

The Effect of an AI-Assisted Professional Ethics Education Program on Nursing Students' Moral Reasoning: A Quasi-Experimental Study

Paria Saeedi¹

Student Research Committee, School of Nursing and Midwifery, Yasuj University of Medical Sciences, Yasuj, Iran

Naeem Abdi

2. Social Determinants of Health Research Center, Yasuj University of Medical Sciences, Yasuj, Iran

Rahim Pendar²

2. Social Determinants of Health Research Center, Yasuj University of Medical Sciences, Yasuj, Iran

Mohammad Malekzadeh²

2. Social Determinants of Health Research Center, Yasuj University of Medical Sciences, Yasuj, Iran

Mohammad Behnam Moghadam²

2. Social Determinants of Health Research Center, Yasuj University of Medical Sciences, Yasuj, Iran

Mohammadsaeed Mirzaee

saeedmirzaee75@gmail.com

2. Social Determinants of Health Research Center, Yasuj University of Medical Sciences, Yasuj, Iran

Short Report

Keywords: Professional Ethical Codes, Artificial Intelligence, Moral Reasoning

Posted Date: June 19th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-9895083/v1>

License:   This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Additional Declarations: No competing interests reported.

Version of Record: A version of this preprint was published at BMC Research Notes on October 16th, 2026. See the published version at <https://doi.org/10.1186/s13104-026-08071-3>.

Abstract

Objective

Moral reasoning is one of the most critical professional competencies in nursing and plays a fundamental role in clinical decision-making. The use of emerging technologies, including artificial intelligence, in teaching professional ethical codes can enhance the ethical capabilities of nursing students. This study aimed to evaluate the effect of an AI-assisted professional ethics education program on nursing students' moral reasoning compared with usual curriculum without a structured ethics intervention.

Results

Immediately after the intervention, a statistically significant difference was observed in the mean moral reasoning score between the experimental group (48.83 ± 5.97) and the comparison group (44.59 ± 5.21) ($p < 0.001$). At the three-month follow-up, the mean moral reasoning score remained significantly higher in the experimental group (48.68 ± 5.43) compared to the comparison group (43.97 ± 5.37) ($p < 0.001$). An AI-assisted, multi-component professional ethics education program was associated with significant improvements in nursing students' moral reasoning compared with no structured ethics intervention. This approach can enhance future nurses' professional performance in clinical settings and encourage reliance on moral reasoning rather than mere adherence to administrative and employment regulations in clinical decision-making.

Introduction

Nurses constitute the largest group of service providers within the healthcare system. Adherence to ethical principles in this context helps nurses maintain respect for family decisions while prioritizing the interests and comfort of the patient, thereby clarifying their professional and humanistic path [1]. According to existing studies, approximately 11% of nurses encounter ethical challenges daily, and 36% face such issues every few days [2]. Research findings indicate that nursing students, upon entering clinical environments, confront numerous ethical dilemmas and challenges [3–5]. Given that the domain of nursing care is rife with complex ethical issues, it inherently requires ethical decision-making [6]. One of the criteria for professional competence in nursing is the ability to reason through ethical issues, which is an effective factor in improving nurses' performance [7]. All individuals involved in patient care encounter problems that necessitate an appropriate level of moral reasoning to resolve [8]. Moral reasoning is a component of the ethical decision-making process, reflecting an individual's capacity to judge and decide correctly and rationally when faced with ethical dilemmas [9]. Moral reasoning is a concept related to professional ethics that assists students in making correct decisions regarding ethical issues [10]. Moral reasoning helps students strengthen their ability to choose the best solution among various alternatives [11]. Fundamental ethical principles associated with moral reasoning include

justice, beneficence, non-maleficence, and patient autonomy [12]. One of the most recognized theories concerning human moral development is Kohlberg's theory. Kohlberg categorized moral reasoning into three levels, pre-conventional, conventional, and post-conventional. At the pre-conventional level, individuals tend to be more self-centered and prefer strict obedience to avoid blame. At the conventional level, individuals mostly rely on societal laws and norms in their decision-making and consider the social conventions influential in their choices. At the post-conventional level, which is the highest, individuals strive to guide their actions and behavior according to key moral principles and make humane and ethical decisions accordingly [13, 14]. Studies have shown that there are methods and strategies to strengthen moral reasoning in nursing students, including teaching nursing ethical principles [15], nursing ethics education through case-based learning[16], narrative storytelling via simulation [17], and education based on Kohlberg's moral development theory[18]. Considering that nursing students will soon undertake significant nursing roles, it is imperative to seriously promote professional ethics in them and increase efforts in teaching ethical codes and enhancing their moral reasoning[13, 19–21]. Nursing ethical codes refer to a set of principles and professional standards that guide nurses' behavior and decision-making in clinical settings [22]. Teaching professional ethical codes to nursing students is a foundational pillar of professional education in this field, as it improves care quality skills and fosters the development of professional identity, ethical commitment, and the trust of patients and society in the healthcare system [23–25]. The use of advanced and effective technologies, including artificial intelligence, in teaching ethical codes can strengthen nursing students' learning of ethical codes and enhance their moral reasoning. Artificial intelligence can personalize the learning process by delivering educational content and ethical scenarios tailored to each student's abilities, needs, and learning style. Additionally, AI systems can provide immediate feedback on the quality of students' moral reasoning, highlighting their strengths and weaknesses, thereby enabling the tailoring and optimization of instruction based on the students' actual needs [26]. One of the AI-based tools that revolutionized the internet shortly after its introduction is ChatGPT. ChatGPT is an artificial intelligence platform, or more specifically, a chatbot developed by OpenAI [27, 28] ²⁸. AI, particularly tools like ChatGPT, has found extensive applications in nursing education due to its interactive capabilities and dynamic content generation. Artificial intelligence can simulate real clinical scenarios, such as patient management in intensive care units, allowing students to practice their decision-making skills in a safe environment [29]. Although various educational strategies such as case-based learning and classroom ethics education have been shown to enhance moral reasoning in nursing students, evidence regarding the effectiveness of AI-assisted approaches in ethics education remains limited. In particular, there is a lack of empirical studies evaluating whether AI-assisted ethics education can serve as an effective supplementary educational tool alongside usual curricula.

Purpose of the study

Therefore, this study aimed to evaluate whether participation in an AI-assisted, multi-component professional ethics education program was associated with changes in nursing students' moral reasoning compared with usual education without a structured ethics intervention.

Methods

Study Design

The present study employed a quasi-experimental, non-equivalent control group design with pre-test, post-test, and three-month follow-up assessments..

Population and Setting

The study population included 92 undergraduate nursing students at Yasuj University of Medical Sciences, Iran, in the year 2025–2026.

Sampling and participants' recruitment

Participants were selected using a census method. After applying inclusion and exclusion criteria, 80 students were enrolled in the study. Participants were allocated to the experimental and comparison groups based on administrative and academic scheduling, without individual-level randomization (experimental and comparison, with 40 participants in each group). During the post-intervention phase, one dropout occurred in the comparison group. Inclusion criteria were nursing students in semesters 6 and 8, willingness and informed consent to participate, physical and mental health, and no prior participation in similar studies or courses. Exclusion criteria comprised unwillingness to continue participation, absence from more than one session, dropout from the program, incomplete questionnaires, and the presence of psychiatric disorders or use of psychotropic medications. The CONSORT diagram was used to illustrate the sample selection and allocation process (Fig. 1).

Data Collection

Data were collected using a tool consisting of a demographic information form and the Crisham Moral reasoning instrument [30]. This tool comprises six scenarios addressing common ethical dilemmas in the nursing care domain. The dilemmas include a newborn with a limb defect, forced medication administration, patient requests for end-of-life, introduction of a new nurse to the system, medication error, and end-of-life care. Each scenario presents a situation causing decision-making confusion for nurses and nursing students who care for patients and their families. Following each scenario, two main questions are posed, to which respondents must answer. Each scenario contains a series of statements representing Kohlberg's stages of moral development, with an additional item assessing the extent of institutional rule consideration in decision-making. Using this instrument, three key indices are calculated for each participant. The first index is the Nursing Moral reasoning Score, reflecting the development of nurses' moral reasoning across three levels: pre-conventional (sum of levels 1 and 2), conventional (sum of levels 3 and 4), and post-conventional (sum of levels 5 and 6). Nursing moral reasoning scores range from 18 to 66. The second index evaluates moral reasoning specifically at the

post-conventional level (sum of levels 5 and 6), also ranging from 18 to 66, as explained above. These moral reasoning scores indicate the extent to which ethical principles influenced decision-making and the individual's level of moral development. The third index includes clinical considerations. This index assessed the degree of consideration given to administrative regulations in ethical decision-making. In each scenario, one of the six response options corresponded to this section, and participants were scored based on the priority they assigned to this option. The score for this index ranged from 6 to 36. Higher scores in this section indicated greater attention to administrative rules in ethical decisions and a lower level of moral development. The score range was between 6 and 30. Within this instrument, a score of 6 to 17 signified encountering and familiarity with the dilemma, while 18 to 30 indicated no prior encounter or unfamiliarity with ethical dilemmas. For ease of interpretation of the familiarity variable in this study, scores were reversed; thus, higher scores indicated less familiarity with ethical dilemmas. In Hajilo et al.'s study (2022), the instrument's validity was confirmed by the opinions of 10 ethics faculty members at Hamadan University of Medical Sciences, and its reliability was reported with a Cronbach's alpha coefficient of 0.83 [31]. The questionnaire was administered before, immediately after, and three months following the completion of the interventions.

Intervention

After obtaining the ethical code and approval from the Ethics Committee, as well as securing the necessary permits from the Research and Educational Deputy of Yasuj University of Medical Sciences in Iran, coordination was made with the School of Nursing to access the target population. The intervention was conducted at the School of Nursing. After applying the inclusion criteria, participants were randomly assigned via block randomization into the experimental and comparison groups. Upon commencing the study, based on the received list, coordination for scheduling the first session was made through phone contact with student representatives. The researcher attended the first session in the classroom to provide necessary explanations regarding the aims and details of the study, distributed the pre-test questionnaires to the students, and collected them upon completion. The experimental group participated in four 2-hour educational sessions. The sessions were held once a week over a period of one month. The comparison group received the usual curriculum without a structured or supplementary ethics education intervention during the study period. Questionnaires were re-administered immediately after the intervention and again three months post-intervention to both groups, and the collected data were analyzed. Outcome assessment and data analysis were conducted without group labels to reduce analytical bias.

Session One

Completion of informed consent forms, explanation of the research objectives and methodology to participants, comprehensive instruction on how to use the AI tool ChatGPT, including how to access and obtain an account, and step-by-step training on how to formulate prompts (guidance on account access and question formulation for optimal use of ChatGPT was provided).

Session Two

Instruction on the items and domains of professional ethical codes based on the approved Iranian national codes [32] was delivered to participants using the XmindMap software. Initially, practical training on how to use the XmindMap software was provided, covering how to create a concept map, utilize nodes, and establish relationships between concepts.

Session Three

Pre-designed prompt formats based on the ethical codes taught in the previous session were provided to participants to extract responses using the AI tool ChatGPT. Participants were asked to formulate their questions regarding the professional ethical codes, after which the research team compiled, refined, and improved these questions. This approach aimed to enhance participants' critical thinking skills and learning. The final prompts were initially reviewed with participants to familiarize them thoroughly with the prompt format. Subsequently, step-by-step instructions were given on how to retrieve responses from ChatGPT. To reinforce learning and build confidence in using artificial intelligence, participants were requested to design five hypothetical cases related to ethical codes at home and prepare them as examples for examination in the next session. The prompt design was structured in three stages: Identification of ethical codes: Participants reviewed the ethical codes taught in the second session and designed one or more prompts for each code. Focus on case creation: The prompts were case-based. Participants were asked to present real or hypothetical conditions and issues related to professional ethics in the form of cases. Precision in question design: Prompts were crafted to request ChatGPT to provide explanations on how to address specific ethical situations.

Session Four

In this session, participants were divided into five-member teams (small groups) to collaboratively review cases and evaluate their alignment with the ethical codes. Subsequently, the teams were required to share their findings with the other groups. The objective of this review was to validate the cases against the ethical codes taught in the second session. At the end of the session, the post-test questionnaire was completed. For the three-month follow-up, the questionnaire was distributed both online and in person. For participants who were not accessible in person, an online questionnaire was created using the Persian-language survey platform, "Porsline," and the link was sent via messaging apps or email to enable them to submit their responses. For participants able to attend in person, printed questionnaires were provided and collected. The data collected from both methods were then combined for statistical analysis. It should be noted that no intervention was performed in the comparison group.

Reporting Guidelines

This study is reported in accordance with the recommended reporting standards for quasi-experimental studies.

Data Analysis

Data were analyzed using SPSS software version 27. After assessing data normality with the Kolmogorov–Smirnov test, descriptive statistics (mean and standard deviation, tables, and charts) and inferential statistics were employed. Given the significant baseline difference between groups in academic terms, this variable was included as a covariate in the analysis. A repeated-measures ANCOVA was conducted to compare changes in moral reasoning scores over time between groups while controlling for academic term.

Ethics approval

This study received ethical approval number IR.YUMS.REC.1403.173 from the Research and Technology Deputy of Yasuj University of Medical Sciences in Iran. The study was conducted in accordance with the principles of ethics. Written informed consent was obtained from all participants before enrollment, and all data were handled confidentially and used solely for research purposes.

Results

The results of this study showed that the mean age and standard deviation of the participants were 25.17 ± 2.89 years. Other demographic information of the experimental and comparison groups is presented in Table 1. In the experimental group, the mean and standard deviation of the students' moral reasoning scores increased from 43.13 ± 29.5 at the pre-test stage to 48.83 ± 97.5 at the post-test stage, and at the three-month follow-up, the mean and standard deviation remained higher than the pre-test with 48.68 ± 43.5 . In contrast, the comparison group's mean scores across different measurement stages showed no significant change from the baseline (Table 2). The results indicated a significant main effect of time ($p = 0.001$). A significant group $\times$ time interaction effect ($p = 0.001$) demonstrated that the pattern of changes in scores over time differed between the experimental and comparison groups. After controlling for academic term, the main effect of group remained statistically significant, indicating higher overall moral reasoning scores in the experimental group compared to the comparison group ($p = 0.02$), meaning that the overall mean score of the experimental group was significantly higher than that of the comparison group (Table 3). Pairwise comparisons showed that scores at both post-test and follow-up stages were significantly higher than at the pre-test stage ($p = 0.001$), but no significant difference was found between post-test and follow-up scores ($p = 0.13$) (Table 4).

Table 1
Comparison of Demographic Characteristics by Gender, Academic Term, and Marital Status of Nursing Students in experimental and Comparison group.

Variable	Group	Mean (SD) or n (%)	Test Statistic (t/ χ^2)	p-value
Age (years)	experimental	25.27 (2.81)	t = 0.27	0.30
	comparison	25.07 (3.02)		
Grade Point Average (GPA)	experimental	15.07 (1.11)	t = 1.49	0.14
	comparison	14.67 (1.31)		
Gender	Female	19 (47.5) experimental	$\chi^2 = 0.012$	1.00
		19 (48.70) comparison		
	Male	21 (52.5) experimental		
		20 (48.80) comparison		
Academic Term	Term 6	13 (32.5) experimental	$\chi^2 = 10.65$	0.002
		27 (69.20) comparison		
	Term 8	27 (67.5) experimental		
		12 (30.80) comparison		
Marital Status	Single	37 (92.5) experimental	$\chi^2 = 1.95$	1.93
		32 (82.10) comparison		
	Married	3 (7.5) experimental		
		7 (17.90) comparison		

Table 2

Comparison of Mean and Standard Deviation of Moral Reasoning Scores of Nursing Students in experimental and comparison Groups, Pre-intervention, Post-intervention, and Three Months Follow-up.

Group	N	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD	3 Months Post-intervention Mean $\pm$ SD
experimental	40	43.13 $\pm$ 5.29	48.83 $\pm$ 5.97	48.68 $\pm$ 5.43
comparison	39	43.90 $\pm$ 5.69	44.59 $\pm$ 5.21	43.97 $\pm$ 5.37

Table 3

Results of Repeated Measures ANOVA Examining Main and Interaction Effects

Source of Variation	F-value	df	p-value	Partial η^2
Main effect of time	65.63	(1.45, 111.33)	0.001	0.460
Group $\times$ Time interaction	49.60	(1.45, 111.33)	0.001	0.392
Main effect of group	5.26	(1. 77)	0.025	0.064

Table 4

Post-hoc Pairwise Comparisons of Measurement Time Points (Bonferroni-adjusted)

Time Comparison	Mean Difference	p-value
Pre-test vs. Post-test	-3.196	0.001
Pre-test vs. Follow-up	-2.813	0.001
Post-test vs. Follow-up	0.383	0.138

Discussion

This study assessed the effect of artificial intelligence-based professional ethics code training on the moral reasoning of nursing students, with the obtained results subjected to analysis. In the present study, the experimental and comparison groups showed no significant differences in demographic variables of age, GPA, gender, and marital status, whereas the two groups exhibited a significant difference in academic term. The findings of this study indicate that an AI-assisted professional ethics education program can effectively enhance nursing students' moral reasoning when compared with the absence of a structured ethics intervention. These results suggest that AI-assisted learning may serve as a feasible and supportive educational approach rather than a replacement for traditional ethics education methods. The study by Yalcinkaya et al. (2024), which examined nursing students' attitudes and readiness toward artificial intelligence technology in education, showed that students have relatively positive attitudes and acceptable readiness for using artificial intelligence [23]. Both studies demonstrate that artificial intelligence plays an important role in nursing education and can contribute to enhancing skills and technology acceptance. The findings reinforce that integrating practical training with artificial intelligence can simultaneously improve ethical skills and positive attitudes toward

technology, paving the way for its more effective application in the nursing profession. The observed improvements should be interpreted as the effect of an ethics education program supported by artificial intelligence rather than the isolated effect of AI itself. The study design does not allow for the disentangling of the independent contribution of AI from other educational components, such as case-based learning and group discussion, revealing the practical and observable effect of artificial intelligence in enhancing nursing students' skills. Buchanan et al. (2021), through a systematic and extensive study, examined the anticipated impacts of artificial intelligence on nursing education. This study showed that artificial intelligence, including technologies such as virtual avatars, augmented reality, and robots, plays an important role in improving nursing education. This comprehensive review emphasizes the importance of integrating artificial intelligence technologies into advanced educational systems and clinical simulations, which can enhance the quality of nursing education and nurses' clinical decision-making [25]. The alignment between these two studies and the findings of the present study highlights the importance of practical artificial intelligence-based education in developing essential nursing competencies and ensuring healthcare quality, indicating that artificial intelligence can comprehensively and effectively contribute to the education and empowerment of students. Taskiran (2023), in a quasi-experimental study, investigated the effect of incorporating an artificial intelligence course into the nursing curriculum on students' readiness for medical artificial intelligence applications. The results of this study showed that students who received training demonstrated greater readiness for using medical artificial intelligence, emphasizing that such courses should be included in the curriculum [33]. This study bears considerable similarity to the present research. Both studies demonstrated that artificial intelligence-based training can enhance nursing students' skills and professional readiness. Soltani et al. (2022), in a quasi-experimental study, examined the effect of an intervention based on Kohlberg's moral development theory on the moral reasoning of nursing interns. The results indicated that training during a one-month follow-up period led to a significant improvement in moral reasoning in the experimental group, underscoring the necessity of attending to professional ethics education [18]. The present study, focusing on case-based training of professional ethics codes using artificial intelligence with nursing students as the target population, reported sustained improvements in moral reasoning, consistent with these findings. Shin et al. (2023), in a quasi-experimental study, evaluated the effect of artificial intelligence-based learning on ethical decision-making and clinical reasoning among nursing students. The experimental group utilized ChatGPT, while the control group used traditional resources. The results indicated superior performance by the control group in ethical standards and nursing processes. The findings emphasize the need to integrate artificial intelligence with strategies for enhancing critical thinking and verifying sources, proposing a blended educational approach to improve ethical decision-making[34]. The results of this study conflict with those of the present research. It is important to note that this study did not aim to compare AI-assisted ethics education with traditional classroom-based instruction or action learning approaches. Rather, the objective was to evaluate whether an AI-assisted intervention could provide measurable educational benefits beyond the absence of structured ethics training. Comparative effectiveness studies evaluating AI-assisted education against established teaching methods are warranted in future research.

Limitations

This study has several limitations. First, the quasi-experimental design and the absence of a comparison with traditional classroom-based or action-learning ethics education limit conclusions about the relative superiority of AI-assisted approaches. Second, the study was conducted in a single academic center with a relatively small sample size, which may limit generalizability. Third, the novelty of using AI-assisted tools such as ChatGPT may have influenced student engagement and outcomes. Because the comparison group did not receive an alternative non-AI ethics intervention, the specific contribution of artificial intelligence cannot be isolated, and findings should be interpreted accordingly. Future randomized controlled studies comparing AI-assisted and traditional ethics education approaches are needed to clarify the role of artificial intelligence.

Conclusion

AI-assisted ethics education can be considered a supportive and supplementary educational strategy to enhance moral reasoning among nursing students, particularly in contexts where structured ethics education is limited. Implementation of this intervention enhances students' competencies in addressing clinical ethical issues and produces substantial improvements in their moral reasoning skills. The findings suggest that AI-assisted ethics education can be considered a supportive and supplementary strategy within nursing curricula to enhance moral reasoning, particularly in settings where structured ethics education is limited; therefore, attention to the potentials of artificial intelligence technology and its integration with traditional education represents an important step toward enhancing the quality of professional ethics education and clinical performance among nursing students. Since moral reasoning plays a key role in clinical decision-making and the delivery of high-quality care by nurses, the findings of this research hold substantial importance. The educational method employed in this study, utilizing artificial intelligence that was widely accessible to students, facilitated interactive training based on real-world scenarios. This approach enabled deeper and more practical learning of moral reasoning, allowing students to enhance their critical thinking and ethical decision-making skills through active participation in the educational process. The presence of artificial intelligence technology as an accessible tool for students made the training more engaging, dynamic, and aligned with current clinical needs, exerting a profound influence on improving their moral reasoning. It is recommended that this educational method be incorporated as part of nursing curricula and that faculty and instructors increase their awareness of the potential of artificial intelligence technology in professional ethics education.

Abbreviations

GPT "Generative Pre-trained Transformer"

AI "Artificial Intelligence"

Declarations

Acknowledgments

The authors express their deepest gratitude and appreciation to all students who contributed to the implementation of this study. The present article is extracted from a master's thesis in psychiatric nursing. ChatGPT (OpenAI) and Grammarly were used to improve the English language and readability of the manuscript.

Authors' contributions

M.S.M. and N.A. conceived the study and served as its supervisor. The study design was conducted by M.S.M. and M.B.M. Specialized consultation was provided by R.P. P.S. executed the research process and interventions. Data analysis was performed by M.M.Z. All of the authors read and confirmed the final draft of the manuscript.

Funding

The authors received no specific funding for this work.

Data Availability

The data supporting this study are kept confidential and are not publicly available due to privacy and ethical considerations. However, they are available from the corresponding author upon reasonable request.

Ethics approval and consent to participate

Ethical approval was obtained from Research Council and the Ethics Committee of Yasuj University of Medical Sciences, Yasuj, Iran. With ethical approval number (*IR.YUMS.REC.1403.173*). We confirm that All methods were carried out in accordance with relevant guidelines and regulations of Declaration of Helsinki. The ethical principles and good scientific practices defined by the Iran National Ethics Committee were followed throughout the research process. Prior to the study, necessary permissions were obtained from the administrators of the study settings. Also, all participants were informed about the study objectives, and confidentiality of the information. Informed consent was obtained, and they were assured they could withdraw from the study at any stage without any obligation. All of the Participants signed a written consent prior to the study. The study adhered to the ethical standards outlined in the Declaration of Helsinki for the conduct of research involving human subjects.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Conflict of interest

The authors declared no conflict of interest.

References

1. Kwak Y, Ahn J-W, Seo YH. Influence of AI ethics awareness, attitude, anxiety, and self-efficacy on nursing students' behavioral intentions. *BMC nursing*. 2022;21(1):267.
2. Hariharan S, Jonnalagadda R, Walrond E, Moseley H. Knowledge, attitudes and practice of healthcare ethics and law among doctors and nurses in Barbados. *BMC Medical ethics*. 2006;7:1-9.
3. Cameron ME, Schaffer M, Park H-A. Nursing students' experience of ethical problems and use of ethical decision-making models. *Nursing ethics*. 2001;8(5):432-47.
4. Hakbilen HG, Ince S, Ozgonul ML. Ethical sensitivity of nursing students during a 4-year nursing curriculum in Turkey. *Journal of Academic Ethics*. 2023;21(1):41-51.
5. Sinclair J, Papps E, Marshall B. Nursing students' experiences of ethical issues in clinical practice: A New Zealand study. *Nurse education in practice*. 2016;17:1-7.
6. Mohammadi S, Borhani F, Roshanzadeh M. Moral sensitivity and delivering bad news skills: A study on critical care unit nurses. *Medical Ethics Journal*. 2016;10(37):7-16.
7. Chen Q, Su X, Liu S, Miao K, Fang H. The relationship between moral sensitivity and professional values and ethical decision-making in nursing students. *Nurse education today*. 2021;105:105056.
8. Izadi F, Bijani M, Fereidouni Z, Karimi S, Tehranineshat B, Dehghan A. The effectiveness of teaching nursing ethics via scenarios and group discussion in nurses' adherence to ethical codes and patients' satisfaction with nurses' performance. *The Scientific World Journal*. 2020;2020(1):5749687.
9. Zirak M, Moghaddsiyan S, Abdollahzadeh F, Rahmani A. Moral development of nursing students of Tabriz University of Medical Sciences. *Iranian Journal of Medical Ethics and History of Medicine*. 2011;4(4):45-55.
10. Ignatowicz A, Slowther AM, Bassford C, Griffiths F, Johnson S, Rees K. Evaluating interventions to improve ethical decision making in clinical practice: a review of the literature and reflections on the challenges posed. *Journal of Medical Ethics*. 2023;49(2):136-42.
11. Giuffrida S, Silano V, Ramacciati N, Prandi C, Baldon A, Bianchi M. Teaching strategies of clinical reasoning in advanced nursing clinical practice: A scoping review. *Nurse Education in Practice*. 2023;67:103548.
12. Beauchamp T, Childress J. *Principles of biomedical ethics: marking its fortieth anniversary*. Taylor & Francis; 2019. p. 9-12.
13. Zirak M, Hasankhani H, Parizad N. The moral reasoning ability of nurses and nursing students: a literature review. *Iranian Journal of Medical Ethics and History of Medicine*. 2015;7(6):15-28.

14. Barger RN. A summary of Lawrence Kohlberg's stages of moral development. Retrieved November. 2000;29:2004.
15. Mohamadi J, Azizi A. Effectiveness of nursing ethics education on moral reasoning nurses. 2015.
16. Namadi F, Hemmati-Maslakpak M, Moradi Y, Ghasemzadeh N. The effects of nursing ethics education through case-based learning on moral reasoning among nursing students. *Nursing and Midwifery Studies*. 2019;8(2):85-90.
17. Fard A, Sadat Hoseini AS, Kazemnejad A. The Effect of Storytelling through Simulation on Moral Reasoning and Moral Sensitivity of Nursing Students in Tehran University of medical sciences. *Education and Ethics In Nursing*. 2022;11(1-2):55-64.
18. Soltani M, Etemadifar S, Kheiri S. The effect of a Kohlberg's theory of moral development-based intervention on moral reasoning in nurse interns at Shahrekord University of Medical Sciences. *Journal of Multidisciplinary Care*. 2022;11(2):47-54.
19. İlaslan E, Adıbelli D, Teskereci G, Cura ŞÜ. Development of nursing students' critical thinking and clinical decision-making skills. *Teaching and Learning in Nursing*. 2023;18(1):152-9.
20. Borhani F, Abbaszadeh A, Kohan M, Fazael MA. Nurses and nursing students' moral reasoning in facing with dilemmas: a comparative study. *Iranian journal of medical ethics and history of medicine*. 2010;3(4):71-81.
21. Comrie RW. An analysis of undergraduate and graduate student nurses' moral sensitivity. *Nursing ethics*. 2012;19(1):116-27.
22. Rachmad YE. Beyond the Code: Ethical Artificial Intelligence and Its Impact on Social Evolution: Professional Work Organisation, Labour & Globalisation Book Publishing ...; 2022.
23. Yalcinkaya T, Ergin E, Yucel SC. Exploring nursing students' attitudes and readiness for artificial intelligence: a cross-sectional study. *Teaching and Learning in Nursing*. 2024;19(4):e722-e8.
24. O'Connor S, Permana AF, Neville S, Denis-Lalonde D. Artificial intelligence in nursing education 2: opportunities and threats. *Nursing Times*. 2023;119(11):28-32.
25. Buchanan C, Howitt ML, Wilson R, Booth RG, Risling T, Bamford M. Predicted influences of artificial intelligence on nursing education: Scoping review. *JMIR nursing*. 2021;4(1):e23933.
26. Schwartzstein RM. CLINICAL REASONING AND ARTIFICIAL INTELLIGENCE: CAN AI REALLY THINK? *Transactions of the American Clinical and Climatological Association*. 2024;134:133.
27. Castelvechi D. Are ChatGPT and AlphaCode going to replace programmers? *Nature*. 2022.
28. Stokel-Walker C. AI bot ChatGPT writes smart essays-should academics worry? *Nature*. 2022.
29. Bumbach MD. The use of AI powered ChatGPT for nursing education. *Journal of Nursing Education*. 2024;63(8):564-7.
30. Crisham P. Measuring moral judgment in nursing dilemmas. *Nurs Res*. 1981; 30(2):104 -10.
31. Hajilo P, Torabi M, Eslami Panah M. Relationship between moral reasoning and professional values among nursing students. *Avicenna Journal of Nursing and Midwifery Care*. 2022;30(1):1-11.

32. Sanjari M, Zahedi F, Aaelae M, Peymani M, Parsapoor A, Aramesh K, et al. Code of ethics for Iranian nurses. *Journal of Medical Ethics and History of Medicine*. 2012;5(1):17-.

33. Taskiran N. Effect of artificial intelligence course in nursing on students' medical artificial intelligence readiness: a comparative quasi-experimental study. *Nurse educator*. 2023;48(5):E147-E52.

34. Shin H, De Gagne JC, Kim SS, Hong M. The impact of artificial intelligence-assisted learning on nursing Students' ethical decision-making and clinical reasoning in pediatric care: a quasi-experimental study. *CIN: Computers, Informatics, Nursing*. 2023:10.1097.

Figures

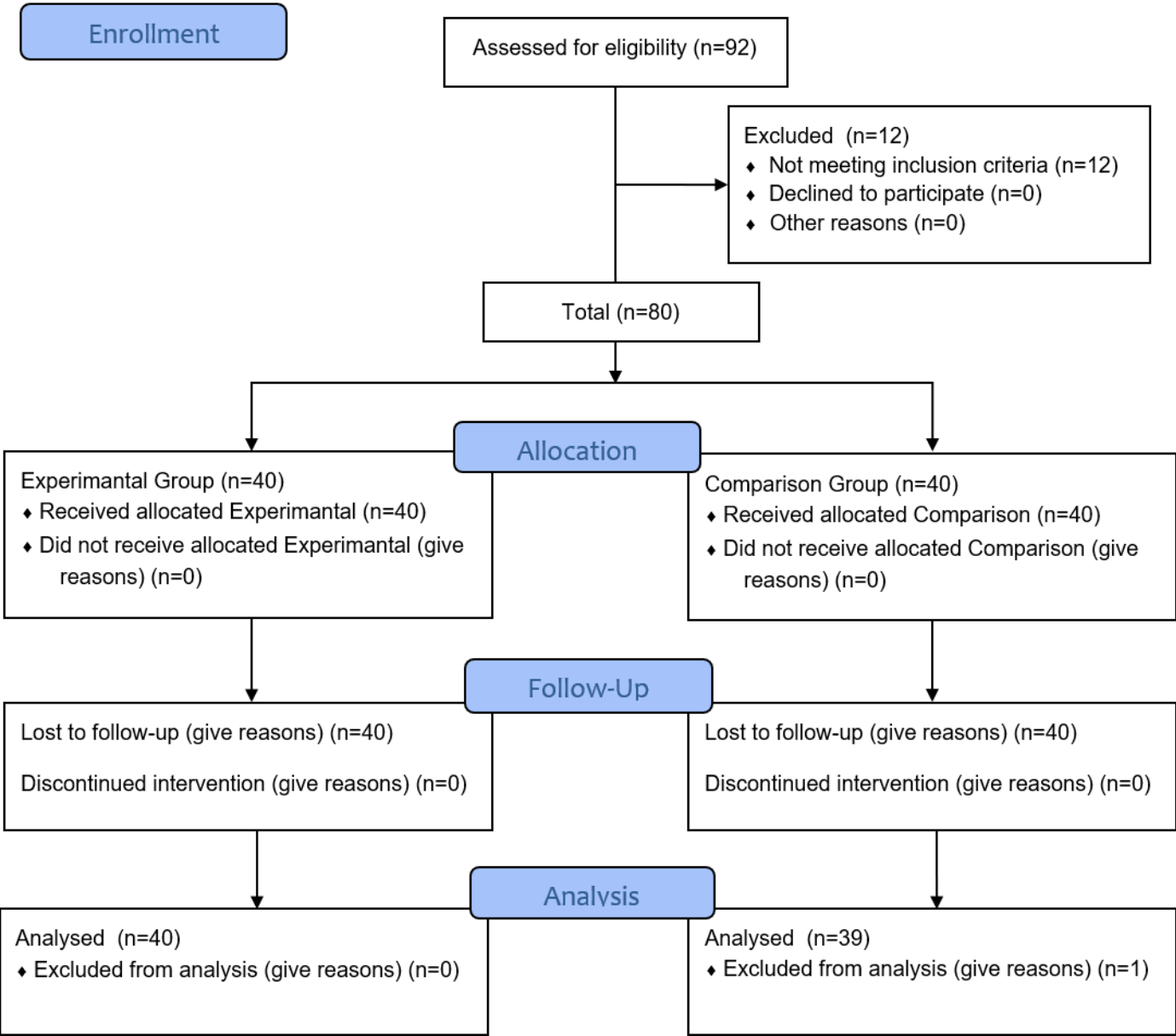


Figure 1

Flow diagram of participant enrollment, allocation, follow-up, and analysis.