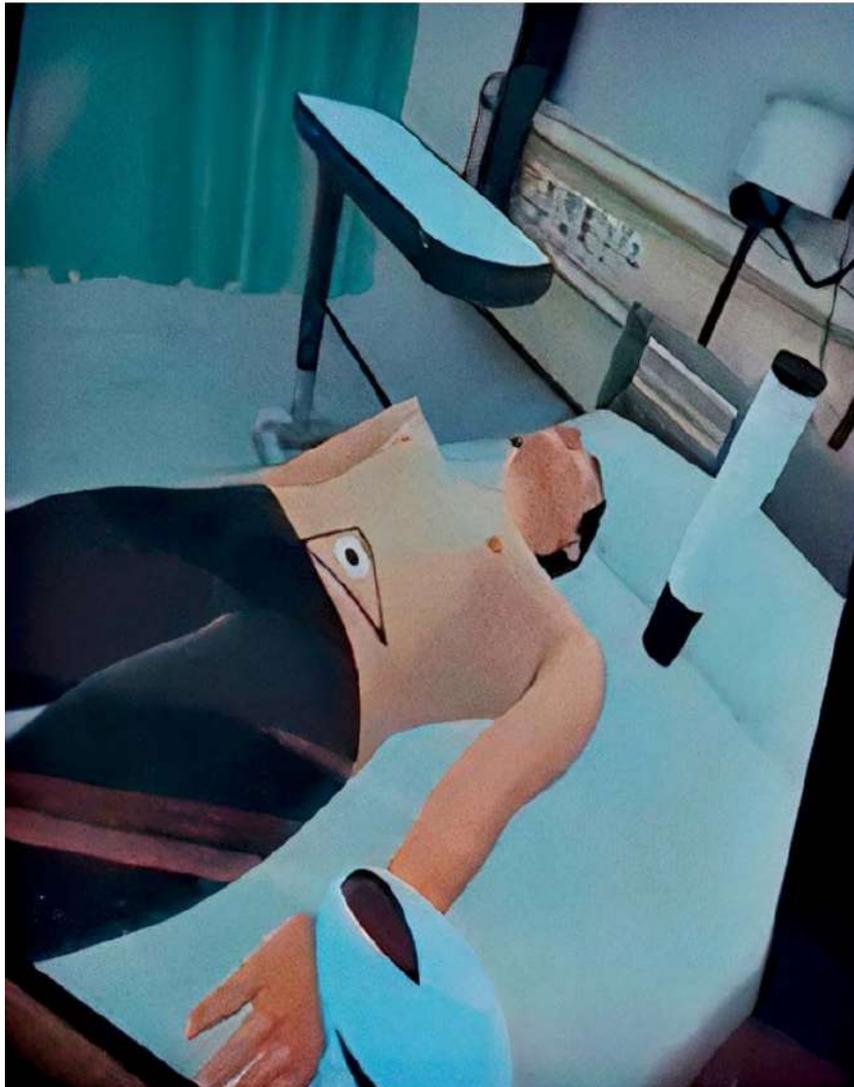
## Methods

**Study design and setting.** A quasi-experimental study of three arms was conducted to evaluate the knowledge about stoma care, the self-efficacy, and satisfaction-self-confidence with the use of different learning methods and different levels of simulation in nursing students. Group A (GA) included traditional teaching methods and low-fidelity simulation, group B (GB), included traditional teaching methods and high-fidelity simulation (HFS) and group C (GC), included active learning methods (ALMs) and HFS. The data collection period was from November to December 2022, at two different times, one week apart. The study design and procedures conform to the criteria of the "CONSORT - Simulation-Based Research Extension".

**Participants.** A convenience sample comprised of 429 third-year nursing students enrolled in two Spanish Nursing Faculties of two public universities (academic year 2022-2023) taking the subject "Adult Nursing III" at the University of Granada (UGR) (GC and GA) and the subject "Clinical Nursing III" at the University of Jaén (UJA) (GB), all of them taught in the third year of the fifth semester. In these courses, the content

of the training in stoma care is taught in small groups of 15-20 students each.

The groups within the UGR (GA and GC) were randomly assigned to each campus in such a way as to compensate for low-fidelity and high-fidelity, morning and afternoon shift. Subsequently, the third arm was (GB) included with the UJA students, being a single group. For all, Inclusion criteria were: third-year nursing students enrolled in the "Adult Nursing III" at the UGR and the subject "Clinical Nursing III" at the UJA. Exclusion criteria were students who did not participate and those who have a health problem (such as dizziness) that prevents them from wearing virtual reality glasses. Thus, GA ( $n=114$  participants) and GC ( $n=165$  participants) (both at the University of Granada-Granada, Ceuta, and Melilla Campuses) and GB was composed of students from the University of Jaén ( $n=83$  participants). The final participation rate was 84.38% ( $n=362$ ). The data collected were used for research purposes only and were kept in the custody of the researchers. The scenario of the *Virtual Reality stoma site marking training (sVR-SSIMAT)*. The design of the sVR-SSIMAT was created by the researchers and a stomatherapy nurse based on the literature.<sup>(13)</sup> CREAME software was used in the development of the idea. The experience immerses the student, through the Oculus Quest 2 Virtual Reality goggles. The student can see a clinical room with a patient and a tablet with the steps for a stoma marking procedure. Once the student reads the first steps about location, ribs, scars, etc., the virtual patient lies down and with a pencil the student must mark the stoma. Once the bisector point is drawn, the trainee must mark the stoma in multiple potential sites in different abdominal quadrants (Figure 1).



**Figure 1. Screenshot showing a digital content of the sVR-SSIMAT**

**Implementation phase.** For the implementation phase, three intervention groups were conducted: the intervention for GA and GC was carried out at University of Granada with a total of 23 sessions of 120 min each. The GB intervention was carried out at the University of Jaén with a total of 10 sessions lasting 180 min each. All the monitors who participated in the experience received previous training for the type of methodology to

be developed. At the UGR (Granada and Ceuta Campuses) the interventions were developed by the same researcher (in addition to the teachers of the subject) while at the Melilla Campus and at the UJA, the interventions were carried out by two researchers participating in the study, who also have the role of teacher. A planning was prepared for each group of simulation (Table 1).

**Table 1. Planning of each group of simulation**

Group	Planification	Min
A: traditional teaching methods and low-fidelity simulation	Introduction of the lecturer and explanation of the content of the seminar by means of a master class.	5
	Teacher's demonstration of the contents through lecture: 1) Concept of ostomy and types of pouching; 2) General complications; 3) Peristomal skin measurement scales and marking.	45
	Students will divide the class into 4-5 groups of 4-5 people and perform teacher-guided group practice on the manikin: device change, irrigation and marking.	70
B: traditional teaching methods and high-fidelity simulation	Introduction of the lecturer and explanation of the content of the seminar by means of a master class.	45
	Teacher demonstration of the procedures to be performed: 1) Placement and removal of devices + hygiene; 2) Peristomal skin assessment with DET scale; 3) Stoma marking.	15
	Organization of the group in 3 scenarios: 1) Placement and removal of devices + hygiene; 2) Evaluation of peristomal skin with DET scale through imaging; 4) Stoma marking with virtual reality. sVR-SSIMAT.	60
C: active learning methods and high-fidelity simulation.	Introduction of the lecturer and explanation of the seminar contents.	5
	Resolution of doubts that may have arisen after consulting PRADO infographics.	15
	Individual game dynamics through 10 knowledge questions with four alternative answers that students will answer through the Socrative platform. It is a space race where, the more questions they get right, the better place they will obtain in the competition.	15
	Students will divide the class into 4-5 groups of 4-5 people and will perform group practices guided by the teacher on the manikin: changing the device, irrigation. Stoma marking with virtual reality sVR-SSIMAT (Parallel session with another teacher).	85

**Data collection procedure.** Data were collected through a questionnaire with demographic information, and the following evaluative tools: The Nursing Outcomes Classification (NOC) “Knowledge: Ostomy Care [1829]”<sup>(15)</sup> and its indicators, self-efficacy<sup>(16)</sup> and student satisfaction and self-confidence with learning<sup>(17)</sup> By completing the questionnaires, participants gave their consent to participate in the study. The students were also clearly informed that their answers would not be used to evaluate them in the course. The pretest included: **(i) Questionnaire with demographic information:** It included the age of the participants, gender, class shift (morning-afternoon), university of belonging and number of times the course was

taken; **(ii) Ad hoc knowledge test on nursing stoma care:** to measure the level of knowledge about stoma care, no validated scale was found. Therefore, it was considered appropriate to use the NOC outcomes “Knowledge: Ostomy Care [1829]”<sup>(15)</sup> (Extent of understanding conveyed about maintenance of an ostomy for elimination) and its indicators. It consists of 16 indicators, observable and quantifiable measures used to evaluate the level of knowledge about ostomy care through a Likert scale from 1 to 5, where 1= No knowledge and 5= Extensive knowledge. The NOC outcomes are a standardised nursing language that has been translated into nine languages to explore and describe nursing practice in a

variety of specialisms, patient groups, healthcare settings<sup>(15)</sup> and studies to evaluate knowledge;<sup>(18)</sup> (iii) *Self efficacy scale*: the “General Scale of Self-Efficacy”,<sup>(16)</sup> validated for the Spanish university population, was used to evaluate the student’s perception of self-efficacy with respect to learning. It aims to assess the stable feeling of personal competence to effectively handle a wide variety of stressful situations. It has good internal consistency (Cronbach’s alpha = 0.87) and a high validity rate. It consists of 10 items evaluated with Likert scale from 1 to 10, whose total score varies between 10 and 100 points (higher scores indicate higher levels of perceived self-efficacy). In the post-test, on the one hand, the instruments of the pre-test (excluding the demographic variables) were measured, as well as the (iv) *Satisfaction and self-confidence of the students in learning with respect to the simulation*. For this purpose, the satisfaction and self-confidence scale adapted and validated for implementation in the Spanish educational context was used. This tool evaluates clinical learning based on simulation in the Nursing degree. It has a high internal consistency (Cronbach’s alpha  $\alpha$  = 0.93) and consists of 13 items distributed in two dimensions (satisfaction/5 items and self-confidence in learning/8 items) that are evaluated with Likert scale from 1 to 5, where 1 = Totally disagree and 5 = Totally agree. This instrument was distributed to all students after the session.

**Data analysis.** The analysis of the data was conducted using SPSS (Statistical Package for the Social Sciences) version 28.0.1.0. Data from the descriptive analysis were presented as percentages for categorical variables and as the mean (M) along with the standard deviation (SD) for continuous variables. Different non-parametric tests were employed for inferential analysis due to

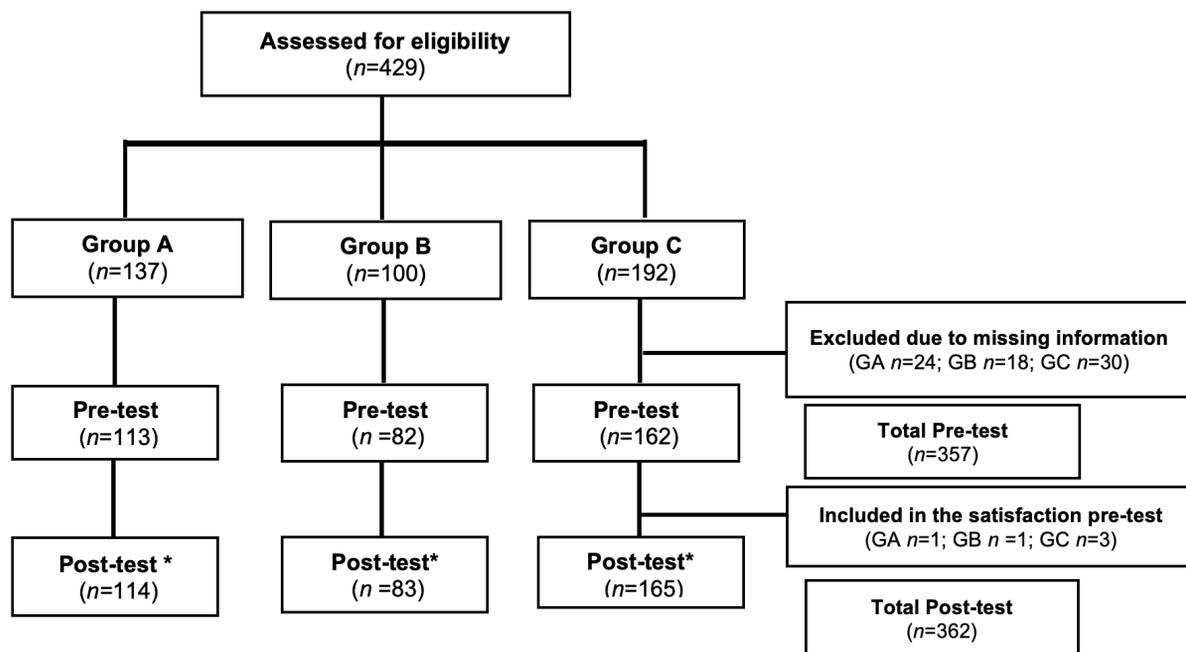
the non-normality and lack of homoscedasticity, as demonstrated by the Kolmogorov-Smirnov and Levene’s tests, respectively. Kruskal-Wallis tests were conducted to check for differences among fidelity groups and groups based on shifts for the variables NOC outcomes, confidence, satisfaction, and self-efficacy. Additionally, Friedman tests were carried out to compare pre- and post-simulation differences in the variables NOC outcomes and self-efficacy. Significant differences were considered for  $p$ -values less than 0.05. Students with incomplete tests were excluded from the analysis.

**Ethical considerations.** The study was approved by the Research Ethics Committee at the University of Granada (registry number: 2110/CEIH/2021) and Research Ethics Committee at the University of Jaén (registry number: OCT.22/4.PRY). Students were informed about the main goal of the investigation, and their consent was obtained digitally upon the distribution of the questionnaires.

## Results

**Participants’ characteristics.** The sample consisted of a total of 362 undergraduates nursing students, of whom 65 (17.96%) were male, 295 (81.49%) were female, and 2 (0.55%) preferred not to disclose their gender. The average age was 22.31 years (SD = 4.98). Among the participants, 98.62% were taking the adult III subject for the first time, while the remaining had repeated the course on one or more occasions

**Evaluative Tools.** To achieve the proposed objectives the different evaluative tools were completed before (pre-test) and after (post-test) the class (Figure 2).



**Figure 2. Participants' Flow Chart**

\* Post-test was completed for more students. Its analysis was done independently for those who did not completed pre-test

Note: Group A: traditional teaching methods and low-fidelity simulation; Group B: traditional teaching methods and high-fidelity simulation; Group C: active learning methods and high-fidelity simulation.

**The NOC indicators.** Before the simulation, no significant differences among the fidelity groups were observed in 9 out of 15 indicators. However, statistically significant differences were found after the simulation ( $p < 0.001$ ). Specifically, in 14 out of 15 NOC indicators measured (no significant differences for the "Indicator [182909]: Supplies required to care for ostomy") (Table 2). In addition to the Kruskal-Wallis analysis, a Mann-Whitney test was performed, revealing significant

differences in all indicators between GA and GC, except for the indicator [182909]. In contrast, when comparing the GB and GC groups, only two indicators showed significant differences: [182911] and [182912]. Moreover, during the post hoc analysis between the GA and GB groups, significant differences were observed in 11 of the indicators measured, with the exceptions of [182902], [182908], [182909], and [182916].

**Table 2. Comparison of NOC indicators pre and post-test mean scores, test statistics, and *p*-values among different learning methodologies and different levels of simulation in nursing students by group-**

NOC	Group A		Group B		Group C		<i>p</i> -value	
	M ± SD		M ± SD		M ± SD		Pre-test	Post-test
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
[182901] Function of ostomy	2.60 ± 0.88	4.43 ± 0.58	2.38 ± 0.96	4.28 ± 0.64	2.58 ± 0.93	4.45 ± 0.58	0.167	<0.001
[182902] Purpose of ostomy	3.27 ± 0.94	4.62 ± 0.53	3.11 ± 1.02	4.62 ± 0.56	3.24 ± 1.03	4.66 ± 0.54	0.447	<0.001
[182903] Skin care needs around ostomy	2.63 ± 0.96	4.42 ± 0.63	2.54 ± 1.04	4.54 ± 0.57	2.76 ± 1.04	4.50 ± 0.65	0.102	<0.001
[182904] Irrigation techniques	1.80 ± 0.86	4.05 ± 0.76	1.90 ± 1.12	3.86 ± 0.67	1.88 ± 0.99	4.18 ± 0.65	0.927	<0.001
[182905] How to measure stoma	2.03 ± 1.16	4.78 ± 0.50	1.73 ± 1.10	4.65 ± 0.57	1.96 ± 1.19	4.65 ± 0.68	0.130	<0.001
[182907] Complications related to stoma	2.34 ± 0.93	4.36 ± 0.71	2.10 ± 0.90	4.29 ± 0.56	2.31 ± 1.07	4.39 ± 0.75	0.221	<0.001
[182908] Schedule for changing ostomy bag	2.35 ± 1.14	4.55 ± 0.63	1.95 ± 1.02	4.59 ± 0.56	2.29 ± 1.19	4.64 ± 0.60	0.035	<0.001
[182909] Supplies required to care for ostomy	2.45 ± 1.09	4.57 ± 0.59	2.16 ± 1.09	4.56 ± 0.58	2.29 ± 1.10	4.55 ± 0.60	0.149	0.215
[182910] Flatus-producing foods	2.75 ± 1.13	4.18 ± 0.83	2.32 ± 1.05	3.99 ± 0.66	2.70 ± 1.17	4.47 ± 0.67	0.012	<0.001
[182911] Diet modifications	2.51 ± 1.02	4.19 ± 0.83	1.96 ± 0.82	3.95 ± 0.74	2.49 ± 1.11	4.46 ± 0.64	0.001	<0.001
[182912] Fluid intake requirements	2.41 ± 1.04	4.32 ± 0.78	2.05 ± 0.91	4.07 ± 0.73	2.45 ± 1.07	4.53 ± 0.59	0.012	<0.001
[182914] Modification of daily activities	2.39 ± 0.99	4.25 ± 0.71	1.94 ± 0.81	4.18 ± 0.66	2.49 ± 1.01	4.41 ± 0.72	0.001	<0.001
[182915] Procedure to change ostomy bag	2.30 ± 1.16	4.71 ± 0.50	2.12 ± 1.17	4.62 ± 0.57	2.40 ± 1.19	4.63 ± 0.59	0.178	<0.001
[182916] Procedure to empty ostomy bag	2.12 ± 1.07	4.59 ± 0.59	2.02 ± 1.03	4.60 ± 0.61	2.22 ± 1.11	4.49 ± 0.69	0.430	<0.001
[182917] Available support groups	1.59 ± 0.77	3.95 ± 0.94	1.60 ± 0.87	3.88 ± 0.88	1.84 ± 0.96	4.12 ± 0.86	0.024	<0.001

**Note:** Group A: traditional teaching methods and low-fidelity simulation; Group B: traditional teaching methods and high-fidelity simulation; Group C: active learning methods and high-fidelity simulation.

A comprehensive analysis of repeated measures was performed to assess the effect of the intervention on NOC indicators responses before and after the simulation. The findings indicated a notable increase in NOC indicator scores post-simulation, showing statistically significant

differences both within each group and across all three groups. These enhancements were evident after the simulation, not only in the cumulative NOC indicator scores, (Table 3) but also across all individual indicators, highlighting the impact of the intervention.

**Table 3. Comparison of NOC indicators in post and pre-test accumulative score among groups**

	Groups			X <sup>2</sup> <sub>F</sub>	p-value
	A M ± SD	B M ± SD	C M ± SD		
Pre-Intervention	35.56 ± 10.83	31.88 ± 10.13	36.00 ± 11.34	7928	<0.001
Post-Intervention	65.96 ± 7.09	64.67 ± 6.31	67.11 ± 7.14		

**Note:** Group A: traditional teaching methods and low-fidelity simulation; Group B: traditional teaching methods and high-fidelity simulation; Group C: active learning methods and high-fidelity simulation.

*Self-efficacy.* Prior to the intervention, baseline self-efficacy scores did not differ significantly among the groups ( $p > 0.05$ ). This also happened with the post-intervention results as indicated by the Kruskal-Wallis test, although a tendency toward higher scores was noted in the GC Table 4). The analysis between fidelity groups (Mann-

Whitney test) revealed no differences when comparing the groups pairwise (either in the pre- or post-simulation results). Nevertheless, when analysing the changes in self-efficacy scores after the intervention (pre- and post-simulation), a significant overall difference was identified among all the participant groups ( $p < 0.001$ ).

**Table 4. Comparison of self-efficacy final score in post-test and pre-test (individually) and differences between pre- and post-intervention scores**

Moment	Group A	Group B	Group C	H/p-value	X <sup>2</sup> <sub>F</sub> p-value*
	M ± SD	M ± SD	M ± SD		
Pre-Intervention	70.76 ± 1 2.70	69.66 ± 11.62	73.85 ± 10.94	5.79 / 0.055	188.478 / <0.001
Post-Intervention	77.94 ± 14.07	78.06 ± 12.72	81.28 ± 10.76	3.267 / 0.195	

\*H= Kruskal-Wallis test; X<sup>2</sup><sub>F</sub>= Friedman test

**Note:** Group A: traditional teaching methods and low-fidelity simulation; Group B: traditional teaching methods and high-fidelity simulation; Group C: active learning methods and high-fidelity simulation.

*Student satisfaction and self-confidence.* Regarding learning satisfaction and self-confidence, the intervention revealed significant differences across the groups. The satisfaction scores reported in GC were higher than GA (Table 5). Likewise, self-confidence scores exhibited significant variations among the groups. Notably,

the GC reported higher self-confidence levels compared to GA. Comparing satisfaction and self-confidence scores (Mann-Whitney test) among the fidelity groups pairwise, differences were observed between GA and GB/GC, and GB and GC ( $p < 0.001$ ).

**Table 5. Comparison of satisfaction and self-confidence among groups**

Variables	Group A M ± SD	Group B M ± SD	Group C M ± SD	H*	p-value
Satisfaction	21.69 ± 4.36	24.76 ± 2.22	22.99 ± 4.512	74.046	<0.001
Self-confidence	33.50 ± 6.38	39.92 ± 0.28	34.44 ± 7.28	115.85	<0.001

\*H= Kruskal-Wallis test

**Note:** Group A: traditional teaching methods and low-fidelity simulation; Group B: traditional teaching methods and high-fidelity simulation; Group C: active learning methods and high-fidelity simulation.

## Discussion

This study addresses the differences in learning methods as well as the level of knowledge, self-efficacy, satisfaction, and self-confidence of nursing students in stoma care depending on the level of fidelity of the simulation.

*The NOC outcome “Knowledge: Ostomy Care [1829]”.* In this study, the simulation appeared to positively influence the cognitive ability of nursing students, indicating an improvement in the acquisition of knowledge for the care of people carrying digestive stoma. The results point to an improvement in knowledge in the GC and GB groups, compared to the GA group. These results are consistent with other studies that show the use of high-fidelity simulation in nursing education is more effective than the traditional method in terms of knowledge improvement, skill levels for cardiac auscultation, and anxiety reduction.<sup>(19)</sup> On the same line, Aljohani *et al.*<sup>(20)</sup> show an improvement in training in cardiac life support with simulation. For their part, So *et al.*<sup>(21)</sup> find that simulation-based learning increases the retentive ability of nursing students by improving their future learning skills. Finally, other authors argue that the integration of ALMs with simulation technology increases the acquisition of knowledge.<sup>(22)</sup>

*Self-efficacy.* Although self-efficacy in this study did not present significant differences between the different intervention groups, the result

is consistent with other authors in which no improvements were found when comparing the simulation with the traditional methodology.<sup>(23)</sup> This may be because, as some papers report,<sup>(24)</sup> self-efficacy declines significantly as students’ progress in academic years. These results suggest that simulation may not have a uniform impact on students’ self-efficacy and that other factors may influence these results. Thus, it is important to explore other variables that may affect the perception of self-efficacy of university students in relation to simulation due to the effects it may have on the development of adaptive academic goals and successful effort in nursing students.<sup>(25)</sup> Since self-efficacy is a complex construct and depends on several factors, such as mastery experience, repeated success in tasks could increase positive self-efficacy in self-assessments whereas repeated failures could decrease them.<sup>(26)</sup> Therefore, considering that the students only had one opportunity to experience VR, the absence of significant differences in self-efficacy between groups could be attributed to this limited practice.

*Satisfaction and self-confidence.* Regarding the level of satisfaction and self-confidence of the students, the GB and GC achieved higher scores than the GA. This suggests that HFS increases the satisfaction and self-confidence of nursing students in stoma care. So, Zapko *et al.*<sup>(27)</sup> conclude that using simulations of patients with HFS and MFD, and actors as patients in different real scenarios (e.g., mental health, critical care, obstetrics, medical/surgical, and geriatric scenarios),

students improved satisfaction and confidence. Another study<sup>(28)</sup> examines the use of simulation for cardiopulmonary resuscitation learning in nursing students, revealing high satisfaction and self-confidence scores. Meanwhile, Tawalbeh<sup>(29)</sup> studied the effect of simulation on the learning of nursing care in critical patients with cardiac, respiratory, and neurological problems, revealing an increase in student self-confidence after the simulation. So *et al.*<sup>(21)</sup> describe that the increase in student self-confidence is due to the simulation providing a safe environment where students can apply care without fear of harming patients, which positively influences satisfaction, contributing to the development of self-confidence and essential skills to provide safe care to patients.

Despite the results, the inclusion of ALMs in higher education classrooms still requires ongoing training and continuing professional development<sup>(30)</sup> as well as investment in ALMs training courses by the educational institution<sup>(31)</sup> to enable further research in this regard. The use of VR in health sciences education can offer significant benefits, such as enhanced engagement students as well as demonstrating comparable effectiveness to standards of care,<sup>(32)</sup> but it must be regulated, as it presents several risks. It may hinder critical thinking by promoting passive content acceptance and can cause physical issues like motion sickness, eye strain, and fatigue. Additionally, heightened immersion may lead to cognitive effects such as stress and disorientation.<sup>(33)</sup>

**Conclusions.** It has been found that simulation improves the level of knowledge in relation to ostomies as well as that the degree of fidelity of simulation has a positive impact on student satisfaction and self-confidence in learning. These findings offer an opportunity to implement ALM in stoma care teaching and highlight the need to

validate scales to measure the knowledge about stoma care. This will help in future studies to measure more properly active learning methods in the topic, helping teachers to evaluate the simulation, enabling them to improve it.

**Limitations.** There are several limiting factors in this research. First, the study was conducted across two different universities and four campuses to obtain a considerable sample, which may have introduced potential bias. Conducting the same study at a single university could help reduce this bias. Additionally, the involvement of different researchers in guiding the experience at each campus may have introduced variability in how the intervention was carried out, impacting consistency. Regarding the measurement instruments, the lack of validated scales to assess knowledge of ostomies in nursing students led to the use of NOC outcomes and indicators, emphasizing the need for validated tools in this area. Furthermore, the gender imbalance, with the nursing degree being predominantly female, prevented an analysis of this category. Lastly, the limited existing literature on simulation in the area of ostomies, particularly with VR, meant that the data could not be compared with similar experiences, further limiting the contextual analysis.

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# Factors related to self-medication in undergraduate nursing students: a scoping review

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Review



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## Factors related to self-medication in undergraduate nursing students: a scoping review

### Abstract

**Objective.** The aim of this study was to map and summarize the extent and type of evidence related to self-medication among undergraduate nursing students. **Method.** A scoping review was conducted in accordance with the guidelines of the Joanna Briggs Institute. The guiding questions of the interviews were the following: 1) "What are the reasons/motivations and health conditions leading to self-medication behavior in nursing students?"; 2) "What are the sources of information involved in the decision-making process for self-medication?"; 3) "What medications are used in self-medication?"; 4) "What are the perceptions of risks and benefits of this behavior?"; 5) "What are the knowledge, beliefs/attitudes, and practices regarding self-medication?" The descriptors used were: "self-medication" AND "students, nursing" combined with their synonyms. A total of 55 articles were included from searches in the MEDLINE, Web of Science, Scopus, and Virtual Health Library databases, including gray literature. **Results.** The analysis of the studies resulted in ten categories characterizing the factors of self-medication: clinical conditions ( $n=52$ ), reasons/motives ( $n=54$ ), recall period ( $n=22$ ), drug classes ( $n=54$ ), sources of advice ( $n=53$ ), perception of risks ( $n=47$ ) and benefits ( $n=21$ ), knowledge ( $n=27$ ), beliefs and attitudes ( $n=27$ ), and practices ( $n=20$ ). **Conclusion.** This study showed that clinical, socioeconomic, and behavioral factors are common themes described in the literature on self-medication among undergraduate nursing students. There are opportunities, especially in training, to improve self-medication practices and patient safety among future nurses.

**Descriptors:** self-medication; drug utilization; drug-related side effects and adverse reactions; students, nursing; nursing

## Factores relacionados con la automedicación en estudiantes universitarios de enfermería: una revisión de alcance

### Resumen

**Objetivo.** El objetivo de este estudio fue mapear y sintetizar el alcance de la evidencia relacionada con la automedicación en estudiantes universitarios de enfermería. **Métodos.** Se llevó a cabo una revisión de alcance de acuerdo con las directrices del Instituto Joanna Briggs. Las preguntas guía fueron: 1) «¿cuáles son las razones o motivos y las situaciones de salud que conducen al comportamiento de automedicación en estudiantes de enfermería?»; 2) «¿cuáles son las fuentes de información implicadas en la decisión del comportamiento de automedicación?»; 3) «¿cuáles son los medicamentos utilizados en la automedicación?»; 4) ¿cuáles son las percepciones sobre los riesgos y beneficios de este comportamiento?»; 5) «¿cuáles son los conocimientos, creencias, actitudes y prácticas que implican la automedicación?». Para la estrategia de búsqueda se utilizaron los descriptores «automedicación» Y «estudiantes, enfermería» con sus respectivos sinónimos. Se

incluyeron 55 artículos procedentes de la búsqueda en las bases de datos MEDLINE, Web of Science, Scopus, Virtual Health Library; y se revisó literatura gris. **Resultados.** El análisis de los estudios dio como resultado diez categorías que caracterizan los factores de la automedicación: condiciones clínicas ( $n=52$ ), razones o /motivos ( $n=54$ ), periodo de recuerdo ( $n=22$ ), clases de fármacos ( $n=54$ ), fuentes de consejo ( $n=53$ ), percepción de riesgos ( $n=47$ ) y beneficios ( $n=21$ ), conocimientos ( $n=27$ ), creencias y actitudes ( $n=27$ ) y prácticas ( $n=20$ ). **Conclusión.** Este estudio mostró que los factores clínicos, socioeconómicos y conductuales son temas comunes descritos en la bibliografía en relación con la automedicación entre los estudiantes universitarios de enfermería. Existen oportunidades, especialmente de carácter formativo, para mejorar la práctica de la automedicación entre los futuros enfermeros.

**Descriptor:** automedicación; utilización de medicamentos; efectos colaterales y reacciones adversas relacionados con medicamentos; estudiantes de enfermería; enfermería.

## Fatores relacionados à automedicação em estudantes de graduação em Enfermagem: revisão de escopo

### Resumo

**Objetivo.** Objetivou-se mapear e sintetizar a extensão de evidência relacionada à automedicação em estudantes de graduação em Enfermagem. **Método.** Revisão de escopo realizada conforme diretrizes do Instituto *Joanna Briggs*. As questões norteadoras foram: 1) “quais são as razões/motivos e condições de saúde que levam ao comportamento da automedicação em estudantes de enfermagem? ”; 2) “quais são as fontes de informação envolvidas na decisão do comportamento da automedicação?”; 3) “quais são os medicamentos utilizados na modalidade de automedicação?”; 4) “quais são as percepções acerca de riscos e benefícios deste comportamento?”; 5) “quais são os conhecimentos, as crenças/attitudes e as práticas envolvendo a automedicação?” Os descritores “*self medication*” AND “*students, nursing*” foram utilizados com seus respectivos sinônimos para a estratégia de busca. Foram incluídos 55 artigos a partir da busca em bases de dados MEDLINE, *Web of Science*, *Scopus*, Biblioteca Virtual em Saúde; incluindo a literatura cinzenta. **Resultados.** Da análise dos estudos, resultaram dez categorias que caracterizam os fatores da automedicação: condições clínicas ( $n=52$ ), razões/motivos ( $n=54$ ), período recordatório ( $n=22$ ), classes de medicamentos ( $n=54$ ), fontes de aconselhamento ( $n=53$ ), percepção de riscos ( $n=47$ ) e benefícios ( $n=21$ ), conhecimento ( $n=27$ ), crenças e attitudes ( $n=27$ ) e práticas ( $n=20$ ). **Conclusão.** Este estudo evidenciou que fatores natureza clínica, socioeconômica e comportamental foram temas comuns descritos na literatura acerca automedicação em estudantes de graduação em Enfermagem. Existem oportunidades, sobretudo de caráter formativo, para melhorar a pratica da automedicação dos futuros enfermeiros.

**Descritores:** automedicação; uso de medicamentos; efeitos colaterais e reações adversas relacionados a medicamentos; estudantes de enfermagem; enfermagem.

## Introduction

Epidemiological evidence reports that self-medication is a global, growing phenomenon, highly prevalent across different age groups.<sup>(1,2)</sup> However, university students appear to be more prone to practicing self-medication. A systematic review with meta-analysis, covering 60,938 university students, revealed a global prevalence of self-medication at 70.1%. Among health science students, the prevalence was higher (97.2%).<sup>(3)</sup> The main motivations for self-medication among university students, including nursing students, involve various factors such as high educational level, easy access to medications, quick symptom resolution, limited time to seek healthcare services, high consultation and examination costs, and difficulty accessing healthcare services.<sup>(4-8)</sup> Nevertheless, although self-medication may seem like a practical and quick self-care strategy, from a pharmacovigilance perspective, it can become a public health issue.<sup>(9)</sup> The negative effects of this practice include the risk of adverse drug events (ADEs), drug interactions, antimicrobial resistance (AMR), and increased healthcare costs.<sup>(10)</sup>

In this context, where evidence on the concept of self-medication<sup>(10)</sup> and its prevalence<sup>(3)</sup> has contributed to a broader understanding of the issue, knowledge gaps still need to be addressed to support efforts to tackle this public health problem, especially among undergraduate nursing students.

In this group, self-medication may indirectly affect future practices related to medication management and significantly impact patient safety. Nurses play a crucial role in the medication administration process and, in multiprofessional collaboration, engage in various activities related to medication safety.<sup>(11)</sup> Thus, this scoping review aimed to map and synthesize the available evidence on self-medication among undergraduate nursing students.

## Method

**Study design.** This scoping review followed the recommendations of the Joanna Briggs Institute (JBI) - Methodology for JBI Scoping Review<sup>(12)</sup> and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR).<sup>(13)</sup> The review protocol was registered in the Open Science Framework - <https://doi.org/10.17605/OSF.IO/ZYFG9>. The guiding questions of the interviews were the following: 1) *“What are the reasons/motivations and health conditions leading to self-medication behavior in nursing students?”*; 2) *“What are the sources of information involved in the decision-making process for self-medication?”*; 3) *“What medications are used in self-medication?”*; 4) *“What are the perceptions of risks and benefits of this behavior?”*; 5) *“What are the knowledge, beliefs/attitudes, and practices regarding self-medication?”* The following steps were undertaken: defining

and aligning the objectives and research question; setting inclusion criteria; planning and conducting the search strategy; selecting studies; extracting evidence; analyzing evidence; and summarizing the results. The research question was formulated using the *participants, concept, and context* (PCC) strategy: P (Participants) – undergraduate nursing students; C (Concept) – aspects related to self-medication; C (Context) – public/private higher education institutions worldwide.

**Inclusion and exclusion criteria.** Scientific studies addressing self-medication among undergraduate nursing students were included. Primary studies and systematic reviews were assessed without temporal or language restrictions. Duplicates, studies without full text, and conference abstracts were excluded.

**Data sources and search strategies.** Data collection occurred in June 2024 from the following databases: Medical Literature Analysis

and Retrieval System Online (MEDLINE/via PubMed), Web of Science Core Collection/Clarivate Analytics (WoS), Scopus (Elsevier), and *Biblioteca Virtual em Saúde* (BVS). Subsequently, the search was expanded to include grey literature from sources such as: *Portal de Teses e Dissertações da Coordenação de Aperfeiçoamento de Pessoal do Nível Superior* (CAPES), Europe E-Theses Portal (DART), Electronic Theses Online Service (ETHOS), *Repositório Científico de Acesso Aberto de Portugal* (RCAAP), National ETD Portal, Theses Canada, *Portal de Tesis Latinoamericanas* e Open Grey. The research team defined the search strategy using Health Sciences Descriptors (DeCS) and/or Medical Subject Headings (MeSH). Boolean operators AND and/or OR were employed according to the specifics of each database. The English descriptors used were: “*self medication*” AND “*students, nursing*” combined with their synonyms. Table 1 presents the detailed search strategy.

**Table 1. Terms and search strategies applied to each database**

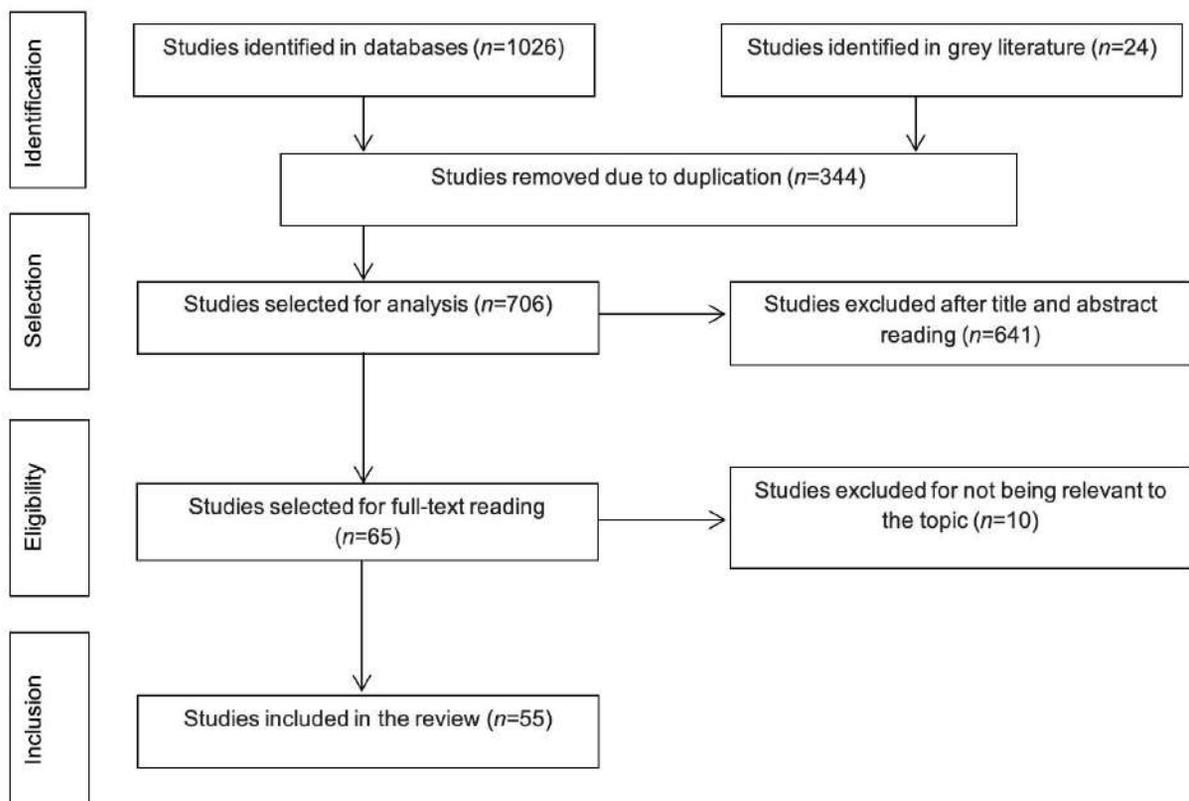
Database	Search strategy	Results
MEDLINE via PUBMED	<p>#1 ((“Self Medication”[MeSH Terms] OR (“self”[All Fields] AND “medication”[All Fields]) OR “Self Medication”[All Fields] OR (“medication”[All Fields] AND “self”[All Fields]) OR “medication self”[All Fields]) AND (“Self Medication”[MeSH Terms] OR (“self”[All Fields] AND “medication”[All Fields]) OR “Self Medication”[All Fields] OR (“medications”[All Fields] AND “self”[All Fields]) OR “medications self”[All Fields]) AND (“Self Medication”[MeSH Terms] OR (“self”[All Fields] AND “medication”[All Fields]) OR “Self Medication”[All Fields] OR (“self”[All Fields] AND “medications”[All Fields]) OR “self medications”[All Fields]) = 39254</p> <p>#2 (“students, nursing”[MeSH Terms] OR (“students”[All Fields] AND “nursing”[All Fields]) OR “nursing students”[All Fields] OR (“pupil”[All Fields] AND “nurses”[All Fields]) OR “pupil nurses”[All Fields]) AND (“students, nursing”[MeSH Terms] OR (“students”[All Fields] AND “nursing”[All Fields]) OR “nursing students”[All Fields] OR (“student”[All Fields] AND “nursing”[All Fields]) OR “student nursing”[All Fields]) AND (“students, nursing”[MeSH Terms] OR (“students”[All Fields] AND “nursing”[All Fields]) OR “nursing students”[All Fields] OR (“nurses”[All Fields] AND “pupil”[All Fields])) AND (“students, nursing”[MeSH Terms] OR (“students”[All Fields] AND “nursing”[All Fields]) OR “nursing students”[All Fields] OR (“nurse”[All Fields] AND “pupil”[All Fields]) OR “nurse pupil”[All Fields]) AND (“students, nursing”[MeSH Terms] OR (“students”[All Fields] AND “nursing”[All Fields]) OR “nursing students”[All Fields] OR (“pupil”[All Fields] AND “nurse”[All Fields]) OR “pupil nurse”[All Fields]) AND (“students, nursing”[MeSH Terms] OR (“students”[All Fields] AND “nursing”[All Fields]) OR “nursing students”[All Fields] OR (“nursing”[All Fields] AND “student”[All Fields]) OR “nursing student”[All Fields]) AND (“students, nursing”[MeSH Terms] OR (“students”[All Fields] AND “nursing”[All Fields]) OR “nursing students”[All Fields] OR (“nursing”[All Fields] AND “students”[All Fields])) = 61158</p> <p>#3 #1 and #2 = 252</p>	252
Scopus	<p>#1 ( TITLE-ABS-KEY ( self AND medication ) OR TITLE-ABS-KEY ( medication, AND self ) OR TITLE-ABS-KEY ( medications, AND self ) OR TITLE-ABS-KEY ( self AND medications ) ) = 64939</p> <p>#2 ( TITLE-ABS-KEY ( students, AND nursing ) OR TITLE-ABS-KEY ( student, AND nursing ) OR TITLE-ABS-KEY ( nursing AND student ) OR TITLE-ABS-KEY ( nursing AND students ) = 70952</p> <p>#3 #1 AND #2 = 305</p>	305
Web of Science	<p>#1 ALL=(Self Medication OR Self Medications OR Medication, Self OR Medications, Self OR Self-Medication OR Self-Medications OR “Self Medication” OR “Self Medications” OR “Medication, Self” OR “Medications, Self” OR “Self-Medication” OR “Self-Medications” ) = 45406</p> <p>#2 ALL=(Students, Nursing OR Student, Nursing OR Nursing Student OR Nursing Students OR “Students, Nursing” OR “Student, Nursing” OR “Nursing Student” OR “Nursing Students”) = 64603</p> <p>#3 #1 and #2 = 435</p>	435
BVS	“Self Medication” AND “Students, Nursing”	34

**Study selection and data extraction.** Study selection occurred in three consecutive stages by two independent reviewers: 1. title reading, which had to include the terms self-medication and/or university students or undergraduate nursing students; 2. abstract reading; and 3. full-text reading. Discrepancies or doubts were resolved by consensus with a third independent reviewer. For data extraction, a spreadsheet was created with sections for authorship, title, journal, year and country of publication, objectives, study type, recall period for self-medication, health conditions, drug classes according to the *Anatomical Therapeutic Chemical (ATC) classification*,<sup>(14)</sup> reasons/motivations for self-medication, sources of advice, perception of risks and benefits, knowledge, attitudes, and practices regarding self-medication.

**Data analysis and treatment.** In each publication, the central elements related to the problem were identified and extracted through full-text reading. The selected studies were characterized and then organized into thematic categories. Descriptive statistics were used to present absolute and relative frequencies. The research team participated in interpreting and synthesizing the data from the articles through narrative discussion, which enabled the association of tabulated results with the research objectives and guiding questions.

## Results

Of the 65 studies selected for full-text reading, 10 were excluded for reasons described in the PRISMA-ScR flowchart.<sup>(13)</sup> The sample consisted of 55 studies (Figure 1).



**Figure 1. Flowchart of the study selection process according to PRISMA ScR recommendations.**

Table 2 presents the authorship, title, year, country of publication, study type, and journal of each included study. The studies were conducted in 23 different countries, with nearly half (47.3%) originating from Asia and about one-third (29.1%) from South America. The publication period spanned from 2004 to 2024, with nearly half (49.1%) published between 2020 and 2024. Most studies (69.1%) were published in English. Almost all studies (90.9%) used a quantitative methodological approach; there was a wide variety of journals publishing on the topic (Table 2). Ten categories were identified to synthesize the factors involved in self-medication among undergraduate nursing students, which are described below and detailed in Table 3.

**Clinical Conditions:** A total of 94.5% of the studies identified the clinical conditions that motivated nursing students to practice self-medication. Among these, all highlighted “general pain,” and a significant portion (80.7%) pointed to symptoms related to upper respiratory tract infections.

**Reasons or motivations for self-medication:** All studies described the reasons or motivations for self-medication, with predominant aspects related to limited access to healthcare services, including financial/economic factors (77.7%).

**Medications used:** All studies examined the medications used in self-medication. Among these, the prevalent groups according to *Anatomical Therapeutic Chemical Classification* included antibacterials or antifungals – Class J (61.1%), analgesics, opioids, and antipyretics – Class N (61.1%), and non-steroidal anti-inflammatory drugs.

**Recall period:** Less than half of the studies (40.0%) indicated the recall period. Of these, 54.6% reported self-medication use in the last

four to 12 months, and ten studies (45.4%) reported a period of 15 days to three months.

**Sources of advice:** Regarding sources of advice, almost all studies (96.4%) noted this variable. Pharmacy attendants or pharmacists were the most self-reported for assistance (69.8%), followed by fellow students (58.5%) and family members (54.7%).

**Perception of risks:** Concerning risk perceptions of self-medication, described in 85.4% of the studies, participants most frequently listed the risk of adverse reactions and side effects (51.1%), the possibility of masking or delaying appropriate treatments and diagnoses (51.1%), and the possibility of drug interactions (34.0%).

**Perception of benefits:** More than one-third of the studies (38.2%) reported the benefits of the practice, predominantly including the promotion of self-care (80.9%).

**Knowledge (n = 27):** Regarding knowledge of self-medication, about half of the articles (49.1%) provided information, showing that students considered their pharmacology knowledge insufficient to promote safe or effective self-medication (37.0%) or sufficient only for certain drug classes (37.0%).

**Beliefs and Attitudes:** Beliefs/attitudes were addressed in one-third of the studies (30.9%). Findings indicated that nursing students were favorable to advising on self-medication (29.4%) and endorsed this practice among their peers.

**Practices:** Regarding daily self-medication practices, reported in 36.4% of the studies, frequent use of medications was observed in 55.0%, and the combination of different medications was reported in four articles (20.0%).

**Table 2. Characterization of studies according to year, authorship, periodical, title and country**

Year	Authorship	Journal	Title	Country
2024	Batalla, A. <i>et al.</i> <sup>(15)</sup>	Healthcare (Basel)	Dermatology Self-Medication in Nursing Students and Professionals: A Multicentre Study	Spain
2023	Nakato, G. <i>et al.</i> <sup>(16)</sup>	Plos One	Practices and drivers of self-medication with antibiotics among undergraduate medical students in Eastern Uganda: A cross-sectional study	Uganda
	Malli, IA. <i>et al.</i> <sup>(17)</sup>	Preventive Medicine Reports	The prevalence of self-medication and its associated factors among college students: Cross-sectional study from Saudi Arabia	Saudi Arabia
	Guevara-Alburqueque, MA. <i>et al.</i> <sup>(18)</sup>	Revista Cubana de Farmácia	Self-medication during COVID-19 in Nursing Students at a Peruvian University	Peru
	El-Kader, RGA. <i>et al.</i> <sup>(19)</sup>	Health Science Reports	Assessment of health-related behaviors among medical students: A cross-sectional study	United Arab Emirates
	Shanmugam, AJ. <i>et al.</i> <sup>(20)</sup>	International Journal of Electrical and Electronics Engineering	Analysis of Undergraduate Student's Knowledge of Self-Medication Practice using Machine Learning Algorithms	Saudi Arabia
	Zambrano Barriga, F.P. <i>et al.</i> <sup>(21)</sup>	Salud, Ciencia y Tecnología	Factors causing self-medication in nursing students	Equator
2022	Aranha, PR. <i>et al.</i> <sup>(12)</sup>	Journal of Health and Allied Sciences NU	Assessment of Health-Seeking Behavior among Undergraduate Students at a University	India
	Manikanta, KN. <i>et al.</i> <sup>(23)</sup>	Journal of Pharmaceutical Negative Results	Antibiotic Use and Resistance: A Cross-Sectional Study Exploring Knowledge, Attitudes and Practices among Medical, Dental, Pharmacy and Nursing Students	India
	Janatolmakan, M. <i>et al.</i> <sup>(4)</sup>	Nursing Research and Practice	The Reasons for Self-Medication from the Perspective of Iranian Nursing Students: A Qualitative Study	Iran
	Castro-Cataño, ME. <i>et al.</i> <sup>(24)</sup>	Enfermería Global	Self-medication among undergraduate nursing students	Colombia
	Terzic, D. <i>et al.</i> <sup>(5)</sup>	Serbian Journal of Experimental and Clinical Research	Self-medication with antibiotics among nursing students in Serbia: pilot study	Serbia

**Table 2. Characterization of studies according to year, authorship, periodical, title and country (Cont.)**

Year	Authorship	Journal	Title	Country
2021	Fetensa, G. <i>et al.</i> <sup>(25)</sup>	Journal of Pharmaceutical Policy and Practice	Prevalence and predictors of self-medication among university students in Ethiopia: a systematic review and meta-analysis	Ethiopia
	Saddique, N. <i>et al.</i> <sup>(16)</sup>	Pakistan Journal of Medical & Health Sciences	Prevalence, Awareness Level and Attitude of Self-Medication Among Student Nurses	Pakistan
	Akande-Sholabi, W. <i>et al.</i> <sup>(26)</sup>	Journal of Pharmaceutical Policy and Practice	Prevalence, knowledge and perception of self-medication practice among undergraduate healthcare students	Nigeria
	Faqihi, AHMA. <i>et al.</i> <sup>(27)</sup>	Annales Pharmaceutiques Françaises	Self-medication practice with analgesics (NSAIDs and acetaminophen), and antibiotics among nursing undergraduates in University College Farasan Campus, Jazan University, KSA	United States
	González-Muñoz, F. <i>et al.</i> <sup>(28)</sup>	Educación Médica	Self-medication among final year students of Nursing, Physiotherapy and Medicine at the University of Cordoba	Spain
	Bharati, JP. <i>et al.</i> <sup>(29)</sup>	Journal of Nepal Medical Association	Self-medication in primary dysmenorrhea among medical and nursing undergraduate students of a tertiary care hospital: A descriptive cross-sectional study	Nepal
	Andrés, MIG. <i>et al.</i> <sup>(30)</sup>	International Journal of Environmental Research and Public Health	Self-medication of drugs in nursing students from Castile and Leon (Spain)	Spain
	Naseef, H. <i>et al.</i> <sup>(7)</sup>	Journal of Young Pharmacists	Pattern Knowledge and Determinants of Analgesic Self-medication among Undergraduate Students in the Faculty of Pharmacy, Nursing and Health Professions	Palestine
	Kifle, ZD. <i>et al.</i> <sup>(9)</sup>	Inquiry: The Journal of Health Care Organization, Provision, and Financing	Self-medication Practice and Associated Factors among Private Health Sciences Students in Gondar Town, North West Ethiopia. A Cross-sectional Study	Ethiopia
	Araújo Júnior, AG. <i>et al.</i> <sup>(31)</sup>	Arquivos em Odontologia	Prevalência da automedicação em acadêmicos de odontologia e enfermagem em uma instituição pública brasileira	Brazil

**Table 2. Characterization of studies according to year, authorship, periodical, title and country (Cont.)**

Year	Authorship	Journal	Title	Country
2020	Bohomol, E. <i>et al.</i> <sup>(32)</sup>	Ciência, Cuidado e Saúde	Prática da automedicação entre estudantes de enfermagem de instituição de ensino superior	Brazil
	Parra-Fernández ML. <i>et al.</i> <sup>(33)</sup>	International Journal of Environmental Research and Public Health	Management of Primary Dysmenorrhea among University Students in the South of Spain and Family Influence	Spain
	Khatony, A. <i>et al.</i> <sup>(34)</sup>	BMC Nursing	Nursing students' perceived consequences of self-medication: A qualitative study	Iran
	Chindhalore, C. <i>et al.</i> <sup>(35)</sup>	Journal of Education and Health Promotion	Comparison of self-medication practices with analgesics among undergraduate medical and paramedical students of a tertiary care teaching institute in Central India - A questionnaire-based study	India
	Olorunfemi, O. <i>et al.</i> <sup>(36)</sup>	Journal of Integrative Nursing	Assessing the reasons for increase in self-medication and control measures among student nurses in University of Benin Teaching Hospital, Edo State, Nigeria	Nigeria
	Sharma, K. <i>et al.</i> <sup>(37)</sup>	Clinical Epidemiology and Global Health	Self-medication practices with antibiotics among nursing students: A cross-sectional descriptive survey at tertiary care teaching hospital in Uttarakhand	India
2019	Nogueira, WB. <i>et al.</i> <sup>(38)</sup>	Revista de Enfermagem UFPE on-line	Automedicação: prática entre graduandos de enfermagem	Brazil
	Al Essa, M. <i>et al.</i> <sup>(39)</sup>	Saudi Pharmaceutical Journal	Practices, awareness and attitudes toward self-medication of analgesics among health sciences students in Riyadh, Saudi Arabia	Saudi Arabia
	Karaman, A. <i>et al.</i> <sup>(40)</sup>	Florence Nightingale Journal of Nursing	Rational Drug Usage Status of Nursing Students	Turkey
	Colares, KTP. <i>et al.</i> <sup>(41)</sup>	Revista de Enfermagem UFPE online	Prevalência e fatores associados à automedicação em acadêmicos de enfermagem	Brazil

**Table 2. Characterization of studies according to year, authorship, periodical, title and country (Cont.)**

Year	Authorship	Journal	Title	Country
2018	Anand, S. <i>et al.</i> <sup>(42)</sup>	Asian Journal of Pharmaceutical and Clinical Research	A study of pattern of self-medication among students for dysmenorrhea	India
	Abdi, A. <i>et al.</i> <sup>(43)</sup>	BMC Pharmacology and Toxicology	Prevalence of self-medication practice among health sciences students in Kermanshah, Iran	Iran
	Donmez, S. <i>et al.</i> <sup>(44)</sup>	International Journal of Pharmacology	Knowledge, attitude and practice of self-medication with antibiotics among nursing students	Turkey
	Kim, Hae-Ok. <i>et al.</i> <sup>(45)</sup>	Health Communication	Knowledge and Attitude about Drugs and the Current Status of Self-medication of Nursing Students	South Korea
	Esan, DT. <i>et al.</i> <sup>(46)</sup>	Journal of Environmental and Public Health	Assessment of Self-Medication Practices and Its Associated Factors among Undergraduates of a Private University in Nigeria	Nigeria
2017	Sajith, M. <i>et al.</i> <sup>(47)</sup>	The Open Public Health Journal	Self-medication practices among health care professional students in a tertiary care hospital, Pune	India
	Tse, MMY. <i>et al.</i> <sup>(48)</sup>	Cyberpsychology, Behavior and Social Networking	Pain and Pain Management Among University Students: Online Survey and Web-Based Education	Hong Kong
	Santiago, A. <i>et al.</i> <sup>(49)</sup>	Revista Gaúcha de Enfermagem	Automedicação em estudantes de enfermagem do Estado do Amazonas – Brasil	Brazil
	Virmani, S. <i>et al.</i> <sup>(50)</sup>	Clinical Epidemiology and Global Health	Antibiotic use among health science students in an Indian university: A cross-sectional study	India
	Rasheed, FA. <i>et al.</i> <sup>(51)</sup>	Journal of Pharmacy and Bioallied Sciences	Academic stress and prevalence of stress-related self-medication among undergraduate female students of health and non-health cluster colleges of a public sector University in Dammam, Saudi Arabia	Saudi Arabia

**Table 2. Characterization of studies according to year, authorship, periodical, title and country (Cont.)**

Year	Authorship	Journal	Title	Country
2016	Yadav, AK. <i>et al.</i> <sup>(52)</sup>	Journal of Nepal Medical Association	Self-prescription of paracetamol by undergraduate students in BP Koirala institution of health sciences	Nepal
	Williams, A. <i>et al.</i> <sup>(53)</sup>	Contemporary Nurse	Self-medication practices among undergraduate nursing and midwifery students in Australia: a cross-sectional study	Australia
	Johnson, D. <i>et al.</i> <sup>(54)</sup>	International Journal of Pharmacy and Pharmaceutical Sciences	Self-medication practice among medical, pharmacy and nursing students	India
	Iuras, A. <i>et al.</i> <sup>(55)</sup>	Revista Portuguesa de Estomatologia, Medicina Dentária e Cirurgia Maxilofacial	Prevalence of self-medication among students of State University of Amazonas (Brazil)	Brazil
	Ali, AS. <i>et al.</i> <sup>(56)</sup>	Journal of the Pakistan Medical Association	Practices of self-medication with antibiotics among nursing students of institute of nursing, Dow University of Health Sciences, Karachi, Pakistan	Pakistan
2015	Mlinar, S. <i>et al.</i> <sup>(57)</sup>	Vojnosanitetski Pregled	Analysis of over-the-counter medicines use among nursing students	Slovenia
2014	Silva, FM da. <i>et al.</i> <sup>(58)</sup>	Revista Eletrônica de Enfermagem	Caracterização da prática de automedicação e fatores associados entre universitários do curso de Enfermagem	Brazil
	Martinez, JE. <i>et al.</i> <sup>(59)</sup>	Revista Brasileira de Reumatologia	Estudo da automedicação para dor musculoesquelética entre estudantes dos cursos de enfermagem e medicina da Pontifícia Universidade Católica - São Paulo	Brazil
2012	Santos, B dos. <i>et al.</i> <sup>(60)</sup>	Journal of the Health Science Institute	Incidência da automedicação em graduandos de Enfermagem	Brazil
2011	Jalapeña, B. <i>et al.</i> <sup>(61)</sup>	Revista Visión de Enfermería Actualizada	Automedicación en estudiantes de Enfermería	Argentina
	Souza, LAF. <i>et al.</i> <sup>(8)</sup>	Revista Latino-Americana de Enfermagem	The prevalence and characterization of self-medication for obtaining pain relief among undergraduate nursing students	Brazil
2007	Damasceno, DD. <i>et al.</i> <sup>(62)</sup>	Revista Mineira de Enfermagem	Automedicação entre graduandos de enfermagem, farmácia e odontologia da Universidade Federal de Alfenas	Brazil
2004	Magaldi, L. <i>et al.</i> <sup>(63)</sup>	Revista de La Facultad de Medicina	Farmacovigilancia y hábitos de consumo de medicamentos en los estudiantes de la Escuela de Enfermería de la Universidad Central de Venezuela	Venezuela

**Table 3. Categorization of factors involved in the practice of self-medication among undergraduate nursing students**

Categories and factors related to self-medication	Studies identifying the category/ factor <i>n</i> (%)	
	<i>n</i>	%
<b>Clinical conditions (<i>n</i> = 52)</b>		
General pain (headaches, back pain, muscle pain)	52	100.0
Flu, colds, and cough	42	80.7
Gastrointestinal disorders	24	46.2
Fever	22	42.3
Sore throat	18	34.6
Skin problems (allergies, dermatitis, abrasions)	17	32.7
Dysmenorrhea	14	26.9
Emotional and psychological problems	8	15.4
Infections in general	5	9.6
Urinary problems	4	7.7
Insomnia	3	5.8
Weakness and fatigue	3	5.8
Parasitic infections	2	3.9
Weight loss	1	1.9
Sexual enhancement	1	1.9
<b>Reasons or motivations (<i>n</i> = 54)</b>		
Financial/economic factors	28	51.8
Lack of time for consultation	26	48.1
Ease and speed of access to medication and/or pharmacies	22	40.7
Previous experience with the illness and/or medication	20	37.1
Using one's own knowledge of pharmacology	16	29.6
Mild illnesses/symptoms	15	27.8
Difficulty accessing healthcare services	14	25.9
Long waiting times for appointments	8	14.8
Quick resolution of severe symptoms	6	11.1
Hostility from healthcare professionals	4	7.4
Lack of resolution after a consultation	4	7.4
Lack of trust in healthcare professionals	3	5.6
Cultural factors	2	3.7
<b>Medication groups according to <i>Anatomical Therapeutic Chemical</i> (ATC) classification (<i>n</i> = 54)</b>		
ATC J (systemic antibacterials or antifungals)	33	61.1
ATC N (analgesics or opioids or antipyretics)	33	61.1
ATC M (anti-inflammatories)	27	50.0
ATC A (antiemetics or vitamins or minerals or antacids or laxatives)	15	27.8
ATC R (antihistamines or decongestants or expectorants)	14	25.9
ATC N (anxiolytics or antidepressants or sedatives or stimulants)	8	14.8
ATC D (antifungals or antiseptics or antihistamines or anesthetics or topical antibiotics)	6	11.1
ATC H (corticosteroids)	2	3.7
ATC P (antiprotozoal or anthelmintic)	1	1.9
ATC G (contraceptives)		

**Table 3. Categorization of factors involved in the practice of self-medication among undergraduate nursing students (Cont.)**

Categories and factors related to self-medication	Studies identifying the category/ factor <i>n</i> (%)	
<b>Recall period (n=22)</b>		
1-3 months	9	40.9
4-6 months	6	27.3
12 months	6	27.3
15 days	1	4.5
<b>Sources of advice (n=53)</b>		
Pharmacy attendants or pharmacists	37	69.8
Fellow students	31	58.5
Family members	29	54.7
Previous medical prescriptions	13	24.5
<i>Internet</i>	12	22.6
Pharmacology and/or pathology books and/or package inserts and/or course materials	6	11.3
Other non-medical professionals	6	11.3
<b>Perception of risks (n=47)</b>		
Adverse reactions and events	24	51.1
Masking symptoms, leading to incomplete treatment and delayed/incorrect diagnoses.	24	51.1
	16	34.0
Risk of drug interactions	12	25.5
Increase in antimicrobial resistance	9	19.1
Considering the practice unsafe	6	12.8
Leading to drug abuse and dependence	5	10.7
Raising treatment and healthcare system costs	5	10.7
Incorrect administration	2	4.3
Intoxication		
<b>Perception of benefits (n=21)</b>		
Promoting self-care	17	80.9
Not overburdening the healthcare system	4	19.1
Quickly resolving mild symptoms	2	9.5
<b>Knowledge (n=27)</b>		
Knowledge was insufficient about medications	10	37.0
Knowledge was sufficient about the clinical condition and/or medication used	10	37.0
Knowledge was sufficient only for certain drug classes	8	29.6
Students in more advanced semesters had greater knowledge about medications	3	11.1
Lack of exposure to the topic in pharmacology courses	1	3.7
<b>Beliefs and Attitudes (n=17)</b>		
Used to advise others on self-medication	5	29.4
Believed antibiotics could be beneficial in casual situations	4	23.5
Previous experiences with medications contributed to self-medication	3	17.6
For simple and recurring illnesses, they believed there was no need to consult a doctor	1	5.9
	1	5.9
Self-medication conducted by qualified individuals is beneficial	1	5.9
Did not take medications for severe illnesses	1	5.9
Reading the package insert is important for self-medication	1	5.9
Felt fear about misdiagnosis and drug effects		

**Table 3. Categorization of factors involved in the practice of self-medication among undergraduate nursing students (Cont.)**

Categories and factors related to self-medication	Studies identifying the category/ factor <i>n</i> (%)	
<b>Practices (<i>n</i>=20)</b>		
Frequent use of medications	11	55.0
Combining different medications	4	20.0
Continuous use of medication	3	15.0
Stopping medication when symptoms disappear	2	10.0
Being cautious about taking medication before or after meals	1	5.0
Oral administration of medication	1	5.0
Taking medication at the correct time	1	5.0
Stopping medication in case of adverse reactions	1	5.0
Using inappropriate medications for the clinical condition	1	5.0
In earlier semesters, self-medication was practiced more frequently	1	5.0

*ATC: Anatomical Therapeutic Chemical (ATC) classification*

## Discussion

This scoping review provides a broad and detailed overview, covering the years 2004 to 2024, of self-medication among undergraduate nursing students. The findings<sup>(4-8,15-63)</sup> showed that this behavior is generally influenced by clinical, socioeconomic, educational, and healthcare access factors.<sup>(4-8,15-63)</sup>

Almost all studies,<sup>(4-8,15-18,20,21,23-63)</sup> regardless of country and year of publication, indicated that “general pain” and flu-like conditions are the main reasons for self-medication among undergraduate nursing students. These conditions are typically observed in young adults,<sup>(4-8,15-18,20,21,23-63)</sup> especially in academic environments where stress and exposure to pathogens are common; they are perceived as mild and self-limiting, which may lead to the belief that formal medical intervention is unnecessary.<sup>(34,43)</sup> Additionally, this finding may be associated with the signs and symptoms experienced during the COVID-19 pandemic, as nearly half of the articles were published between 2020 and 2024, i.e., during or post-pandemic.

Although most studies<sup>(4,6,7,15-29,31-41,43-50,52-62)</sup> presented various risks of self-medication, there was widespread use of systemic antibiotics/antifungals (ATC J). This is an important finding that deserves attention, especially since these are nursing students, given the health recommendation for medical prescriptions to acquire this drug class, and the fact that there has been an international campaign for nearly a decade about AMR issues.<sup>(64,65)</sup> This phenomenon represents a growing threat to global public health, where misuse, overuse, and lack of professional supervision are factors that tend to accelerate the process.<sup>(64,65)</sup>

Countries in Asia and South America were the main contributors to knowledge dissemination on the topic, suggesting that these regions have paid more attention to the problem of self-medication. However, these countries share certain aspects related to their healthcare systems,<sup>(66,68)</sup> which may contribute to this behavior. The shortage of healthcare professionals, especially in remote and peripheral areas, combined with limited access to healthcare services and economic factors, are common elements that emerged in the students’ self-reports. In these cases, the benefits of the practice were often associated with seeking self-

care, corroborating previous research findings in the region.<sup>(69,70)</sup>

Advice<sup>(4-8,15-45,47-63)</sup> for students came mainly from information provided by pharmacy professionals, not necessarily pharmacists, fellow students, followed by family members. In this sense, the evidence presented is concerning, requiring joint interpretation beyond understanding the practice itself and may provide support for potential interventions, especially in academic training.

Regarding knowledge, beliefs/attitudes, and practices about self-medication, the findings identified limited knowledge, negative beliefs/attitudes, and practices considered inappropriate/unsafe regarding the medications used.<sup>(4,6,16,23,27,30,32,34,36-38,39,41,42,44,45,47,49,50,52,53,55,59)</sup> This set of findings requires attention and academic intervention in professional training. Nurses<sup>(71)</sup> play a crucial role in the medication administration process, in preventing and recognizing ADEs.

In this sense, the fragility in acquiring knowledge, especially in pharmacology during undergraduate studies, may represent one of the main causes involved in the occurrence of an ADE. It is essential to overcome certain barriers to incorporating knowledge, which may involve adjustments in the course's pedagogical project, teaching methods, and the need for theoretical-practical articulation about the benefits and risks of medications in different areas of student practice. Knowledge limited to classic aspects, such as 10 traditional certainties of the profession regarding drug preparation and administration, may contribute to the emergence of inadequate beliefs and practices that lead to significant risks.<sup>(72,73)</sup>

There were two limitations to consider in this scoping review. The recall period for self-medication was highly varied, which may

underestimate or overestimate the practice; many studies included undergraduate nursing students and others from health sciences fields, which may have impacted the specific analysis for the nursing profession.

Therefore, this review contributed to mapping the trend of self-medication. The identified evidence highlights the seriousness of this practice not only for students' health but also for patient safety. It seems essential to reflect critically and hold curricular discussions on the emerging need to include and incorporate content involving "safe use of medications" integrated into Pharmacology, Public Health, or Patient Safety courses in nursing curricula. Thus, it reinforces the development of competencies and skills involving this extensive topic during the teaching-learning process, especially in Asian and South American countries.

## Conclusion

This study showed that clinical, socioeconomic, and behavioral factors were related to self-medication among undergraduate nursing students, particularly in Asia and South America. Knowledge and beliefs/attitudes, which are conditioning elements of self-medication practice, despite being drivers of this behavior, were underexplored in the studies.

It is emphasized that future nurses play a relevant role in the medication system in healthcare services since they are involved from preparation to monitoring outcomes after drug administration. It is essential that they develop good practices related to medication safety, which can substantially contribute to educating the population about the risks of adverse events resulting from unsafe medication use.

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# Impulsivity among Senior Nursing Students: The role of Emotional Intelligence and clinical performance

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Original Article



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## Impulsivity among Senior Nursing Students: The role of Emotional Intelligence and clinical performance

### Abstract

**Objective.** This study examined the relationship between impulsivity, emotional intelligence, and clinical performance. **Methods.** Through a total enumerative sampling technique, this correlational study involved 229 pre-final and final-year nursing students from Northern India. Data were collected using validated questionnaires measuring Emotional Intelligence -EI- (Schutte Self-Report Emotional Intelligence Scale), Barratt Impulsiveness Scale–Brief (BIS-Brief), and clinical competence (Clinical Competence Questionnaire). **Results.** All participants were nursing students, with 62% in their pre-final year; however, only 83.41% expressed interest in pursuing a nursing career. A significant negative correlation of impulsivity with self-awareness ( $r=-0.54$ ,  $p=0.021$ ) and advanced nursing skills ( $r=-0.61$ ,  $p=0.031$ ) was found. Among selected socio-demographic variables, age ( $p=0.049$ ) emerged as a significant positive predictor of impulsive behaviour. **Conclusion.** The findings suggest impulsivity is inversely related to self-awareness, a domain of EI, and advanced nursing skills, implying that students with higher self-awareness exhibit better emotional regulation and decision-making in clinical settings.

**Descriptors:** emotional intelligence; impulsivity; student, nurses; clinical performance.

## Impulsividad en estudiantes de último curso de Enfermería: El papel de la Inteligencia Emocional y el rendimiento clínico

### Resumen

**Objetivo.** Investigar la relación entre impulsividad, inteligencia emocional y rendimiento clínico. **Métodos.** En este estudio correlacional participaron 229 estudiantes de enfermería de último y penúltimo año de una universidad del norte de la India, los cuales fueron seleccionados mediante una técnica de muestreo enumerativo total. Los datos se recogieron utilizando cuestionarios validados que medían la Inteligencia Emocional -EI- (Schutte Self-Report Emotional Intelligence Scale), Barratt Impulsiveness Scale-Brief (BIS Brief), y la competencia clínica (Clinical Competence Questionnaire). **Resultados.** Más de la mitad de las participantes (62%) cursaban el último año de la carrera de enfermería y el 83.41% manifestaron interés por la profesión. Se encontró una correlación negativa

significativa de la impulsividad con la autoconciencia ( $r=-0.54$ ,  $p=0.021$ ) y las habilidades avanzadas de enfermería ( $r=-0.61$ ,  $p=0.031$ ). Entre las variables sociodemográficas seleccionadas, la edad ( $p=0.049$ ) resultó ser un predictor positivo significativo del comportamiento impulsivo. **Conclusión.** Los hallazgos sugieren que la impulsividad está inversamente relacionada con la autoconciencia -un dominio de la IE-, y las habilidades avanzadas de enfermería, lo que implica que los estudiantes con mayor autoconciencia muestran una mejor regulación emocional y tienen adecuadas tomas de decisiones en entornos clínicos.

**Descriptor:** inteligencia emocional; impulsividad; estudiantes enfermeras; desempeño clínico.

## Impulsividade em estudantes do último ano de enfermagem: O papel da inteligência emocional e do desempenho clínico

### Resumo

**Objetivo.** Investigar a relação entre impulsividade, inteligência emocional e desempenho clínico. **Métodos.** Este estudo correlacional envolveu 229 estudantes de enfermagem do último e penúltimo ano de uma universidade no norte da Índia. Eles foram selecionados por meio de uma técnica de amostragem enumerativa total. Os dados foram coletados por meio de questionários validados que mensuram a Inteligência Emocional (IE) (*Schutte Self-Report Emotional Intelligence Scale*), *Barratt Impulsiveness Scale-Brief* (BIS Brief) e competência clínica (*Clinical Competence Questionnaire*). **Resultados.** Mais da metade dos participantes (62%) estavam no último ano do curso de enfermagem. Foi encontrada uma correlação negativa significativa entre impulsividade e autoconsciência ( $r=-0.54$ ,  $p<0.05$ ) e habilidades avançadas de enfermagem ( $r=-0.61$ ,  $p<0.05$ ). Entre as variáveis sociodemográficas selecionadas, a idade ( $p<0.05$ ) foi considerada um predictor positivo significativo do comportamento impulsivo. **Conclusão.** Os resultados sugerem que a impulsividade está inversamente relacionada à autoconsciência - um domínio da IE - e às habilidades avançadas de enfermagem, o que implica que os alunos com maior autoconsciência apresentam melhor regulação emocional e tomada de decisão adequada em ambientes clínicos.

**Descritores:** inteligência emocional; impulsividade; estudantes de enfermagem; desempenho clínico.

## Introduction

**E**motional intelligence (EI), as defined by Salovey and Mayer,<sup>(1)</sup> is a form of social intelligence that involves the ability to recognise and understand both one's own and others' emotions, distinguish between them, and use this awareness to guide thoughts and actions. Nurses and nurse educators must understand the idea of EI and be familiar with the theories and research that underpin it. Nursing is considered a high-pressure and demanding profession. Nursing students are expected to play a key role in providing care services soon, requiring them to develop the necessary clinical skills to enhance patient care quality, and make them more competent in clinical areas, so incorporating EI may give an advantage among nursing students. For enhancing clinical performance, students nurse requires knowledge, skills, attitudes, and abilities, as well as applying technical, communication, and clinical reasoning skills to deliver effective care in clinical settings, and this competence develops over time through practice, experience, and quality education.<sup>(2,3)</sup> Clinical performance is vital for professional growth, confidence in the workplace, and ensuring safe and efficient care. Nurses with higher clinical competence are more adept at building empathetic connections with patients and applying their skills effectively in clinical settings. As a result, clinical competence plays a vital role in enhancing care quality, patient satisfaction, and the sustainability of hospitals in today's competitive healthcare environment.<sup>(4)</sup>

While some studies from other countries have established a clear link between emotional intelligence and better performance in clinical areas and observed relationships between EI and clinical performance, higher emotionally intelligent student nurses maintained better patient relationships, clinical reasoning, self-awareness, and adaptability<sup>(5)</sup> as compared to lower EI students. Whereas other research has found no such correlation between EI and clinical competence. Impulsivity may also act as a significant predictor of performing better in a clinical setting through EI. Low EI is characterised by poor emotional reasoning that can lead to more impulsive reactions to stressful situations. Enhancing emotional clarity (understanding emotions) and emotional regulation (managing emotions) could help mitigate impulsive behaviour.<sup>(6)</sup> Higher impulsive behaviour leads to difficulty in inhibiting responses and delaying gratification, often leading to choices based on immediate rewards rather than long-term benefits.<sup>(7)</sup> This impulsive behaviour may be because a person acts without prior planning or consideration, responding impulsively to internal or external stimuli and ignoring possible negative consequences.<sup>(8)</sup> Major factors for higher impulsive behaviours are if the person (students) doesn't understand their own or others' emotional states and responds inappropriately to threats or frustrations, resulting in impulsivity. Understanding own as well as others' emotions is one of the crucial components of emotional intelligence. In this way, EI and impulsivity seem

to be interconnected. While many studies have explored the relationship between emotional intelligence and the clinical performance of nursing students, none have examined the link between impulsivity, emotional intelligence, and clinical performance. Given the limited research on impulsivity and its association with EI and clinical performance among nursing students, this study aimed to examine the relationship between impulsivity, EI and clinical performance among senior nursing students so that the findings of this study can address the present gaps in the literature. Specifically, this study seeks to address the following research questions: (i) How do impulsivity, EI and clinical performance differ among pre-final and final-year nursing students? and (ii) What are the factors associated with impulsivity among senior nursing students? By examining these factors together, this study sought to provide a more comprehensive understanding of the factors influencing nursing students' impulsivity. So, curriculum developers inculcate measures to enhance EI and decrease impulsivity for better control of emotion during patient care.

## Methods

**Study design and setting.** A correlational study using a total enumerative sampling technique was conducted to investigate the role of EI and clinical performance on nursing students' impulsivity. The sample of this study consists of 229 pre-final and final-year bachelor's nursing students,  $\geq 18$  years of age, and willing to participate in the study. These specific years were chosen because students have gained sufficient clinical experience at this educational stage. Data were collected from August 2024 to December 2024 from a nursing college in Northern India.

**Data collection tools.** This study utilized several data-collection tools. A data sheet was created to elicit information related to socio-demographic variables. Impulsivity among nursing students was assessed using the Barratt Impulsiveness Scale–

Brief (BIS-Brief). BIS is an 8-item questionnaire that evaluates general impulsiveness or the absence of future planning and forethought. It is a valid and reliable tool. The estimated Cronbach's alpha for the scale was 0.78.<sup>(9)</sup> Schutte Self-Report Emotional Intelligence Scale (SSREI) with Cronbach's alpha=0.90 validity (CVI=0.88) was used to measure emotional intelligence. The SSREI is a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) and includes 33 items. EI was measured as the sum of the scores for all 33 items, with a score range of 33–165. A score below 124 suggested a low EI level, and 124 or higher denoted a high level of EI.<sup>(10)</sup> The Clinical Competence Questionnaire (CCQ) was used to evaluate the clinical competency of the nursing students. It consists of 47 items that represent clinical competencies categorised as either nursing professional behaviour (items 1-17), or related to clinical competency (items 17-47). The CCQ uses a 5-point Likert scale, ranging from 1 (do not have a clue) to 5 (known in theory, competent in practice without supervision). The total score ranges from 47 to 235, with higher scores indicating good clinical competence. The Cronbach's alpha for the entire 47-item Clinical Competence Questionnaire was 0.98.<sup>(11)</sup>

**Ethical considerations.** Before participation, the participants were informed of the aim and purpose of the study. Informed written consent was obtained before data collection. Confidentiality and anonymity were maintained. The Institutional Ethics Committee of the Uttar Pradesh University of Medical Sciences, with reference number: 167/Cert./IEC/UPUMS/2023-24, dated 11/03/2024. Written informed consent was obtained from all eligible participants.

**Statistical analysis.** We conducted data analysis and interpretation to reduce, organise, and give meaning to the data. Statistical analyses were carried out using SPSS software (version 26.0; IBM Corp., Armonk, N.Y., USA). Both descriptive and inferential statistics were employed to analyse the data from the current study. Descriptive statistics,

including percentages, means, and standard deviations, were calculated. A chi-square test was used for comparative analysis between the poor and good EI groups. Independent t-tests were conducted to examine differences in mean EI, clinical competence levels, and impulsivity across academic years. Pearson correlation was applied to evaluate the correlation between impulsivity and EI with clinical competence. One-way ANOVA and independent t-tests were used to find the association of socio-demographic variables with impulsivity. Multivariate linear regression analyses were performed to identify predictors of impulsiveness. All statistical tests were two-tailed, with statistical significance set at  $p < 0.05$ .

## Socio-demographic profile of participants:

The study included 229 nursing students (response rate: 81.84%), the majority of whom were aged 22–23 years (65.50%) and unmarried (97.81%). Most participants (62%) were in the pre-final year of their nursing programs. The majority, 83.41%, expressed an interest in nursing and were in favour of accepting the nursing profession as a job in future (Table 1). Among the whole participants, 16.59 % did not like nursing as they were in not in favour of doing a nursing job in future.

**Table 1. Socio-demographic Profile of 229 Nursing Students**

Variables	Categories	n (%)
Age (years)	19-21	53 (23.14)
	22-23	150 (65.50)
	24-25	26 (11.36)
Religion	Hindu	208 (90.83)
	Other	21 (9.17)
Academic Year	Third	142 (62)
	Fourth	87 (38)
Marital Status	Unmarried	224 (97.81)
	Married	5 (2.19)
Any Psychiatric illness	No	214 (93.45)
	Yes	15 (6.55)
Interested in Nursing	Yes	191 (83.41)
	No	38 (16.59)

## Emotional Intelligence, Clinical Competence and Impulsivity Scores by Academic Years:

Table 2 shows the mean score differences in study variables between third-year and fourth-

year students. Fourth-year students scored significantly higher than third-year students in all EI and clinical competence domains, except for self-control and nursing professional behaviour.

**Table 2. Impulsivity, Emotional Intelligence and Clinical Competence Scores by Academic Year (n=229)**

Variable	3 <sup>rd</sup> year Mean (SD)	4 <sup>th</sup> year Mean (SD)	t-value	p-value
BIS	15.13 (3.59)	15.88 (3.71)	-1.53	0.122
EI- Motivation	25.55 (4.06)	26.76 (3.12)	-2.38	0.015
EI- Self-awareness	29.28 (3.53)	30.51 (2.83)	-2.75	0.016
EI- Self-control	25.60 (3.56)	26.40 (3.12)	-1.72	0.081
EI- Social Consciousness	22.05 (3.24)	23.10 (2.41)	-2.60	0.010
EI- Social Skills	17.82 (2.65)	18.71 (2.09)	-2.66	0.015
Over EI	120.32 (11.86)	125.49 (11.43)	-2.78	0.069
CCQ-Nursing Professional Behaviours	57.01 (14.07)	60.19 (12.01)	-1.76	0.081
CCQ-General Performance	44.53 (11.51)	48.00 (9.01)	-2.39	0.021
CCQ-Core Nursing Skills	47.62 (12.39)	51.95 (9.30)	-2.81	0.016
CCQ-Advanced Nursing Skills	22.25 (5.46)	24.41 (4.59)	-3.09	0.016
Overall CCQ	175.27 (41.39)	188.79 (32.46)	-2.59	0.012

Abbreviations: EI- Emotional Intelligence; SSEIT- Schutte Self Report Emotional Intelligence Test; CCQ- Clinical Competence Questionnaire; BIS- Barratt Impulsiveness Scale

Participants were split into two groups based on their EI scores (below 124 and 124 or higher). (Supplementary Table 1) These groups had no significant differences regarding demographics such as age, religion, marital status, or psychiatric

history. However, differences were found in academic year and interest in nursing, suggesting that EI might be related to a student's academic progression and passion for the nursing field.

**Supplementary Table 1. Comparison of Clinical and Demographic Profiles between the Participants with Poor and Good Emotional Intelligence Scores. (n=229)**

Variables	Categories	Poor EI < 124 (n = 116) n (%)	Good EI ≥ 124 (n = 113) n (%)	p-value
Age (years)	19-21	27 (50.94)	26 (49.06)	0.891
	22-23	77 (51.33)	73 (48.67)	
	24-25	12 (46.15)	14 (53.85)	
Religion	Hindu	105 (50.48)	103 (49.52)	0.214
	Other	11 (52.38)	10 (47.62)	
Academic Year	Third	85 (59.86)	57 (40.14)	0.015
	Fourth	31 (35.63)	56 (64.37)	
Marital Status	Unmarried	114 (50.89)	110 (49.11)	0.681
	Married	2 (40)	3 (60)	
Any Psychiatric illness	No	105 (49.07)	109 (50.93)	0.076
	Yes	11 (73.33)	4 (26.67)	
Interested in Nursing	Yes	88 (46.07)	103 (53.93)	0.022
	No	28 (73.68)	10 (26.32)	

### Correlation of Impulsivity with Emotional Intelligence and Clinical Competence:

Table 3 indicates a significant negative correlation of impulsivity with self-awareness ( $r=-0.54$ ,

$p \leq 0.05$ ), meaning less self-aware students tended to be more impulsive. However, no relationship was found between impulsivity and all parameters of clinical competence except advanced nursing skills ( $r=-0.61$ ,  $p \leq 0.05$ ).

**Table 3. Correlation of Impulsivity with Emotional Intelligence and Clinical Competence (n=229)**

	Impulsivity	p-value
EI- Motivation	0.05	0.621
EI- Self-Awareness	-0.54	0.021
EI- Self-control	0.07	0.711
EI- Social Consciousness	0.04	0.073
EI- Social Skills	0.07	0.124
Total-EI	0.08	0.985
CCQ-Nursing Professional Behaviours	0.01	0.176
CCQ-General Performance	0.01	0.548
CCQ-Core Nursing Skills	0.01	0.283
CCQ-Advanced Nursing Skills	-0.61	0.031
Total CCQ	-0.01	0.192

Abbreviations: SSEIT- Schutte Self-Report Emotional Intelligence Test; CCQ- Clinical Competence Questionnaire.

Selected socio-demographic variables were not found to be associated with impulsivity, except age, with  $p < 0.05$ . (Table 4) Impulsivity was

observed to increase with age, meaning older participants were more likely to display impulsive behaviour.

**Table 4. Socio-demographic Factors Associated with Impulsivity in Univariate Analyses (n=229)**

Variables		Impulsivity	
		Mean (SD)	p-value
Age (years)	19-21	14.47 (3.67)	0.049
	22-23	15.59 (3.42)	
	24-25	16.31 (4.55)	
Religion	Hindu	15.54 (3.69)	0.973
	Other	15.50 (3.07)	
Academic Year	Third	15.13 (3.59)	0.135
	Fourth	15.89 (3.71)	

**Table 4. Socio-demographic Factors Associated with Impulsivity in Univariate Analyses (n=229) (Cont.)**

Variables		Impulsivity	
		Mean (SD)	p-value
Age (years)	19-21	14.47 (3.67)	0.049
	22-23	15.59 (3.42)	
	24-25	16.31 (4.55)	
Religion	Hindu	15.54 (3.69)	0.973
	Other	15.50 (3.07)	
Academic Year	Third	15.13 (3.59)	0.135
	Fourth	15.89 (3.71)	
Marital Status	Unmarried	15.44 (3.66)	0.539
	Married	14.40 (3.01)	
Any Psychiatric illness	No	15.45 (3.53)	0.552
	Yes	14.87 (5.21)	
Interested in Nursing	Yes	<b>15.42 (3.66)</b>	0.931
	No	15.37 (3.65)	

Additionally, we conducted a multiple linear regression analysis to identify significant predictors of impulsiveness. The dependent variable (impulsiveness) was regressed on the predicting

variables of age, EI, and clinical competence ( $R^2=0.094$ ; adjusted  $R^2=0.021$ ). Age and self-awareness were found to be significant predictors of impulsiveness ( $p<0.05$ ) (Table 5).

**Table 5. Multiple Linear Regression Analysis of Factors Associated with Impulsivity**

Variables	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
Age	0.91	0.44	0.14	2.07	0.032	0.04	1.78
Psychiatric illness	-0.92	1.00	-0.06	-0.91	0.362	-2.90	1.06
Interested in Nursing	0.16	0.69	0.01	0.23	0.814	-1.21	1.53
Marital Status	-0.83	1.79	-0.03	-0.46	0.642	-4.37	2.69
Academic Year	0.43	0.53	0.05	0.81	0.415	-0.62	1.50
Religion	-0.54	0.43	-0.08	-1.23	0.212	-1.41	0.32
EI-Motivation	-0.09	0.12	-0.09	-0.74	0.452	-0.33	0.14
EI-Self-Awareness	-0.22	0.11	-0.20	-1.91	0.049	-0.01	0.46
EI-Self-Control	0.06	0.12	0.06	0.53	0.595	-0.17	0.30
EI-Social Consciousness	-0.13	0.14	-0.11	-0.93	0.352	-0.41	0.14
EI-Social Skills	0.02	0.13	0.01	0.19	0.842	-0.24	0.29
Overall EI	0.72	0.21	0.08	1.23	0.753	-0.78	0.21

**Table 5. Multiple Linear Regression Analysis of Factors Associated with Impulsivity (Cont.)**

Variables	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
CCQ-Nursing Professional Behaviours	-0.89	0.48	-3.29	-1.84	0.065	-1.85	0.06
CCQ-General Performance	-0.95	0.53	-2.79	-1.78	0.072	-2.01	0.09
CCQ-Core Nursing Skills	-0.79	0.50	-2.51	-1.58	0.115	-1.79	0.19
CCQ-Advanced Nursing Skills	-1.07	0.49	-1.55	-2.17	0.031	-2.05	-0.10
Overall CCQ	0.88	0.48	9.37	1.80	0.071	-0.08	1.84

Abbreviations: EI- Emotional Intelligence; SSEIT- Schutte Self Report Emotional Intelligence Test; CCQ- Clinical Competence Questionnaire

## Discussion

According to the present study, there was an association between impulsive behaviour among nursing students, and the factors that were influencing impulsivity were age, the self-awareness domain of emotional intelligence, and advanced nursing skills. Findings also suggested that students with higher self-awareness had better self-control with low impulsive behaviour, which ultimately leads to perfection in advanced nursing skills. Concerning academic progression (3<sup>rd</sup> vs 4<sup>th</sup>) and interest in nursing were positively associated with good EI scores. The results are consistent with previous studies and show that young people who demonstrate low EI levels also tend to be more impulsive.<sup>(12)</sup> While one study reported that impulsivity was associated with overall EI, another study<sup>(13)</sup> reported that emotional intelligence does not significantly predict emotional behaviour.

Higher EI abilities, particularly the ability to manage emotions, would allow us to control

our impulsivity associated with positive and negative emotional states, manage the tendency toward seeking new and exciting sensations, and reduce our emotional reactivity to rewards.<sup>(14)</sup> One study observed a strong negative correlation between EI and impulsiveness, so lack of support and dysfunctional emotional regulation were found as factors for impulsive behaviours.<sup>(15)</sup> They said that students' emotional, social, and cognitive competencies and ability to self-regulate are excellent for their success in managing interpersonal relationships, completing daily activities, meeting varying needs and resolving conflict. This study also observed neither a significant difference in impulsivity by gender, nor did impulsiveness change between academic specialisations or years of study. The impulsivity has been related to empathy and risk-taking behaviour in a study<sup>(16)</sup> which concluded that medical students had higher empathy and impulsivity when compared to nursing students, and this could lead to harmed patient satisfaction outcomes, so impulsive behaviour negatively associates with clinical performance.

Emotional maturity, depending on their age, was reported by a study and showed a direct relationship between nursing students' age ( $r_s = 0.18$ ;  $p < 0.05$ ) and their EI. EI increases with age, thus older people are more socially intelligent and better able to manage their way of feeling and understanding others' feelings and body language too.<sup>(17)</sup> In the present study, participants in the age range of 22-23 had higher EI than those aged 19-21, however, we didn't find a significant association. The same result was also reported by the study.<sup>(18)</sup> Coming into the academic year, the present study found that 4th-year students had significantly higher emotional intelligence as compared to 3rd-year students; This finding is in line with a study<sup>(19)</sup> that also reported that students, by the end of the eighth (the last semester), had acquired emotional intelligence components such as self-awareness. Oppositely, a study<sup>(20)</sup> showed that 2nd-year students had higher emotional intelligence than senior students. This conflict in findings can be attributed to the fact that seniors usually have higher emotional intelligence, but juniors can also develop higher emotional intelligence by participating in various cultural programmes and curricular activities, so this trait does not come with age or seniority, but with exposing themselves to outdoor activities. A study done by Abdali *et al.*<sup>(21)</sup> concluded that there is no association between EI with age and gender, and others<sup>(19)</sup> concluded no association with the gender of the students. A study<sup>(22)</sup> observed that EI has no association with gender, education, and interest in nursing, but was associated with satisfaction with the socioeconomic status of the family.

Concerning to area of interest in nursing study<sup>(22)</sup> concluded that those interested in nursing studies had higher EI than those who were not interested, even though this difference was not significant. In contrast with these findings present study was also reported as significant. EI is considered one of the determining factors of people's adjustment, and, therefore, those who have more adjustment abilities have higher emotional intelligence.<sup>(23)</sup> The positive correlation of emotional intelligence with clinical competency and its components was

also reported in the present study, which is in agreement with the study.<sup>(24,25)</sup> Although a study<sup>(26)</sup> found a relation between performing tasks with patients (communication abilities) was associated with emotional intelligence. Understanding emotions properly enables better control in mood monitoring, so it can be assumed that Students with high EI managed to stay in positive moods longer and generate positive results even in emergency times.<sup>(27)</sup>

The Clinical competence of nurses was also assessed, and the results showed a positive relationship between emotional intelligence and clinical performance.<sup>(28,29)</sup> A consistent result was also observed by the present study, but only a significant difference was observed with the sub-domain of clinical competence, i.e. advanced skills. It is important to make sure nursing students are not ignoring their feelings but allowing them to be felt because they hope to be able to manage challenging and strong feelings and positively channel this so they can move about calmly and professionally.<sup>(30)</sup> A study<sup>(29)</sup> measured students' performance in the six dimensions leadership, critical care, education and collaboration, planning, interpersonal relations and professional development, all of which had a significant positive correlation with emotional intelligence, congruent results were also observed in residents' performance, whereas another study examined no correlation between emotional intelligence and residents' performance<sup>(31)</sup> discussed the subscales of EI, it found that social skills had a significant relationship with clinical competence and concluded the importance of emotions in decisions of daily work domains.

**Limitations and future directions:** The present study includes several limitations, first, a self-reporting measure. To begin with, self-reporting tools may lead to compromised levels of honesty. Second, a large number of questions and the length of the questionnaire overall may have impacted the reactivity and quality of the data retrieved, and students may have lost interest

while filling form, which could lead to bias. Third, all participants were from the government college, which restricts the generalizability of the findings. Only a few demographic variables were examined ultimately. Educational institutions should incorporate structured EI development programs, including self-awareness exercises and emotional regulation techniques, to enhance students' ability to manage impulsive behaviours effectively, which can improve clinical performance and patient care. Longitudinal studies should be conducted to explore the long-term impact of EI on impulsivity and clinical performance across various demographic and institutional settings. These recommendations aim to strengthen nursing education by promoting emotional intelligence development, which is crucial for clinical competence and effective patient care. The findings of this study indicate the need for further investigation into the interplay between EI, impulsivity, and clinical competence in different nursing education settings.

**Implications:** Educational institutions should incorporate structured EI development programs, including self-awareness exercises and emotional regulation techniques, to enhance students' ability to manage impulsive behaviours effectively, which can improve clinical performance and patient care. Developing targeted interventions to improve clinical competence and reduce impulsivity, particularly for students with lower EI scores, focusing on self-awareness, is crucial.

**Conclusion:** This study examined the relationships among emotional intelligence (EI), clinical competence, and impulsivity in nursing students. The findings revealed that fourth-year students demonstrated significantly higher levels of EI and clinical competence compared to third-year students, suggesting that both emotional and professional skills develop with academic progression. Interestingly, while impulsivity did not significantly differ between academic years, it was negatively associated with self-awareness and advanced nursing skills. Furthermore, age emerged as a positive predictor of impulsivity, indicating that older students tended to display higher levels of impulsive behaviour. Self-awareness, a core component of EI, was a significant negative predictor of impulsivity, underscoring its potential as a protective factor. These insights highlight the importance of fostering emotional intelligence and self-awareness in nursing education to enhance clinical competence and mitigate impulsivity.

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**Availability of data and materials:** The data that support the findings of this study are available upon request from the corresponding author. The data are not publicly available because of privacy or ethical restrictions.

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# The Digital Shift in the Post-COVID Era: Evaluating the Impact of Web-Enabled Education on Cognitive, Affective, and Psychomotor Skill Enhancement in Gen 'Z' Nursing Students- A Systematic Review with meta-analysis.

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## The Digital Shift in the Post-COVID Era: Evaluating the Impact of Web-Enabled Education on Cognitive, Affective, and Psychomotor Skill Enhancement in Gen 'Z' Nursing Students- A Systematic Review with meta-analysis

### Abstract

**Objective.** This study evaluates the impact of digital educational technologies on nursing students' academic achievement and learning outcomes. **Methods.** A literature review was conducted to identify peer-reviewed articles published in English between 2020 and June 2024 in databases such as Web of Science, Science Direct, EBSCO, NLM/NIH/PMC and Scopus. This review compares the efficacy of digital educational interventions against control groups using Cochrane Collaboration's risk of bias (RoB) and Standardized Mean Difference (SMD) for outcome measurement, with results analyzed using RevMan Web. **Results.** This study analyzed fourteen randomized controlled trials involving 1611 participants. The meta-analysis found that digital educational technologies enhanced nursing students' cognitive skills (SMD=0.45;  $p<0.001$ ), critical thinking and clinical decision-making skills (SMD=0.88;  $p<0.001$ ), attitudes (SMD=0.94;  $p<0.001$ ), and clinical skills (SMD=1.09;  $p<0.001$ ) when compared to conventional instructional methods. Nevertheless, there was no statistically significant improvement in the problem-solving ability (SMD=1.00,  $p=0.07$ ). **Conclusion.** Recent advances in digital technology provide a spectacular opportunity to improve healthcare practices for nurses and nursing students. Their integration can potentially increase educational and professional skills, quality of life, and patient satisfaction.

**Descriptors:** educational technology; internet-based intervention; computer-assisted instruction; students, nursing; education, nursing; clinical decision-making.

## El cambio digital en la era post-COVID: evaluación del impacto de la educación a través de la web en la mejoría de las habilidades cognitivas, afectivas y psicomotoras en los estudiantes de enfermería de la generación 'Z'. Revisión sistemática con meta-análisis

### Resumen

**Objetivo.** Evaluar el impacto de las tecnologías educativas digitales en el rendimiento académico y los resultados de aprendizaje de los estudiantes de enfermería. **Métodos.** Se realizó una búsqueda bibliográfica para identificar artículos revisados por pares publicados en inglés entre 2020 y junio de 2024 en bases de datos Web of Science, Science Direct, EBSCO, NLM/NIH/PMC y Scopus. Esta revisión comparó la eficacia de las intervenciones educativas digitales frente a grupos de control, se evaluó el riesgo de sesgo (RoB) de la Colaboración Cochrane y la Diferencia de medias estandarizada (DME) para la medición de resultados. **Resultados.** Se analizaron catorce ensayos controlados aleatorios con 1611 participantes. El metaanálisis

mostró que las tecnologías educativas digitales mejoraron las habilidades cognitivas de los estudiantes de enfermería (DME=0.45;  $p<0001$ ), las habilidades de pensamiento crítico y toma de decisiones clínicas (DME=0.88;  $p<0001$ ), las actitudes (DME=0.94;  $p<0001$ ) y las habilidades clínicas (DME=1.09;  $p<0001$ ) en comparación con los métodos de instrucción convencionales. Sin embargo, no hubo una mejoría estadísticamente significativa en la capacidad de resolución de problemas (DME=1.00,  $p=0.07$ ). **Conclusión.** Los recientes avances en tecnología digital mejoraron significativamente las prácticas asistenciales de las estudiantes de enfermería y su integración puede aumentar potencialmente las competencias educativas y profesionales, la calidad de vida y la satisfacción de los pacientes.

**Descriptor:** tecnología educativa; intervención basada en la internet; instrucción por computador; estudiantes de enfermería; educación en enfermería; toma de decisiones clínicas.

## Mudança digital na era pós-Covid: avaliando o impacto da educação online na melhoria das habilidades cognitivas, afetivas e psicomotoras em estudantes de enfermagem da Geração Z. Revisão sistemática com meta-análise.

### Resumo

**Objetivo.** Avaliar o impacto das tecnologias educacionais digitais no desempenho acadêmico e nos resultados de aprendizagem de estudantes de enfermagem.

**Métodos.** Foi realizada uma revisão bibliográfica para identificar artigos revisados por pares publicados em inglês entre 2020 e junho de 2024 em bases de dados como a *Web of Science*, *Science*, *Science Direct*, EBSCO, NLM/NIH/PMC e *Scopus*. Esta revisão compara a eficácia das intervenções educacionais digitais versus grupos de controle usando o risco de viés (RoB) e a diferença média padronizada (SMD) da *Cochrane Collaboration* para medição de resultados, com resultados analisados usando *RevMan Web*. **Resultados.** Quatorze ensaios clínicos randomizados com 1611 participantes foram analisados. A meta-análise mostrou que as tecnologias educacionais digitais melhoraram as habilidades cognitivas dos estudantes de enfermagem (SMD = 0.45;  $p<0.001$ ), o pensamento crítico e as habilidades de tomada de decisão clínica (SMD = 0.88;  $p<0.001$ ), as atitudes (SMD = 0.94;  $p<0.001$ ) e as habilidades clínicas (SMD = 1.09;  $p<0.001$ ) em comparação com os métodos instrucionais convencionais. No entanto, não houve melhora estatisticamente significativa nas habilidades de resolução de problemas (SMD = 1,00,  $p = 0,07$ ). **Conclusão:** Os avanços recentes na tecnologia digital melhoraram significativamente as práticas de saúde dos estudantes de enfermagem, e sua integração pode potencialmente melhorar as competências educacionais e profissionais, a qualidade de vida e a satisfação do paciente.

**Descritores:** tecnologia educacional; intervenção baseada em internet; instrução por computador; estudantes de enfermagem; educação em enfermagem; tomada de decisão clínica.

# Introduction

In nursing education worldwide, digital learning platforms, whether used independently or in conjunction with traditional teaching methods, have become integral to developing practical competencies among undergraduate students.<sup>(1)</sup> With the rapid pace of technological advancement, educational institutions have increasingly embraced online instructional tools, recognizing their potential to transform learning environments.<sup>(2)</sup> While digital learning platforms have been utilized in educational sciences since the 1980s, their application in nursing education remains relatively recent.<sup>(3)</sup> The primary goal of nursing programs is to prepare students to graduate as highly competent and confident professionals. Nursing education relies on both theoretical knowledge and practical skills, such as in-person, hands-on training, where recall ability is often achieved through visual presentations, note-taking, and interactive learning techniques.<sup>(4)</sup> Guven *et al.* suggested that incorporating e-learning alongside traditional face-to-face instruction can significantly enhance the development of clinical skills.<sup>(5)</sup>

Before the COVID-19 pandemic, nursing students were ready to embrace digital learning and acknowledged its value in education. However, persistent challenges, including insufficient technical support and the stress associated with technology use, posed barriers to its seamless adoption.<sup>(6)</sup> The pandemic, however, necessitated an extraordinary and immediate shift to digital-based education, particularly in disciplines, including the nursing profession, that heavily demands hands-on training. This abrupt transition emphasized the critical need for nursing students to acquire clinical competence through innovative teaching and learning technologies, as traditional in-person experiences were no longer feasible.<sup>(7)</sup> Globally, social distancing mandates disrupted higher education, compelling institutions to pivot to distance learning almost overnight.<sup>(8)</sup> The focus shifted to virtual clinical experiences, emphasizing participative learning and leveraging digital tools to simulate real-world scenarios.<sup>(9)</sup> Niigata University in Japan, for instance, faced significant obstacles in securing clinical training placements for Basic Nursing Practicum II during the fiscal years 2020 and 2021 due to restricted hospital access. In response, the university adopted a hybrid high-fidelity simulation model, integrating on-campus, face-to-face sessions with remote online components. This innovative approach maintained the integrity of nursing education by blending time-lapse unfolding case studies with interactive virtual experiences.<sup>(10)</sup>

E-learning has become a valuable resource for overcoming the limitations of conventional education. It enables nursing students to take an active and accountable role in their learning journey while offering cost-effective, accessible, and lifelong learning opportunities.<sup>(11)</sup> Furthermore, online education supports the development of both theoretical knowledge and practical clinical skills essential for nurses to excel in their practice.<sup>(12)</sup> Traditional training methods

often face challenges due to the demands of clinical practice, including limited access to diverse and flexible learning environments.<sup>(13)</sup> Digital educational solutions address these gaps by providing accessible, time-efficient, and scenario-rich learning experiences. Scenario-based instruction combined with reflective feedback strengthens cognitive integration and helps bridge the gap between academic theory and clinical application, preparing student nurses for the dynamic healthcare landscape.<sup>(14)</sup>

While numerous studies have highlighted the benefits of web-based learning in nursing education, outcomes vary depending on the intervention and assessment criteria. This study aims to evaluate the impact of digital-based educational technology on nursing students' knowledge acquisition, critical thinking, decision-making, problem-solving abilities, attitude and clinical skill enhancement. To achieve this, a meta-analysis of available randomized controlled trials (RCTs) was conducted. Despite the limited number of RCTs on e-learning in nursing curricula, this analysis provides a comprehensive evaluation of digital-based educational approaches, from online pedagogies to high-fidelity virtual reality simulators, compared to traditional teaching methods. The findings contribute to the ongoing discussion on the integration of digital-based education into modern nursing curricula to enhance student learning and clinical preparedness.

## Methods

Meta-analysis, an effective quantitative research approach, was used to carefully synthesis previous study findings and draw comprehensive conclusions. This study strictly adhered to the Preferred Reporting Items for methodical Reviews and Meta-Analyses (PRISMA) standards<sup>(15)</sup> to ensure a clear and methodical approach to reporting. The study topic was carefully crafted utilizing the PICOT framework, with nursing students as the population, web-based learning as

the intervention, and traditional learning methods as the comparator. The results of interest were knowledge, critical thinking, decision-making, problem-solving abilities, attitude and clinical skill enhancement with research published after COVID defining the temporal scope. This rigorous methodology provided a precise and focused framework that allowed for a thorough assessment of the influence of digital-based learning on nursing education across multiple crucial domains.

**Search strategy.** An extensive electronic search was carried out across several academic databases, including Scopus, Science Direct, Web of Science, EBSCO, and NLM/NIH/PMC. The review included English-language papers published after COVID. To ensure a thorough and relevant search, the following MeSH terms were employed: “Nursing Students”; “Web-Based Learning”; “Traditional Learning Methods”; “Knowledge”; “Performance Confidence”; “Critical Thinking”; “Decision-Making”; “Problem-Solving Ability”; “Internet -Based Intervention”; Clinical Competence”; “Randomized Control Trials.” Ongoing clinical trials listed on ClinicalTrials.gov and the International Clinical Trial Registry Platform were also reviewed. Furthermore, references from this study and existing systematic reviews were examined to identify any missing studies.

**Criteria for Inclusion and Study Selection.** The process of choosing papers to evaluate the impact of web-based learning in nursing education followed predefined inclusion criteria. The following standards were used to select the studies for inclusion: 1) Nursing students enrolled in colleges, utilizing various web-based learning methods as part of their teaching and learning strategies. 2) Full-text randomized controlled trials (RCTs) published in English between the post-COVID period and June 2024. 3) All randomized controlled trials available up to the search date. 4) Online teaching and learning methods, including internet-based teaching platforms such as Virtual Reality Simulation, Virtual Reality (Video; Online &

game-based phone application), Virtual Learning, Simulation (Video-based; Zoom learning), Web-based game, Online Learning, AI-Powered Doctor, Web-based (Mobile training; Learning). 5) Comparative methods involving traditional teaching approaches, such as theoretical lecture and laboratory teaching, Questionnaire/training booklet/structured guidelines, Self-directed learning using e-books, Offline Low-fidelity simulation and Human-controlled Avatar. The selected studies were required to report pre-test and post-test outcomes, indicating positive, negative, or neutral effects resulting from the use of web-based learning approaches. This systematic and comprehensive approach ensured an integrative assessment of the impact of web-based learning methods on nursing education across diverse modalities and outcome measures.

**Exclusion Criteria.** Studies were excluded if they lacked a clearly stated research question, were limited to case studies, or were presented as conference abstracts or editorial letters.

**Collection of data.** The articles found using the search approach were imported into the Zotero referencing system for management, where duplicate records were carefully removed. Two reviewers separately screened titles, abstracts, and complete texts using the defined inclusion and exclusion criteria. For instances where full texts were inaccessible or clarifications were needed, the authors contacted researchers via email and academic platforms like Google Scholar and Research Gate. Any differences that developed during the evaluation process were resolved through detailed discussions. If no consensus could be achieved, the case was referred to a third reviewer, who made the final decision. All studies excluded from the review were recorded, along with the reasons for their exclusion.

**Assessment for risk bias.** The included studies were evaluated for bias using the Cochrane Collaboration Risk of Bias Tool, version 2,<sup>(16)</sup> and their quality was assessed using the Joanna

Briggs Institute (JBI) Critical Appraisal Tool.<sup>(17)</sup> Two reviewers separately completed these evaluations. When the reviewers differed, a third reviewer was engaged to reconcile the differences before finalizing the summary and grade of the overall risk of bias.

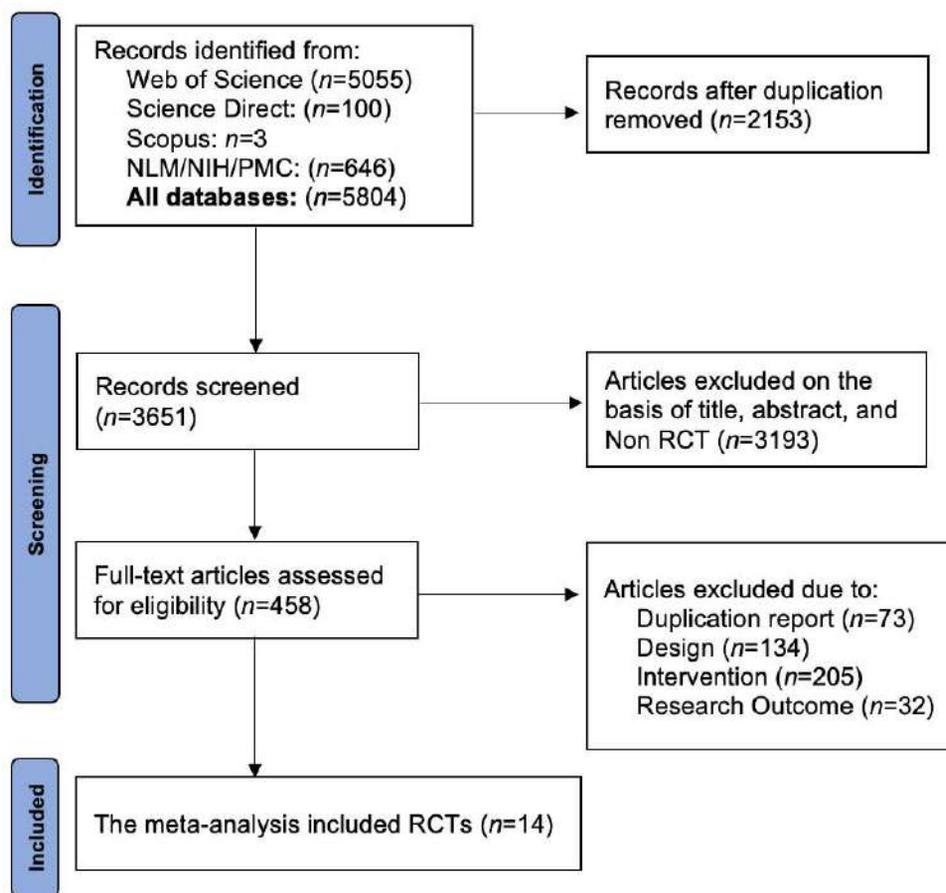
**Quality Assessment.** Figures 2 and 3 show a visual depiction of the RoB and an evaluation of methodological quality for fourteen RCTs. Among these, three studies<sup>(18-20)</sup> presented an unclear risk related to participant blinding, allocation concealment, and missing data (Figures 2 and 3) while eleven studies<sup>(21-31)</sup> demonstrated a low risk of bias. Furthermore, regarding methodological quality, five studies<sup>(18,19,26,27,29)</sup> were identified as having moderate quality, while the remaining nine studies<sup>(20-25,28,30,31)</sup> were rated as high quality.

**Data Analysis.** The web-based version of Cochrane's Review Manager software (RevMan) was used to analyze the data. A 95% CI random-effects model was used to demonstrate the meta-analysis results as standardized mean differences. The study's heterogeneity was assessed using the  $I^2$  statistic. However, the small number of studies included the conduct of additional subgroup analysis.

## Results

### Population Characteristics and Study Selection

Our comprehensive literature search yielded a total of 5,804 studies from various databases: Web of Science ( $n=5055$ ), Science Direct ( $n=100$ ), Scopus ( $n=3$ ), NLM/NIH/PMC repositories ( $n=646$ ). After eliminating duplicate entries, the pool was reduced to 458 unique articles. These were then meticulously evaluated against our predefined inclusion criteria. Ultimately, only 14 studies<sup>(18-31)</sup> fully satisfied these rigorous standards and were consequently incorporated into our systematic review. As shown in Figure 1.



**Figure 1. PRISMA Flow diagram.**

### **Key Features of Included RCTs Comparing Digital and Traditional Educational Methods**

This research encompasses the main characteristics of 14 studies evaluating educational interventions that employed both digital and traditional teaching methodologies for nursing students. Comprehensive details are outlined in Table 1. Regarding the design framework, sample size,

exposure, and outcome measures, all included studies adhered to a randomized controlled trial (RCT) design. The total sample size was 1,611 participants, with 868 nursing students assigned to the experiment group and 793 to the control group.

**Table 1. Outlines the features of the 14 studies chosen for inclusion in the systematic review**

Reference	Design	Sample size	Exposure	Outcome Measures										Quality Assessment tool (JBI)
				Knowledge		Critical thinking & clinical decision making		Problem solving ability		Attitude		Clinical Skill		
				I	II	I	II	I	II	I	II	I	II	
21	RCT	87 (E:42, C:45)	E: Video-Based Simulation Training on Perioperative Process	20.38 ± 7.41	22.14 ± 9.84	169.60 ± 11.82	171.86 ± 10.22	-	-	-	-	-	-	High 11/13
			C: Theoretical Lecture and laboratory teaching on post-operative patient care	19.96 ± 8.35	18.36 ± 8.35	168.26 ± 9.53	166.23 ± 12.73	-	-	-	-	-	-	
22	RCT	72 (E:36, C:36)	E: Blended learning approach, integrating virtual simulation with interactive operation performance online for CPR Skills	-	-	277.75 ± 25.47	286.64 ± 26.678	-	-	-	-	-	-	High 12/13
			C: Low-fidelity simulation offline for teaching CPR skills	-	-	267.22 ± 22.221	274.11 ± 29.399	-	-	-	-	-	-	
23	RCT	44 (E:22, C:22)	E: two-week mobile web-based training programme covering key topics in patient safety management	18.68 ± 5.46	18.55 ± 5.23	-	-	-	-	3.38 ± 0.36	4.01 ± 0.39	3.26 ± 0.40	3.93 ± 0.4	High 11/13
			C: Training booklet.	10.91 ± 5.48	12.36 ± 4.85	-	-	-	-	3.68 ± 0.32	3.70 ± 0.39	3.47 ± 0.57	3.5 ± 0.57	
18	RCT	328 (E:226, C:102)	E: Simulation-based Zoom learning (SBZL)	-	-	-	79.69 ± 3.96	3.95 ± 0.39	3.99 ± 0.41	-	-	-	-	Moderate 9/13
			C: Traditional method	-	-	-	77.69 ± 6.31	4 ± 0.45	-	-	-	-	-	
24	RCT	228 (E:128, C:100)	E: Virtual learning strategy	0.79 ± 2.15	5.12 ± 2.46	-	-	-	-	-	-	-	-	High 12/13
			C: Active teaching methods	0.74 ± 2.25	4.75 ± 2.76	-	-	-	-	-	-	-	-	

**Table 1. Outlines the features of the 14 studies chosen for inclusion in the systematic review (Cont.)**

Reference	Design	Sample size	Exposure	Outcome Measures										Quality Assessment tool (JBI)
				Knowledge		Critical thinking & clinical decision making		Problem solving ability		Attitude		Clinical Skill		
				I	II	I	II	I	II	I	II	I	II	
25	RCT	57 (E:27, C:30)	E: 360° VR video	5 ( $p=0.87$ )	15 ( $p=0.952$ )	-	-	-	-	-	-	-	30 ( $p= 0.273$ )	High 11/13
			C: face-to-face demonstration	5 ( $p=0.87$ )	16 ( $p=0.952$ )	-	-	-	-	-	-	-	-	
26	RCT	50 (E:25, C:25)	E: VR-based simulation training on geriatric oral health care	-	8.92 ± 0.70	-	-	-	-	-	28.92 ± 2.6	35.28 ± 6.15	42.05 ± 4.19	Moderate 10/13
			C: Questionnaire	-	7.28 ± 1.34	-	-	-	-	-	27.92 ± 3.75	34.08 ± 4.86	35.84 ± 5.61	
27	RCT	64 (E:32, C:32)	E: AI-powered doctor (AI-powered group)	6.91 ± 1.63	9.06 ± 1.78	-	-	-	-	-	-	-	13.63 ± 4.23	Moderate 10/13
			C: virtual reality simulation (human-controlled group)	7.03 ± 2.25	7.75 ± 2.08	-	-	-	-	-	-	-	12.75 ± 3.85	
28	RCT	299 (E:101, C:98)	E: Online problem-based learning intervention on self-based learning	-	-	-	163.15 ± 17.94	-	-	-	-	-	82.97 ± 11.5	High 13/13
			C: Problem solving though group work	-	-	-	146.3 ± 19.06	-	-	-	-	-	77.49 ± 13.28	
19	RCT	102 (E:52, C:50)	E: VR simulation experiences	-	-	5.94 ± 1.46	7.4 ± 1.14	-	-	-	-	2.94 ± 0.39	7.4 ± 1.14	Moderate 10/13
			C: Traditional teaching	-	-	4.30 (1.43)	4.78 ± 1.16	-	-	-	-	2.72 ± 0.27	4.78 ± 1.16	
29	RCT	42 (E:21, C:21)	E: Web-based serious game	52.14 ± 19.07	81.19 ± 8.5	2.39 ± 0.88	3.99 ± 0.63	3.35 ± 0.55	4.16 ± 0.39	-	-	3.50 ± 1.97	7.91 ± 1.34	Moderate 10/13
			C: Case-based self-directed learning using e-books.	53.33 ± 13.54	71.42 ± 11.95	2.60 ± 0.64	3.46 ± 0.61	3.22 ± 0.42	3.23 ± 0.36	-	-	3.54 ± 1.69	5.84 ± 1.2	

**Table 1. Outlines the features of the 14 studies chosen for inclusion in the systematic review (Cont.)**

Reference	Design	Sample size	Exposure	Outcome Measures										Quality Assessment tool (JBI)
				Knowledge		Critical thinking & clinical decision making		Problem solving ability		Attitude		Clinical Skill		
				I	II	I	II	I	II	I	II	I	II	
30	RCT	136 (E:68, C:68)	E: Web based learning	20.5 ± 9.8	32.2 ± 10.5	-	-	-	-	10.5 ± 5.2	18.2 ± 4.9	-	-	High 12/13
			C: Traditional Face to face learning	20.6 ± 10.2	22.1 ± 10.2	-	-	-	-	9.9 ± 4.8	11.7 ± 5.2	-	-	
31	RCT	122 (E:63, C:59)	E: Online education and game-based virtual reality phone applications	10.4 ± 2.6	13.2 ± 2.7	-	-	-	-	8.7 ± 2.2	11.2 ± 1.5	-	-	High 13/13
			C: Traditional education	9.5 ± 2.4	12.3 ± 1.1	-	-	-	-	6.1 ± 1.4	9.3 ± 2.5	-	-	
20	RCT	50 (E:25, C:25)	E: VR simulation program	22.79 ± 2.28	23.44 ± 2.28	-	-	5.47 ± 1.47	8.36 ± 1.05	-	-	-	-	High 12/13
			C: Routine NICU practice	22.05 ± 3.31	22 ± 3.3	-	-	5.36 ± 1.68	7.46 ± 1.34	-	-	-	-	

**Footnotes:** RCT: Randomized Control Trial; E: Experimental Group; C: Control Group; I-Pretest (Mean & Standard Deviation); II-Posttest (Mean & Standard Deviation); JBI-Joanna Briggs Institute Quality Assessment Tool

**Table 2. Outlines the characteristics included in the studies**

Study Characteristics	Frequency	Percentage	References
<b>Type of Intervention</b>			
Virtual Reality Simulation	4	28.57	19,20,22,26
Virtual Reality (Video; Online & game-based phone application)	2	14.29	25,31
Virtual Learning	1	7.14	24
Simulation (Video-based; Zoom learning)	2	14.29	18,21
Web-based game	1	7.14	29
Online Learning	1	7.14	28
AI-Powered Doctor	1	7.14	27
Web-based (Mobile training; Learning)	2	14.29	23,30

**Table 2. Outlines the characteristics included in the studies (Cont.)**

Study Characteristics	Frequency	Percentage	References
<b>Conventional Approaches</b>			
Theoretical lecture and laboratory teaching	8	57.14	18,19,20,21,24,25,30,31
Questionnaire/training booklet/structured guidelines	3	21.43	23,26,28
Self-directed learning using e-books.	1	7.14	29
Offline Low-fidelity simulation	1	7.14	22
Human-controlled Avatar	1	7.14	27
<b>Study design</b>			
RCT	14	100.00	18-31
<b>Setting</b>			
Government set up	6	42.86	18,21,24,25,27,30
Private set-up/ Deemed Universities	4	28.57	19,22,26,29
Not Specified	4	28.57	20,23,28, 31
<b>Sample Size</b>			
10-150	11	78.57	19-23,25-27,29-31
151- 300	2	14.29	24,28
More than 301	1	7.14	18
<b>Programme duration</b>			
1-2 Weeks	6	42.86	20,21,23,25,26,27
More than 2 weeks	6	42.86	19,24,28,29,30,31
Not Specified	2	14.29	18,22
<b>Group Nature</b>			
Closed group	13	92.86	18-24,26-31
Open Group	1	7.14	25
<b>No. of facilitators per group</b>			
1-15 facilitators	4	28.57	18,25,26,28
Not specified	10	71.43	19-24,27,29-31
<b>The educational program of Group</b>			
1 <sup>st</sup> Year BSc Nursing	2	14.29	22,24
2 <sup>nd</sup> Year BSc Nursing	0	0.00	-
3 <sup>rd</sup> Year BSc Nursing	4	28.57	23,25,27,29
4 <sup>th</sup> Year BSc Nursing	2	14.29	18,31
Under Graduate (Not Specified)	3	21.43	26,28,30
Other Nursing Courses	2	14.29	19,20,21
<b>Conduction of Group Activities</b>			
Yes	9	64.29	18,20,21,22,24,25,27,28,31
No	5	35.71	19,23,26,29,30

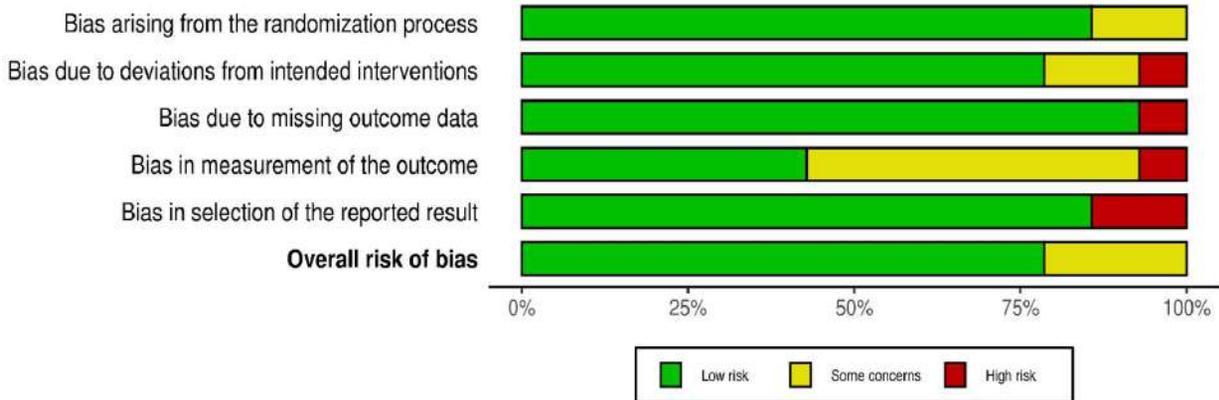
**Table 2. Outlines the characteristics included in the studies (Cont.)**

Study Characteristics	Frequency	Percentage	References
<b>Countries Conducted</b>			
Turkey	1	7.14	21
China	3	21.43	18,22,28
Korea	3	21.43	20,23,29
Spain	1	7.14	24
Japan	1	7.14	25
Taiwan	1	7.14	26
Singapore	1	7.14	27
Jordan	1	7.14	19
Egypt	1	7.14	30
North Cyprus	1	7.14	31
<b>Research Approach Used</b>			
Quantitative Research	14	100.00	18-31

### Evaluation of Methodological Quality in Intervention Studies

Figure 2 summarizes the RoB assessment. Among the 14 studies, 11 consistently show a low RoB throughout most domains. In contrast, three

studies raise concerns in particular areas, such as deviations from targeted treatments, insufficient outcome data, and selective outcomes reporting. Figure 3 depicts a complete investigation of the RoB.



**Figure 2. Overall RoB assessment for included RCTs**

Study	Risk of bias domains					Overall
	D1	D2	D3	D4	D5	
Nurşen Kulakaç et al (2023)	+	-	+	+	⊗	+
Li Y et al (2023)	+	+	+	-	+	+
Oh JW et al (2023)	+	+	⊗	+	+	+
Carmen Chan et al (2024)	-	+	+	-	+	-
Guillero Moreno et al (2024)	+	-	+	+	+	+
Babaita AO et al (2024)	+	+	+	-	+	+
Lin PC et al (2024)	+	+	+	⊗	+	+
Liaw S Y et al (2023)	+	+	+	-	+	+
Wong FM et al (2022)	+	+	+	+	+	+
Ayman K et al (2024)	+	⊗	+	-	+	-
Baek G et al (2024)	+	+	+	-	+	+
Mohamed et al (2024)	+	+	+	+	+	+
AL-Mugheed et al (2022)	+	+	+	-	+	+
Yu et al (2020)	-	+	+	+	⊗	-

Domains:  
D1: Bias arising from the randomization process.  
D2: Bias due to deviations from intended intervention.  
D3: Bias due to missing outcome data.  
D4: Bias in measurement of the outcome.  
D5: Bias in selection of the reported result.

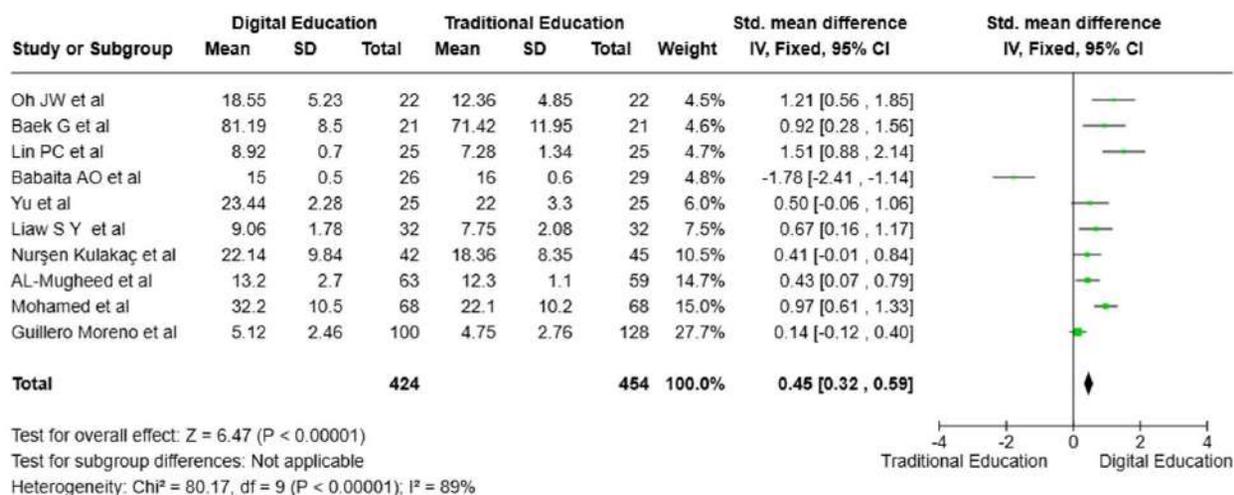
Judgement  
⊗ High  
- Some concerns  
+ Low

**Figure 3. The evaluation of the RoB was conducted for each RCT**

## Results of metanalysis

**Effect of digital and traditional interventions on cognitive domain (Knowledge).** As shown in Figure 4, 10 RCTs<sup>(20,21,23-27,29-31)</sup> evaluated the effect of digital technology on nursing students' theoretical knowledge development. The analysis showed significant heterogeneity in included RCTs ( $p < 0.00001$ ;  $I^2 = 89\%$ ), requiring a random-effects model. The total effect size was calculated to be 0.45 [95% CI: 0.32, 0.59], demonstrating a preference for the experimental group using digital

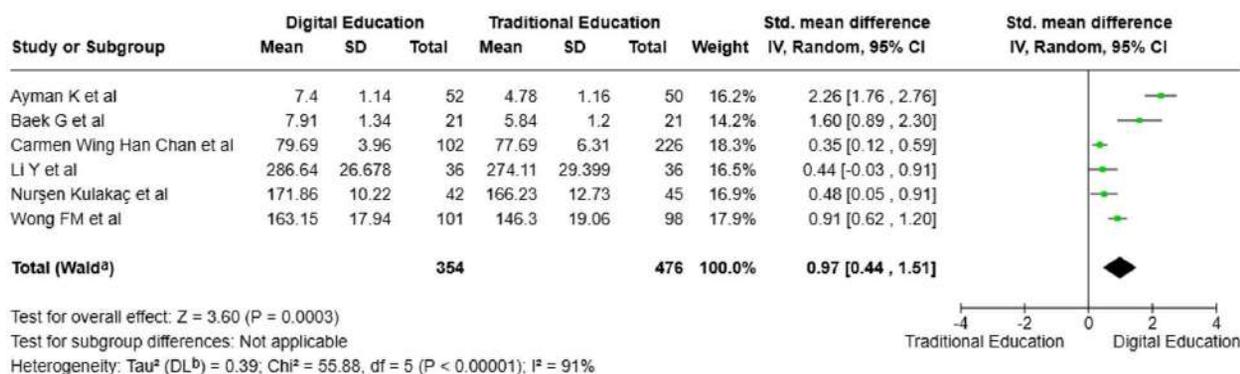
education. The result is statistically significant ( $p < 0.00001$ ) and indicates a moderate positive effect of digital education compared to traditional methods. Studies conducted by Oh *et al.*,<sup>(23)</sup> Baek *et al.*,<sup>(29)</sup> Lin *et al.*,<sup>(26)</sup> and Mohamed *et al.*<sup>(30)</sup> show positive effects favoring digital education, while others like Babaita *et al.*,<sup>(25)</sup> and Moreno *et al.*<sup>(24)</sup> show minimal effects, with confidence intervals crossing zero. This variation highlights the influence of study-specific factors on the outcomes.



**Figure 4. Impact of digital education on nursing students' cognitive skills (Knowledge)**

**Effect of digital and traditional interventions on critical thinking and clinical decision making.** Figure 5 highlights the findings of six studies<sup>(18,19,21,22,28,29)</sup> involving 830 participants randomly assigned to digital education ( $n=354$ ) and traditional education ( $n=476$ ). The trials examined the intervention's success in improving critical thinking and clinical decision-making.

The meta-analysis found a significant improvement in these domains among nursing students, with a total effect size of 0.97 (95% CI: 0.44, 1.51). Additionally, the heterogeneity was high ( $I^2 = 91\%$ ), indicating substantial variation between the studies. The total effect was statistically significant ( $p=0.0003$ ), demonstrating that digital education exceeded traditional techniques.



**Footnotes**

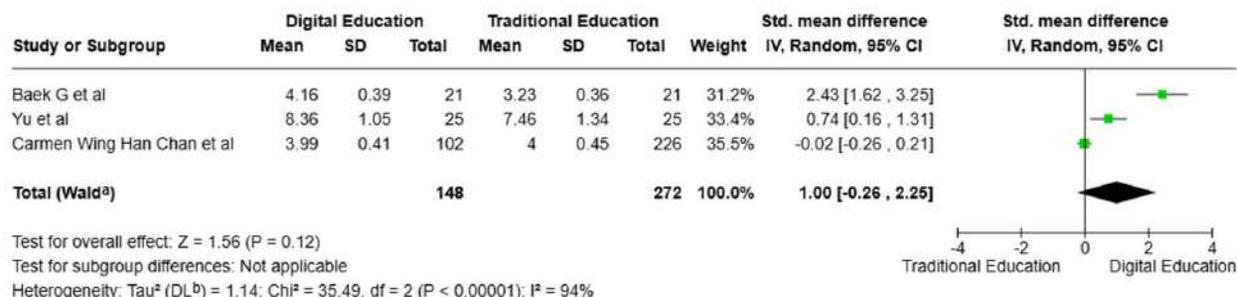
<sup>a</sup>CI calculated by Wald-type method.

<sup>b</sup>Tau<sup>2</sup> calculated by DerSimonian and Laird method.

**Figure 5. Digital education's impact on nursing students' critical thinking and decision-making**

**Effect of digital and traditional interventions on problem-solving ability.** Figure 6 shows that three studies<sup>(18,20,29)</sup> assessed the impact of digital education on nursing students' problem-solving ability, revealing significant heterogeneity in the involved RCTs ( $p < 0.00001$ ;  $I^2 = 94\%$ ). As a result, a random-effects model was used in the study, resulting in an overall effect size of 1.00 (95%

CI: -0.26, 2.25), indicating a minor preference for digital education. However, the confidence interval contains 0, implying that the result is not statistically significant. The total impact p-value is 0.12, indicating no substantial difference between digital and traditional education in terms of the examined result.



**Footnotes**

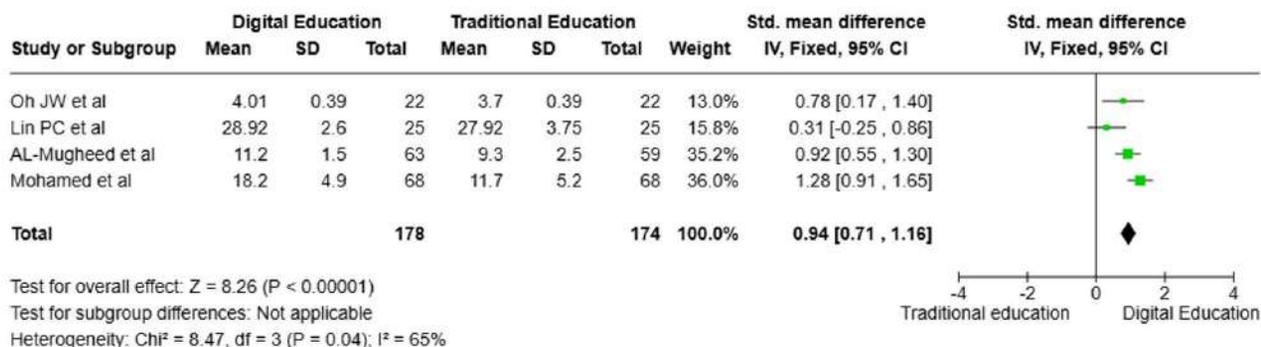
<sup>a</sup>CI calculated by Wald-type method.

<sup>b</sup>Tau<sup>2</sup> calculated by DerSimonian and Laird method.

**Figure 6. The effect of digital education on problem-solving ability among nursing students**

**Effect of digital and traditional interventions on affective domain (Attitude).** Figure 7 highlights the findings of four studies<sup>(23,26,30,31)</sup> involving 352 participants, randomly assigned to digital education ( $n = 178$ ) and traditional methods ( $n = 174$ ). These studies evaluated the intervention's impact on the affective domain, specifically the attitudes of nursing students toward digital education. The standardized mean differences in self-confidence scores before and after the intervention were reported as 0.78,<sup>(23)</sup>

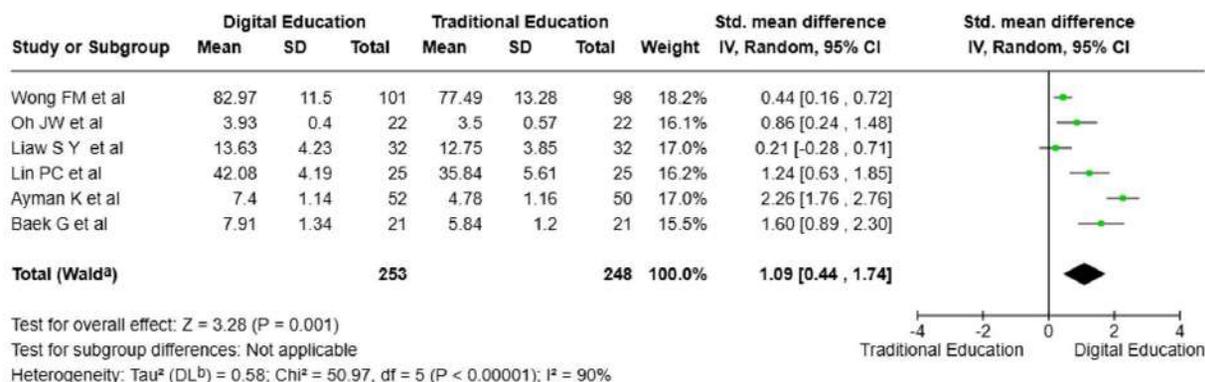
0.25,<sup>(26)</sup> 0.92,<sup>(31)</sup> and 1.28,<sup>(30)</sup> respectively. The meta-analysis found a significant improvement in nursing students' attitudes, with a total effect size of 0.94 (95% CI: 0.71, 1.16). Additionally, the heterogeneity was moderate ( $I^2 = 65\%$ ), indicating some variation between the studies but not excessively high. The overall effect demonstrated statistical significance ( $p < 0.00001$ ), confirming a notable difference favoring digital education over traditional methods.



**Figure 7. Impact of digital education on nursing students' attitudes**

**Effect of digital and traditional interventions on the psychomotor domain (Clinical skills improvement).** Figure 6 highlights the findings of six studies<sup>(19,23,26-29)</sup> involving 501 participants randomly assigned to digital education ( $n=253$ ) and traditional education ( $n=248$ ). The research investigated how digital simulation affected nursing students' confidence in their clinical performance. The meta-analysis found a total effect size of 1.09 (95% CI: 0.44, 1.74), demonstrating a preference for digital education. The total impact was statistically significant ( $p < 0.001$ ), indicating

that digital simulation significantly improves clinical performance and confidence in nursing students compared to traditional education methods. However, heterogeneity was high ( $I^2=90\%$ ,  $p < 0.00001$ ), indicating considerable variability among the studies. Salameh *et al.*<sup>(19)</sup> and Baek *et al.*<sup>(29)</sup> found more significant benefits, but Wong *et al.*,<sup>(28)</sup> and Liaw *et al.*<sup>(27)</sup> observed more moderate effects. This variation implies that study-specific variables, such as intervention design or population characteristics, may have influenced the results.



**Footnotes**

<sup>a</sup>CI calculated by Wald-type method.  
<sup>b</sup>Tau<sup>2</sup> calculated by DerSimonian and Laird method.

**Figure 8. The effect of digital education on improving clinical skills among nursing students**

## Discussion

The primary objective of this systematic review and meta-analysis was to evaluate and analyse key data on the efficacy of using digital instructional tools for nursing students at diverse institutions. According to our findings, this study provides evidence for the beneficial effects of experimental interventions that use digital teaching tools to improve nursing students' cognitive capabilities, including knowledge acquisition, critical thinking, clinical decision-making, and problem-solving abilities. Additionally, it investigated the affective domain, evaluating students' attitudes toward digital educational tools, and the psychomotor domain, investigating the improvement of clinical skills after exposure to digital learning approaches against traditional teaching methods. This detailed review sheds light on the numerous benefits of using digital tools in nursing education.

### The Effect of Digital Education on Nursing Students' Knowledge

A meta-analysis revealed that using digital educational technology in nursing education significantly enhanced cognitive capabilities compared to traditional teaching techniques ( $p < 0.05$ ). Simultaneously, the theoretical framework of nursing education is still crucial for preparing nurses to integrate knowledge into practical skills, providing a core component of nursing pedagogy. Nurse educators steadily implemented digital instructional technologies to enhance the impact of theoretical instruction. Chavez *et al.*<sup>(32)</sup> and Liu *et al.*<sup>(33)</sup> discovered that digital technologies improve student engagement by offering immersive learning experiences akin to real-world clinical settings.

Furthermore, a qualitative study on the employment of digital advancements in nursing curricula<sup>(34)</sup> suggests that combining digital tools with conventional teaching methods allows students to interact with elements in a simulated

digital setting, evoking experiences and emotions similar to those encountered in real-world situations. This immersive strategy improves learners' understanding of learned concepts and ability to apply them successfully in clinical situations. According to Kolb's instructional paradigm, nursing students gain essential insights from digital learning experiences that resemble real-life circumstances, leading to more substantial and durable learning outcomes.<sup>(35)</sup> According to Chen *et al.*<sup>(36)</sup> and Voutilainen *et al.*,<sup>(37)</sup> digital education effectively increases information acquisition. Still, it has the most impact when used in conjunction with traditional teaching approaches. Furthermore, using digital technology in nursing education improves student interest and attention to studying while expanding their knowledge base and practical nursing competencies. This integration is a critical step in shifting from knowledge-centered education to competency-driven practice in nursing.

### Digital Education's Impact on Nursing Students' Critical Thinking and Decision-Making

The results demonstrated that digital education interventions significantly improved critical thinking and clinical decision-making skills compared to traditional teaching approaches ( $p < 0.05$ ). This indicates how digital teaching tools can effectively bridge the gap between theoretical knowledge and practical application in nursing education. The observed heterogeneity amongst research ( $I^2 = 89\%$ ) is due to variances in implementation and lack of standardization in digital teaching methodologies. Further inquiry is needed to establish consistent best practices. Similarly, studies have highlighted the benefits of blended and digital learning methodologies for developing critical thinking skills. According to Voutilainen *et al.*,<sup>(37)</sup> blended learning systems that combine digital education with traditional teaching methods considerably improve knowledge acquisition and skill development compared to conventional methods alone. Similarly, Saghafi

*et al.*<sup>(38)</sup> conducted a meta-analysis to highlight the usefulness of digital simulations in improving nursing students' clinical reasoning and critical thinking skills.

Furthermore, the findings of Li *et al.*<sup>(39)</sup> highlight the transformational significance of immersive technologies in enhancing critical thinking tendencies in nursing students. Bagheri *et al.*<sup>(40)</sup> investigated the effects of network-based learning on nursing students' critical thinking skills. Their findings revealed a statistically significant improvement in critical thinking scores in the intervention group ( $373.28 \pm 18.55$ ) compared to the control group ( $340.2 \pm 10.38$ ,  $P < 0.001$ ), highlighting the effectiveness of problem-solving-focused digital learning tools. In addition, Sterner *et al.*<sup>(41)</sup> reported a significant improvement in critical thinking scores post-education ( $p < 0.001$ ) with a large effect size (Cohen's  $d = -0.87$ ). In addition, Jans *et al.*<sup>(42)</sup> conducted an integrative review that synthesized the evidence highlighting the capacity of virtual reality (VR) to enhance critical thinking, clinical reasoning, and judgment, with students expressing positive perceptions of VR's role in fostering these skills. While digital education technologies and immersive learning environments have demonstrated their effectiveness in nurturing critical thinking and clinical decision-making skills, challenges such as variability in implementation and cognitive load persist. Addressing these problems through properly developed digital and blended learning systems is critical to fully leveraging their promise in nursing education.

### Effect of digital and traditional interventions on the affective domain (Attitude)

The results of this meta-analysis show that digital education is much more effective than traditional approaches in improving nursing students' attitudes, as demonstrated by an SMD of 0.94 (95% CI: 0.71 to 1.16). This finding is consistent with earlier studies emphasizing the

value of digital education in developing empathy, emotional engagement, and decision-making skills in nursing practice. This is consistent with a systematic study that investigated how digital interventions improve the emotional abilities of nursing students and registered nurses compared to traditional training methods.<sup>(43)</sup> A recent study by Efendi *et al.*<sup>(44)</sup> further underscores the efficacy of digital interventions in enhancing nursing staff's affective competencies. The findings align with the outcomes observed in this study, indicating that digital education is a promising tool for fostering emotional engagement, empathy, and trust-building, key components of nursing competence.

### Effect of digital and traditional education on the psychomotor domain (clinical skills enhancement)

Incorporating digital technology into nursing education has resulted in a considerable improvement in nursing students' psychomotor abilities compared to traditional teaching methods. Liu *et al.*<sup>(33)</sup> emphasized that digital education offers an immersive, interactive platform that promotes emotional involvement and comprehension, successfully bridging the gap between theoretical knowledge and practical application. Their meta-analysis revealed a marked improvement in the clinical skills acquirement (SMD = 0.52, 95% CI [0.33, 1.46],  $p < 0.001$ ). These findings are congruent with Choi KS,<sup>(45)</sup> who demonstrated the benefits of digital-based instructional technology. Similarly, Jefferson *et al.*<sup>(46)</sup> showed increased learning retention and self-confidence among nursing students who took high-fidelity simulation courses, highlighting the importance of simulation-based education in improving critical thinking and practical aptitude. Furthermore, Azher *et al.*<sup>(47)</sup> found that both headset-based digital education and screen-based virtual simulations provide similar benefits in nursing education. These tools efficiently simulate complex clinical circumstances, allowing students to practice approaches that would be impractical with actual patients, establishing a connection

between clinical experience and classroom theory. This promotes a more seamless transition from student to practitioner while overcoming the inherent constraints of traditional training techniques.

Future efforts should focus on improving digital education platforms to promote seamless skills transfer from digital environments to real-world clinical settings. Allowing nursing students to interact with virtual patients enhances their clinical expertise and enables them to deal with tough challenges effectively in real-world situations. Furthermore, using digital education and simulation technologies can speed up the development of both technical and emotional competencies, increasing learning efficiency and overall instructional efficacy in nursing education.

### Strengths and limitations of the study

The findings of this study are derived from a rigorous randomized controlled trial, which provides a more substantial evidentiary basis compared to cohort studies. This high-quality evidence corresponds to the tenets of evidence-based medicine and establishes a concrete framework for the future integration of digital educational technologies into nursing education. Despite its contributions, this meta-analysis encountered some limitations. The variability in study results led to challenges in making direct comparisons, requiring cautious interpretation of the findings and limiting the ability to generalize the effects on nursing education.

## Conclusion

This comprehensive review and meta-analysis found that digital educational tools can considerably improve nursing students' knowledge, attitudes toward digital learning, clinical competence, critical thinking, and clinical decision-making skills in patient care. However, no significant advantage was observed in improving their problem-solving abilities. The findings advocate for nursing educators to realign their teaching strategies, emphasizing the importance of digital education and actively integrating advanced technological tools to drive educational progress. This review recommends that nursing educators incorporate digital technology into blended classroom teaching. This approach combines the emotional human touch of traditional education with the flexibility of digital platforms, enabling students to learn at their own pace. Generation Z is highly comfortable with digital learning environments, so this method aligns well with their learning preferences.

**Author contribution statement.** Mathivanan JR and Devi S developed the systematic review and search strategy, carried out the database searches, took part in selecting relevant articles, and Devi S handled the quality assessment of the studies. Both authors contributed to drafting the manuscript.

**Data availability statement.** The findings presented in the article are supported by data that can be obtained from the author, Devi S upon reasonable request.

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# Pioneers in Care: The Incorporation of Men in Nursing in Spain and Great Britain (1915-1980)

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Original Article



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## Pioneers in Care: The Incorporation of Men in Nursing in Spain and Great Britain (1915-1980)

### Abstract

**Objective.** To describe the incorporation of the first male nurses in Spain and Great Britain between 1915 and 1980. **Methods.** This study adopted the analytical-synthetic historical method as epistemological framework to examine the evolution of the appearance of the first male nurses in Spain and Great Britain, supported by documentary sources from databases (SCIELO, SCOPUS, EBSCO, Google Scholar) using descriptors in Spanish, English, and Portuguese. Historical critique was applied at three levels: authenticity, representativeness, and relevance. The analysis combined temporal and thematic perspectives, examining causal factors, such as economic, social, ideological factors. **Results.** In Spain, nursing had segregated roles, women as nurses or midwives and men in the role of interns. In Great Britain, it was exclusively practiced by women. The Spanish Civil War

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and the dictatorship of Francisco Franco in Spain and the Second World War in Great Britain promoted male incorporation in both countries. The post-war periods and changes in gender roles facilitated a sociocultural transformation, integrating men into nursing and breaking stereotypes. This process redefined the profession, promoting equity and highlighting care beyond gender. **Conclusion.** The historical study reveals that nursing in Spain and Great Britain evolved from an exclusive profession for women toward a more inclusive model, defying stereotypes. Wars and social changes permitted incorporating men, redefining the professional identity. This transformation does not seek to privilege, rather, it seeks to highlight equity and that regardless of the sex or gender care can be provided as long as it has a scientific and ethical basis.

**Descriptors:** history; men; nursing; nurses, male; Spain; the United Kingdom

## Pioneros en el cuidado: la incorporación de hombres en la enfermería en España y Gran Bretaña (1915-1980)

### Resumen

**Objetivo.** Describir la incorporación de los primeros hombres enfermeros en España y Gran Bretaña entre 1915 y 1980. **Metodología:** Estudio que adoptó el método histórico analítico-sintético como marco epistemológico para examinar la evolución de la aparición de los primeros hombres enfermeros en España y Gran Bretaña, apoyado en fuentes documentales de bases de datos (SCIELO, SCOPUS, EBSCO, Google Académico) utilizando descriptores “historia de la enfermería”, “hombres enfermeros”, “enfermería”, “España” y “Gran Bretaña” en español, inglés y portugués. Se hizo crítica histórica en tres niveles: autenticidad, representatividad y pertinencia. El análisis combinó perspectivas temporales y temáticas, examinando factores causales como son: económicos, sociales e ideológicos. **Resultados.** En España, la enfermería tenía roles segregados: mujeres como enfermeras o matronas y hombres en rol de practicantes. En Gran Bretaña, era exclusivamente ejercida por mujeres. La Guerra Civil española y la dictadura de Francisco Franco en España, y la Segunda Guerra Mundial en Gran Bretaña impulsaron la incorporación masculina en ambos países. Las posguerras y los cambios en los roles de género facilitaron una transformación sociocultural, integrando a los hombres en la enfermería y rompiendo estereotipos. Este proceso redefinió la profesión, promoviendo la equidad y destacando el cuidado más allá del género. **Conclusión.** El estudio histórico revela que la enfermería en España y Gran Bretaña evolucionaron desde una profesión exclusiva de la mujer hacia un modelo más inclusivo, desafiando estereotipos.

Guerras y cambios sociales permitieron la incorporación del hombre, redefiniendo la identidad profesional. Esta transformación no buscó privilegiar, sino destacar la equidad y que sin importar el sexo o género se pueda realizar cuidado mientras tenga una base científico-ética.

**Descriptor:** historia; hombres; enfermeros; enfermería; España; Reino Unido.

## Pioneiros no Cuidado: A Incorporação do Homem na Enfermagem em Espanha e Grã-Bretanha (1915-1980)

### Resumo

**Objetivo.** Descrever a incorporação dos primeiros enfermeiros na Espanha e na Grã-Bretanha entre 1915 e 1980. **Métodos:** Este estudo adotou o método histórico analítico-sintético como referencial epistemológico para examinar a evolução do surgimento dos primeiros enfermeiros na Espanha e na Grã-Bretanha, apoiado por fontes documentais de bases de dados (SCIELO, SCOPUS, EBSCO, Google Acadêmico) utilizando descritores em espanhol, inglês e português. A crítica histórica foi aplicada em três níveis: autenticidade, representatividade e relevância. A análise combinou perspectivas temporais e temáticas, examinando fatores causais como econômicos, sociais e ideológicos. **Resultados.** Na Espanha, a enfermagem tinha papéis segregados: mulheres como enfermeiras ou parteiras e homens como profissionais. Na Grã-Bretanha, era exercida exclusivamente por mulheres. A Guerra Civil Espanhola e a ditadura de Francisco Franco na Espanha e a Segunda Guerra Mundial na Grã-Bretanha promoveram a incorporação de homens em ambos os países. O período pós-guerra e as mudanças nos papéis de gênero facilitaram uma transformação sociocultural, integrando homens à enfermagem e quebrando estereótipos. Esse processo redefiniu a profissão, promovendo a equidade e destacando o cuidado para além do gênero. **Conclusão.** Este estudo histórico revela que a enfermagem na Espanha e na Grã-Bretanha evoluiu de uma profissão exclusivamente feminina para um modelo mais inclusivo, desafiando estereótipos. Guerras e mudanças sociais permitiram a incorporação de homens, redefinindo a identidade profissional. Essa transformação não busca privilegiar, mas sim destacar a equidade e que o cuidado pode ser prestado independentemente de sexo ou gênero, desde que seja baseado em fundamentos científicos e éticos.

**Descritores:** história; homens; enfermeiros; enfermagem; Espanha; Reino Unido.

## Introduction

Nursing, as social and institutional practice, has maintained a historical link with the female gender role; its transition from informal occupation (based on knowledge transmitted over generations) to formalized profession with scientific status was and continues being a complex process promoted by pioneers like Florence Nightingale. Her work during the War of Crimea (1853-1856) not only revolutionized military health management by applying statistical methodologies and hygiene measures, but also set the epistemological bases of modern nursing through her work *“Notes on Nursing”* during 1859.<sup>(1)</sup> Her struggle for disciplinary autonomy, regulated education, and the social recognition of the profession continues influencing on the formation of current and future generations. Due to this, female leadership in nursing is not a mere reflection of ancestral traditions, but the result of a deliberate professionalization process, marked by gender, class, and ethnic tensions. Nurses have been agents of global change, from the reform of health systems to the defense of human rights in contexts of crisis. Their impact, although historically invisible, is inseparable from the development of past, present, and future health.<sup>(1)</sup>

Care, as social activity, has been historically associated with the feminine due to patriarchal structures that linked women with domestic and affective roles, while relegating men to the public and productive sphere. This sexual division of work, rooted since ancient times and reinforced during the Industrial Revolution, was not casual, but a social-order tool that justified the exclusion of women and nursing to subordinated roles.<sup>(2)</sup> However, although a minority, male nurses have played a relevant role in the history of nursing since ancient times; their contributions, despite being less documented, have been significant for the development of the profession. Therein, it results key to analyze, from a historical perspective, how men began to undertake active roles within care contexts, which would permit understanding their impact on the construction of an inclusive professional identity and broaden the scope of this discipline.<sup>(3)</sup>

In this sense, it is essential to investigate the reasons that drove the first male incorporations into nursing, as well as the factors that facilitated their participation.<sup>(4)</sup> A paradigmatic case is that of Spain and Great Britain, where – despite language, cultural, and historical differences, the first male nurses emerged during similar periods. This coincidence offers a unique opportunity for a comparative analysis that explores parallelisms and divergence in both contexts.<sup>(5)</sup> Hence, the aim of this work was to describe the incorporation of the first male nurses in Spain and Great Britain between 1915 and 1980, highlighting the historical, social, and cultural factors that influenced on their initial insertion. This analysis seeks to enhance comprehension of how gender roles and sociocultural contexts shaped nursing’s transition from occupation to profession, with the participation an actor: male nurses.

## Methods

This study adopted the analytical-synthetic historical method as epistemological framework to examine the evolution of the appearance of the first male nurses in Spain and Great Britain. This dual approach permits decomposing the historical phenomenon into its constitutive elements to then reconstruct it critically, overcoming the limitations of merely chronological analyses. The documentary phase was supported on a database search (SCIELO, SCOPUS, EBSCO Host, Google Scholar) using a trilingual strategy (Spanish, English, Portuguese) with key descriptors, like: history of nursing, male nurses, nursing, Spain and Great Britain, combined with the Boolean operator "AND". The resulting drafts were subjected to a three-level historical critique process: source authenticity, contextual representativeness, and thematic pertinence. The structural analysis revealed the intrinsic dynamics of the phenomenon through a double approximation: vertical (temporal, establishing meaningful periodization) and horizontal (thematic, examining the economic, social, and ideological dimensions in their interaction). This multi-causal dissection permitted identifying not only the dominant patterns, but specially the latent tensions that configured historical inflection points. The final synthesis transcended the mere sum of evidence that articulated three analysis scales: the particularity of the cases studied, their national context and global influences. This process revealed how structural continuities coexisted with paradigmatic ruptures, offering an understanding of evolution that enriches existing historiography.

## Results

Between 1915 and 1980, an interesting period for analysis took place due to the emergence of the institutionalization of revolutionary or post-war processes in 1915. By 1980, on the other

hand, the post-war economic boom ended and the transition to neoliberalism began in countries, like Spain and Great Britain. Both nations underwent transformations that influenced profoundly on diverse aspects of their societies, including the evolution of nursing. These historical changes provided a fundamental framework to comprehend the profession's development and the insertion of male nurses in both countries.

### From interns to nurses: the first Spanish men in nursing.

In Spain, the first half of the 20<sup>th</sup> century was deeply influenced by marked political instability that affected social development, as well as educational and professional structures. Although the country adopted a neutrality posture during the First World War (1914-1918), the conflict's economic and social repercussions had a significant impact in the national territory.<sup>(6)</sup> This period was marked by political transformations, such as Primo de Rivera's dictatorship (1923-1930) and the Second Republic (1931-1936), which promoted initiatives aimed at modernizing the State and endorsing reforms in distinct sectors.<sup>(7)</sup> Within the nursing setting, training of professionals was profoundly conditioned by the institutional and sociocultural environment of the time. Nurses and midwives were educated in hospital schools, predominantly run by religious orders, where they received training oriented exclusively to the hospital field. Nurses were specialized in providing direct care to patients, while the midwives performed functions in areas of gynecology and obstetrics, as well as in care during natural births. These professions were strictly reserved for women, in consonance with the social values that associated women with the role of caregivers par excellence.<sup>(8)</sup>

In contrast, men played the role of interns, an occupation whose formation was carried out in medical schools. This technical preparation included activities, like healing wounds, bandages, vaccinations, and minor surgery. The interns

acted principally as medical assistants, both in the public sector and in private consultations, and acquired special relevance in rural zones, where the lack of physicians was a constant.<sup>(9,10)</sup> This professional configuration evidenced a clear sex segregation in the functions and responsibilities assigned. Women, considered culturally suitable for direct care due to their presumed maternal instinct, were trained for care tasks. In turn, men occupied a more technical role, closely related with the medical practice.<sup>(8)</sup> It is worth indicating that nursing during this period lacked autonomous professional identity, given that it was deeply subordinated to the medical figure. Physicians were not only in charge of training the nurses, they also regulated their labor practice, evaluated their performance, and defined the standards of the occupation. This dynamic perpetuated a care-based and dependent vision of nursing, limiting its development as a scientific and professional discipline.<sup>(11)</sup>

The Spanish Civil War and the establishment of the Franco regime marked a turning point in the history of nursing in Spain, causing a significant setback in its professionalization. The Decree of 4 December 1953 unified the studies of nursing, midwives and interns under the figure of the Technical Health Assistant (THA). Nonetheless, despite this formal unification, differentiated training paths and hierarchical work roles persisted. Women continued mostly associated to care tasks in religious hospital environments, while men retained a technical profile, similar to that of the former practitioner/intern. This distinction, under the same professional name, demonstrates the depth of gender barriers in the healthcare field: beyond the title shared, the professional's sex determined rigidly the type of care provided. This division was reinforced by the context of ideological and educational regression of Francoism, which isolated Spanish nursing from international progress and relegated it to a traditional model, linked to conservative values and immovable gender roles.<sup>(10,12,13)</sup>

Nevertheless, after Franco's death in 1975, Spain experienced a process of opening and transformation in the educational and healthcare sectors; This context favored the evolution of nursing towards a more scientific model and less dependent on its vocational and religious nature.<sup>(10,12,13)</sup> Between 1977 and 1980, the integration of nursing into the higher education system, through the creation of the University Diploma in Nursing, marked a fundamental milestone. This advance not only permitted the creation of academic programs with a broader and inclusive curricular perspective, but also consolidated the professionalization of nursing, guaranteeing the formation of men and women under equality of conditions and strengthening its autonomy as scientific and professional discipline in the healthcare environment.<sup>(8,10)</sup>

### Male nurses from Great Britain (1915 - 1980)

During the course of the 19<sup>th</sup> century, nursing in Great Britain underwent a profound restructuring in educational terms, accompanied by the consolidation of a marked sexual division of labor.<sup>(14)</sup> This phenomenon was rooted in Victorian ideologies, characterized by a separatist conception of the sexes, which attributed strictly differentiated roles to men and women. Within this framework, the nursing profession was practically circumscribed to women, a situation that persisted even in the 20<sup>th</sup> century.<sup>(15,16)</sup> Contrary to Spain, whose neutrality during the First World War (1914-1918) limited the direct impact on the healthcare setting, Great Britain played an active role in said conflict.<sup>(17,18)</sup> The growing demand for healthcare staff during this period encouraged the massive incorporation of women into nursing. However, the magnitude of the needs also promoted, although incipiently, the participation of men in this occupation, marking the beginning of a paradigm shift in the dynamics of care work.<sup>(15,16)</sup>

The interwar period (1919-1939) was an ambivalent period.<sup>(19)</sup> On the one hand, the war experience underlined the relevance of nursing and its need to adapt to new demands; on the other hand, the normative and cultural structures reinforced segregation.<sup>(20)</sup> Within this context, the enactment of the First Nursing Registration Act in 1919, promoted by the newly created General Nursing Council, established that the nursing practice should be carried out exclusively by women. This legislative act, far from being a mere formalism, consolidated the exclusion of men from training schools, based on logistical and cultural arguments, such as the lack of adequate infrastructure or incompatibility with the social norms of the time.<sup>(15,16)</sup> Nevertheless, in 1922 the first 15 male nurses were officially registered, representing a symbolic disruption in the hegemonic model. In 1923, the election of the first male nurse as a member of the General Nursing Council marked a milestone in the fight for equality in the profession. This representative played a crucial role until 1932, advocating for the inclusion of men as an integral part of the nursing community.<sup>(15,16)</sup>

The foundation of the Society of Registered Nurses in 1937 by Edward Glavin constituted substantial progress. This institution was focused on professionalizing men in nursing, fostering their training in modern techniques and addressing the specific challenges of their integration, particularly within the setting of mental health, where the need for qualified personnel was pressing.<sup>(15,16)</sup> Progress towards equality reached an inflection point in 1943, with the merger of the male and female registers into a single general register. This measure, although progressive, generated significant tensions, given that many female nurses perceived this integration as a threat to their position in the profession. The abolition of the Nurses Act in 1949 definitively consolidated the union of both groups, setting the bases for a more-inclusive profession.<sup>(15,16)</sup>

Between 1937 and 1945 there was a notable expansion in educational opportunities for male nurses. While at the beginning of this period there were only seven hospitals that accepted them, by its conclusion this figure had increased to 24 transforming institutions. This development evidenced change in the social and professional perception of men in nursing, reducing gaps in access to training.<sup>(15,16)</sup> During the Second World War (1939-1945), the masculine incorporation into nursing increased again due to the emergency generated by the conflict.<sup>(21)</sup> Thereafter, the social movements of the 1960s and 1970s challenged gender stereotypes, promoting greater equity in healthcare.<sup>(15,16)</sup>

The implementation of the Management Policy by the National Health Service represented another crucial factor in this process. This regulation promoted professional advancement based exclusively on merit and abilities, independent of sex. Due to such, men were able to access leadership positions in nursing, breaking from the tradition that reserved these roles for women.<sup>(15,16)</sup>

Lastly, in 1980, the Royal Commission on Health Services established as priority objective to attract men to nursing, promoting their full integration in the profession. This effort culminated with the consolidation of an inclusive model that eliminated the sex barriers mainly, transforming radically the perception and dynamics of nursing in Great Britain.<sup>(15,16)</sup>

## Male nurses: a description of their appearance in Spain and Great Britain

The analysis of the incorporation of men in nursing between 1915 and 1980, within the contexts of Spain and Great Britain, permits identifying how, despite cultural and linguistic differences, a transformation emerged in the perception about who could practice this profession. Understanding the historical context that facilitated this change is essential to strengthen the construction of

more inclusive and sound professional identity.<sup>(22)</sup> In its beginnings, nursing in both countries was profoundly linked with the feminine role, with minimum participation from men in health care.<sup>(2)</sup> This minority group dedicated to this task used to be pigeonholed into peripheral roles that, although associated with nursing, were not considered an integral part of the profession. This context marked the start of a transformation process in the nursing professional identity, albeit still far from a definitive consolidation.<sup>(23)</sup>

War conflicts in Spain and Great Britain were the principal catalyst for this change in both contexts. Wars, as historical events of great impact, tend to transform social perspectives and generate new ways of approaching rising needs, including the offer of health care. During health crises derived from these conflicts, both in the battle fronts and outside of such, the increasing demand for nursing personnel evidenced the need to incorporate more men in this profession.<sup>(6,19,20)</sup> The massive loss of men during war conflicts and the need for women to assume traditionally masculine roles in industry and other work sectors reconfigured profoundly the sex perceptions within the professional setting, including nursing. This phenomenon, also influenced by the Industrial Revolution and labor reorganization, transformed how professions were understood and assumed during that historical moment.<sup>(6,19,20)</sup>

Simultaneously, nursing began to transcend the hospital confines, acquiring a new professional dimension. This implied a transition from a traditional model of maternal and self-sacrificing care toward a profession that required technical, clinical, and academic training.<sup>(24)</sup> This change both broadened the scope of nursing and impacted its structure and language, contributing to the creation of a more inclusive professional gender identity.<sup>(25)</sup> Historically, nursing has been marked by being practiced almost exclusively by women, which makes it essential to include gender as a central variable in any study on professional identity. In this sense, it is necessary to more

clearly define the framework within which men began their integration into this discipline in both countries.<sup>(24)</sup> Gender, understood as a historical and social construction, responds to factors such as the territory, communication, language, and collective and individual representations. The inclusion of men broke with a model that traditionally associated this profession exclusively to feminine sector, enriching and diversifying its professional identity.<sup>(25)</sup>

Identity, far from being a fixed concept, is a position that subjects adopt regarding their existence and the collectivities surrounding them. This joint identity, influenced by styles, habits, and discourses, positions the individual within a heterogeneous social structure. Therefore, the integration of men in nursing by 1980 was not a fortuitous event, but the result of a series of multifactorial events that culminated in the transformation of the profession.<sup>(22)</sup> Finally, the integration of men in nursing and its progressive normalization reflect significant change in the social and professional structures of the time. This process permitted opening the profession to individuals from any sex and gender, enriching its identity and marking progress toward greater equity and inclusion in the health care environment.<sup>(22)</sup>

## Conclusion

The historical analysis of the male presence in nursing between 1915 and 1980 permits understanding how this profession underwent a paradigmatic transformation in Spain and Great Britain. During this period, nursing stopped being perceived exclusively as a setting reserved for women, paving the way for change in the social and professional structures of both countries. In spite of the cultural and contextual differences, both shared a phenomenon in which the inclusion of men challenged traditional norms tied to gender, configuring a new professional identity.

Construction of a new more inclusive professional identity not only benefits female and male nurses, but also promotes more comprehensive understanding of the profession. History, as a tool to rescue and value the roots of nursing, allows reflecting upon the challenges and progress that marked this change. Particularly, it turns out essential to highlight the impact of incorporating men onto a context in which, for quite some time, they represented a minority in this discipline. This historical perspective honors the path taken and helps those who today have the privilege of being called nurses to comprehend the context that enabled their participation.

It is fundamental to stress that this reflection does not seek to position men above women in nursing, rather, it seeks to reinforce an identity based on equity and on anybody's capacity, regardless of their gender, to provide care from a scientific and ethical perspective. In this sense, we are called on to delve into the research and analysis of the history of nursing; understanding our past helps us to recognize the current state of the profession and permits our influencing positively on its future, consolidating nursing as a science and essential discipline for the wellbeing of society.

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# How do annoying environmental stimuli affect cognitive failures and sleep quality in intensive care unit nurses? Mediating role of mood

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## How do annoying environmental stimuli affect cognitive failures and sleep quality in intensive care unit nurses? Mediating role of mood

### Abstract

**Objective.** To investigate the relationship between disturbing environmental stimuli with sleep quality and cognitive failures in intensive care unit nurses, taking into account the mediating role of mood. **Methods.** A cross-sectional study was done with the participation of 201 intensive care unit nurses who were selected by census method from public hospitals in western Iran. Questionnaires were used to collect data, including: pittsburgh sleep quality index (PSQI), occupational cognitive failure questionnaire (OCFQ), Brunel Mood Scale (BRUMS), environmental annoyance and perceived noise annoyance. Modeling was done with univariate linear regression and multivariate regression. **Results.** The results of the study revealed that 84.1% of the participants had poor sleep quality. 13.3% experience cognitive failures at a low level, 61.7% at an average level, and 7% experience cognitive failures at a high level. By examining the mediating role of mood, it was found a significant and negative relationship between positive mood and: annoying environmental stimuli and people's positive mood ( $p=0.004$ ) and noise annoyance ( $p=0.002$ ); another significant and negative relationship was also observed between noise annoyance and cognitive failures ( $p<0.001$ ). **Conclusion.** Considering the mediating role of mood in the effect of environmental variables on cognitive failures and quality of sleep, it is recommended to use psychological interventions to adjust nurses' mood.

**Descriptors:** sleep quality; environmental exposure; cognitive dysfunction; affect; nurses; intensive care units; cross-sectional studies.

## ¿Cómo afectan los estímulos ambientales molestos al rendimiento cognitivo y a la calidad del sueño de las enfermeras que trabajan en unidades de cuidados intensivos? El papel mediador del estado de ánimo

### Resumen

**Objetivo.** Investigar la relación entre los estímulos ambientales molestos con la calidad del sueño y las fallas en el rendimiento cognitivo en enfermeras de la Unidad de Cuidados Intensivos -UCI-, teniendo en cuenta el papel mediador del estado de ánimo. **Métodos.** Estudio de corte transversal en el que participaron 201 enfermeras de UCIs seleccionadas por el método censal de hospitales públicos del oeste de Irán. Para la recolección de datos se utilizaron 5 instrumentos: Índice de Calidad del Sueño de Pittsburgh (PSQI), Cuestionario de Fracaso Cognitivo Ocupacional (OCFQ), Escala de Estado de Ánimo de Brunel (BRUMS), Molestia ambiental y Molestia por ruido percibido. Se realizaron modelos de regresión lineal univariada y de regresión multivariada. **Resultados.** Los hallazgos del estudio revelaron que el

84.1% de los participantes tenían una mala calidad de sueño. El 13.3% experimenta fallos cognitivos a un nivel bajo, el 61.7% a un nivel medio y el 7% restante a un nivel alto. Al examinar el papel mediador del estado de ánimo, se encontró una relación significativa y negativa entre el estado de ánimo positivo y: los estímulos ambientales molestos y el estado de ánimo positivo de las personas ( $p=0.004$ ), la molestia por ruido ( $p=0.002$ ); también se observó otra relación significativa y negativa entre la molestia por ruido y los fallos cognitivos ( $p<0.001$ ). **Conclusión.** Se encontró que el estado de ánimo tiene un papel mediador en el efecto sobre las variables ambientales, los fallos cognitivos y la calidad del sueño de las enfermeras que laboran en UCIs. Se recomienda utilizar intervenciones para mejorar el estado de ánimo de esta población en este tipo de servicios.

**Descriptor:** calidad del sueño; exposición a riesgos ambientales; disfunción cognitiva; afecto; enfermeras y enfermeros; unidades de cuidado intensivo; estudios transversales.

## Como estímulos ambientais incômodos afetam os comprometimentos cognitivos e a qualidade do sono em enfermeiros de unidade de terapia intensiva? Papel mediador do humor

### Resumo

**Objetivo.** Investigar a relação entre estímulos ambientais perturbadores e qualidade do sono e comprometimentos cognitivos em enfermeiros de Unidade de Terapia Intensiva (UTI), levando em consideração o papel mediador do humor. **Métodos.** Um estudo transversal envolvendo 201 enfermeiros de UTI selecionados pelo método de censo de hospitais públicos no oeste do Irã. Cinco instrumentos foram usados para coleta de dados: Índice de Qualidade do Sono de Pittsburgh (PSQI), Questionário de Falha Cognitiva Ocupacional (OCFQ), Escala de Humor de Brunel (BRUMS), Incômodo Ambiental e Incômodo de Ruído Percebido. Modelos de regressão linear univariada e regressão multivariada foram realizados. **Resultados.** Os resultados do estudo revelaram que 84.1% dos participantes tinham má qualidade de sono. 13.3% experimentaram lapsos cognitivos em um nível baixo, 61.7% em um nível médio e os 7% restantes em um nível alto. Ao examinar o papel mediador do humor, foi encontrada uma relação significativa e negativa entre humor positivo e: estímulos ambientais irritantes e humor positivo das pessoas ( $p=0.004$ ), incômodo com ruído ( $p=0.002$ ); outra relação significativa e negativa também foi observada entre incômodo com ruído e lapsos cognitivos ( $p<0.001$ ). **Conclusão.** Foi descoberto que o humor tem um papel mediador no efeito sobre variáveis ambientais, lapsos cognitivos e qualidade do sono de enfermeiros que trabalham em UTIs; recomenda-se o uso de intervenções para ajustar o humor dessa população neste tipo de serviço.

**Descritores:** qualidade do sono; exposição ambiental; disfunção cognitiva; afeto; enfermeiras y enfermeiros; unidades de terapia intensiva; estudos transversais.

## Introduction

**N**ursing is the most stressful occupation in the healthcare sector, with numerous stressors that can negatively impact the mental health of those employed in this field.<sup>(1)</sup> The ability to provide effective nursing care is considered a crucial factor in the recovery of patients in special care units. Among the nursing skills employed in intensive care units is the monitoring of the environment and the creation of a supportive and stress-free atmosphere. This monitoring encompasses the regulation of light, sound, colour, view, music and social sensitivities.<sup>(2)</sup> Hospital personnel in a tranquil environment are better equipped to provide medical services to patients. Inappropriate environmental conditions are a significant contributing factor to the creation of mental pressure (tension) that endangers mental health.<sup>(3)</sup> The presence of environmental stimuli has been demonstrated to cause destruction and damage to the fundamental physiological needs, and to interfere with the growth, development, and productivity of humans.<sup>(4)</sup> A study conducted by Liu et al. in 2023, entitled “Critical indoor environmental factors affecting productivity” identified four environmental factors, including sound, lighting, ventilation, and thermal comfort, that can directly and indirectly influence an individual’s mental health and, consequently, their performance and productivity at work.<sup>(5)</sup> The response of an individual to a stressor is contingent upon the characteristics of the stimulus and the individual’s characteristics. In the absence of a suitable response to a stressor, symptoms such as fatigue, irritability and a lack of concentration may manifest.<sup>(4)</sup> A study conducted by G. Belojevic et al. demonstrated that sound has an effect on human cognitive tasks, including memory, alertness, processing, and the accuracy of performance. These effects were observed under the influence of sound. The study revealed that individuals who are particularly sensitive to sound are more susceptible to the adverse effects of noise on cognitive performance.<sup>(6)</sup>

A study conducted by Kolakari et al. determined that the most common cause of stress among intensive care unit workers is related to unpleasant odours and chemicals. This environmental stimulus can be stressful regardless of causing poisoning.<sup>(4)</sup> If the stressors in the work environment are such that the personnel feel unable to meet the existing requirements, adverse physiological and psychological responses will appear, which can endanger the health of the individual and directly affect their physical and mental health and efficiency.<sup>(7)</sup> The nursing profession is characterised by shift work and sleep disorders, which may contribute to the prevalence of sleep disorders among nurses and the relationship between human health and sleep quantity and quality.<sup>(8)</sup> In addition to the aforementioned consequences, occupational accidents, erroneous decisions and choices are also significant outcomes of suboptimal sleep quality in individuals. These outcomes can be particularly pertinent in professions such as nursing.<sup>(9)</sup>

Another consequence of environmental stimuli is the impact on individuals' cognitive performance. Indeed, the results of several studies conducted in this field indicate that exposure to environmental stimuli can have detrimental effects on people's cognitive performance, including attention, memory, and reaction time.<sup>(10)</sup> Conversely, it appears that one of the areas most affected by sleep quality is the brain capacity and cognitive functions of individuals. In other words, individuals with sleep disorders are likely to be more susceptible to cognitive impairment than those without such disorders.<sup>(11)</sup> In addition to sleep quality and cognitive failures, certain internal states and moods can influence how individuals respond to environmental stimuli.<sup>(12)</sup> In general, mood states are psychological responses to environmental and periodic stimuli that influence the evaluation and interpretation of psychological situations and the functions of the past, present, and future. The presence of irritating environmental stimuli can result in the manifestation of mental distress, including fatigue, psychological symptoms, and mood fluctuations.<sup>(7,13)</sup> Such mood changes can result in a reduction in the speed of work, an increase in occupational accidents, and a decline in productivity among the organisation's employees. Yari Kia *et al.* in 2010, it was found that exposure to inappropriate environmental factors such as light, smell, and improper ventilation causes negative mood reactions. Furthermore, it has been demonstrated that inappropriate environmental factors, such as light, smell, and ventilation, can lead to aggressive behaviour in individuals. This study has identified the modification of lighting systems in therapeutic environments as a key strategy for the prevention of negative mood disorders in people.<sup>(14)</sup> The objective of the present study is to examine the relationship between exposure to annoying environmental stimuli, sleep quality and cognitive failures in nurses. Additionally, the study will assess the potential for mood mediation in these relationships.

This is a cross-sectional study conducted in 2023. The research community comprised intensive care nurses in Borujerd city in Iran. Nurses working in the ICU, CCU, and NICU departments were studied. Sampling was conducted using the census method, and the final sample size was 201 individuals. In order to be eligible for inclusion in the study, participants were required to have at least one year of experience working in intensive care unit. Furthermore, pregnant and lactating women were excluded from the study due to exemption from night shift service. Prior to their participation in the study, all subjects were required to provide informed consent. In addition, they were permitted to withdraw from the study at any point during the research process should they so desire. The data required for the research were collected via five questionnaires, including the questionnaires on pittsburgh sleep quality index (PSQI), occupational cognitive failure questionnaire (OCFQ), Brunel Mood Scale (BRUMS), environmental annoyance and perceived noise annoyance.

### Instruments

The *Pittsburgh Sleep Quality Questionnaire (PSQI)* was utilised to assess the sleep status of the participants. The score of the responses varies from zero to three, based on the grading criteria. The number 3 signifies an unsuitable outcome, while a score of zero (0) indicates a highly suitable result. To assess the quality of sleep, the total score is employed, with a score of 0 to 4 classified as indicative of good sleep quality and a score of 5 or above indicative of poor sleep quality. The questionnaire has been subjected to a validation procedure, which has been conducted by experts in the field. The reliability of this questionnaire was also reported as 0.89 for all questions using the Cronbach's alpha method.<sup>(15)</sup>

*The Occupational Cognitive Failures Questionnaire (OCFQ)* was employed to assess the aforementioned variable. A 30-item questionnaire (OCFQ) was employed to assess this variable. The grading method employed is a five-point Likert scale, with the options representing a complete disagreement, disagreement, no opinion, agreement, and complete agreement, respectively. The final score is calculated by adding together the total scores for all questions. The resulting score will fall within the range of 30 to 150. A score of 30-60 is indicative of a low level of cognitive error, a score of 60-90 is indicative of a moderate level of cognitive error, and a score above 90 is indicative of a high level of cognitive error. The content validity index (CVI) index of the questionnaire is 0.7, which is within the acceptable range. The reliability of the questionnaire has already been confirmed by other studies.<sup>(16)</sup>

*The Brunel Mood Scale (BRUMS)* is a psychometric instrument designed to assess mood states. It comprises 32 items, with five-point Likert-type scales, and includes three positive dimensions (calmness, happiness, and vitality) and five negative dimensions (tension, depression, anger, fatigue, and confusion). The questionnaire comprises 32 questions and employs a five-choice Likert-type scale. It encompasses three positive dimensions, namely calmness, happiness and vitality, which collectively account for 12 questions. In contrast, it encompasses five negative dimensions, namely tension, depression, anger, fatigue and confusion, which collectively account for 20 questions. The lowest possible score for an individual on the mood questionnaire is 0, while the highest possible score is 128.<sup>(12)</sup> The reliability of the questionnaire was evaluated using Cronbach's alpha by the researchers of the same study, and its value was recorded as 0.86.

*The Environmental Stimuli Questionnaire* was employed to assess the environmental stimuli present within the work environment. The

reliability of the questionnaire was evaluated using Cronbach's alpha by the researchers of the same study, and its value was recorded as 0.86. In order to assess the qualitative validity, the questionnaire was initially administered to 10 expert professors specialising in ergonomics. Subsequently, two relative coefficients of content validity, CVR (Content Validity Ratio) and CVI, were employed to assess content validity quantitatively. The CVR and CVI values obtained were 0.78 and 0.93, respectively. Given that the value of CVR and CVI obtained is higher than the minimum value suggested for these coefficients in the relevant standard tables, their values were confirmed. The questionnaire comprises five questions pertaining to both light and smell, which were subjected to both validity and reliability testing. The level of annoyance caused by encountering these two factors is reflected in the responses to the questions. The first option (no) indicates that the respondent is not annoyed by the factor in question. The second option (yes, sometimes) indicates that the respondent is sometimes annoyed by the factor in question. The third option (yes, a lot) indicates that the respondent is frequently annoyed by the factor in question. These responses are then divided into three groups: people annoyed by lighting equipment, people annoyed by smells, and people generally annoyed .

*The Annoying Noise Perception Questionnaire (ANPQ)* is a self-report instrument designed to assess the subjective experience of noise annoyance. The reliability of this questionnaire was assessed using Cronbach's alpha, with a value of 0.82 calculated. In order to assess the qualitative validity of the questionnaire, it was initially administered to 10 expert professors in the field of ergonomics. Subsequently, two relative coefficients of content validity, CVR (Content Validity Ratio) and CVI (Content Validity Index), were employed to assess content validity quantitatively. The values of CVR and CVI obtained for the questionnaire were 0.88 and

0.92, respectively. Given that the values of CVR and CVI obtained are greater than the minimum values suggested for these coefficients in the relevant standard tables, it can be concluded that their values are confirmed. The questionnaire comprises 12 questions and was subjected to a process of validation and reliability testing. The questionnaire comprises both 5-point Likert scale questions and multiple-choice options. The questionnaire comprises subscales pertaining to noise annoyance, mental health (including feelings and symptoms associated with noise), work productivity, adopted solutions against noise, personal strategies against noise, employees' sensitivity and reaction to noise, and an understanding of the source of noise.<sup>(17)</sup>

## Ethical issues

All participants were aware of the study's objectives and methodology and participated completely voluntarily. The study was also conducted under the supervision of the Ethics Committee of Hamadan University of Medical Sciences with the number IR.UMSHA.REC.1402.098.

## Statistical analysis

This research employed a descriptive and inferential analysis approach, as well as data recording and preliminary investigations utilising the SPSS 23 software suite. Furthermore, confirmatory factor analysis and structural equation modelling were employed to test hypotheses, using STATA software. Finally, univariate and multivariate regression methods with a significance level of 0.05 were applied.

# Results

The participants in this study were 201 nurses, of whom 70.6% were women and 29.4% were men. The age range of the participants was between 24 and 54 years, with an average 34.68 and a standard deviation of 6.36 years. The results obtained from the questionnaire on

annoying environmental stimuli revealed that 31 nurses (15.42%) were affected by electrical irritation. It was determined that the electrical sources in the department, including visual alarms, constituted the primary irritating factor. A total of 129 nurses (64.17%) were identified as belonging to the group of individuals whose irritation is affected by chemicals and smells in the ward. The highest score obtained from their questionnaire was related to questions 4 and 5. A total of 44 nurses (21.89%) in the study group exhibited a high level of annoyance, as indicated by their responses to both sets of questions. These questions pertained to electrical irritation and to odours and chemicals.

An examination of the scores obtained from the participants on the noise annoyance questionnaire indicated that 187 individuals (93.1%) exhibited sensitivity and annoyance in response to noise, whereas only 14 individuals (6.9%) were affected by noise and noise-related distress in the intensive care unit. Among the mental symptoms caused by people being exposed to noise, the most frequently reported feelings are related to lack of concentration during the task and dissatisfaction. These feelings were experienced by 38.30 and 19.40% of people, respectively. Loss of motivation was reported in only one study subject. Among the sound sources in the special care department, the most frequent complaints of patients are due to continuous exposure to alarms related to medical equipment (ventilator, wavy mattresses, etc.) and the voices of other patients and staff. These were reported by 43.3 and 35.8 percent of patients, respectively. The least frequent source of complaint among patients was noise from sirens and alarms, which was reported in only 2.5% of cases. A total of 164 (82%) of the study participants demonstrated sensitivity to the noise of their work environment, exhibiting a range of reactions. In contrast, 38 (19%) of them did not exhibit any specific reaction to the noise of their environment. The noise in the intensive care unit had an adverse effect on the performance and productivity of 163 participants (81%),

while 38 nurses (18%) did not feel any change in their work productivity under the influence of this factor. Among the 201 individuals under study, 79 (39.3%) opted to request that others reduce their voice levels in order to mitigate the impact of noise in the workplace. Only 1% of respondents indicated that they had adopted a different task to address this factor.

The findings of the sleep quality questionnaire indicated that 32 individuals (15.9%) exhibited good sleep quality, while 169 individuals (84.1%) demonstrated poor sleep quality. Additionally, the analysis revealed that there was no significant

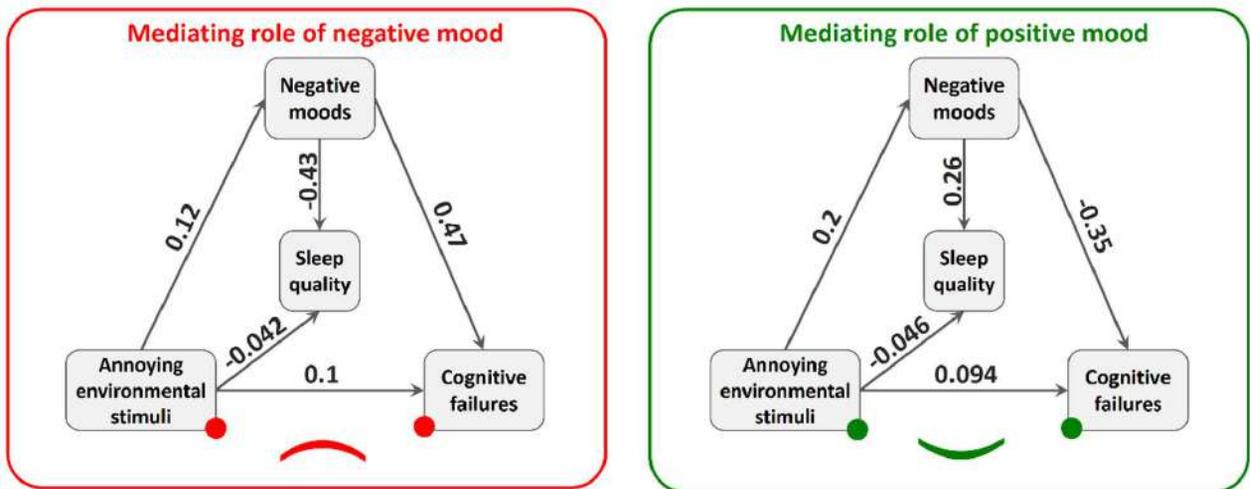
correlation between annoying environmental stimuli and sleep quality. These relationships are depicted in Figure 1. However, a negative and significant relationship was observed between noise annoyance and sleep quality (see Table 1). Among the participants, 63 individuals (13.3%) exhibited low-level cognitive failures, 124 (61.7%) exhibited average-level cognitive failures, and 14 (7%) exhibited high-level cognitive failures. A significant relationship was observed between noise annoyance and cognitive failures of people ( $p < 0.0001$ ), but no significant relationship was observed between annoying environmental stimuli and cognitive failures of people ( $p = 0.048$ ).

**Table 1. Linear relationships between dependent and independent variables**

Dependent variables	Independent variables	Coefficient	$p$ -value	Lower limit	Upper limit
Cognitive failure	Environmental irritants	0.70	0.048	0.00	1.40
	Voice annoyance	1.25	<0.001	0.89	1.60
Sleep quality	Environmental irritants	-0.29	0.046	-0.59	-0.004
	Noise annoyance	-0.32	<0.001	-0.48	-0.16
Positive mood	Noise annoyance	-0.30	0.003	-0.50	-0.10
	Environmental irritants	-0.22	0.235	-0.59	0.14
Negative mood	Environmental irritants	1.15	<0.001	0.60	1.70
	Noise annoyance	0.64	<0.001	0.33	0.94
Cognitive failure	Environmental irritants	0.70	0.048	0.00	1.40
	Noise annoyance	1.25	<0.001	0.89	1.60
Sleep quality	Environmental irritants	-0.29	0.046	-0.59	-0.004
	Noise annoyance	-0.32	<0.001	-0.48	-0.16
Positive mood	Noise annoyance	-0.30	0.003	-0.50	-0.10
	Environmental irritants	-0.22	0.235	-0.59	0.14
Negative mood	Environmental irritants	1.15	<0.001	0.60	1.70
	Noise annoyance	0.64	<0.001	0.33	0.94

By examining the mediating role of mood, it was found that there is a significant relationship between annoying environmental stimuli and people's positive mood ( $p=0.004$ ). This indicates that with the increase in the amount of annoying environmental stimuli, the positive mood of people decreases. However, between annoying

environmental stimuli and negative mood, there is no significant relationship ( $p=0.073$ ) (Table 2). Furthermore, the results indicate that there is a relationship between noise annoyance and sleep quality, with the mediating role of positive and negative mood in intensive care nurses (see Table 3).



**Figure 1.** The relationship between annoying environmental stimuli, sleep quality and cognitive failures; mediating role of positive mood (right) and negative mood (left)

**Table 2.** The relationship between annoying environmental stimuli and sleep quality: the mediating role of positive and negative mood

Dependent variables	Independent variables	Coefficient	<i>p</i> -value	Lower limit	Upper limit
Positive mood	Irritating environmental stimuli	-0.19	0.004	-0.32	-0/06
Negative mood	Irritating environmental stimuli	0.12	0.073	-0.01	0.25
Sleep quality	Positive moods	0.25	0.000	0.12	0.38
	Irritating environmental stimuli	-0.04	0.509	0.18	0.08
	Negative moods	-0.43	0.000	-0/54	-0.31
	Irritating environmental stimuli	-0.04	0.507	-0/16	0.08
Variance	Sleep quality	0.92	-	0.86	0.99
	Positive moods	0.96	-	0.91	1.01
	Sleep quality	0.80	-	0.71	0.91
	Negative moods	0.98	-	0.95	1.01

**Statistical fit test.** TLI: 0.000; CFI: 1.000; RMSE: 0.000.

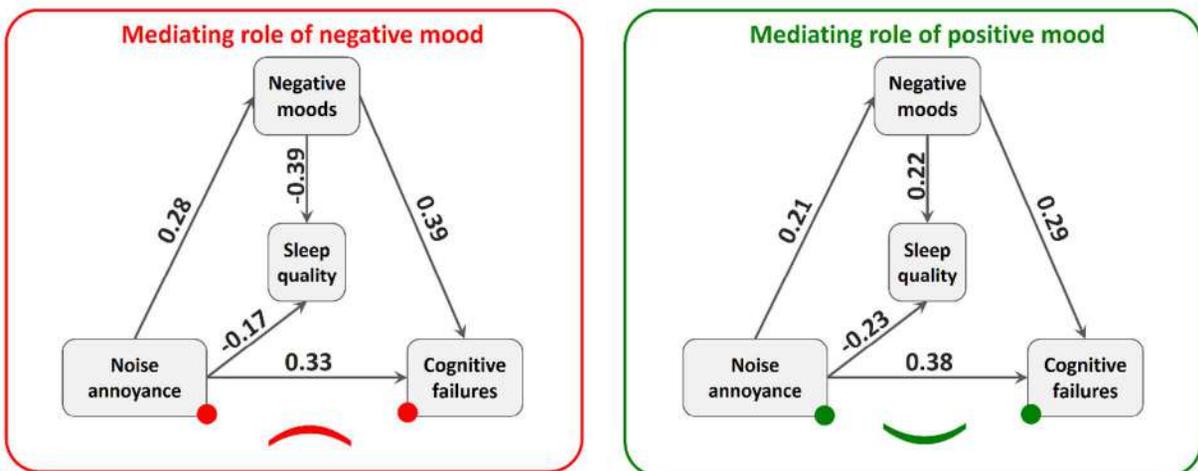
**Table 3. The relationship between noise annoyance and sleep quality: the mediating role of positive and negative mood**

Dependent variables	Independent variables	Coefficient	p-value	Lower limit	Upper limit
Positive mood	Noise annoyance	-0.20	0.002	-0.33	-0/07
Negative mood	Noise annoyance	0.27	<0.001	0.15	0.40
Sleep quality	Positive moods	0.21	0.001	0.08	0.34
	Noise annoyance	0.23	<0.001	-0.35	-0.10
	Negative moods	-0.38	0.000	-0/50	-0.27
	Noise annoyance	-0.16	<0.001	-0/29	-0.04
Variance	Sleep quality	0.87	-	0.79	0.96
	Positive moods	0.95	-	0.90	1.01
	Sleep quality	0.78	-	0.69	0.89
	Negative moods	0.92	-	0.85	1.99

Statistical fit test. TLI: 0.000; CFI: 1.000; RMSE: 0.000.

Furthermore, the results indicate that there is a relationship between annoying environmental stimuli and cognitive failures, with the mediating role of positive mood ( $p=0.004$ ). However, there is no relationship with negative mood ( $p=0.087$ ). The specifics of these interconnections are showed in Table 4. A significant correlation was observed between noise annoyance and positive mood ( $p=0.002$ ), indicating that as noise annoyance increases, positive mood declines. Additionally,

there is a significant correlation between noise annoyance and negative mood ( $p<0.001$ ), indicating that an increase in noise annoyance is associated with an increase in negative mood. The data presented in Table 5 indicates a correlation between noise annoyance and cognitive failures, with the mediation of positive and negative mood in intensive care nurses. These relationships are depicted in Figure 2.



**Figure 2. The relationship between noise annoyance, sleep quality and cognitive failures; mediating role of positive mood (right) and negative mood (left)**

**Table 4. The relationship between annoying environmental stimuli and cognitive failures: the mediating role of positive and negative mood**

Dependent variables	Independent variables	Coefficient	p-value	Lower limit	Upper limit
Positive mood	Irritating environmental stimuli	-0.19	0.004	-0.32	-0/06
Negative mood	Irritating environmental stimuli	0.12	0.073	-0.01	0.25
Cognitive failure	Positive moods	-0.35	<0.001	-0.47	-0.23
	Irritating environmental stimuli	0.09	0.155	-0.03	0.22
	Negative moods	0.47	<0.001	0.36	0.57
	Irritating environmental stimuli	0.10	0.087	-0/01	0.22
Variance	Positive moods	0.96	-	0.91	1.01
	Cognitive failure	0.85	-	0.76	0.94
	Negative moods	0.98	-	0.95	1.01
	Cognitive failure	0.75	-	0.65	0.86

Statistical fit test. TLI: 0.000; CFI: 1.000; RMSE: 0.000.

**Table 5. The relationship between noise annoyance and cognitive failures: the mediating role of positive and negative mood**

Dependent variables	Independent variables	Coefficient	p-value	Lower limit	Upper limit
Positive mood	Noise annoyance	-0.20	0.002	-0.33	-0/07
Negative mood	Noise annoyance	0.27	<0.001	0.15	0.40
	Positive moods	-0.29	<0.001	-0.40	-0.17
Cognitive failure	Noise annoyance	0.37	<0.001	0.27	0.48
	Negative moods	0.39	<0.001	0.28	0.50
	Noise annoyance	0.33	<0.001	0.22	0.44
	Positive moods	0.95	-	0.90	1.01
	Cognitive failure	0.66	-	0.56	0.77
	Negative moods	0.92	-	0.85	0.99

Statistical fit test. TLI: 0.000; CFI: 1.000; RMSE: 0.000.

## Discussion

The present study was conducted with the aim of examining the relationship between annoying environmental stimuli and cognitive failures, alongside sleep quality in intensive care unit nurses, with mood as the mediating factor. The

findings indicated that the quality of sleep was directly correlated with the exposure to noise in the work environment. However, no significant association was observed between the smell and lighting of the environment and the quality of sleep. Among the effects of chronic exposure to noise, we can cite the primary consequences of delayed sleep onset, sleep fragmentation, and

shortened sleep duration . The findings of the present study indicate that the most significant source of noise annoyance in intensive care units is the sound generated by medical equipment and the human voice. This includes staff conversations, expressions of pain by patients, and the voices of patients' companions. The study by Nasari *et al.*<sup>(18)</sup> revealed that numerous environmental factors, including light and sound, in intensive care units can induce stress and sleep disorders in patients. Furthermore, it was found that 17-57% of sleep disorders in these units are attributable to the sound alarms of the equipment. In addition, the study revealed that 25% of patients received calls from the department. Furthermore, the study conducted by Wayne and colleagues demonstrated that approximately 11-17% of the sleep disturbances experienced by healthcare professionals in intensive care units are attributable to noise. According to the findings of this study, the primary source of auditory interference was medical equipment alarms and human-produced noises.<sup>(19)</sup> In a related study, Freedman asserted that noise-induced sleep disturbances can be mitigated in intensive care units by eliminating frequent noise exposures, when compared to other sleep disruptors.<sup>(20)</sup>

The findings of this study indicate that there is no correlation between the lighting of the workplace and the exposure to chemical odours and the incidence of cognitive failures. However, there is a significant and direct relationship between the exposure to noise in the workplace and the incidence of cognitive failures in special care units. Additionally, there is no significant relationship between qualitative variables, including age and gender, and the incidence of these failures. In their study, Jinjing, Jing and Xiaowei also demonstrated that environmental noise has a detrimental effect on work performance, health and safety. The findings indicated a negative correlation between the quality of the participants' performance and their exposure to sound. This was evidenced by the observation that exposure to sound resulted in alterations to individuals' internal cognitive states,

including changes in attention, stress levels, and mental workload.<sup>(7,21)</sup>

Neil Ellis's research also revealed that continuous exposure to sound has a detrimental effect on people's level of alertness and attention, increasing the likelihood of performance errors and fatigue.<sup>(22)</sup> Yuyan Chen *et al.* demonstrated that environmental conditions, including ventilation in work environments, influence cognitive performance, with a negative correlation between the two variables.<sup>(23)</sup> Schiavon *et al.* demonstrated that environmental conditions, specifically lighting, influence cognitive performance, resulting in increased positive emotions, decreased negative emotions, enhanced work memory, and improved concentration.<sup>(24)</sup>

In addition to sleep quality and cognitive failures, certain internal states and moods can also influence how individuals respond to environmental stimuli.<sup>(12)</sup> In general, mood states are a psychological response to an environmental and periodic stimulus that intervenes in the evaluation and interpretation of a psychological situation and how to react to it. The results of this research indicate that annoying stimuli (light and smell) have no effect on the fluctuation of positive mood dimensions (vitality, happiness, calmness).<sup>(12)</sup> However, they do appear to increase the level of negative mood dimensions (tension, confusion, fatigue, depression, anger). Conversely, noise exposure in intensive care units has been found to reduce the level of positive dimensions and increase the level of negative dimensions. The findings of this study indicate that mood does not act as a mediator in the effect of odor and light stimuli on cognitive failures and sleep quality. However, it does play a mediating role in the effect of sound on the occurrence of cognitive failures and sleep quality. The study by Passos *et al.* also demonstrated that noise exposure can influence mood and performance, resulting in fatigue and irritability.<sup>(25)</sup>

It should be noted that every research study, including its valuable findings and results, is also accompanied by limitations and weaknesses. One limitation of this study is that data collection was conducted exclusively through questionnaire methods, which is the most accessible approach for establishing communication with personnel working in these departments. This was due to the sensitivity of special care units and the need for constant monitoring of patients during their hospitalisation period in these units. Additionally, the lack of examination of the variables separately for different work shifts (morning, evening, night) suggests that future studies should investigate the effect of this factor.

**Conclusion.** Given the significant impact of noise exposure on sleep quality variables, such as sleep efficiency, and cognitive performance and mood, this study suggests a series of control strategies to mitigate noise events. These include eliminating the sound of doors opening and closing, reducing the level of the loudest alarms, separating the call answering room by phone, asking people to reduce

their conversation volume, and communicating with patients' companions through short message sending systems instead of phone calls. Moreover, it is acknowledged that environmental stimuli can influence sleep quality and cognitive performance. This can be attributed to the impact of mood on these outcomes. Therefore, it is crucial to consider the role of psychological interventions in regulating mood, as this can effectively reduce the impact of environmental stressors. These interventions include reinterpretation methods, which alter one's view of a situation, self-soothing methods, attention control methods, acceptance methods, and problem-solving abilities. By addressing mood, these approaches can help mitigate the effects of environmental stressors on sleep quality and cognitive performance.

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# Incidence of Pressure Ulcers in Adults Hospitalized in Intensive Care Units in Colombia

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## Incidence of Pressure Ulcers in Adults Hospitalized in Intensive Care Units in Colombia

### Abstract

**Objective.** To estimate the incidence of pressure ulcers (PU) in hospitalized adults and its relationship with prevention practices in adult intensive care units (ICU) in Colombian hospitals. **Methods.** This was a multicenter prospective cohort study in 31 non-COVID-19 ICUs from 11 hospitals in Colombia, including 1543 patients without ability to move, but with healthy skin, admitted consecutively upon admission to ICU. The primary outcome was the incidence of PU per 1,000 days of hospital stay. **Results.** The participants were mostly men (57.5%), with mean age of  $59 \pm 18$  years and body mass index of  $25.5 \pm 4.6$  kg/m<sup>2</sup>. The study observed 120 PU in 17 063 days of hospital stay, the majority were in the sacral region (60.0%) and heels (10.8%). Overall incidence was of 7.03 (95%CI 5.9-8.41) by 1000 days-patient. The PU incidence rate was double in ICUs of public hospitals than in private hospitals [Incidence Rate Ratio (IRR) = 2.00; 95%CI: 1.30 to 3.01]. The risk of pressure ulcers was lower in hospitals that had skin-care group (IRR = 0.38; 95%CI: 0.25 to 0.58), used dressings [IRR = 0.66; 95%CI: 0.45 to 0.95] and support surfaces [IRR = 0.37; 95%CI: 0.24 to 0.59] in their preventive care practices. **Conclusion.** Much variability was noted in the PU incidence among the hospitals observed. However, Grade I and II ulcers and located in the sacral region continue having the highest incidence, according with global reference data. Hospital preventive care patterns reported a series of interventions administered in ICU that can be related with the risk of PU.

**Descriptors:** incidence; pressure ulcer; nursing; critical care

## Incidencia de úlceras por presión en adultos hospitalizados en unidades de cuidado intensivo en Colombia

### Resumen

**Objetivo.** Estimar la incidencia de úlceras por presión (UPP) en adultos hospitalizados y su relación con las prácticas preventivas en unidades de cuidados intensivos (UCI) de adultos de hospitales colombianos. **Métodos.** Estudio multicéntrico de cohorte prospectiva en 31 UCIs no Covid-19, de 11 hospitales de Colombia. Se incluyeron 1543 pacientes sin capacidad para movilizarse, pero con piel sana, admitidos consecutivamente al momento de la admisión en UCI. El desenlace primario fue la incidencia de UPP por mil días-estancia hospitalaria. **Resultados.** Los participantes eran en su mayoría hombres (57.5 %), con media de edad  $59 \pm 18$  años y un índice de masa corporal de  $25.5 \pm 4.6$  kg/m<sup>2</sup>. Se observaron 120 UPP en 17 063 días estancia hospitalaria, la mayoría fueron en región sacra (60.0 %) y en talones (10.8 %). La incidencia general fue de 7.03 (IC95% 5.9-8.41) por 1000 días-paciente.

La tasa de incidencia de UPPs fue el doble en las UCIs de hospitales públicos que en los privados [Razón de Tasas de Incidencia (RTI) = 2.00; IC95%: 1.30 a 3.01]. El riesgo de UPP fue menor en hospitales que tenían grupo de cuidado de la piel (RTI = 0,38; IC95%: 0,25 a 0,58), usaban apósitos [RTI = 0.66; IC95%: 0.45 a 0.95] y superficies de apoyo [RTI = 0,37; IC95%: 0,24 a 0,59] en sus prácticas de cuidado preventivo. **Conclusión.** Se observó una gran variabilidad en la incidencia de UPP entre los hospitales observados. Sin embargo, las úlceras Grado I y II y ubicadas en la región sacra continúan siendo las de mayor incidencia, acorde con datos referentes a nivel mundial. Los patrones de cuidado preventivo hospitalario reportaron una serie de intervenciones administradas en UCI que pueden relacionarse con el riesgo de UPP.

**Descriptor:** incidencia; úlcera por presión; enfermería; cuidados críticos.

## Incidência de úlceras de pressão em adultos hospitalizados em unidades de terapia intensiva na Colômbia

### Resumo

**Objetivo.** Estimar a incidência de úlceras de pressão (UPP) em adultos hospitalizados e sua relação com práticas preventivas em unidades de terapia intensiva (UTI) adultas em hospitais colombianos. **Métodos.** Um estudo de coorte prospectivo multicêntrico foi conduzido em 31 UTIs não Covid-19 de 11 hospitais na Colômbia. Um total de 1.543 pacientes com mobilidade prejudicada, mas pele saudável, admitidos consecutivamente no momento da admissão na UTI, foram incluídos. O desfecho primário foi a incidência de UPPs por 1.000 dias de internação hospitalar. **Resultados.** Os participantes eram em sua maioria homens (57.5%), com idade média de  $59 \pm 18$  anos e índice de massa corporal de  $25,5 \pm 4,6 \text{ kg/m}^2$ . 120 UPPs foram observadas em 17.063 dias de internação hospitalar, a maioria das quais na região sacra (60.0%) e calcanhares (10.8%). A incidência geral foi de 7.03 (IC 95% 5.9–8.41) em 17.063 pacientes-dia. A taxa de incidência de úlceras de pressão foi duas vezes maior em UTIs de hospitais públicos do que em hospitais privados [Razão da Taxa de Incidência (IRR) = 2.00; IC 95%: 1.30–3.01]. O risco de úlceras de pressão foi menor em hospitais que tinham um grupo de cuidados com a pele (IRR = 0.38; IC 95%: 0.25–0.58), usavam curativos [IRR = 0.66; IC 95%: 0.45–0.95] e usavam superfícies de suporte [IRR = 0.37; IC 95%: 0.24–0.59] em suas práticas de cuidados preventivos. **Conclusão.** Houve uma grande variabilidade na incidência de úlceras de pressão entre os hospitais observados. No entanto, úlceras de grau I e II localizadas na região sacra continuam apresentando a maior incidência, de acordo com dados globais. Os padrões de cuidados preventivos hospitalares relataram uma série de intervenções administradas na UTI que podem estar relacionadas ao risco de úlceras de pressão.

**Descritores:** incidência; úlcera por pressão; enfermagem; cuidado intensivo.

## Introduction

Pressure ulcers (PU), also known as recumbent ulcers or pressure injuries represent one of the adverse events of greater impact on the quality of life of hospitalized patients, on their relatives, and on costs for health systems.<sup>(1)</sup> These lesions are located in the skin and underlying tissue, and are produced as consequence of increased external pressure on some bony prominence, and constitute a complication during hospitalization in high-risk patients, especially those bedridden.<sup>(1,2)</sup> The complications associated with these lesions can produce increased morbidity and mortality during the hospital stay.<sup>(2)</sup> According to the Agency for Healthcare Research and Quality (AHRQ), the number of individuals affected by PU exceeds 2.5-million yearly.<sup>(3,8)</sup> A systematic literature review of the global disease burden 1990-2019<sup>(9,10)</sup> reported a slight trend in the decrease of the incidence and of the global prevalence [reduction of 10.6%, 95%CI 8.7% to 12.3% in incidence and of 10.2% in prevalence, 95%CI 8.2% to 11.9%), respectively.<sup>(9,10)</sup> Likewise, reports indicate by 2019 a standardized prevalence by age of 11.3 (95%CI 10.2 to 12.5), incidence of 41.8 (95%CI 37.8 to 46.2) and 1.7 [95%CI 1.2 to 2.2] years of life with a disability (YLD) for every 100-thousand inhabitants.

Critically ill patients hospitalized in ICU constitute one of the groups most-vulnerable to developing these lesions, which are associated with states of greater fragility related with their state of health, which worsens with immobility and prolonged periods in bed.<sup>(11,12)</sup> The global incidence of PU in ICUs varies between 3.3% and 53.4%,<sup>(10)</sup> prevalence between 13.1 % and 45.5%,<sup>(10)</sup> and hospital mortality associated with complications due to PU between 23% and 27%.<sup>(12-15)</sup> In Colombia (2019) the incidence rate in ICUs has been estimated between 7.0% and 26.9%.<sup>(14)</sup> The determining factors in adult ICU include variables, like age [  $\geq 70$  years OR: 2.14 95%CI 1.27-3.6; presence of comorbidities, such as type-II diabetes mellitus [OR 5.58 95%CI 1.83-18.7], admission to ICU due to trauma and diagnosis of sepsis, respectively [OR: 15.9 95%CI 3.7-68; OR: 2.89 95%CI 1.16-7.22], and use of vasopressor medications [vasopressin OR: 4.81 95%CI 1.66-13.92; noradrenalin OR: 3.68 95%CI 1.12-12.16], and ventilator therapy >7 hours [OR 23.0 95%CI 6.42-86.0].<sup>(12,14)</sup>

At hospital level, a series of preventive measures have been implemented within the framework of the organization of policies and PU prevention programs in intensive care in hospitals throughout the world. Pressure ulcer reduction has been reported with the implementation of some protective measures, like postural changes/repositioning [OR: 0.45 95%CI 0.21-0.97], use of dynamic surfaces [OR: 0.87 95%CI 0.81-0.94], use of dressings on sacral region [absolute reduction of PU of 9.2%, 95%CI: 2.3% to 16%], and implementation of group care measures or packages [0.37 95%CI 0.24

-0.57].<sup>(12)</sup> In this sense, it is required for hospitals and clinics to guide their care plans towards improving safety and quality to reduce the onset of these events in patients at risk. Existence of a prevention policy that includes using clinical practice guides (CPG) with effective evidence-based interventions, structuring of a skin-care group that guides preventive care, assessment of indicators, and the provision of human and material resources are determining strategies in preventing PU in ICU and other hospital services.<sup>(12, 13,16)</sup>

Although in Colombia prior studies have reported PU prevalence and incidence during hospitalization, such have not characterized the incidence of these events in critical care, where these rates are possibly higher.<sup>(17)</sup> Moreover, these studies lack the description of the characteristics of the practice environments and institutional prevention policies related with human, physical, and organizational resources, and of the conventional practices used to prevent these lesions in ICU<sup>(18-21)</sup>, which are key to understand the tendency of this problem and the planning of nursing interventions in hospital prevention. Consequently, this study's overall objective was to determine the incidence of PU in adults hospitalized in ICUs of hospital in Colombia. It also sought to describe standardized preventive care practices and their relationship with the PU incidence in these units.

## Methods

**Design.** A secondary analysis was performed of the cohort of the control group of the cluster randomized clinical trial called "Evaluation of two levels of repositioning frequency in reduction of pressure ulcers PENFUP-2" (Registry clinicaltrials.gov NCT04604665)<sup>(22)</sup> whose objective was to evaluate the effectiveness of the high frequency of repositioning in reducing PUs in 22 hospitals-ICUs with respect to the frequency of postural change according to conventional care in the incidence

of PU. The study was approved by the ethics committees of the 11 hospitals. The patients from the control group were observed during their conventional care; they were recruited in 31 ICUs (9 medical, 9 mixed, 6 surgical, 4 neurological, 3 coronary) in 11 high-complexity hospitals located in Bogotá ( $n = 5$ ), Bucaramanga ( $n = 2$ ), Medellín ( $n = 2$ ), Barranquilla ( $n = 1$ ), and Manizales ( $n = 1$ ) between 1<sup>st</sup> April 2021 and 30<sup>th</sup> March 2023. The hospitals included had to have adult ICU service ( $\geq 18$  years), offer specialized care to critically ill patients with any type of care emphasis, and have a minimum of 10 beds. The study included intermediate care units, burnt patient care units, and units to manage patients with COVID-19 or mixed including patients with COVID-19. With respect to patients, these were eligible if upon admission they had intact skin, *i.e.* without PU (no degree of ulcer), as well as complete inability to mobilize and requirement for hospitalization  $\geq 24$  hours. Patients with device- or adhesive-associated ulcers (MARSU) or incontinence dermatitis were not included. PENFUP-2 was approved by the ethics committees of all the participating hospitals, likewise, all the patients signed an informed consent accepting voluntary participation.

**Procedures.** The study's lead researcher in each hospital evaluated the eligibility of patients that consecutively were hospitalized in the ICUs during the observation period. The patients were included with informed consent previously signed by their relatives. Monitoring since their recruitment was daily until the primary outcome occurred, that is, development of the first pressure ulcer (PU) or mobility began autonomously, or discharge from the ICU or death. The PUs were classified as Grade I, II, III, or IV according to that established by the National Pressure Ulcer Advisory Panel (NPUAP)<sup>(23)</sup> and the National Group for the Study and Advice on Pressure Ulcers and Chronic Wounds - Spain (GNEAUP, for the term in Spanish),<sup>(24)</sup> and in keeping with the definition by the Pressure Ulcer Prevention Guide in Colombia.<sup>(13)</sup> The events were validated by the quality staff in each hospital. Furthermore,

for each patient, sociodemographic and clinical information on admission (comorbidities) was obtained; the risk of PU was determined using the Braden scale, as well as the occurrence of complications during hospitalization, including those associated with repositioning, time of hospital stay, and reason for discharge from the ICU. With regard to the standardized prevention strategies, each hospital's typology was determined (public-university or private-university), as well as the existence of a skin-care group, and specifically for ICUs, the ratio of the number of nurses per patient, the number of nurses specialized in intensive care, and implementation of the following preventive care practices: standardized use of special pressure management surfaces (SPMS), moisturizing cream, preventive dressings, fatty acids, and repositioning frequency. The nursing professional leader of each ICU and the study collaborators received training to verify the patients' eligibility criteria, as well as to collect admission and follow up data, which were entered into electronic formats using the REDCap program<sup>(25)</sup> and subject to permanent audit by the study's central committee.

**Statistical analysis.** The sample size estimated for the control group in the PENFUP-2 study ( $n = 1,650$ ) permitted reaching precision between  $\pm 1.0\%$  and  $\pm 1.5\%$  for PU incidences between  $5.0\%$  and  $10.0\%$ , respectively. The sample was described by estimating means (standard deviations [SD]) and medians (interquartile range [IQR]) in the case of continuous variables with and without normal distribution, respectively,

according to the Kolmogorov-Smirnov test; while discrete variables were summarized through absolute and relative frequencies (%). The hypotheses of differences among the groups of patients who did or did not develop PU regarding the distribution of the continuous variables were evaluated using Student's t test (Wilcoxon for those without normal distribution) and for the discrete variables through the Chi-squared test or, alternatively, Fisher's exact test. Finally, PU incidence rates were estimated (per 1,000 patients-day) and their respective confidence intervals of 95% (95%CI), as well as the incidence rate ratios (IRR) and 95%CI among the levels of the independent variables at individual level (patients) and conglomerate level (hospitals). A two-tailed statistical significance level of 5% was defined. All the analyses were performed with the Stata version 12 statistical program.

## Results

The work evaluated 1543 patients, mostly of male sex (57.5%), with mean age of 59.0 years (SD = 18.0 years) and body mass index (BMI) of  $25.7 \text{ kg/m}^2$  (SD =  $4.6 \text{ kg/m}^2$ ). The most prevalent comorbidities on admission to the ICUs were cardiovascular ( $n = 867$ ; 56.2%), respiratory ( $n = 361$ ; 23.4%), metabolic, such as type-II diabetes mellitus ( $n = 298$ ; 19.3%), and neurological ( $n = 229$ ; 14.8%). Regarding risk of PU, 47.6% and 45.2% of the patients were classified as high and very high risk, respectively, according with the Braden scale<sup>(28)</sup> (Table 1).

**Table 1. Characteristics, condition, and repositioning frequency of patients in ICU**

Characteristics	Total N = 1543	With PU n = 120	Without PU n = 1423	p-value
Age (years), mean [SD]	59.3 (19.1)	59.0 (18.8)	59.3 (19.1)	0.825
Men, n (%)	887 (57.5)	72 (60.0)	815 (57.3)	0.562
Body mass index (kg/m <sup>2</sup> ), mean [SD]	25.7 (4.6)	25.5 (4.6)	25.7 (4.6)	0.439
<b>Comorbidities*, n (%)</b>				
Cardiovascular	867 (56.2)	63 (52.5)	804 (56.5)	0.392
Respiratory	361 (23.4)	33 (27.5)	328 (23.1)	0.271
Type-II Diabetes	298 (19.3)	31 (25.8)	267 (18.8)	0.060
Neurological	229 (14.8)	12 (10.0)	217 (15.3)	0.120
Renal	211 (13.7)	22 (18.3)	189 (13.3)	0.123
Cancer	148 (9.6)	10 (8.3)	138 (9.7)	0.624
Peripheral vascular disease	58 (3.8)	6 (5.0)	52 (3.7)	0.458
Malnutrition	43 (2.8)	6 (5.0)	37 (2.6)	0.125
<b>Braden scale, n (%)</b>				
Low	31 (2.2)	1 (0.8)	30 (2.4)	0.228
Medium	69 (4.9)	2 (1.7)	67 (5.2)	
High	665 (47.6)	61 (50.8)	604 (47.3)	
Very high	631 (45.2)	56 (46.7)	575 (45.1)	
<b>Hospitalization ICU</b>				
Duration of stay in ICU/days, mean [SD]	12.6 (13.8)	20.5 (18.3)	11.9 (13.1)	<0.001
<b>Complications during hospitalization in ICU, n (%)</b>				
Sepsis	254 (16.5)	41 (34.2)	213 (14.9)	<0.001
Cardiovascular	244 (15.8)	28 (23.3)	216 (15.2)	0.019
Respiratory	215 (13.9)	32 (26.7)	183 (12.9)	<0.001
Kidney failure	167 (10.8)	26 (21.7)	141 (9.9)	<0.001
Bleeding	163 (10.6)	21 (17.5)	142 (9.9)	0.010
Neurological	85 (5.5)	9 (7.5)	76 (5.3)	0.319
Delirium	107 (6.9)	15 (12.5)	92 (6.5)	0.012
Death	330 (21.4)	33 (27.5)	297 (20.9)	0.089
<b>Repositioning frequency, mean (SD)</b>	76.0 (85.2)	75.0(107.7)	76.1(83.0)	0.475
<b>Repositioning frequency, n (%)</b>				
Every 2 hours	943 (61.1)	37 (30.8)	906 (63.7)	<0.001
Every ≥3 hours	600 (38.9)	83 (69.2)	517 (36.3)	

\*Patients may have more than one comorbidity. SD = Standard deviation

Of all the patients, 120 (7.8%) developed at least one PU during follow up for an incidence rate of 7.0 (95%CI: 5.9 – 8.4) per 1,000 days-patient (range between participating hospitals 0.0 – 41.1, Table 2). No differences were observed in age, sex, BMI, comorbidities, or risk of PU among patients who developed or not PU; nevertheless, incident cases had longer times of hospital stay: 20.5 versus 11.8 days. In addition, it was noted that the group of patients who developed PU had a higher frequency of complications, including cardiovascular (23.3% versus 15.2%), respiratory (26.7% versus 12.9%), renal (21.7% versus 9.9%), bleeding (17.5% versus 9.9%), delirium

(12.5% versus 6.5%), and sepsis (34.2% versus 14.9%), but not mortality, during the stay in ICU compared with the group of patients who did not develop PU. Regarding preventive repositioning frequency throughout the stay in ICU no statistically significant difference was observed between the groups that did or did not develop PU (76.0 versus 75.0, respectively); however, the incident group was characterized with a high periodicity of low-frequency position changes every 4, 6, and 8 hours (69.2%) compared with the group that did not have events, which presented a high frequency of mobility every 2 h (63.7%).

**Table 2. Incidence of pressure ulcers per hospital**

Hospital	<i>n</i>	PU	Days-patient	Incidence rate* (95%CI)
1	150	0	1250	0.0 (0.0-0.0)
2	86	1	1305	0.8 (0.1 to 5.4)
3	150	2	1004	2.0 (0.2 to 8.0)
4	150	11	3562	3.1 (1.7 to 5.6)
5	107	4	1048	3.8 (1.4 to 10.2)
6	150	12	2268	5.3 (3.0 to 9.3)
7	150	7	1162	6.0 (2.9 to 12.6)
8	150	13	1766	7.4 (4.3 to 12.7)
9	150	21	1511	13.9 (9.1 to 21.3)
10	150	27	1652	16.3 (11.3 to 23.8)
11	150	22	535	41.1 (27.1 to 62.5)
Total	1543	120	17 063	7.0 (5.9 to 8.4)

\* Per 1,000 patients-days.

According with their location, PUs were observed more frequently in the sacral region (4.22 per 1,000 patient-days; 95%CI: 3.3 – 5.3), followed by the heels (0.76 per 1,000 patient-days; 95%CI: 0.4 – 1.3) and the face (0.52 per 1,000 patient-

days; 95%CI: 0.2 – 1.0 (Table 3). Regarding the severity of the lesions, such was distributed, thus: 33.3%, 62.5%, 2.5%, and 1.7% as grade I, II, III, and IV, respectively.

**Table 3. Incidence of 120 pressure ulcers according to area of location**

Body area	Events (n = 120)	Incidence rate*	(95%CI)
Sacrum	72	4.22	3.30 to 5.31
Heel	13	0.76	0.40 to 1.30
Face	9	0.52	0.24 to 1.00
Elbow	6	0.35	0.13 to 0.76
Occipital	5	0.32	0.09 to 0.68
Auricle	5	0.32	0.09 to 0.68
Scapula	3	0.17	0.03 to 0.51
Shoulder	3	0.17	0.03 to 0.51
Chest	2	0.11	0.01 to 0.42
Iliac Crest	1	0.05	0.00 to 0.32
Ankle	1	0.05	0.00 to 0.32

All the hospitals included were tier III level of complexity: 9 private-university and 2 public-university. With respect to preventive care practices, all the hospitals had an institutional policy to prevent PUs and standardized the use of moisturizing cream. Additionally, of the 11 hospitals, 9 had a skin group, 9 implemented the use of support surfaces, 6 used anti-bedsore

mattresses, 6 used preventive skin dressings, 4 used fatty acids, and 7 had a periodicity standard of repositioning every two hours. Regarding the distribution of professional nurses per patient in ICU, in two (18.2%) hospitals the ratio ranged between 1:1 and 1:2, in three (27.3%) it was 1:3, and in six (54.5%) it was higher than 1:3 (Table 4).

**Table 4. Description of the standardized prevention strategies in hospitals and incidence of pressure ulcers**

Standardized interventions	Events	Days-patient	Incidence rate (95%CI) *	Ratio of incidence rate (95%CI)
<b>Type of hospital</b>				
Private-University	86	14,249	6.0 (4.9 to 7.5)	1.00
Public-University	34	2,814	12.1 (8.6 to 16.9)	2.00 (1.30 to 3.01)
<b>Institutional skin care monitor group</b>				
Yes	85	14,762	5.8 (4.7 to 7.1)	0.38 (0.25 to 0.58)
No	35	2,301	15.2 (10.9 to 21.2)	1.00
<b>Nurse-patient ratio</b>				
1:1-1:2	7	2,412	2.9 (1.4 to 6.1)	1.00
1:3-1:4	28	8,183	3.4 (2.4 to 4.9)	1.18 (0.50 to 3.19)
≥1:5	85	6,468	13.1 (10.6 to 16.3)	4.52 (2.10 to 11.60)

**Table 4. Description of the standardized prevention strategies in hospitals and incidence of pressure ulcers (Cont.)**

Standardized interventions	Events	Days-patient	Incidence rate (95%CI) *	Ratio of incidence rate (95%CI)
<b>Anti-bedsore mattresses</b>				
Yes	97	10,576	9.2 (7.5 to 11.2)	2.59 (1.63 to 4.27)
No	23	6,487	3.5 (2.4 to 5.3)	1.00
<b>Mobility protocol/24 h</b>				
Every 1-2 hours	37	11,599	3.2 (2.3 to 4.4)	1.00
≥3 hours	83	5,464	15.2 (12.2 to 18.8)	4.76 (3.19 to 7.22)
<b>Use of preventive dressings</b>				
Yes	61	10,440	5.8 (4.5 to 7.5)	0.66 (0.45 to 0.95)
No	59	6,623	8.9 (6.9 to 11.5)	1.00
<b>Protection with fatty acids</b>				
Yes	55	5,575	9.9 (7.6 to 12.8)	1.74 (1.19 to 2.54)
No	65	11,488	5.7 (4.4 to 7.2)	1.00
<b>Use of support surfaces</b>				
Yes	94	15,480	6.1 (4.9 to 7.4)	0.37 (0.24 to 0.59)
No	26	1,583	16.4 (11.2 to 24.1)	1.00

\* Per 1000 patient-days.

The incidence rate of PUs was double in ICUs of public-university hospitals than in private-university hospitals (IRR=2.00; 95%CI: 1.30 – 3.01) but 62% lower in those that had a group to monitor skin care (IRR=0.38; 95%CI: 0.25 – 0.58) (Table 3). The use of preventive dressings [IRR= 0.66; 95%CI: 0.45 to 0.95] and support surfaces [IRR=0.37; 95%CI: 0.24 to 0.59] were associated to lower PU incidence (34% and 63% less risk, respectively), use of anti-bedsore mattresses, protection with fatty acids, and repositioning periodicity  $\geq 3$  hours were associated with a greater incidence of ulcers. Furthermore, a dose-response relationship was observed in terms of the nurse-patient ratio and the incidence of PU: a greater number of patients per nurse was associated with a greater incidence of lesions (Table 4).

## Discussion

This study report, to our knowledge, the first prospectively planned estimate of the incidence of pressure ulcers in the intensive care units of a diverse group of high-complexity hospitals in Colombia. In addition, it explores its relationship with the institutional preventive care practices therein. The reported incidence of 7.03% [95%CI 5.8%-8.41%] of the first ulcer acquired during the stay in the participating ICUs of the hospitals included in the study provides a reference for hospital administrators and caregivers in said care scenario, represents the lower limit of the data previously reported in Colombia (2019) (7.0% and 26.9%).<sup>(14)</sup> The location of greater frequency in the sacral region is quite similar to that of most studies of this type and does not indicate that probably preventive care must be

aimed at caring for this body area. The study described that private-university hospitals and implementation of preventive measures in ICU, such as having a continuous skin care monitoring group at institutional level, use of dressings, and use of support surfaces showed lower incidence of PU. Likewise, it is indicated that the high number of patients per caregiver, application of low frequencies of repositioning, and use of anti-bedsores mattresses and fatty acids increased the onset of PU.

Our estimate gains additional value due to the difficulty of comparing with other studies, given that these report the accumulated rate and not the incidence rate. The incidence rate (IR) includes as denominator the time of stay of each individual in ICU during a given time and accumulated rate (AR) bears in mind only the number of individuals exposed, assuming that patients have the same hospital stay and, thus, the same risk. A systematic literature review of hospitals in Brazil included nine studies, which reported IR with great variation (5.6% to 65.3%).<sup>(26)</sup> Something similar happened in our study, which found hospitals with rates from 0.0% or 14%, reaching a maximum of 41%. This variability by hospitals, in the case of Brazil, according to the authors could be related with their being or not in a developed part of the country. In our study, the variability could be because different blocks of preventive care are used in one or another hospital, some with better follow-up standards in private hospitals, which – in turn – are university teaching centers, have the best resources, and have the best quality of care.<sup>(27)</sup>

The onset of PU in critically ill patients continues being a problem of great impact that affects specially patients in critical state throughout the world. The variability in the incidence of PU depends to a large extent on multiple factors, not only demographic like old age but those related with the patient's state of health and frailty and dependence levels that lead to developing greater complications that prolong the hospital stay.<sup>(28)</sup>

Although in our study only patients with history of type-II diabetes had greater incidence of PU, anticipated identification of other comorbidities that can compromise the circulatory system and alter cardiac output and, thus, tissue perfusion is a determining factor in risk assessment upon admission to these critical care services and in planning individualized preventive care.<sup>(29)</sup>

Patients who developed cardiorespiratory complications in the ICU, as well as sepsis, renal failure, delirium, and bleeding, had a higher proportion of PU. Low cardiac output and low oxygenation lead to tissue hypoperfusion, which requires management with vasoconstrictor medications and ventilator use, care measures that further increase the risk of tissue hypoperfusion injury.<sup>(30)</sup> Moreover, these types of complications lead to longer hospital stay, and – consequently – to longer periods of bed rest, immobility and, thus, the appearance of PU.<sup>(30)</sup> In this study, patients with PU had longer times of hospital stay compared with those without PU [20.5 days vs 11.8], (mean difference 8.6 days [95%CI 6.12-11.21]). Critically ill patients with prolonged hospital stay require aid for their repositioning in bed due to their functional deconditioning. Also, immobility in bed or the administration of low repositioning frequency is a determining factor of PU in these patients in ICU.<sup>(34)</sup> Our study shows similar results as those reported elsewhere, evidencing that hospitals that implemented a high repositioning frequency of every 2 h had lower incidence of PU.<sup>(30,31)</sup>

Our study reported a higher frequency of Grade II (62.5%) and Grade I (33%) ulcers. Overall, studies reporting incidence and prevalence do not report Grade I lesions, likely due to the difficulty in being properly identified, which may lead to classification bias. Training of the staff involved in ICU on differentiating the types of lesion and existence of a skin care group and institutional quality allowed for the control of potential bias associated with lesion classification.<sup>(32)</sup> This training was conducted according to indications

from the health system in our country<sup>(13)</sup> and by following international recommendations for better accuracy of the types of ulcers in our study. As in other studies, inclusion of Grade I injuries, although not of mandatory report to the Social Protection System, must be reported early to stop their progression to more advanced stages. In addition, identification of a high number of Grade II ulcers indicates that Grade I lesions were not identified on time and, consequently, these progressed to this stage, as may have occurred in our study, given the high incidence of Grade II ulcers.<sup>(33)</sup>

The site of greatest occurrence of ulcers was the sacral region, a result similar to most studies conducted on ICU patients and patients hospitalized in other hospital services.<sup>(31)</sup> These lesions are related to prolonged permanence of patients at risk in supine-semi-recumbent position (30-45° inclination angle) and low repositioning frequency that apparently reduces ventilator-associated pneumonia.<sup>(34)</sup> Likewise, sacral lesions are much more prevalent because their onset is associated with the proximity of the perianal area, its humidity, and organic fluids.<sup>(30)</sup>

Standardized preventive care patterns on the appearance of PU were explored in our study. All the hospitals in the study reported having a preventive care policy and – additionally – used moisturizing cream for skin care, general practices whose effectiveness is still unknown. A lower incidence of ulcers was identified in private-university hospitals, those with a hospital skin care monitoring group, with a repositioning standard every 2 h, with a nurse-patient ratio from 1:1 to 1:2, those that used preventive dressings, and used support surfaces. These care patterns have been standardized following some of the International Clinical Practice Guidelines,<sup>(23,24)</sup> but the adjustment of the recommendations is mostly based on weak positive evidence or there is not yet sufficiently robust evidence (based on clinical trials). Furthermore, although we relate the use of certain care patterns that appear in the CPG,

the interventions are not applied generally to all patients in ICU, which indicates that further and better quality research is still warranted on the prescription of certain preventive care. Exposure assessment, as done in this study, exploring skin care strategies recorded at the institutional level, but with the outcome (PU) recorded at the individual level may carry a margin of error.<sup>(35)</sup> Thus, it is fundamental to assess the interventions conducted in each patient in each center to establish estimates closer to reality.<sup>(35)</sup>

In conclusion, the PU incidence estimated in the 11 hospital ICUs participating in Colombia was 7.0 (5.9 to 8.4). A large variability in reported rates was observed among hospitals, from having no PU to reporting high rates, such as 16.3 (11.3 - 23.8) and 41.1 (27.1 - 62.5). The most-frequent location of this lesion was the sacral region (4.22, 95%CI 3.30-5.31), followed by the heels (0.76, 95%CI 0.40-1.30) and face (0.52, 95%CI 0.24-1.00), and a high frequency of injury severity between I and II (95.8%). By relating the incidence rate with the care patterns reported by each hospital, it was identified that private hospitals had a lower incidence of PU compared with public hospitals.

Among the hospital care patterns, applied to ICU patients that reported low rates of PU, included having a skin care monitoring group compared to hospitals that do not have it; having a mobilization or repositioning plan every 2 h; maintaining a nurse-patient ratio between 1:1 and 1:2 and between 1:3 and 1:4, compared with hospitals that have a ratio  $\geq$  1:5. Low PU rates were also observed in hospitals that have implemented the use of support surfaces and preventive dressings in their care plan. Among the hospital care patterns that reported high rates of PU, there is the use of anti-bedsores mattresses, along with use of repositioning or position changes protocols  $\geq$  every 3 h and use of fatty acids.

**Political and clinical implications.** The findings herein are crucial given that they are strongly

related with structuring of nursing preventive care plans reflected in the patient's risk and safety outcomes. The findings permit identifying the occurrence of PU in individuals with intact skin and the PU incidence report allows our greater understanding of the tendency of this situation in hospital health while indicating the guidelines that must be improved in health and the interventions that must be implemented for better prevention of these events. Although our study observed several strategies in the diverse hospitals about prevention related with nursing care and a specialized support group to implement these strategies in all the hospitals included, support of preventive practices should be extended to all the hospitals caring for population at risk. Similarly, it is key to advance in research on the effectiveness of preventive interventions to produce quality scientific evidence. Updating and improving the National Clinical Practice Guide related to preventing these events must be considered by the Ministry of Social Protection, which oversees hospital safety.

**Strengths and limitations of the study.** The principal strength of this study is that it was based on a multicenter prospective cohort design of several hospitals in Colombia, including critically ill patients with high risk of developing PU, but with intact skin. Also, this study evaluated the incidence rate according to each patient's hospital stay. Finally, this study registered the preventive strategies implemented in the hospitals evaluated and explored their association with the incidence rate, nevertheless, studies, such as clinical trials, are required to confirm the effectiveness of the interventions described in our study. Although the study explored the possibility of including hospitals from remote zones of the country, it is likely that in said hospitals skin care is less structured and the incidence higher than that reported in our study. The incidence rate of pressure ulcers is an indicator that reflects the quality of care in hospitals and healthcare centers. Variability in implementing preventive care may

be affected by administrative factors. Thus, the results presented herein do not reflect the incidence of all the hospitals in Colombia, which may be underestimated. The results indicate that a greater application of preventive measures is required in our hospitals. The results obtained may indicate that these preventive measures may possibly not apply to all the patients, and further evidence of the effectiveness and benefit of these interventions is needed to justify their use.

**Researchers from PENFUP-2 Colombia Participating Hospitals.**

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# Relationship of Digital Game Addiction with Aggression and Anger in the Post COVID-19 Era: A Systematic Review and Meta-Analysis

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## Relationship of Digital Game Addiction with Aggression and Anger in the Post COVID-19 Era: A Systematic Review and Meta-Analysis

### Abstract

**Objectives.** To evaluate the relationship of digital gaming addiction with aggression and anger behavior among people. **Methods.** This meta-analysis and systematic review was conducted using PRISMA and MOOSE guidelines to find articles in the databases PubMed, Scopus, Embase, and EBSCO. The evaluation comprised ten studies with 11,259 individuals. Researchers systematically extracted data on aggression, anger, and gaming addiction. The meta-analysis evaluated heterogeneity and pooled correlations using random-effects models. The study protocol was registered with PROSPERO under the registration number CRD42025642494. **Results.** Addiction to digital games was found to be strongly correlated with aggression ( $r = 0.531$ , 95% CI [0.226, 0.836]) and moderately with anger ( $r = 0.348$ , 95% CI [0.177, 0.518]). Regional analysis revealed that Saudi Arabia study had the strongest correlation ( $\beta = 1.004$ ,  $p < 0.001$ ), whereas Italy, Nepal, Singapore, and Turkey studies had comparatively lower correlations. Anger consequences were also found to be moderated correlations by age, with younger adolescents experiencing more negative consequences ( $\beta = -0.0696$ ,  $p = 0.049$ ). **Conclusion.** The meta-analysis demonstrates significant positive correlations between digital game addiction, aggression, and anger, highlighting the importance of nurse-led interventions in vulnerable groups in order to promote the reduction of the negative consequences of digital addiction.

**Descriptors:** internet addiction disorder; aggression; anger; meta-analysis; COVID-19.

## Relación de la adicción a los juegos digitales con la agresividad y la ira en la era posterior a COVID-19: Una Revisión Sistemática y Meta-Análisis

### Resumen

**Objetivo.** Evaluar la relación de la adicción a los juegos digitales con la agresión y el comportamiento de ira. **Métodos.** Esta revisión sistemática con meta-análisis se realizó utilizando las directrices de las guías PRISMA y MOOSE para encontrar artículos en las bases de datos PubMed, Scopus, Embase y EBSCO. La evaluación comprendió diez estudios con 11 259 individuos. Los investigadores extrajeron sistemáticamente datos sobre agresividad, ira y adicción al juego. El meta-análisis evaluó la heterogeneidad y agrupó las correlaciones mediante modelos de efectos aleatorios. El protocolo del estudio se registró en PROSPERO con el número de registro CRD42025642494. **Resultados.** Se observó que la adicción a los juegos digitales estaba fuertemente correlacionada con la agresividad ( $r = 0.531$ ; IC del

95%: [0.226; 0.836]) y moderadamente con la ira ( $r = 0.348$ ; IC del 95%: [0.177; 0.518]). El análisis regional reveló que un estudio de Arabia Saudí tenía la correlación más fuerte ( $\beta = 1.004$ ,  $p < 0.001$ ), mientras que otros estudios realizados en Italia, Nepal, Singapur y Turquía tenían correlaciones comparativamente más bajas. Las consecuencias de la ira también se correlacionaron moderadamente con la edad, teniendo los adolescentes más jóvenes las consecuencias más negativas ( $\beta = -0.0696$ ,  $p = 0.049$ ). **Conclusión.** El meta-análisis muestra correlaciones positivas y significativas entre la adicción a los juegos digitales, la agresión y la ira, lo que pone de relieve la importancia de realizar intervenciones lideradas por enfermería en los adolescentes vulnerables con fin de promover la reducción de las consecuencias negativas de la adicción digital .

**Descriptor:** transtorno de adição à internet; agressão; ira; metanálise COVID-19.

## Relação da adição a jogos digitais com agressão e raiva na era pós-COVID-19: uma revisão sistemática e meta-análise

### Resumo

**Objetivo.** Avaliar a relação entre a adição a jogos digitais e o comportamento de agressão e raiva. **Métodos.** Esta meta-análise com revisão sistemática foi conduzida usando as diretrizes PRISMA e MOOSE para buscar artigos nas bases de dados PubMed, Scopus, Embase e EBSCO. A avaliação compreendeu dez estudos com 11.259 indivíduos. Os pesquisadores extraíram sistematicamente dados sobre agressão, raiva e vício em jogos. A meta-análise avaliou a heterogeneidade e as correlações agrupadas usando modelos de efeitos aleatórios. O protocolo do estudo foi registrado no PROSPERO sob o número de registro CRD42025642494.

**Resultados.** O vício em jogos digitais foi fortemente correlacionado com a agressão ( $r=0.531$ ; IC de 95%: [0.226; 0.836]) e moderadamente correlacionado com a raiva ( $r=0.348$ ; IC de 95%: [0.177; 0.518]). A análise regional revelou que um estudo da Arábia Saudita apresentou a correlação mais forte ( $\beta=1.004$ ,  $p < 0.001$ ), enquanto outros estudos conduzidos na Itália, Nepal, Cingapura e Turquia apresentaram correlações comparativamente menores. As consequências da raiva também foram moderadamente correlacionadas com a idade, com adolescentes mais jovens apresentando as consequências mais negativas ( $\beta = -0.0696$ ,  $p = 0.049$ ). **Conclusão.** A meta-análise mostra correlações positivas e significativas entre vício em jogos digitais, agressão e raiva, destacando a importância de intervenções focadas em adolescentes vulneráveis a fim de promover a redução das consequências negativas da dependência digital.

**Descritores:** transtorno de adicción a internet; agresión; ira; metaanálisis; COVID-19.

## Introduction

Gaming is a widely popular and rapidly growing leisure activity worldwide, with an estimated 2.7 billion gamers in 2020.<sup>(1)</sup> While gaming offers entertainment and social interaction, excessive gaming has been linked to behavioural concerns, including anger and aggression.<sup>(1)</sup> According to ICD-11, disordered gaming is characterized by a pattern of gaming behaviour (digital or video) where individuals lose control, prioritize gaming over other activities, and persist despite negative consequences. Similarly, digital game addiction refers to excessive and impulsive gaming that leads to social or emotional problems, accompanied by difficulty in regulating this behaviour.<sup>(2,3)</sup> The COVID-19 pandemic increased digital gaming due to lockdowns, remote learning, and social restrictions. While gaming provided entertainment and social connection, concerns grew over excessive gaming and its psychological and behavioural effects on individuals.<sup>(4-7)</sup> Even after the pandemic, many people continue the gaming habits they developed during lockdowns and this has raised worries about the long-term effects of digital game addiction.

Playing digital games is generally considered normal and can even have positive effects, such as providing emotional relief, relaxation, improved leisure time utilization, and enhanced problem-solving skills.<sup>(8)</sup> However, excessive and uncontrolled gaming has led to the emergence of the term 'game addiction,' raising serious concerns worldwide due to its associated negative consequences.<sup>(9)</sup> The significant prevalence of gaming disorder highlights a growing public health concern, particularly due to its potential association with increased anger and aggression.<sup>(10,11)</sup> Aggression and anger are essential areas of exploration in gaming research. Anger is a heightened emotional response triggered by frustration, in-game losses, perceived failure, or obstacles encountered during gameplay.<sup>(9)</sup> In the context of digital game addiction, excessive gaming can intensify these emotional reactions, leading to difficulties in emotional regulation. When anger remains uncontrolled, it may escalate into aggression, which is characterized as a behaviour directed toward another individual with the immediate intent to cause harm.<sup>(10)</sup> Understanding the relationship between digital game addiction, anger, and aggression is essential for addressing its psychological and behavioral consequences.<sup>(12,13)</sup> Previous researches have consistently demonstrated a relationship between gaming and the manifestation of aggression and anger behaviors.<sup>(14-19)</sup> The underlying mechanism of this relationship assumes that aggression and anger contribute to excessive gaming. One perspective posits that players tend to select games that align with their pre-existing characteristics, including anger and aggression.<sup>(20-21)</sup>

As the world moves towards normalcy following the COVID-19 pandemic, it is more important than ever for healthcare professionals, especially nurses to understand the long-term behavioral and emotional effects of digital gaming disorders. Nurses frequently serve as the first point of contact for people

exhibiting emotional dysregulation and aggression, as well as for their management and counseling. The possible association between excessive digital gaming with aggression and anger is a serious public health issue that has broad ramifications for nursing practice in a variety of settings, such as educational institutions, community health programs, mental health services, and acute care hospitals. This study examines the relationship of digital game addiction with aggression and anger in post COVID era, providing insights that may help nurses with patient evaluation, early intervention techniques, psychosocial support, and health education.

## Methods

**Type of study.** This systematic review and meta-analysis combined and analysed existing studies to investigate how digital game addiction correlates with aggression and anger among individuals after the COVID-19 pandemic. It followed strict guidelines (MOOSE and PRISMA) and registered with PROSPERO (CRD42025642494).

**Information Resources and the Search Equation.** A systematic search was conducted on studies published during and after COVID (published after year 2020) using four databases: PubMed, Scopus, Embase, and EBSCO. The search strategy incorporated Mesh terms and general keywords related to online gaming addiction, including “Digital Game Addiction” OR “Mobile game addiction” OR “Gaming overuse” OR “Video game dependency” OR “Internet gaming dependency” OR “Internet gaming addiction” OR “Online gaming dependency”. Additionally, terms associated with anger, such as “anger” OR “rage” OR “Road rage” OR “fury” OR “wrath” as well as aggression-related terms like “aggressiveness” OR “Aggressive behaviour” OR “aggression” OR “violent behaviour” OR “irritating” were included. To find all relevant studies, the researchers also checked the reference lists of the included papers. All identified studies were then managed in Rayyan software, where duplicates were removed. Subsequently, two researchers independently reviewed titles and

abstracts to determine which studies met the predefined criteria for inclusion. The shortlisted papers were then reviewed in full text, which was also performed separately by two authors. Where there was disagreement, a third author was consulted to make a final decision.

**Study selection.** Studies were included if they met the following criteria: a) original, peer-reviewed research article published in English, b) observational or cross-sectional studies focusing on individuals published during and after COVID-19, c) studies examining the relationship of digital game addiction with aggression and anger among individuals. Studies were excluded if they had fewer than 50 participants, duplicate observational studies, or lacked sufficient individual-level data related to aggression and anger. Only specific study designs were included, with experimental studies, case-control studies, case reports, editorials, commentaries, clinical practice guidelines, opinions, and reviews being excluded.

**Codification of the findings.** Data including authors, publication year, country, anger and aggression measurement instruments, and risk of bias, were independently extracted by two reviewers into a pre-defined Microsoft Excel file. Participants data, including age (mean, SD, or range) and gender distribution (male-to-female ratio), were also tabulated. Primary findings, including sample size, gaming addiction scores, aggression scores, and anger scores (and their means and standard deviations), and correlations ( $r$ ) between gaming addiction with aggression and anger were examined. Any discordance in study selection was resolved by a third reviewer. If there were missing data necessary for inclusion, the authors of the studies were emailed for clarification.

**Risk of Bias.** To evaluate the risk of bias in studies examining the relationship of digital game addiction with aggression and anger in individuals, two researchers independently used the Joanna Briggs Institute tool to assess the methodological quality of prevalence studies.<sup>(22)</sup> A third researcher resolved any disagreements. The tool scored studies as low, moderate, or high quality based on nine criteria.”

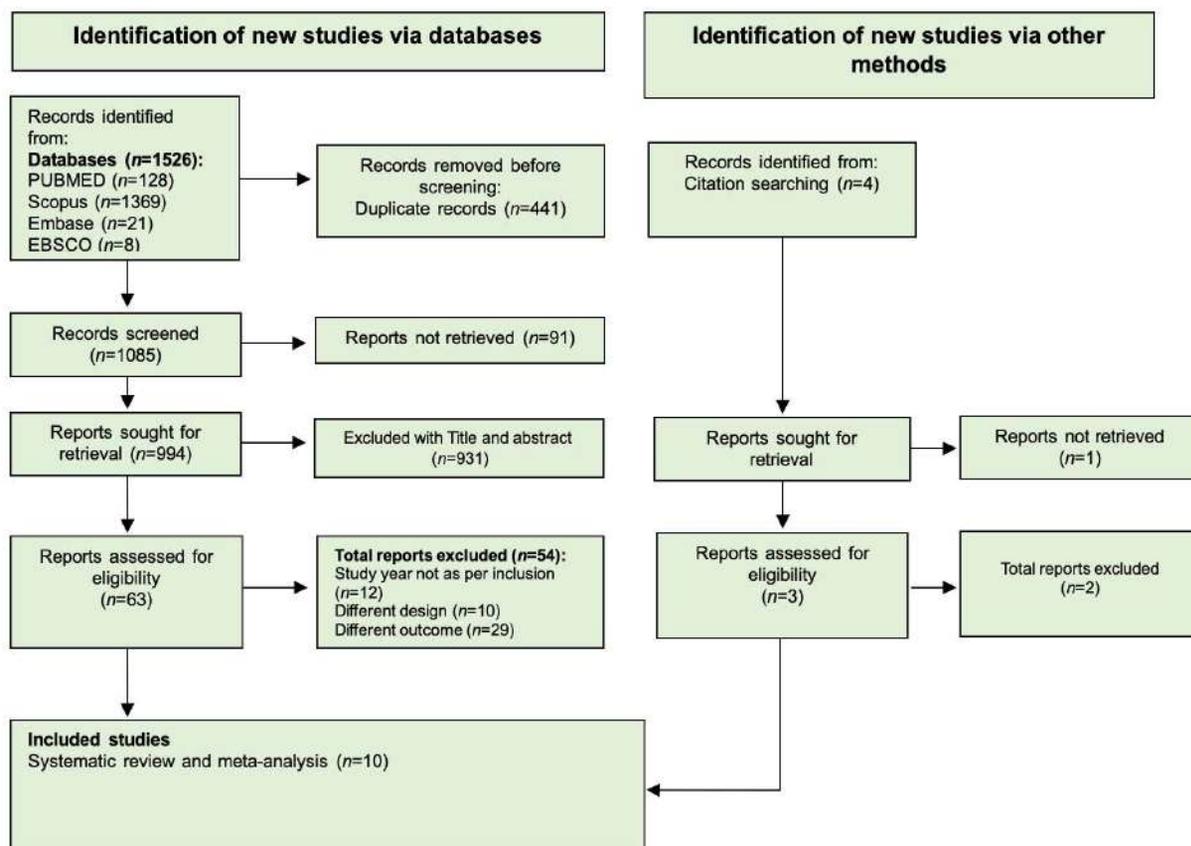
**Statistical Analysis.** To better understand the effects of digital game addiction with aggression and anger among individuals after COVID-19, we conducted a meta-analysis by examining its relationship with aggression and anger behaviours. Given the variability among studies, we used a random-effects model to ensure a more accurate overall estimate, with results presented using 95% confidence intervals (CIs). To assess differences between studies, we measured heterogeneity using the Cochran's Q statistic and  $I^2$  test, which helped us determine how much variation existed across the included research. Additionally, we performed Meta-ANOVA (moderation analysis) based on country and age to explore potential regional differences in the effects of digital game addiction with aggression and anger behaviours. All statistical analyses were conducted using R software (version 4.2.3). Specifically, we used the "predict" function to estimate the overall pooled correlation of digital

game addiction with aggression and anger and the "rma" function to calculate the moderation analysis based on country and age across studies.

# Results

## Search Results

We systematically identified studies meeting the inclusion criteria using PRISMA guidelines (Figure 1). Initial database searches yielded 1526 records, with 441 duplicates removed in Rayyan software. After screening titles/abstracts of 994 studies, 931 were excluded for irrelevance. Full-text reviews of the remaining 63 studies led to the exclusion of 53 studies. One additional study was identified through citation searching, resulting in a final inclusion of 10 studies (total participants: 11,259) for systematic review and meta-regression.



**Figure 1. PRISMA flow chart**

## Study Characteristics

The analysis included 10 studies with a total of 11,259 participants from eight countries. Turkey contributed the largest number, with five studies,<sup>(23,24,30-32)</sup> followed by China,<sup>(27)</sup> Saudi Arabia,<sup>(28)</sup> Italy,<sup>(25)</sup> Singapore,<sup>(26)</sup> and Nepal<sup>(29)</sup> each with one (Table 1). The ages of the participants ranged widely, from 10.57 to 29.6 years, spanning adolescents and young adults. Sample sizes also varied widely, from 52 to 7,318 participants. Addiction to digital games was predominantly assessed using various assessment measures among the 15 studies, viz., Internet Gaming Disorder Scale–Short Form (IGDS9-SF; 4 studies), Digital Game Addiction Scale for Children (CDGAS; 2 studies), Gaming Addiction Scale (GAS; 2 studies), Digital Game Addiction Scale (DGAS-7; 1 study), and Internet Gaming Disorder Test (IGD-20; 1 study). Incidence of gaming addiction across the studies varied between  $36.43 \pm 15.89$  to  $57.45 \pm 22.99$ .

Aggression was assessed in nine studies,<sup>(23-31)</sup> primarily using the Buss-Perry Aggression Questionnaire (BPAQ; 7 studies), while the Sahin Aggression Scale (SA; 1 study) and the Impulsive/Premeditated Aggression Scale (IPAS; 1 study) were also used. The reported mean aggression scores varied widely, ranging from  $19.60 \pm 5.36$  to  $119.69 \pm 13.58$ , indicating differences in aggression intensity across populations. Anger was measured in three studies<sup>(23,29,32)</sup> using the Trait

Anger and Anger Expression Style Scale and the Anger subscale, with mean scores between  $19.05 \pm 5.39$  and  $22.81 \pm 6.81$ . Compared to aggression, fewer studies reported data on anger outcomes. The correlation between gaming addiction and aggression varied across studies, ranging from  $r = 0.24$  to  $r = 0.92$ , with Turkish studies accounting for 40% of the total sample. Meanwhile, the correlation between gaming addiction and anger ranged from  $r = 0.18$  to  $r = 0.45$ .

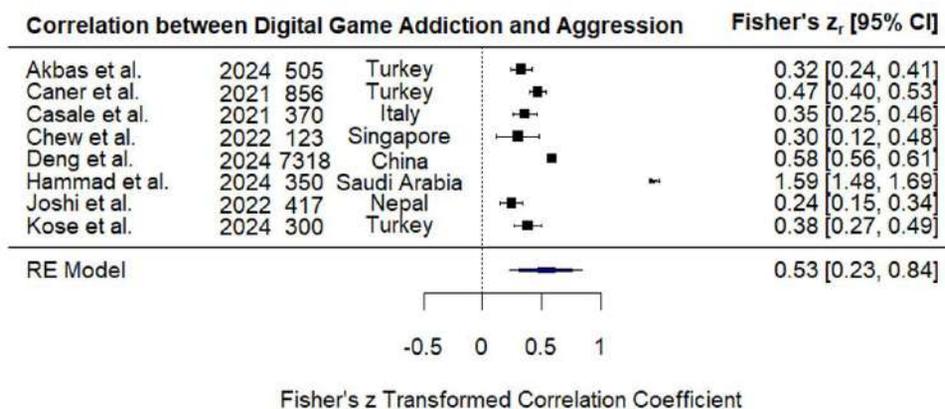
## Effect Sizes and Homogeneity Test

Eight studies<sup>(23-30)</sup> that tested the correlation between digital game addiction and aggression (Figure 2) and three studies<sup>(23,29,32)</sup> that tested its correlation with anger (Figure 3) were used in the meta-regression analysis and involved 10,239 and 1,880 participants, respectively. Homogeneity test revealed substantial heterogeneity for aggression ( $Q = 481.45$ ,  $p < 0.001$ ,  $I^2 = 99.25\%$ ) and anger ( $Q = 25.88$ ,  $p < 0.001$ ,  $I^2 = 92.32\%$ ), implying heterogeneity likely due to differences in measurement scales, cultural settings, and sample sizes. To control for this high heterogeneity, random-effects models were used. The correlation analysis found a high, significant correlation between digital game addiction and aggression ( $r = 0.531$ , 95% CI [0.226, 0.836],  $Z = 3.411$ ,  $p < 0.001$ ) and a moderate, significant correlation between digital game addiction and anger ( $r = 0.348$ , 95% CI [0.177, 0.518],  $Z = 4.006$ ,  $p < 0.001$ ).

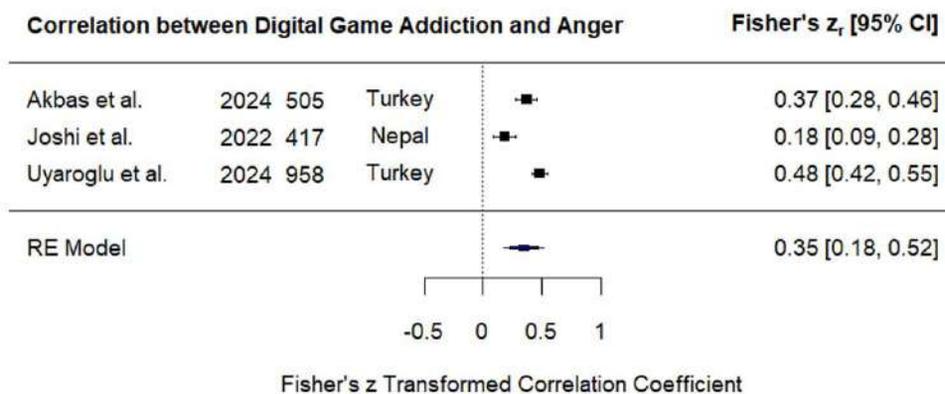
Table 1. Summary table of included studies

Author (year)	Country	Age [Mean (±) SD]	Sample size (N)	Male: female (n)	Gaming addiction scale	Anger scale	Aggression scale	Gaming addiction [Mean (±) SD]	Anger [Mean (±) SD]	Aggression [Mean (±) SD]	r (addiction vs. anger)	r (addiction vs. aggression)	Quality
Akbas (2024)	Turkey	16.33 ± 1.48	505	247:258	GAS	Anger subscale	BPAQ	36.43 ± 15.89	19.05 ± 5.39	119.69 ± 13.58	0.352	0.314	High
Caner (2021)	Turkey	15.4 ± 1.32	856	291:565	DGAS-7	NA	BPAQ	11.54 ± 4.79	NA	64.01 ± 18.87	NA	0.436	High
Casale (2021)	Italy	29.63 ± 7.64	370	270:100	IGD9-SF	NA	BPAQ	1.85 ± 0.67	NA	64.05 ± 23.12	NA	0.34	Moderate
Chew (2022)	Singapore	25.02 ± 5.34	123	52:71	IGDS9-SF	NA	BPAQ	17.93 ± 5.92	NA	76.06 ± 20.39	NA	0.29	High
Deng (2024)	China	15.8 ± 1.45	7318	3891:3427	IGD-20	NA	IPAS	38.35 ± 13.15	NA	69.51 ± 22.19	NA	0.526	High
Hammad (2024)	Saudi Arabia	21.30 ± 4.96	350	186:164	IGDS9-SF	NA	BPAQ	27.23 ± 6.087	NA	28.85 ± 6.88	NA	0.92	High
Joshi (2022)	Nepal	17 ± 1.411	417	278:139	IGDS9-SF	Not mentioned	BPAQ	NA	19.88 ± 5.33	83.79 ± 17.98	0.182	0.239	High
Kose (2024)	Turkey	10.57 ± 0.49	300	144:156	CDGAS	NA	SA	57.45 ± 22.99	NA	19.60 ± 5.36	NA	0.363	High
Tuntruck (2023)	Turkey	14.3 ± 1.7	62	62:0F	GAS	NA	BPAQ	52.0 ± 4.0	NA	89.7 ± 25.8	NA	Not mentioned	High
Koçak Uyaroğlu (2024)	Turkey	13.44 ± 0.50	958	456:502	CDGAS	TAAES	NA	56.74 ± 19.02	22.81 ± 6.81	NA	0.448	NA	High

Note: n = number of participants; SD = standard deviation; GAS = Gaming Addiction Scale; DGAS-7 = Digital Game Addiction Scale-7; IGD9-SF = Internet Gaming Disorder scale short form; IGD-20 = Internet Gaming Disorder Test; IGUESS = Internet Game Use-Elicited Symptom Screen; CDGAS = Digital Game Addiction Scale for Children; TAAES = Trait Anger and Anger Expression Style Scale; BPAQ = Buss-Perry Aggression Questionnaire; SA = Sahin Aggression Scale; IPAS = Impulsive/Premeditated Aggression Scale; r = correlation; NA = Not available.



**Figure 2. Pooled correlation between digital game addiction and aggression**



**Figure 3. Pooled correlation between digital game addiction and anger.**

### Moderator analysis

A random-effects meta-regression was conducted to assess the moderating role of moderator (country and age) on the relationship between gaming addiction with aggression and anger. Country-level moderation analyses (Table 2) through meta-ANOVA revealed significant effects between digital game addiction and aggression with substantial variation across regions as Saudi Arabia exhibited the strongest positive association ( $\beta=1.004$ ,  $p<0.001$ ), suggesting cultural or methodological factors amplify the gaming addiction-aggression relationship, while Italy ( $\beta = -0.2305$ ,  $p = 0.029$ ), Nepal ( $\beta = -0.3409$ ,  $p = 0.001$ ),

Singapore ( $\beta = -0.2860$ ,  $p = 0.027$ ), and Turkey ( $\beta = -0.1891$ ,  $p = 0.017$ ) showed significant negative effects, indicating weaker relationships compared to the reference highlighting regional consistency in some contexts. Country-level moderation analyses (Turkey vs. Nepal) with anger outcomes was marginally significant ( $\beta = 0.1841$ ,  $p = 0.033$ ). Turkey demonstrated a stronger positive association ( $\beta = 0.2450$ ,  $p = 0.018$ ) highlighting regional disparities.

Age wise moderation analyses (Figure 4) between digital game addiction and aggression revealed a non-significant moderating impact ( $\beta = 0.4116$ ,

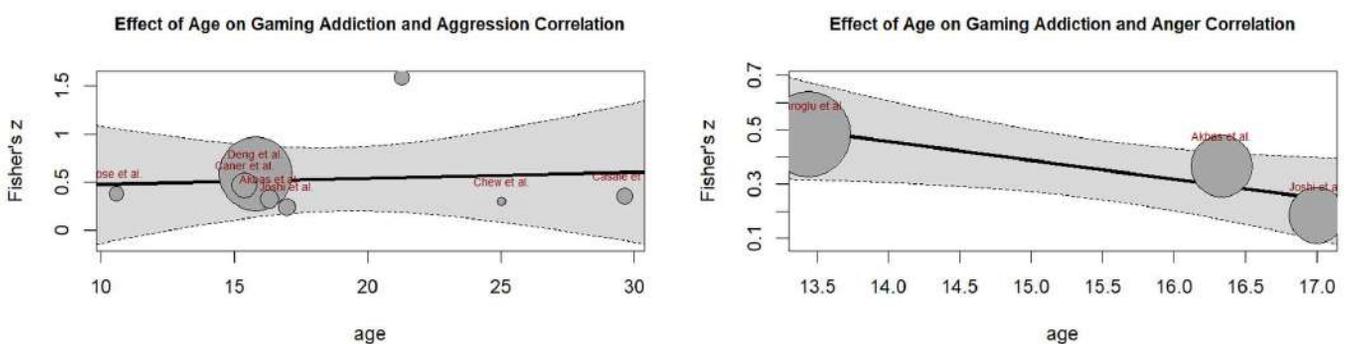
$p = 0.478$ ) with no linear trends. It showed significant residual heterogeneity ( $I^2 = 99.37\%$ ,  $QE = 476.49$ ,  $p < 0.001$ ), indicating that the moderator (age) could not account for almost all of the variability. ( $\beta = 0.0063$ ,  $p = 0.830$ ). Age wise moderation analyses with anger (Figure 4) have limited data ( $k=3$ ) precluded meaningful meta-regression. A visual inspection of the figure revealed a unique pattern of decreasing correlation strength as age advances. Anger and

gaming addiction were more strongly correlated among younger adolescents and the correlation decreased by the latter stages of adolescence. The intercept was significant ( $\beta = 1.4303$ ,  $p = 0.009$ ), although age showed a significant negative moderating impact ( $\beta = -0.0696$ ,  $p = 0.049$ ). The moderators' overall test revealed significance ( $QM = 3.87$ ,  $p = 0.049$ ), indicating that age explains an element of the variation in the relationship between anger and gaming addiction.

**Table 2. Country-level moderation analyses through meta-ANOVA of digital game addiction with aggression and anger**

Variable	Moderator (Country)	Estimate	95% CI	SE	z-value	p-value
Digital game addiction and Aggression	Intercept (Reference)	0.5846	[0.4567, 0.7125]	0.0653	8.9570	<0.001
	Italy	-0.2305	[-0.4371, -0.0239]	0.1054	-2.1871	0.029
	Nepal	-0.3409	[-0.5446, -0.1372]	0.1039	-3.2804	0.001
	Saudi Arabia	1.0044	[0.7964, 1.2124]	0.1061	9.4636	<0.001
	Singapore	-0.2860	[-0.5394, -0.0326]	0.1293	-2.2123	0.027
	Turkey	-0.1891	[-0.3449, -0.0333]	0.0795	-2.3791	0.017
Digital game addiction and Anger	Intercept (Reference)	0.1841	[0.0149, 0.3532]	0.0863	2.1327	0.033
	Turkey	0.2450	[0.0422, 0.4478]	0.1035	2.3681	0.018

Note: CI=Confidence interval; SE=Standard error;

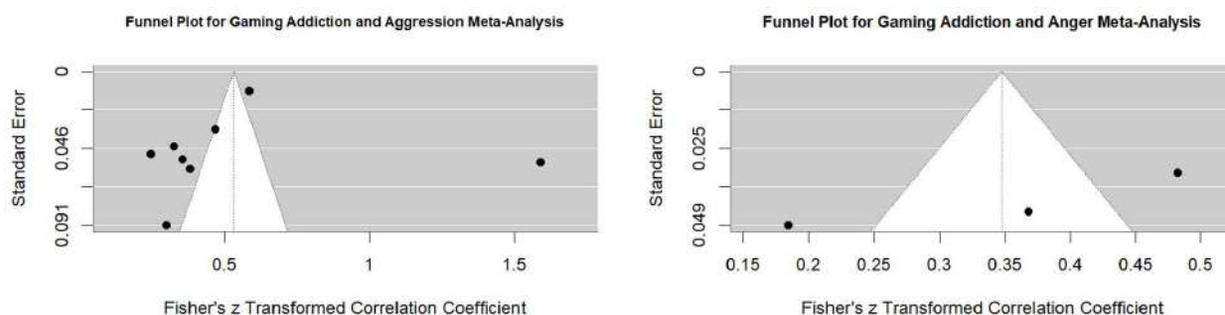


**Figure 4. Age wise moderation analyses of digital game addiction with aggression and anger**

## Publication Bias Assessment

The evaluation of publication bias using Egger's regression test revealed no significant asymmetry in the funnel plot for Gaming Addiction and Aggression Meta-Analysis shown in Figure 5 (-0.242,  $p = 0.808$ ), indicating a low likelihood of publication bias influencing the meta-analytic results. The limit estimate (effect size as standard error approaches zero) was  $b = 0.626$  (95% CI [-0.211, 1.463]), suggesting that even in the absence of small-study effects, the pooled effect

size remains consistent with the observed results. Egger's regression test for funnel plot asymmetry between Gaming addiction and anger (Figure 5) revealed a significant publication bias ( $z = -2.466$ ,  $p = 0.013$ ), indicating asymmetrical distribution of effect sizes around the pooled estimate. The limit estimate (effect size as standard error approaches zero) was  $b = 1.0045$  (95% CI 0.4807, 1.5282), suggesting indicating that the observed association persists even after accounting for potential bias.



**Figure 5: Funnel plot for gaming addiction with aggression and anger meta-analysis**

## Risk of Bias

The wide-ranging JBI scores ranged from 5 to 9. No research was deemed to be of low quality. Comprehensive evidence for each included study is shown in Table 1, and supplementary file contains additional details.

## Discussion

### Relationship between digital game addiction with aggression and anger

This meta-regression revealed a statistically significant positive correlation between digital gaming addiction with aggression ( $r = 0.531$ ,  $p < 0.001$ ) and moderate correlation with anger

( $r = 0.348$ ,  $p < 0.001$ ), supporting results from earlier research studies which highlights, people who already have aggressive tendencies may be more likely to play violent or competitive video games, which reinforces hostile thought patterns.<sup>(20)</sup> Similarly, emotional dysregulation, identified as a prominent feature of gaming addiction<sup>(2,3)</sup> can exacerbate anger because people frequently turn to gaming as a way to avoid stressors in the real world.<sup>(19)</sup> This reciprocal relationship, as suggested by Ferguson,<sup>(21)</sup> is evident: aggressive people are more likely to like games that mirror their personality, and prolonged gaming may normalize aggressive approaches to problem-solving.<sup>(15)</sup> This relationship is further supported by social learning paradigms, which portray in-game violence as a means of promoting hostility.<sup>(13)</sup> Also, a study found that environments for games in culturally constrictive settings increase

impulsivity and aggression, creating a vicious cycle of maladaptive behavior.<sup>(28)</sup> When comparing this finding with pre-COVID-19 data, a longitudinal study<sup>(33)</sup> showed very weak long-term correlations between aggressive video game dependency and youth aggression ( $r = 0.059$ ). whereas, this meta-analysis found a stronger correlation between digital gaming addiction and anger ( $r = 0.348$ ) and aggression ( $r = 0.531$ ) among individuals with regional differences. Even though methodological rigor is still necessary for the accurate interpretation of these relationships, these results demonstrate the changing dynamics in the psychological and behavioral effects of gaming, where stressors related to the pandemic (dependency increased during lockdown), larger frameworks of addiction may worsen aggression and anger behaviors.

### Moderating effects

Country-level analyses regarding digital game addiction with aggression have revealed notable regional differences, with Saudi Arabia showing a significant strong correlation between aggression and gaming addiction compared to Nepal, Singapore, Italy, and Turkey which showed relatively weaker correlation. Cultural norms that are common in collectivist societies, such as the lack of leisure options and strict parental supervision, may make gaming-related annoyance and hostility worse.<sup>(28)</sup> Teenagers in Saudi Arabia who live in restrictive environments might not have enough outlets for their emotions, which could lead to heightened violence when gaming turns becomes an escape.<sup>(28)</sup> Western countries like Italy, on the other hand, could benefit from established regulatory frameworks that limit exposure to violent stimuli, such as age-restricted gaming material.<sup>(25)</sup> Country-level moderation analyses with anger outcomes were marginally significant as Turkey demonstrated a stronger positive association highlighting regional disparities.

Age was not a significant mediator of the relationship between digital game addiction

and aggression with no linear trend, However, it showed a slightly negative trend for anger with stronger relationships seen in younger adolescents, may be more susceptible to the emotional effects of gaming due to developmental factors such immature self-regulation.<sup>(32)</sup> A study found that children who were addicted to gaming exhibited increased aggression and anger, which was probably caused by a lack of effective coping strategies.<sup>(30)</sup> On the other hand, older groups showed mixed patterns, which might be because they were more independent or had a wider range of stress-reduction strategies.<sup>(25)</sup> However, high heterogeneity highlights the impact of unmeasured factors such game genre or socioeconomic level.

The reciprocal relationship outlined in this meta-analysis raises theoretical questions: current aggressiveness may influence game selection<sup>(21,34)</sup> and compulsive gaming may exacerbate violent behaviors by desensitizing players or excluding them from social situations.<sup>(15,35)</sup> However, drawing conclusions about causation is impossible due to the cross-sectional character of the majority of the included studies. To Determine whether interventions reducing gaming addiction reduce aggressiveness and anger over time and elucidating temporal mechanisms require longitudinal studies.<sup>(11, 12)</sup> These findings emphasize the importance of including digital addiction awareness into nursing education curricula and ongoing professional development programs. Equipping nurses with the ability to recognize, manage, and advise persons suffering from digital gaming addiction, aggression, and anger is vital for improving patient safety and mental health outcomes. Nursing-led community awareness campaigns and school-based programs have the potential to significantly reduce the negative consequences of digital addiction on adolescent and families.<sup>(36,37)</sup>

**Limitations and recommendation.** This review has limitations even though it complies with PRISMA and MOOSE guidelines. First, causal interpretation is not possible with cross-sectional

study designs, in order to disentangle temporal correlations, longitudinal analyses are necessary. Second, limiting inclusion to English-language research may miss cultural nuances, and using self-report tools may introduce response bias. Third, comparisons are challenging due to confounding variables (like socioeconomic status) and differences in measurement tools (like BPAQ versus SA). To validate causal mechanisms, future research must concentrate on clinical samples, standardized metrics, and experimental investigations. It is also worthwhile to look into gender differences and the style of game (violent vs. non-violent).

**Conclusion.** This meta-analysis demonstrates a significant correlation between digital game addiction and both aggression and anger in the post-COVID-19 era, with aggression having a strong correlate and anger having a moderate one. The study also found geographical and age-related differences, with higher associations in specific cultural situations and among younger people. These findings provide evidence of the behavioral and emotional consequences of digital gaming addiction, emphasizing the need of identifying these tendencies in clinical and public health settings. Future research and targeted treatments should expand on these findings to address this rising concern.

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# Factors Influencing Clinical Competence Among Nursing Students: Exploring Emotional Intelligence and Sleep Quality

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## Factors Influencing Clinical Competence Among Nursing Students: Exploring Emotional Intelligence and Sleep Quality

### Abstract

**Objective.** This study aimed to investigate emotional intelligence (EI), sleep quality, and clinical competence among nursing students and identify factors associated with clinical competence. **Methods.** This cross-sectional study included 199 pre-final and final-year nursing students from a college in Northern India. Data were collected using validated questionnaires measuring EI (Schutte Self-Report Emotional Intelligence Scale), sleep quality (Pittsburgh Sleep Quality Index), and clinical competence (Clinical Competence Questionnaire). **Results.** Most students demonstrated high EI (56.3%) and good sleep quality (54.3%). EI was positively correlated with clinical

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competence ( $r=0.417$ ,  $p<0.01$ ) and negatively correlated with poor sleep quality ( $r=-0.173$ ,  $p<0.05$ ). Final-year students scored significantly higher on EI, clinical competence, and sleep disturbance than pre-final-year students. Multiple regression analysis identified academic year ( $\beta=0.208$ ,  $p=0.002$ ), EI ( $\beta=0.248$ ,  $p<0.001$ ), and sleep disturbance ( $\beta=-0.188$ ,  $p=0.004$ ) as significant predictors of clinical competence. **Conclusion.** EI and sleep quality are important factors associated with the clinical competence of nursing students. Incorporating EI training and sleep hygiene education into nursing curricula may help improve students' clinical performance and prepare them for professional practice.

**Descriptors:** emotional intelligence; sleep quality; clinical competence; nursing students; academic performance; nursing education; patient care.

## Factores que influyen en la competencia clínica de los estudiantes de enfermería: Explorando la Inteligencia Emocional y la Calidad del Sueño

### Resumen

**Objetivo.** Investigar la inteligencia emocional (IE), la calidad del sueño y la competencia clínica entre los estudiantes de enfermería e identificar los factores asociados con la competencia clínica. **Métodos.** Este estudio transversal incluyó a 199 estudiantes de enfermería de penúltimo y último año de una universidad del norte de la India. Los datos se recogieron mediante los cuestionarios validados: Escala de autoinforme de inteligencia emocional de Schutte, Índice de calidad del sueño de Pittsburgh y el Cuestionario de competencia clínica. **Resultados.** Los estudiantes mostraron una IE alta (56.3%) y una buena calidad del sueño (54.3%). La IE se correlacionó positivamente con la competencia clínica ( $r=0.417$ ,  $p<0.01$ ) y negativamente con la pobre calidad del sueño ( $r=-0.173$ ,  $p<0.05$ ). Los estudiantes de último año puntuaron significativamente más alto en IE, competencia clínica y trastornos del sueño que los estudiantes de penúltimo año. El análisis de regresión múltiple identificó el año académico ( $\beta=0.208$ ,  $p=0.002$ ), la IE ( $\beta=0.248$ ,  $p<0.001$ ) y las alteraciones del sueño ( $\beta=-0.188$ ,  $p=0.004$ ) como predictores significativos de la competencia clínica. **Conclusión.** La IE y la calidad del sueño son factores importantes asociados a la competencia clínica de los estudiantes de enfermería. Incorporar la formación en IE y la educación en higiene del sueño en los

planes de estudio de enfermería puede ayudar a mejorar el rendimiento clínico de los estudiantes y prepararlos para la práctica profesional.

**Descriptor:** inteligencia emocional; calidad del sueño; competencia clínica; estudiantes de enfermería; rendimiento académico; formación en enfermería; atención al paciente.

## Fatores que influenciam a competência clínica de estudantes de enfermagem: Explorando a inteligência emocional e a qualidade do sono

### Resumo

**Objetivo.** Investigar a inteligência emocional (IE), a qualidade do sono e a competência clínica entre estudantes de enfermagem e identificar fatores associados à competência clínica. **Métodos.** Este estudo transversal incluiu 199 estudantes de graduação e do último ano de enfermagem de uma universidade no norte da Índia. Os dados foram coletados usando questionários validados: Escala de Autoavaliação de Inteligência Emocional de Schutte, Índice de Qualidade do Sono de Pittsburgh e Questionário de Competência Clínica. **Resultados.** Os estudantes apresentaram alta IE (56.3%) e boa qualidade do sono (54.3%). A IE foi positivamente correlacionada com a competência clínica ( $r=0.417, p<0.01$ ) e negativamente correlacionada com a má qualidade do sono ( $r=-0.173, p<0.05$ ). *Os estudantes do último ano pontuaram significativamente mais alto em IE, competência clínica e distúrbios do sono do que os estudantes pré-finais.* A análise de regressão múltipla identificou o ano letivo ( $\beta =0.208, p=0.002$ ), a IE ( $\beta =0.248, p<0.001$ ) e os distúrbios do sono ( $\beta =-0.188, p=0.004$ ) como preditores significativos da competência clínica. **Conclusão.** A IE e a qualidade do sono são fatores importantes associados à competência clínica dos estudantes de enfermagem. A incorporação do treinamento em IE e da educação em higiene do sono aos currículos de enfermagem pode ajudar a melhorar o desempenho clínico dos estudantes e prepará-los para a prática profissional.

**Descritores:** inteligência emocional; qualidade do sono; competência clínica; estudantes de enfermagem; desempenho acadêmico; educação em enfermagem; cuidados ao paciente.

## Introduction

**E**motional intelligence (EI), the ability to perceive, assess, communicate, regulate, and manage emotions, plays a crucial role in nursing. Nurses with high EI can communicate constructively, understand others' emotions, and improve their working relationships and performance in clinical settings.<sup>(1)</sup> Although the importance of EI in nursing is well established, there are significant gaps in our understanding of how EI interacts with other factors that influence nursing students' clinical competence. Specifically, previous research has largely overlooked the complex interplay among EI, sleep quality, academic performance, and clinical competence in nursing students. This study aimed to address these gaps by examining these relationships.

Clinical competence refers to a nurse's ability to effectively apply knowledge, skills, and judgment to various healthcare situations.<sup>(2)</sup> It encompasses factors such as interpersonal skills, patient management in multicultural settings and the ability to work well with others. Although academic performance has traditionally been used to assess nursing students' competence, it is not a strong predictor of clinical success.<sup>(3)</sup> In contrast, clinical competence, which is closely linked to EI, appears to be more significant for clinical effectiveness.<sup>(4)</sup> Studies have found relationships between EI and clinical performance, with emotionally intelligent students demonstrating better patient relationships, clinical reasoning, self-awareness, and adaptability.<sup>(5)</sup> Additionally, this study examined two other factors that may affect nursing students' clinical competence: sleep quality and academic performance. Sleep quality, which includes factors such as sleep duration, efficiency, and disturbances, is another important factor that may affect nursing students' EI and performance.<sup>(6)</sup> Poor sleep is common among college students and is associated with decreased academic performance, impaired concentration, and motivational issues.<sup>(7)</sup>

Academic performance, although not a strong predictor of clinical success, may play a role in overall clinical competence. It is typically measured through grades, test scores, and overall grade point averages. Understanding how academic performance interacts with EI, sleep quality, and clinical competence can provide valuable insights into developing targeted interventions to support nursing students' success. The primary aim of this study was to investigate the levels of EI, sleep quality, and clinical competence among nursing students and identify the factors associated with clinical competence. By examining these factors together, this study sought to provide a more comprehensive understanding of the factors influencing nursing students' clinical competence. These findings may inform curriculum development and support strategies to enhance nursing education and practice, ultimately leading to better-prepared nursing graduates and improved patient care.

# Methods

**Study design and setting.** This descriptive cross-sectional study investigated EI, sleep quality, and clinical competence levels and identified factors associated with clinical competence among nursing students. Data were collected from August to October 2024 at a nursing college in Northern India.

**Participants.** Prefinal- and final-year bachelor's nursing students were recruited using a convenience sampling technique. These years were chosen because students had gained sufficient clinical experience at this stage of their education. Students with a history of psychiatric illness, ongoing psychiatric treatment, sleep disorders, or the use of sleep medications were excluded.

**Sample size.** The sample size was calculated using the formula  $n = Z^2 P (1-P)/d^2$ , based on a 31.2% prevalence of clinical competence among nurses (2). The calculated sample size was 172 participants, with a 95% confidence interval and 7% precision. Accounting for a 10% response rate, the final sample size was adjusted to 190.

**Ethical considerations.** Before participation, the participants were informed of the aims and purpose of the study. Confidentiality and anonymity were ensured. Ethical approval was obtained from the Institutional Ethics Committee.

**Data collection tools.** This study utilized several data collection tools. A demographic information questionnaire was used to gather data on participants' age, religion, academic year, parental education, and family income. Academic performance was measured using the percentage score from the previous year.

**Instruments. (i) Schutte Self-Report Emotional Intelligence Scale (SSREI):** The SSREI is a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) and includes 33

items. EI was measured as the sum of the scores for all 33 items, with a score range of 33–165, where a score between 33 and 77 suggested a low EI level, a score between 78 and 121 indicated a moderate level, and a score between 122 and 165 denoted a high EI level.<sup>(8)</sup> The reliability of the EI of nursing students was established using the test-retest method ( $r = 0.92$ ). The SSREI has a reliability coefficient (Cronbach's  $\alpha = 0.90$ ) and validity (CVI = 0.88) (8); **(ii) Clinical Competence Questionnaire (CCQ):** The CCQ was used to evaluate the clinical competency of nursing students. It consists of 47 items that represent clinical competencies categorized as either nursing professional behavior (items 1–17), or related to clinical competency (items 17–47). The CCQ uses a 5-point Likert scale ranging from 1 (do not have a clue) to 5 (known in theory, competent in practice without supervision). The total score ranged from 47 to 235, with higher scores indicating good clinical competence. The Cronbach's  $\alpha$  for the 47-item Clinical Competence Questionnaire was 0.98;<sup>(9)</sup> **(iii) Pittsburgh Sleep Quality Index (PSQI):** The PSQI was used to assess the sleep quality of students. It consists of 19 items based on sleep efficacy, sleep quality, sleep duration, perennial sleep efficiency, sleep disturbance, sleep medication use, and daytime dysfunction. The score for each component ranges from 0 to 3, with scores >5 representing poorer sleep quality. The total score ranges from 0 (easy sleep) to 21 (severe difficulty). The Cronbach's  $\alpha$  coefficient for the PSQI internal consistency reliability was 0.83.<sup>(10)</sup> The Cronbach's  $\alpha$  values for the SSREI, CCQ, and PSQI in this study were 0.914, 0.985, and 0.819, respectively.

**Variables.** The primary outcome was clinical competence, measured using the CCQ. The predictor variables included EI (SSREI), sleep quality (PSQI), academic performance, and demographic factors.

**Statistical analysis.** Prior to entry into the primary database, the information gathered was scrutinized

for completeness and precision. Statistical evaluations were conducted using the SPSS software (version 26.0; IBM Corp., Armonk, N.Y., USA). Descriptive statistics, including percentages, means, and standard deviations, were computed to summarize the participants' sociodemographic profiles, EI, sleep quality, and clinical competence scores. Cronbach's alpha was used to assess the reliability of the scale. Participants were categorized based on their clinical competence scores through a two-step cluster analysis employing the log-likelihood distance measure and Schwarz's Bayesian Information Criterion (BIC) to ascertain the optimal cluster count. Inferential statistics were calculated according to the central limit theorem (CLT). Differences in the mean EI, sleep quality, and clinical competence levels according to academic year and performance were analyzed using an independent t-test and one-way analysis of variance (ANOVA), respectively. Levene's test was used to evaluate the homogeneity of variance using one-way ANOVA. Cohen's *d* effect sizes were calculated for significant t-test results to quantify the magnitude of differences between the groups. Cohen's *d* values of 0.2, 0.5, and 0.8 were considered small, medium, and large effect sizes, respectively. For the ANOVA results, eta-squared ( $\eta^2$ ) was calculated to estimate the proportion of variance in the dependent variable explained by the independent variable.  $\eta^2$  values of 0.01, 0.06, and 0.14 were interpreted as

small, medium, and large effect sizes, respectively. Spearman's rho was used to assess correlations between dependent variables. Univariate regression analysis was used to identify potential associations among sociodemographic factors, study variables, and clinical competence. Multivariate linear regression analyses were conducted to identify predictors of clinical competence, incorporating variables with *p*-values  $<0.2$  into the model. All statistical tests were two-tailed, with statistical significance set at  $p < 0.05$ .

## Results

### Socio-demographic profile of participants

The study included 199 nursing students (response rate:81.84%), with the majority being aged 22–23 years (64.3%) and unmarried (97.5%). Over half of the participants (55.3%) were in the pre-final year of their nursing programs. Academic performance varied, with 51.8% scoring between 70% and 79% in their last professional examination. Most participants (81.9%) reported an interest in pursuing a career in nursing (Table 1).

**Table 1. Socio-demographic profile of 199 nursing students**

Variable	Categories	Frequency (%)
Age (years)	19-21	48 (24.1)
	22-23	128 (64.3)
	23-25	23 (11.6)
Religion	Hindu	180 (90.5)
	Others	19 (9.5)
Marital status	Unmarried	194 (97.5)
	Married	5 (2.5)
Academic year	Pre-final	110 (55.3)
	Final	89 (44.7)
Family monthly income (INR)	Below 25,000	39 (19.6)
	25,000-50,000	73 (36.7)
	50,000-75,000	50 (25.1)
	Above 75,000	37 (18.6)
Marks in the last professional examination	Below 60%	12 (6.0)
	60-69%	78 (39.2)
	70-79%	103 (51.8)
	≥ 80%	6 (3.0)
Interested in nursing profession	No	36 (18.1)
	Yes	163 (81.9)

**Classification of EI, Sleep Quality, and Clinical Competence.** The mean EI, global PSQI, and CCQ scores were  $121.92 \pm 14.57$ ,  $5.85 \pm 2.94$ , and  $178.26 \pm 39.58$ , respectively. Most of the study participants had high EI (56.3%) and good sleep quality (54.3%). Cluster analysis was chosen to classify clinical competence because of its suitability for identifying naturally occurring

patterns and offering insights into groupings based on shared characteristics. The silhouette measures of cohesion and separation were fair. Cluster 1 (55.3%, n=110) had the highest mean scores and was labeled as the good clinical competence group, while Cluster 2 (44.7%, n=89) had lowest mean scores and were labeled as poor clinical competence (Table 2).

**Table 2. Classification of Emotional Intelligence, Sleep Quality, and Clinical Competence Scores**

Variables (Score)	Frequency (%)	Mean ± SD
<b>SSEIT</b>		
High (122-165)	112 (56.3)	$121.92 \pm 14.57$
Moderate (78-121)	85 (42.7)	
Low (33-77)	2 (1.0)	
<b>CCQ</b>		
Good	110 (55.3)	$178.26 \pm 39.58$
Poor	89 (44.7)	
<b>Global PSQI</b>		
Good (0-5)	108 (54.3)	$5.85 \pm 2.94$
Poor (6-21)	91 (45.7)	

Abbreviations: SSEIT- Schutte Self Report Emotional Intelligence Test; PSQI- Pittsburgh Sleep Quality Index; CCQ- Clinical Competence Questionnaire

**Correlations between study variables.** The major findings revealed significant positive correlations between EI and overall clinical competence ( $r=0.417, p<0.01$ ), as well as between EI and the individual domains of clinical competence. EI also showed a negative correlation with the global PSQI score ( $r=-0.173, p<0.05$ ), indicating better sleep quality with higher EI. Poor sleep quality was negatively correlated with overall clinical competence ( $r=-0.148, p<0.05$ ) and its domains. Specifically, the use of sleep medication ( $r=-0.141, p<0.05$ ) and daytime dysfunction ( $r=-0.190, p<0.01$ ) were significantly negatively correlated with overall clinical competence. Strong positive correlations were observed between the clinical competence

domains, particularly between core and advanced nursing skills ( $r=0.932, p<0.01$ ).

**Mean differences across academic year.** Table 3 shows the mean score differences in the study variables between pre-final and final-year students. Final-year students scored significantly higher than pre-final-year students in EI ( $t=-3.443, p=0.001, \text{Cohen's } d= -0.4909$ ), global PSQI ( $t=-2.599, p=0.010, \text{Cohen's } d= -0.3705$ ), and all clinical competence domains. Notably, advanced nursing skills ( $t=-4.153, p<0.001, \text{Cohen's } d= -0.5921$ ) and core nursing skills ( $t=-3.989, p<0.001, \text{Cohen's } d= -0.5688$ ) had medium effect sizes.

**Table 3. Emotional Intelligence, Sleep Quality, and Clinical Competence Scores by Academic Year**

	Pre-final year	Final year	t-value	p-value	Cohen's d
<b>SSEIT</b>	118.81±15.91	125.78±11.70	-3.443	0.001	-0.4909
<b>Subjective sleep quality</b>	0.80±0.73	1.13±0.77	-3.115	0.002	-0.4441
<b>Sleep latency</b>	1.15±0.83	1.35±0.90	-1.565	0.119	-0.2231
<b>Sleep duration</b>	1.18±0.52	1.21±0.48	-0.435	0.664	-0.0620
<b>Sleep efficiency</b>	0.45±0.65	0.51±0.65	-0.544	0.587	-0.0775
<b>Sleep disturbance</b>	1.01±0.61	1.09±0.57	-0.949	0.344	0.1353
<b>Use of sleep medication</b>	0.22±0.56	0.29±0.74	-0.798	0.426	-0.1138
<b>Daytime dysfunction</b>	0.55±0.74	0.87±0.90	-2.646	0.009	-0.3773
<b>Global PSQI score</b>	5.37±2.72	6.45±3.11	-2.599	0.010	-0.3705
<b>Nursing professional behaviour</b>	54.88±14.33	60.66±11.80	-3.057	0.003	-0.4358
<b>Skill competence: general</b>	46.88±13.08	52.48±9.86	-3.342	0.001	-0.4765
<b>Skill competence: core nursing skills</b>	45.68±12.77	52.13±9.28	-3.989	<0.001	-0.5688
<b>Skill competence: advance nursing skills</b>	21.46±5.59	24.53±4.60	-4.153	<0.001	-0.5921
<b>Overall CCQ</b>	168.91±42.47	189.81±32.36	-3.829	<0.001	-0.5459

Abbreviations: SSEIT- Schutte Self Report Emotional Intelligence Test; PSQI- Pittsburgh Sleep Quality Index; CCQ- Clinical Competence Questionnaire

**Mean differences across Academic Performance.**

Significant differences were observed in EI ( $F=2.774$ ,  $p=0.043$ ,  $\eta^2=0.041$ ) and sleep duration ( $F=4.902$ ,  $p=0.003$ ,  $\eta^2=0.070$ ) across academic performances. Higher-performing

students (>80%) also showed better scores for professional nursing behavior ( $F=3.786$ ,  $p=0.011$ ,  $\eta^2=0.055$ ) and overall clinical competence ( $F=3.026$ ,  $p=0.031$ ,  $\eta^2=0.044$ ) (Table 4).

**Table 4. Emotional Intelligence, Sleep Quality, and Clinical Competence Scores by Academic Performance**

	Below 60%	60-69%	70-79%	≥80%	F-value	p-value	eta-square
<b>SSEIT</b>	115.17±12.29	119.45±15.35	124.50±13.58	123.50±18.38	2.774	0.043	0.041
<b>Sleep latency</b>	1.08±0.99	0.92±0.76	0.97±0.76	0.67±0.51	0.444	0.722	0.007
<b>Sleep duration</b>	1.17±0.83	1.44±0.97	1.17±0.84	0.17±0.40	4.902	0.003	0.070
<b>Sleep efficiency</b>	1.25±0.45	1.09±0.51	1.28±0.49	1.00±0.63	2.497	0.061	0.037
<b>Sleep disturbance</b>	0.83±0.57	0.47±0.65	0.44±0.66	0.50±0.54	1.311	0.272	0.020
<b>Use of sleep medication</b>	1.17±0.71	1.09±0.58	1.02±0.59	0.67±0.51	1.181	0.318	0.018
<b>Daytime dysfunction</b>	0.00±0.00	0.27±0.63	0.25±0.68	0.50±0.83	0.912	0.436	0.014
<b>Sleep latency</b>	0.442±0.79	0.68±0.87	0.71±0.77	1.17±1.32	1.100	0.350	0.017
<b>Global PSQI score</b>	5.92±2.35	5.96±2.35	5.83±2.92	4.67±1.36	0.359	0.783	0.005
<b>Nursing professional behaviour</b>	46.42±18.40	56.55±13.08	59.55±12.60	55.67±15.44	3.786	0.011	0.055
<b>Skill competence: general</b>	40.08±15.64	49.01±11.39	51.05±11.70	44.33±11.02	3.544	0.016	0.052
<b>Skill competence: core nursing skills</b>	42.42±16.30	48.31±11.66	49.50±11.27	48.33±10.00	1.327	0.267	0.020
<b>Skill competence: advance nursing skills</b>	19.50±7.25	22.76±5.20	23.24±5.33	23.50±1.87	1.789	0.151	0.027
<b>Overall CCQ</b>	148.42±55.98	176.63±37.89	183.34±37.77	171.83±34.42	3.026	0.031	0.044

Abbreviations: SSEIT- Schutte Self Report Emotional Intelligence Test; PSQI- Pittsburgh Sleep Quality Index; CCQ- Clinical Competence Questionnaire

**Factors Associated with Clinical Competence.**

The multiple linear regression model identified several significant predictors of clinical competence ( $R^2=0.239$ ; adjusted  $R^2=0.207$ ). Final-year students had higher clinical competence scores than pre-final-year students ( $\beta=0.208$ ,  $p=0.002$ ). EI was a strong positive predictor of clinical

competence ( $\beta=0.248$ ,  $p<0.001$ ). Higher levels of sleep disturbance negatively affected clinical competence ( $\beta=-0.188$ ,  $p=0.004$ ). Other variables, such as family income, marks on the last professional examination, and interest in the nursing profession, were not significant predictors in the adjusted model (Table 5).

**Table 5. Multiple Linear Regression Analysis of Factors Associated with Clinical Competence**

Variables	CCQ					
	Unadjusted estimates			Adjusted estimates (R <sup>2</sup> = 0.239)		
	B	95% CI	p-value	B	95% CI	p-value
Age	0.389	-9.112, 9.890	0.936	-	-	-
Religion	4.197	-14.673, 23.067	0.661	-	-	-
Marital status	-11.752	-47.163, 23.660	0.514	-	-	-
Academic year	20.900	10.135, 31.665	<0.001**	16.511	6.092, 26.930	0.002*
Monthly family income	5.970	0.510, 11.431	0.032*	4.943	-0.020, 9.907	0.051
Marks in the last professional examination	9.390	1.038, 17.741	0.028*	4.387	-3.475, 12.249	0.272
Interested in nursing profession	16.828	2.611, 31.046	0.021*	2.647	-10.937, 16.231	0.701
SSEIT	0.953	0.595, 1.310	<0.001**	0.673	0.301, 1.046	<0.001**
Sleep latency	0.864	-6.355, 8.084	0.236	-	-	-
Sleep duration	0.643	-5.738, 7.024	0.843	-	-	-
Sleep efficiency	-3.232	-14.144, 7.680	0.560	-	-	-
Sleep disturbance	-13.104	-21.358, -4.850	0.002*	-11.317	-18.979, -3.654	0.004*
Use of sleep medication	-9.637	-18.853, -0.421	0.041*	-3.679	-12.937, 5.579	0.434
Daytime dysfunction	-9.370	-17.837, -0.904	0.030*	-5.314	-13.846, 3.218	0.221
Sleep latency	-2.671	-9.315, 3.974	0.429	-	-	-
Global PSQI score	-1.698	-3.569, 0.174	0.075	-	-	-

B= Unstandardized coefficient; β=Standardized coefficient, “Global PSQI was removed from adjusted model due to multicollinearity  
 Abbreviations: SSEIT- Schutte Self Report Emotional Intelligence Test; PSQI- Pittsburgh Sleep Quality Index; CCQ- Clinical Competence Questionnaire

## Discussion

This study examined the relationships between EI, sleep quality, academic performance, and clinical competence in nursing students. These findings provide valuable insights into the complex interactions and their implications for nursing education and practice. Most students (56.3%) demonstrated high EI levels, with final-year students scoring significantly higher than pre-final-year students. This suggests that EI may improve over the course of nursing education,<sup>(11)</sup> possibly because teaching methods enhance EI skills during clinical training. These findings

align with previous research showing a moderate positive correlation between EI and effective clinical teaching.<sup>(12)</sup> High EI scores indicate that many students in this study were adept at managing daily challenges and regulating their own and others’ emotions. However, it is worth noting that other studies found average EI scores among nursing students,<sup>(13)</sup> highlighting the need for further research in this area.

Sleep is a vital aspect of life, particularly for students who are highly susceptible to sleep-related issues. In contrast to some previous studies on medical students that found poor sleep quality rates of 19-33.8%<sup>(14,15)</sup>, this study found

that 45.7% of nursing students experienced poor sleep quality. This discrepancy may be due to various factors influencing sleep quality, including socioeconomic status, academic demands, and health.<sup>(16)</sup>

Interestingly, final-year students had higher PSQI scores than pre-final-year students, indicating poorer sleep quality among more advanced students. The improvement in EI scores from the pre-final to the final year indicates that nursing education may naturally enhance EI skills over time. However, the concurrent decline in sleep quality among final-year students raises concerns about the potential trade-offs between academic demands and personal wellbeing. Senior nursing students in this study displayed high levels of clinical competence, which differs from previous research that found moderate performance levels.<sup>(17)</sup> Our findings are encouraging and may reflect the effectiveness of nursing programs in developing students' clinical skills over time.

We found a significant positive correlation between EI and overall clinical competence. This finding supports the idea that students with higher EI are better equipped to handle the emotional demands of clinical practice, potentially leading to improved patient care and outcomes. These results are consistent with those of other studies, suggesting a positive relationship between EI and nursing performance.<sup>(18)</sup> However, it is important to note that some studies have shown weak or no significant relationship between EI and clinical performance.<sup>(19)</sup> The significant relationship between EI and sleep quality in our study is consistent with previous studies.<sup>(20)</sup> Although sleep duration did not significantly correlate with EI, overall sleep quality was associated with higher EI scores. This aligns with studies showing that factors such as mood and emotions affect sleep patterns and that sleep deprivation can impair emotional recognition.<sup>(21)</sup> Our study found a strong relationship between EI and academic performance, supporting previous research that has shown similar correlations among nursing and other healthcare students.<sup>(22)</sup> This suggests

that developing EI skills may have benefits beyond clinical practice and potentially improve overall academic success of students.

Although this study did not find a significant association between PSQI scores and academic performance, a negative correlation was observed between daytime dysfunction and clinical competence. The negative correlation between sleep disturbance and clinical competence highlights the often-overlooked effect of sleep quality on nursing performance. Poor sleep quality, particularly among senior students, may hinder their ability to perform effectively in clinical settings. This aligns with other studies showing that students with better clinical performance tend to have better sleep quality.<sup>(23)</sup> The lack of an association between overall sleep quality and academic performance contrasts with previous research,<sup>(24)</sup> suggesting the need for further studies. The multiple linear regression model identified several significant factors associated with clinical competence, and final-year students had higher clinical competence scores than pre-final-year students. The EI is a strong positive predictor of clinical competence. Higher levels of sleep disturbance negatively affected their clinical competence. In contrast, Park and Chung found that older nursing students performed better in clinical practice.<sup>(25)</sup> However, our findings were not conclusive. Interestingly, family income and interest in nursing were not significant predictors in the adjusted model. The study also revealed that academic performance, although important, may not be the strongest predictor of clinical competence in the field. This challenges traditional assumptions regarding the relationship between academic success and clinical skills, suggesting that a more holistic approach to nursing education is necessary.

This study has several notable strengths, including its comprehensive approach to examining multiple interrelated factors, use of validated measurement tools, adequate sample size that met the calculated requirements, and diverse

statistical analyses. The consideration of multiple predictors in the regression analysis allowed for a nuanced understanding of the factors influencing clinical competence.

**Limitations and Future directions.** The study conducted at a single nursing college in Northern India has several limitations that should be considered. The cross-sectional design and reliance on self-reported data from a specific group of nursing students limit the generalizability of the findings and prevent the establishment of causal relationships. The subjective assessment of sleep quality and the potential influence of unmeasured confounding variables further constrained the scope of this study. To address these limitations and advance the field, future research should focus on multicenter longitudinal studies that incorporate objective sleep measures and a more diverse student population. Expanding research to include mixed-method approaches, intervention studies, and cultural considerations would provide a more comprehensive understanding of the factors influencing clinical competence. Additionally, integrating technology, exploring mentors' perspectives, and conducting comparative studies across healthcare professions may yield valuable insights.

**Practical implications.** This study has several practical implications for nursing education and practice. Incorporating EI training into nursing curricula, focusing on skills such as self-awareness, empathy, and emotion regulation, is crucial. Workshops and mentoring programs can enhance students' EI throughout their academic journeys. Educating students about the importance of good sleep hygiene and its impact on clinical performance is essential, along with

implementing stress management and relaxation techniques to help improve sleep quality. Adjusting clinical schedules to allow better sleep patterns, especially among senior students, should be considered. Developing targeted interventions to improve clinical competence, particularly for students with lower EI scores or poor sleep quality, and incorporating more hands-on clinical experiences and simulations can build competence over time. It is recommended to implement regular assessments of EI, sleep quality, and clinical competence to identify at-risk students early and provide individualized support and resources based on these assessments. Integrating EI concepts and skills throughout nursing programs and emphasizing the connections between EI, sleep quality, and clinical performance in coursework are important. Training nursing educators on the importance of EI and sleep quality in student performance and equipping faculty with the tools to assess and support students in these areas are crucial.

**Conclusions.** This study provides valuable insights into the complex relationships between EI, sleep quality, academic performance, and clinical competence in nursing students. These findings highlight the importance of EI and sleep quality in predicting clinical competence, suggesting potential areas for intervention in nursing education. By addressing these factors, nursing programs may enhance students' clinical performance and better prepare them for the challenges of professional practice. Future research should build on these findings to develop and evaluate targeted interventions that can improve nursing students' EI, sleep quality, and ultimately, their clinical competence.

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