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Original research

EFFECTS OF ONLINE LEARNING ON MENTAL HEALTH IN NURSING STUDENTS: A SYSTEMATIC REVIEW

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ABSTRACT

Aim: *This systematic review aims to explore the effect of online learning on mental health among nursing students.*

Method: The systematic review was conducted for relevant articles published in all languages from 2014 to 2024 in four electronic databases (PubMed, CINAHL, Cochrane Library, MEDLINE). The search terms included 'nursing student', 'online learning', and 'stress'. Studies that were randomized controlled trials or quasi-experimental studies were included.

Results: *A total of 2367 articles were found in 4 databases, and 1 randomized control trial was included as the final result. The study results show that nursing students who received the virtual clinical simulation gained a higher anxiety level compared with those who joined the face - to - face program.*

Conclusion: *Online learning causes more anxiety for nursing students than the face - to - face program. However, more RCT or quasi - experimental studies are needed to confirm this conclusion more convincingly.*

Keywords: *Online learning, mental health effect, nursing students.*

I. INTRODUCTION

Since early 2020, the global pandemic caused by corona virus disease 2019 (COVID-19) has limited human movement and contact. The most effective remedies against the development of COVID-19, according to experts, are social separation, self - isolation, and forbidding big gatherings, notably in schools [1]. The pandemic forced a global movement away from traditional face - to - face schooling and toward electronic learning (E-learning) and instructional approaches [2]. Learning supported by digital electronic tools and media is referred to as e-learning. Insofar as it allows learning to continue across time and distance, e-learning has grown in popularity and has become the standard operating procedure for educational institutions [3].

Online education management systems provide a variety of benefits that encourage students to learn independently and promote the discovery of specific knowledge through presentations, videos, live interactive activities, tests with automatic question correction, re-grading system, immediate scoring, and instant feedback, ongoing assignments and assessment, and training activities that govern students' and teachers' behaviors [4]. COVID-19 has spurred an increase in online learning, and instructors and students at many colleges have been compelled to accept it without sufficient planning [5].

While all learning is valuable, nursing education focuses on making essential decisions that affect people's health. Nursing education consists of both theoretical and practical instruction aimed at improving nurses' professional abilities and

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knowledge [6]. In-person lectures, laboratory teaching, and clinical rotations have traditionally been used to impart these skills and knowledge. On the other hand, new approaches have been prompted to maintain high-quality nursing education, including online learning [7]. Clinical practice is essential for medical education in particular and nursing education in general. However, the highly contagious nature of Covid-19 has made it difficult to continue lectures as usual, thus influencing the medical education process, which is based on lectures and patient-based education [8]. Social distancing has forced them only to study online, leading to concerns about the effectiveness of their clinical skills [9,10].

During a pandemic, students often experience higher anxiety, which can lead to a loss of motivation to study, as well as increased concerns for academic, social, and economic well-being [11]. Online learning is causing burnout in 46.12% of medical students [12]. College students may experience loneliness and isolation not only as a result of their separation from friends but also as a result of the abrupt end of face-to-face learning, which may result in the cessation of research projects and internships, causing un-confidence about practice skills and uncertainty about graduation [13]. According to Wen - Li et al [14], nursing students preferred face - to - face contact and interactions with classmates and in their education. There were many descriptive quantitative approaches and qualitative studies that highlighted the negative impacts of digital learning on the mental health of students in general. However, it is recognized that a systematic review is lacking to address how online learning negatively affects mental health among nursing students in particular.

As a result, we created a PICO question about the negative effect of online learning on mental health among nursing students: Does online learning have negative effects on mental health among nursing students?

II. MATERIALS AND METHODS

2.1. Study eligible

Inclusion criteria for this systematic review consist of: The study was a randomized controlled trial (RCT) or a quasi-RCT design. The intervention included all forms of the e-learning program: Tele-courses, distance learning, internet-based learning, web-based learning, computer - based courses, virtual learning, mobile learning, digital audio education. The control group was either a no-treatment comparison group or a traditional teaching group. The study subjects were nursing students of all degrees. Study outcomes included negative effects on students' mental health such as stress, distress, strain, anxiety, depression, pressure, mental tiredness, or mental illness. Studies have been published from 2014 to 2024.

Exclusion criteria for this systematic review include: Studies were not designed in RCT or Quasi - experimental. Articles that did not mention the influence of online learning on the mental health of students. Nursing students with underlying mental health problems. Combination of traditional methods with E-learning. Article with the accepted date was before 2014.

2.2. Data sources

The electronic databases were EMBASE, MEDLINE, CINAHL, and Cochrane Library. Searching keywords include "nursing students" AND "online learning" AND key terms of negative effect on mental health: stress, distress, strain, anxiety, depression, pressure, mental tiredness, or mental illness.

2.3. Data selection

Four reviewers independently screened and reviewed the abstracts of the selected articles. If the article abstracts met the criteria, reviewers then independently reviewed the full-text articles. Reviewers discussed any disagreements, resolved conflicts, and reached a consensus. A data-extraction form was used to extract data from the selected articles, which include methods, location, characteristics, and the number of subjects,

interventions, and outcomes. The search was not limited by language.

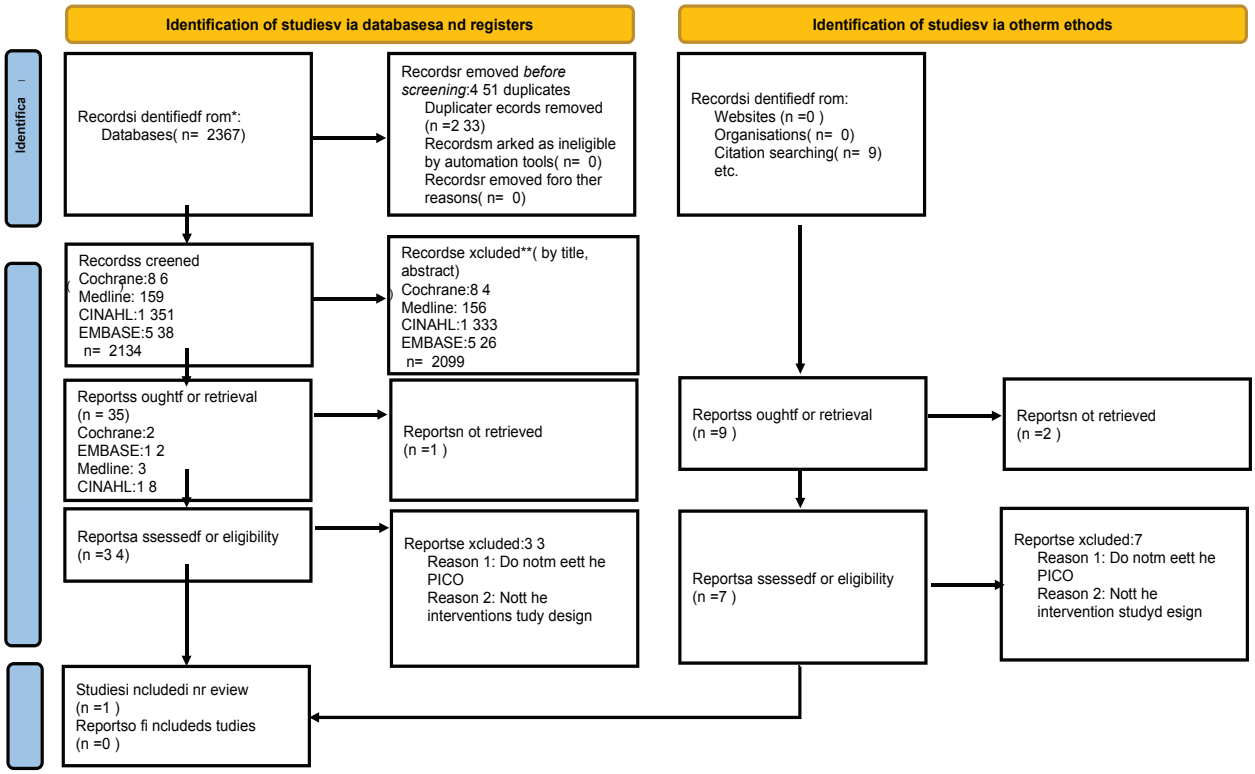
2.4. Critical appraisal

Included studies had been checked for quality appraisal by the Joanna Briggs Institute Checklist (JBI, 2022).

III. RESULTS

3.1. Searching results

We did the search in April 2024, and we got 2367 articles from EMBASE, MEDLINE [OVID], Cochrane Library, and CINAHL in total. Our review team members used ENDNOTE to check for duplication automatically and organized the full texts of articles during the data screening and extraction process. After de-duplicating, we screened through reading the titles and abstracts, then excluded those articles that were not related to our topic, or the full text was not available. Next, our reviewers checked each article in detail and excluded studies that did not meet the PICO question or had not been designed in types of intervention studies. Finally, one article was included based on our systematic searching strategies inclusion and exclusion criteria we set. The PRISMA chart was attached



*Consider, if feasible to do so, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers).

**If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools.

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3.2. Description of studies

The study we included was a Randomized control trial. The purpose of this research was to compare the effects of face - to - face and virtual clinical simulation on third-year undergraduate nursing students. The study outcomes showed a statistically significant difference between two groups of students receiving two different types of simulation courses. Students' anxiety levels were significantly higher for the group with virtual clinical simulation.

Table 1: Matrix of the included study

Author/ Year	Type of study	Country	Population	Method	Outcome	Limitation
Cobbett & Snelgrove-Clarke, 2016 [15]	RCT	Canada	Third-year Bachelor of Science in Nursing students (N=56)	Face-to-face clinical simulation Virtual clinical simulation	Anxiety scores were higher for students in the virtual clinical simulation than for those in the face-to-face simulation	Student motivation, interest, and technological competence may have been intervening variables

3.3. Critical appraisal

We appraised the study with the Joanna Briggs Institute critical appraisal tool, this article got 7 'Yes's from the 13 questions. In this RCT study, the assignments for groups were randomized, and the baseline was similar between the two groups. For the part of outcome measurements in the study, two groups were measured in the same, reliable way. Independent sample t-tests were used to analyze the outcomes of the research to realize the statistical difference between groups. However, some bias may affect the reliability of the research process due to the unclear allocation way and the method designed to blind the participants, teachers in two courses and the outcomes assessors. The result of the critical appraisal for the included RCT is attached to this file.

JBI CRI - TICAL APPRAISAL CHECKLIST FOR RANDOMIZED CONTROLLED TRIALS

Reviewer: Quyen, Lili, Raufina, Liao *Date:_April 01, 2024*

Author: Cobbett, S., & Snelgrove-Clarke, E. *Year_2016 Record Number_____*

	Yes	No	Unclear	NA
1. Was true randomization used for assignment of participants to treatment groups?	√	□	□	□
2. Was allocation to treatment groups concealed?	□	□	√	□
3. Were treatment groups similar at the baseline?	√	□	□	□
4. Were participants blind to treatment assignment?	□	□	√	□
5. Were those delivering treatment blind to treatment assignment?	□	□	√	□
6. Were outcomes assessors blind to treatment assignment?	□	□	√	□
7. Were treatment groups treated identically other than the intervention of interest?	√	□	□	□
1. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?	√	□	□	□
9. Were participants analyzed in the groups to which they were randomized?	□	√	□	□
10. Were outcomes measured in the same way for treatment groups?	√	□	□	□

	Yes	No	Unclear	NA
11. Were outcomes measured in a reliable way?	√	□	□	□
12. Was appropriate statistical analysis used?	√	□	□	□
13. Was the trial design appropriate, and any deviations from the standard RCT design (individual randomization, parallel groups) accounted for in the conduct and analysis of the trial?	□	□	√	□

Overall appraisal: Include √ Exclude □ Seek further info □
Comments (Including reason for exclusion): No

IV. DISCUSSION

This systematic review was done because of the exponential development in online learning and its application in education in recent years. It has been shown as an effective and useful teaching model for medical students in general and for nursing students in specific. However, online learning also causes negative mental health problems for nursing students. The effects of e-learning on the mental health of nursing students were examined in one randomized control trial. The result showed that nursing students who experienced the virtual clinical simulation gained higher anxiety compared with those who joined the face - to - face program e-learning.

Several research has explored student anxiety during simulations [16,17,18,19], but there was no information regarding the difference between virtual and face - to - face simulations. Beverley and Harder [16] did a literature study and reported on factors that lower student anxiety during simulation. Their recommendations included supportive and welcoming teachers, mentorship by senior students, proper environment, planning nursing care as a group, and elimination of video recording/review. Prior to any clinical simulation session, anxiety-reducing strategies for students should be planned and implemented.

Our analysis exclusively focused on the influence of e-learning on nursing students' mental health in the recent ten years with the main purpose of exposing the problem's significance amid a decade of substantial online learning increase. We received only one included final study. The condition of time constraints should be abolished, so researchers could have an opportunity to acquire additional studies and do the meta - analysis. This systematic review only focused on nursing students. We recommend that researchers broaden the population to cover all medical students. The application of e-learning in nursing students is not considerably different from other medical students. Potential biases also exist in the included review study. The result of the critical appraisal after using the JBI checklist showed that only 7/13 questions had a yes answer. Researchers interested in this topic should conduct RCTs with much clearer information about allocation concealment, blinding, and randomization.

V. CONCLUSION

Virtual simulation increases anxiety for nursing students compared with the traditional method. E-learning may be a helpful adjunct to traditional learning for nursing students, but educators should plan strategies to reduce anxiety for students to optimize their studying effectiveness.

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