

Nursing Students' Attitudes Toward Artificial Intelligence: Palestinian Perspectives

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Abstract

Background: Artificial intelligence (AI) is significantly transforming the nursing profession, enhancing patient care, and shaping future nursing practice. Understanding nursing students' attitudes toward AI applications is crucial for its effective integration into clinical practice and education.

Aim: To evaluate nursing students' attitudes toward AI in Palestine.

Methods: A cross-sectional design was conducted among 325 nursing students. Due to logistical constraints, data were gathered via online surveys using the AI attitude scale. The research was conducted between February and March 2024 at Arab American University in Palestine.

Results: The results showed that the average attitudes toward using AI in nursing practice scores ($M = 61.81$; $SD = 9.74$) were significantly greater than the neutral score ($p = .001$). Nursing students have a positive attitude toward AI in terms of benefits and willingness to use it in nursing practice. However, nursing students have a neutral attitude toward the practical advantages of AI and exhibit a negative attitude toward the dangers of AI in nursing. Furthermore, gender, academic year, and purpose of AI had statistically significant differences in nursing students' attitudes toward AI ($p = .034$, $.039$, and 0.042 respectively). Female students showed higher levels of attitudes toward AI usage, while participants with master's degree participants had the lowest level of attitudes toward AI.

Conclusion: Our findings demonstrate that nursing students have a positive attitude toward the integration of AI into nursing and healthcare practice, along with significant intentions to utilize the technology. The results highlight the need for AI-focused training within nursing curricula.

Keywords

artificial intelligence, attitude, nursing, students

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Background

Artificial intelligence (AI) entails creating a computer system capable of performing tasks typically associated with human intelligence. A key branch, machine learning (ML), enables computers to identify patterns in data, while a subcategory, deep learning (DL), uses multiple-layered neural networks to achieve tasks (Ronquillo et al., 2021). AI has the capacity to transform nursing across various domains (Buchanan et al., 2021). It represents a transformative force, especially in healthcare, bringing significant advancements from operating

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rooms to clinical trials and the pharmaceutical sector. AI not only advances the health industry but also reduces costs for patients and facilities (Bini, 2018). In nursing, AI is transforming practice by improving care delivery and educating nurses for future challenges. For example, AI-driven telehealth and robotics technologies expand the scope of nursing care, enhancing patient access, and remote monitoring (Rony et al., 2024; Tuohy, 2019). By integrating relevant data, AI supports nurses in delivering individualized, evidence-based care, ultimately leading to better patient outcomes (Abuzaid et al., 2022; Ronquillo et al., 2021). Furthermore, AI-based training is being developed to help medical students efficiently solve clinical problems using AI technologies (Ahuja, 2019).

It is anticipated that AI will be a key feature in medical and nursing disciplines in the coming years. In order for healthcare professionals to be well-prepared, the use of AI in medical and nursing school curricula is recommended (Briganti & Le Moine, 2020; Dermody & Fritz, 2019; Hegde et al., 2022). Integration of innovative technology into nursing education is particularly beneficial in situations with limited clinical coaching, as it provides effective training and professional skill development (Chang et al., 2018).

Review of Literature

According to Labrague et al. (2023), how student nurses perceive AI in nursing practice can affect their attitudes and intentions toward its adoption. In order to integrate AI into clinical practice, it is important to first appreciate and understand the nurses' attitudes and behaviors toward the present and future uses of AI. Evaluating their present degree of knowledge in AI is very important in assessing their future training needs (Abuzaid et al., 2022). However, despite the significance of nursing attitudes in AI acceptance, this area has received limited attention (Labrague et al., 2023). Additionally, recent systematic review and meta-analysis suggest that while many healthcare students hold generally positive attitudes toward AI, significant knowledge disparities persist across different educational and clinical settings. These gaps are particularly pronounced in low-resource environments where access to AI training and technology may be limited. Furthermore, existing studies have paid insufficient attention to regional variations in AI acceptance and preparedness, leaving critical gaps in our understanding of context-specific challenges (Amiri et al., 2024). This is especially true for Palestine, where the intersection of healthcare education and emerging technologies remains understudied despite the region's unique healthcare challenges and educational infrastructure.

Accordingly, understanding student nurses' attitudes toward AI and addressing barriers to its adoption is crucial. As such, nurse educators can be instrumental in improving technological skills, and increasing knowledge on AI and its applications through practice, thus equipping future nurses to an AI-centered healthcare setting and enhancing patient

care provided by them (Labrague et al., 2023). This study focuses on Palestinian nursing students, an underrepresented group in AI research. In Palestine, AI integration in healthcare and nursing education is hindered by limited infrastructure, restricted access to technology, and the absence of supportive institutional policies (Khlaif et al., 2025). As a result, students have minimal exposure to AI tools compared to peers in more advanced regions.

Therefore, this study aims to evaluate nursing students' attitudes regarding AI in the nursing profession. By investigating these attitudes, we can inform teaching techniques and targeted interventions, gaining important insights into the underlying issues influencing nursing students' attitudes toward AI. Furthermore, while studies on attitudes toward AI in nursing education are limited internationally, there is a knowledge gap in the Palestinian healthcare system. Closing this gap is essential for aligning with global trends and best practices in healthcare technology integration. Ultimately, we hope that our research will inspire curricular improvements and professional development initiatives, empowering future nurses to leverage the advantages of AI to improve the quality of patient care.

Research Questions

1. What are nursing students' attitudes toward the use of AI in the nursing profession?
2. Is there a statistically significant difference in nursing students' attitudes toward using AI based on their demographic characteristics?

Methods

Sample and Sampling Method

A cross-sectional study data was collected among nursing students to evaluate their attitudes toward AI at the Faculty of Nursing, Arab American University. Due to the 7 October war on Gaza and the majority of learning was conducted online, data was distributed to the students via the university platform using Google Forms.

The study involved approximately 500 nursing students from the Faculty of Nursing at Arab American University, Palestine. The actual sample consisted of 325 undergraduate nursing students who consented to participate in the study and returned a completed questionnaire. The Raosoft online sample size calculator (http://www.raosoft.com/sample_size.html) was utilized to determine the minimum required sample size, which was calculated to be 218 (RAOSOFTCOM, 2022). This calculation was based on a 95% confidence level, a 5% margin of error, a population of 500, and a 50% response distribution (population proportion).

Inclusion and Exclusion Criteria. The inclusion criteria were: (1) enrollment in either undergraduate students willing to participate in the study and Participants from graduate students and

undergraduate (first to fourth academic year) or graduate nursing program, and (2) willingness to participate in the study. This ensured comprehensive representation across different academic levels. The exclusion criteria were enrollment in a non-nursing major. Recognizing the limitations of online data collection; particularly the potential exclusion of students with limited internet access; efforts were made to enhance accessibility by allowing survey submission via mobile phones. Additionally, reminders were sent through the university platform and class group chats to encourage broad participation. Data were collected over 2 months, from February 1 to March 31, 2024. To ensure data quality and accuracy during the data collection procedure, an explanatory letter outlining the objectives and purpose of the study was included in the online survey. In the explanatory letter, the researchers also provided a cell phone number in case the participants had any further queries or concerns.

Instruments

The study tool consisted of the following sections:

1. Sociodemographic characteristics: age, gender;
2. AI experience, source, and concerns: Previous AI experience (Yes/No), Sources of information on AI (family, media, social media, university, web browsing), Concerns on AI (data privacy, fear of job replacement, hacking & cyber security attacks, less human patient interaction);
3. Internet duration use and purposes (duration of internet usage :<3 h /day; 3–6 h /day;> 6 h /day); purpose of using the Internet: gather information, play games, messenger/SNW, movies/TV/videos;
4. Nursing students' attitudes toward AI.

The instrument comprised five-point Likert-type items with neutral and strongly/somewhat (dis)agree anchors. The original tool was developed by Schepman and Rodway (2020). Subsequently, Lukić et al. (2023), contextualized and adapted the tool specifically for nursing, with approval granted. The tool consisted of 20 items which are divided into four subscales including Principal factor I (factor subscale titled “positive aspects of artificial intelligence in nursing” has a score range from 5 to 30); Principal factor II (factor subscale titled “negative aspects of artificial intelligence” has a score range of 8–40); Principal factor III (factor subscale titled “positive practical implications of artificial intelligence” has a score range of 4–20); Principal factor IV (factor subscale titled “intent to implement artificial intelligence in nursing” has a score range of 2 to 10; Lukić et al., 2023).

The scoring system for each subscale involves summing the scores of the items in each subscale. Additionally, the neutral score is calculated by summing the total scores of the items * 3 (neutral score on each item) in each subscale,

providing a reference for evaluating participants' general attitudes regarding the relevant aspect of AI in the nursing field. Additionally, Principal factor II, which consists of 8 items, was reversed before the analysis to ensure consistency in interpretation.

The reliability of the original scale was assessed using Cronbach's α , with subscale values ranging from 0.86 to 0.91 (Lukić et al., 2023). In the present study, the reliability of each subscale was also determined using Cronbach's α : Benefits of AI in nursing (6 items, $\alpha=0.60$), Dangers of AI (8 items, $\alpha=0.84$), Practical advantages of AI (4 items, $\alpha=0.76$), and Willingness to use AI in nursing practice (2 items, $\alpha=0.84$).

The survey was translated into Arabic and then back-translated to ensure clarity for all nursing students. Five PhD-holding educators were consulted to assess the tool's validity. They were asked to evaluate and validate its accuracy, provide recommendations for improving clarity, and determine whether the items accurately reflected the study's main objectives. Any necessary changes were made exclusively to the Arabic translation based on their feedback.

Moreover, to confirm the AI attitude scale subscale structure and cultural adaptations for validity within the Palestinian context, Exploratory Factor Analysis was conducted. The analysis resulted in four components that have a Total Initial Eigenvalues greater than 1. Those four components explain 59.0% of the variance. Therefore, we end with four factors that had a high positive correlation with the original tool factors (r =between 0.607 to 0.911). “Factor 1 was comprised of 6 items reported on a 5-point Likert scale that explained 24.55% of the variance with factor loadings from .430 to .900.” “Factor 2 was comprised of eight items reported on a five-point Likert scale that explained 19.83% of the variance with factor loadings from .614 to .764.” “Factor 3 was comprised of four items reported on a five-point Likert scale that explained 8.61% of the variance with factor loadings from .481 to .840.” “Factor 4 was comprised of six items reported on a five-point Likert scale that explained 6.00% of the variance with factor loadings from .523 to .591.”

Pilot Study

Thirty nursing students pretested the questionnaire before the actual data collection procedure. This pretest allowed for the estimation of the time required to complete the questionnaire, the identification of any confusing sections, and the assessment of the questionnaire's validity and utility. The average time to finish the surveys was 10 to 15 min.

Ethical Approval

The Faculty of Nursing at Arab American University approved the study, and ethical approval was obtained from Al-Najah University's nursing faculties (IRB: Nsg.Feb.2024/18). Participation was entirely voluntary, with no penalties or grade

impacts for nonparticipation. Participant anonymity was ensured by not disclosing names or any other personally identifying information, and all data was securely stored for study-related purposes only. All participants provided informed consent.

Data Analysis

Boxplots and normal probability plots were used to graphically analyze the distributions of the total AI scores. The data's boxplots revealed no extreme values, and the normal probability plots showed no significant departures from normalcy. As a result, we used a parametric statistical method to analyze the data. Following data collection, the data was tabulated and analyzed using the Statistical Package for the Social Sciences (SPSS) version 27. As applicable, frequency, percentage, means, and standard deviations were used to report the quantitative data.

One sample *t*-test was conducted to identify whether there is a difference between the results on the four subscales of a Questionnaire used to evaluate nursing students' attitudes regarding AI based on the proposed neutral score. Analysis of variance (ANOVA) test is used to compare differences between two or more of an independent group as the dependent variable (attitudes) is continuous.

Results

Out of a total of 325 nursing students, 178 (54.8%) were female and in the fourth academic year (57.2%) with no AI previous experience (64.3%). Social media was the main source of nurses' information about AI (53.2%), followed by university (16.6%), and web browsing (14.2%), while the least other sources were friends (8.0%) and media (8.0%). The main concerns of nursing students on AI were data privacy (47.5%), followed by hacking (25.3%), and less human–patient interaction (20.0%; see Table 1).

It's clear that nursing students have positive attitudes regarding the benefits of AI in nursing as their average (22.4) exceeded the neutral score (18), especially in their attitudes toward the beneficial applications of AI in nursing (4.17 out of 5) and by their impressed by what AI can do (4.02 out of 5), but little by ability of AI to provide new opportunities for nursing professionals (2.06 out of 5). Also, nursing students have a positive attitude regarding the willingness to use AI in nursing practice as their average (6.96) exceeded the neutral score (6). However, nursing students have a neutral attitude toward the practical advantages of AI in nursing as their average (12) is equal to the neutral score (12.28).

On the other hand, nursing students have a positive attitude regarding the Dangers of AI in nursing as their average (20.51) is lower than the neutral score (24) as they believe that AI might take control of people (2.27/5) and they think that artificially intelligent systems can make many errors (2.39/5; see Table 2).

Table 1. Study Nursing Students' Participants' Characteristics.

		Frequency	Percent
Gender	Female	178	54.8
	Male	147	45.2
Year	First year	36	11.1
	Second year	27	8.3
	Third year	68	20.9
	Fourth year	186	57.2
	Master	8	2.5
AI previous experience	No	209	64.3
	Yes	110	33.8
Sources of information on AI	Friends or family	26	8.0
	Media	26	8.0
	Social media	173	53.2
	University	54	16.6
Duration of internet usage	Web browsing	46	14.2
	<3 h/day	75	23.1
	3–6 h/day	152	46.8
Concerns on AI	More than 6 h/day	98	30.2
	Data privacy	152	46.8
	Fear of job replacement	23	7.1
	Hacking & cyber security attacks	81	24.9
	Less human interaction with the patient	64	19.7

AI: artificial intelligence.

To ascertain whether the results on the attitudes of nursing students regarding AI, as measured against the proposed neutral score of 60 out of 100, were statistically significant, a one-sample *t*-test was performed. The results indicate a significant difference between the neutral scores and nursing students' attitudes regarding using AI in nursing practice ($M = 61.81$; $SD = 9.74$, $p = .001$; see Table 3).

To establish whether the responses provided on the four subscales of a Questionnaire meant to evaluate the attitudes of nursing students regarding AI differ based on the assumed average score, a one-sample *t*-test was performed. The results indicate a significant difference between the neutral scores of the Benefits of AI (18) and a neutral score of Willingness to use AI (6) ($M = 22.04$, 6.96 ; $SD = 3.43$, 2.20 , $p < .001$, respectively). Additionally, the results indicate a significant difference between the neutral scores of the Dangers of AI in nursing (20.51) and nursing students' Dangers of AI in nursing scores ($M = 27.48$; $SD = 6.38$, $p < .001$). On the other side, the results indicate a nonsignificant difference between the neutral scores of the Practical advantages of AI in nursing (12) and nursing students' Practical advantages of AI in nursing scores ($M = 12.28$; $SD = 3.78$, $p = .179$; see Table 4).

Gender, academic year, and purpose of AI had a statistically significant difference in nursing students' attitudes toward AI in nursing ($p = .034$, $.039$, and 0.042 , respectively). Female and messenger purpose had a higher level of attitudes toward AI usage in nursing while master nursing academic

Table 2. Item Statistics of Nursing Students' Attitudes Regarding AI.

	Mean	Standard Deviation	Neutral Point
<i>Benefits of artificial intelligence in nursing</i>	22.4	3.43	18.0
1. "Artificially intelligent systems can benefit human health"	3.99	0.94	
2. "I am impressed by what artificial intelligence can do"	4.02	0.88	
3. "Artificial intelligence can have positive impacts on people's well-being"	2.06	1.14	
4. "Artificial intelligence can provide new opportunities for nursing professionals"	3.90	1.07	
5. "Possibilities for use of artificial intelligence in nursing are exciting"	3.90	1.07	
12. There are many beneficial applications of artificial intelligence in nursing"	4.17	0.87	
<i>Dangers of artificial intelligence</i>	20.51	6.38	24.0
13. "I think that using artificial intelligence in healthcare is dangerous"	2.51	1.09	
14. "Use of artificial intelligence in nursing is unethical"	3.10	1.19	
15. "I think artificially intelligent systems make many errors"	2.39	1.01	
16. "I feel uncomfortable when I think about future uses of artificial intelligence in medicine"	2.59	1.02	
17. "I find artificial intelligence sinister"	2.62	1.20	
18. "Nurses/medical technicians will suffer if artificial intelligence is used more and more"	2.45	1.20	
19. "Artificial intelligence is used to spy on people"	2.56	1.24	
20. "Artificial intelligence might take control of people"	2.27	1.06	
<i>Practical advantages of artificial intelligence</i>	12.28	3.78	12.0
8. "For routine tasks, I would rather use an artificially intelligent system than a human"	2.86	1.32	
9. "The nursing profession will benefit from a wider use of artificial intelligence in the future"	3.68	1.05	
10. "An artificially intelligent agent can do many routine jobs better than a human nurse/technician"	3.02	1.29	
11. "Artificially intelligent systems are more efficient than nurses/medical technicians"	2.73	1.30	
<i>Willingness to use artificial intelligence in nursing practice</i>	6.96	2.20	6.0
6. "I would like to use artificial intelligence in my job"	3.45	1.19	
7. "I am interested in using artificially intelligent systems for my daily nursing tasks"	3.51	1.21	

Bold values present the mean and standard deviation.

Items in Table 2 were used with permission from Lukić et al. (2023).

Table 3. One-Sample t-Test to Evaluate Nursing Students' Attitudes Regarding AI.

	N	Mean	Standard Deviation	t	p Value	Mean Difference	95% CI Difference	
							Lower	Upper
Total nursing attitudes toward AI in nursing care	325	61.81	9.74	3.353	.001	1.81	.7489	2.8758

AI: artificial intelligence.

Table 4. Evaluation of Nursing Students' Attitudes Regarding AI Using Four Key Subscales.

Subscale (Neutral Point)	N	Mean	Standard Deviation	t	p	95% CI of the Difference	
Benefits of AI in nursing (18)	325	22.04	3.43	21.231	<.001	3.671	4.421
Dangers of AI (24)	325	20.51	6.38	9.839	<.001	2.786	4.179
Practical advantages of AI (12)	325	12.28	3.78	1.348	.179	-.1300	.6961
Willingness to use AI in nursing practice (6)	325	6.966	2.20	7.916	<.001	.7260	1.2063

AI: artificial intelligence.

degree participants had the lowest level of attitudes toward AI usage in nursing. Although there were some variations based on their other characteristics, such as previous experience, concerns, source, and duration, none of them had any significant difference as seen in Table 5.

Discussion

To our knowledge, this study stands as the first of its kind among Palestinian undergraduate nursing students, aiming to provide significant insights into nursing students' attitudes toward AI in the nursing field. The study also examines how

Table 5. The Nursing Students' Characteristics and Their Attitudes Toward Using AI in Nursing.

		N	Mean	Standard Deviation	95% CI for Mean		F /t	p Value	Effect Sizes (Cohen's d)
					Lower Bound	Upper Bound			
Gender	Female	178	62.85	10.32	0.18	4.43	2.132	.034*	0.217
	Male	147	60.55	8.88					
AI previous experience	No	209	61.44	9.46	-3.63	0.88	-1.198	.232	-0.152
	Yes	110	62.81	10.23					
Academic year	First year	36	62.03	12.87	57.67	66.38	2.559	.039*	0.053
	Second year	27	62.81	8.23	59.56	66.07			
	Third year	68	61.16	9.06	58.97	63.36			
	Fourth year	186	62.31	9.33	60.96	63.66			
AI sources of information	Master	8	51.50	9.64	43.44	59.56			
	Friends or family	26	60.19	9.34	56.42	63.96	.427	.789	-0.072
	Media	26	60.50	9.75	56.56	64.44			
	Social media	173	61.84	10.34	60.29	63.40			
	University	54	62.56	8.70	60.18	64.93			
Duration of internet usage	Web browsing	46	62.48	9.02	59.80	65.16			
	<3 h/day	75	61.48	9.39	59.32	63.64	.202	.818	-0.038
	3–6 h/day	152	61.64	9.47	60.13	63.16			
Concerns on AI	More than 6 h/day	98	62.33	10.48	60.23	64.43			
	Data privacy	152	62.45	9.67	60.90	64.00	.349	.790	0.016
	Fear of job replacement	23	61.13	11.25	56.27	65.99			
	Hacking & cyber security attacks	81	61.20	9.56	59.08	63.31			
Purpose	Less human interaction with the patient	64	61.91	9.76	59.47	64.35			
	Gather information	97	61.81	8.54	60.09	63.54	2.758	.042*	0.116
	Playing games	12	54.00	12.74	45.91	62.09			
	Messenger/SNW	176	62.26	9.58	60.84	63.69			
	Movies/TV/videos	40	62.18	11.48	58.51	65.85			

AI: artificial intelligence; * bold values significant at $p < .05$.

these attitudes vary based on student characteristics. A study conducted in Korea highlighted the importance of understanding how nursing students perceive AI (Kwak et al., 2022). One key aspect they investigated was the impact of attitudes toward AI on the behavioral intentions of nursing students, utilizing the General Attitudes Towards Artificial Intelligence Scale (GAAIS) developed by Schepman and Rodway (2020). However, in our study, we adopted the scale's components and further contextualized them into subscales to evaluate nursing students' attitudes specifically toward AI in the context of nursing, rather than AI in general (Lukić et al., 2023).

The results of our study showed that female students were predominant among our participants, which is consistent with trends seen in undergraduate nursing programs (Kwak et al., 2022; Labrague et al., 2023; Lukić et al., 2023; Salameh & Salameh, 2017; Salameh et al., 2023). Comparing male and female participants in terms of positive attitudes toward using AI in nursing, a statistically significant difference in their positive attitudes toward using AI in nursing was found. Female nursing students had a higher positive attitude toward using AI in nursing than male students. This disparity underscores the varied exposure to AI technology in healthcare

among nursing students based on gender, necessitating further study and consideration in nursing curricula.

The main concerns of nursing students regarding AI were data privacy, followed by concerns about hacking human-patient interaction, with the least concern being Fear of job replacement. These results were consistent with a previous study conducted on medical students, which suggested that human radiologist won't be replaced by AI (Pinto et al., 2019). Concerns regarding the potential replacement of human teachers must be addressed alongside the technological aspects of AI education. Promoting a balanced perspective on the role of AI in healthcare should be a paramount concern for educational institutions, emphasizing how AI may complement human expertise rather than supplant it (Al-Qerem et al., 2023).

Our findings revealed that undergraduate nursing students have slightly positive attitudes toward AI. The results were slightly lower than a previous study conducted in Croatia (Lukić et al., 2023). The difference may be attributed to differences in the academic level of the participants. In particular, our study encompassed nursing students from all academic levels (first through fourth) as well as graduate-level students, providing a more comprehensive view across different

degrees of exposure to both clinical practice and technology integration in healthcare. In contrast, Lukić et al. (2023) limited their sample to first-year students enrolled in four Croatian universities. Compared to their study, these students had minimal clinical experience and limited formal education on AI-related technologies, which could influence their attitudes differently compared to more senior students. Future studies could further examine how attitudes toward AI evolve as students advance in their education to validate this hypothesis.

A deeper understanding of students' awareness regarding AI was achieved through subscale analysis. Our findings demonstrated that undergraduate nursing students generally have positive attitudes toward the benefits of AI and a willingness to use it. This suggests that students recognize the potential advantages of using AI in nursing programs and incorporate it in their daily tasks (Salameh et al., 2020). However, the majority of nursing students reported no previous experience with AI. This gap may be explained by the fact that, in Palestine, the integration of AI in healthcare and nursing education is hindered by limited infrastructure, restricted access to technology, and the absence of supportive institutional policies, compared to other countries (Khlaif et al., 2025).

However, regarding the dangers associated with AI, there was a moderate level of concern among nursing students. Notably, fear of AI making errors and ethical concerns were prevalent. These results indicate that although students acknowledge the benefit of AI, they also have issues regarding its accuracy, potential negative impacts, and ethical considerations. Similarly, a study conducted in the Philippines identified time constraints, lack of knowledge, awareness, and computer skills as the main barriers to accessing AI (Labrague et al., 2023).

Gender, academic year, and purpose of AI showed statistically significant differences in nursing students' attitudes regarding AI. Female students exhibited more positive attitudes toward AI compared to male students. This contrasts with previous studies that found males to have more favorable attitudes toward AI (Lukić et al., 2023; O'Shaughnessy et al., 2023). One possible explanation for this discrepancy is the higher reported internet usage among female nursing students in our sample. Increased internet engagement may enhance familiarity with digital tools, online platforms, and emerging technologies, including AI applications in healthcare (Nipo et al., 2020). This heightened exposure could foster greater comfort, confidence, and curiosity toward AI, contributing to more positive attitudes. Additionally, internet use may facilitate access to educational content, social media discussions, and digital simulations that portray AI in a favorable light. Moreover, further studies are warranted to explore the gender-based variations, we can inform teaching techniques and targeted interventions, gaining important insights into the underlying issues influencing nursing students' attitudes toward AI. Additionally, master's students exhibited lower

attitudes toward AI compared to undergraduate nursing students. This could be explained that younger students were more exposed to AI, especially during the COVID-19 pandemic when education was rapidly transitioned to online platforms (Reshia et al., 2024). The results showed that nursing students' attitudes toward AI are strongly influenced by its intended usage. In contrast to those who use AI solely for playing games, students who use it for educational and communication purposes (gathering information, messenger/SNW, movies/TV/videos) have more positive attitudes toward its usage. This indicates that positive attitudes are fostered by exposure to the practical and professional applications of AI. Therefore, emphasizing AI's professional benefits and incorporating AI-related tasks and activities into nursing curricula may improve students' attitudes toward and preparedness for using AI in their future daily activities.

This underscores the importance of understanding both the potential benefits and dangers of adopting AI in healthcare, along with the factors influencing nursing students' attitudes and their readiness for adopting it in their clinical practice. Since, the incorporation of AI into the nursing field is paving the way for advancement in patient care (Pepito & Locsin, 2019).

Limitations

The study exhibits certain limitations. Primary, its reliance on a single-university design may impinge on the generalizability of the findings to broader populations. Furthermore, although master's students were included in the study, their number is quite modest. Additionally, this is not a longitudinal study, so caution is necessary when interpreting changes in attitudes between students of different classes or along the course of their studies. Also, responder bias is another limitation, as students who volunteered to participate in the study might have held more favorable attitudes toward AI.

Recommendations and Implications for Practice. The study findings highlight the need for integrating AI education more intentionally within nursing curricula to adequately prepare future nurses for technology-enhanced healthcare environments. Nursing programs should embed foundational knowledge of AI; including its applications, limitations, and ethical considerations; into both theoretical and clinical education. Practical strategies such as AI-focused simulation exercises, interactive online modules, and virtual case studies can help improve students' understanding and confidence in using AI technologies. These tools not only promote technical competence but also promote critical thinking regarding AI's role in patient care. Curricula should also incorporate specific material on digital ethics, patient data protection, and responsible AI use to help alleviate worries about privacy, data security, and ethical issues. Involving students in discussions and reflective exercises around these topics can increase their awareness and promote ethically sound decision making.

These curriculum changes can, finally, promote AI preparedness and guarantee that nursing graduates are prepared to safely and efficiently negotiate the changing terrain of digital healthcare.





Conclusion

Our results reveal that undergraduate nursing students exhibited high motivation to use AI technology, coupled with positive attitudes regarding its integration into nursing and healthcare practice. The implications of the study highlight the importance of incorporating AI-focused coursework, training, and practical learning opportunities within nursing school programs, considering gender variations. By doing so, students can better equip themselves with the essential skills and proficiency to competently utilize AI technology in their future careers. Furthermore, healthcare organizations should create a conducive environment that fosters the learning and application of AI among nursing students. This will ensure that they do not only adapt to the dynamic, AI-driven healthcare environment but also contribute to enhancing patient outcomes.

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Ethical Considerations and Consent to Participate

The study was approved by the Faculty of Nursing at Arab American University, and ethical approval was obtained from Al-Najah University's nursing faculties (IRB: Nsg.Feb.2024/18). Participation was entirely voluntary, with no penalties or grade impacts for nonparticipation. Participant anonymity was ensured by not disclosing names or any other personally identifying information, and all data was securely stored for study-related purposes only. All participants provided written informed consent.

Author Contributions

BS, JQ, BH, and LK designed the study. BS, BH, FE, A A, and IF collected the data. BS and JQ analyzed the data. All authors prepared the manuscript and approved the final version for submission.

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Declaration of Conflicting Interests

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Supplemental Material

Supplemental material for this article is available online.

References

- Abuzaid, M. M., Elshami, W., & Fadden, S. M. (2022). Integration of artificial intelligence into nursing practice. *Health and Technology, 12*(6), 1109–1115. <https://doi.org/10.1007/s12553-022-00697-0>
- Ahuja, A. S. (2019). The impact of artificial intelligence in medicine on the future role of the physician. *PeerJ, 7*(7702), e7702. <https://doi.org/10.7717/peerj.7702>
- Al-Qerem, W., Eberhardt, J., Jarab, A., Al Bawab, A. Q., Hammad, A., & Alasmari, F., Alazab, B., Husein, D. A., Alazab, J., & S. Al-Beool (2023). Exploring knowledge, attitudes, and practices towards artificial intelligence among health professions' students in Jordan. *BMC Medical Informatics and Decision Making, 23*(1), 288. <https://doi.org/10.1186/s12911-023-02403-0>
- Amiri, H., Peiravi, S., Rezazadeh Shojaei, S. S., Rouhparvarzamin, M., Nateghi, M. N., Etemadi, M. H., ShojaeiBaghini, M., Musaie, F., Anvari, M. H., & Asadi Anar, M. (2024). Medical, dental, and nursing students' attitudes and knowledge towards artificial intelligence: A systematic review and meta-analysis. *BMC Medical Education, 24*(1), 412. <https://doi.org/10.1186/s12909-024-05406-1>
- Bini, S. A. (2018). Artificial intelligence, machine learning, deep learning, and cognitive computing: What do these terms mean and how will they impact health care? *The Journal of Arthroplasty, 33*(8), 2358–2361. <https://doi.org/10.1016/j.arth.2018.02.067>
- Briganti, G., & Le Moine, O. (2020). Artificial intelligence in medicine: Today and tomorrow. *Frontiers in Medicine, 7*, 509744. <https://doi.org/10.3389/fmed.2020.00027>
- Buchanan, C., Howitt, M. L., Wilson, R., Booth, R. G., Risling, T., & Bamford, M. (2021). Predicted influences of artificial intelligence on nursing education: Scoping review. *JMIR Nursing, 4*(1), e23933. <https://doi.org/10.2196/23933>
- Chang, C. Y., Lai, C. L., & Hwang, G. J. (2018). Trends and research issues of mobile learning studies in nursing education: A review of academic publications from 1971 to 2016. *Computers & Education, 116*, 28–48. <https://doi.org/10.1016/j.compedu.2017.09.001>
- Dermody, G., & Fritz, R. (2019). A conceptual framework for clinicians working with artificial intelligence and health-assistive Smart Homes. *Nursing Inquiry, 26*(1), e12267. <https://doi.org/10.1111/nin.12267>
- Hegde, S., Ajila, V., Zhu, W., & Zeng, C. (2022). Artificial intelligence in early diagnosis and prevention of oral cancer. *Asia-Pacific Journal of Oncology Nursing, 9*(12), 100133. <https://doi.org/10.1016/j.apjon.2022.100133>
- Khlaif, Z. N., Alkouk, W. A., Salama, N., & Abu Eideh, B. (2025). Redesigning assessments for AI-enhanced learning: A framework for educators in the generative AI era. *Education Sciences, 15*(2), 174. <https://doi.org/10.3390/educsci15020174>

- Kwak, Y., Ahn, J. W., & Seo, Y. H. (2022). Influence of AI ethics awareness, attitude, anxiety, and self-efficacy on nursing students' behavioral intentions. *BMC Nursing, 21*(1), 267. <https://doi.org/10.1186/s12912-022-01048-0>
- Labrague, L. J., Aguilar-Rosales, R., Yboa, B. C., Sabio, J. B., & de Los Santos, J. A. (2023). Student nurses' attitudes, perceived utilization, and intention to adopt artificial intelligence (AI) technology in nursing practice: A cross-sectional study. *Nurse Education in Practice, 73*, 103815. <https://doi.org/10.1016/j.nepr.2023.103815>
- Lukić, A., Kudelić, N., Antičević, V., Lazić-Mosler, E., Glunčić, V., Hren, D., & Lukić, I. K. (2023). First-year nursing students' attitudes towards artificial intelligence: Cross-sectional multi-center study. *Nurse Education in Practice, 71*, 103735. <https://doi.org/10.1016/j.nepr.2023.103735>
- Nipo, D. T., Lily, J., Idris, S., Pinjaman, S., & Bujang, I. (2020). Human development through the lens of digital literacy. *Business and Economic Research, 10*(3), 203–215. <https://doi.org/10.5296/ber.v10i3.17183>
- O'Shaughnessy, M. R., Schiff, D. S., Varshney, L. R., Rozell, C. J., & Davenport, M. A. (2023). What governs attitudes toward artificial intelligence adoption and governance? *Science and Public Policy, 50*(2), 161–176. <https://doi.org/10.1093/scipol/scac056>
- Pepito, J. A., & Locsin, R. (2019). Can nurses remain relevant in a technologically advanced future? *International Journal of Nursing Sciences, 6*(1), 106–110. <https://doi.org/10.1016/j.ijnss.2018.09.013>
- Pinto dos Santos, D., Giese, D., Brodehl, S., Chon, S. H., Staab, W., & Kleinert, R., Maintz, D., & B. Baeßler (2019). Medical students' attitude towards artificial intelligence: A multicentre survey. *European Radiology, 29*, 1640–1646. <https://doi.org/10.1007/s00330-018-5601-1>
- RAOSOFTCOM. (2022). Sample Size Calculator by Raosoft, Inc. Retrieved January 26, 2021, from <http://www.raosoft.com/samplesize.html>
- Reshia, A., Omar, A., Alsadaan, N., Ali, T., Elsobky, F., & Kandil, F. (2024). Adapting to New Norms: Evaluating Student Experiences and Academic Performance with E-Learning at Jouf University during the COVID-19 Pandemic.
- Ronquillo, C. E., Peltonen, L. M., Pruinelli, L., Chu, C. H., Bakken, S., Beduschi, A., Cato, K., Hardiker, N., Junger, A., Michalowski, M., Nyrup, R., Rahimi, S., Reed, D. N., Salakoski, T., Salanterä, S., Walton, N., Weber, P., Wiegand, T., & Topaz, M. (2021). Artificial intelligence in nursing: Priorities and opportunities from an international invitational think-tank of the Nursing and Artificial Intelligence Leadership Collaborative. *Journal of Advanced Nursing, 77*(9), 3707–3717. <https://doi.org/10.1111/jan.14855>
- Rony, M. K. K., Parvin, M. R., & Ferdousi, S. (2024). Advancing nursing practice with artificial intelligence: Enhancing preparedness for the future. *Nursing Open, 11*(1), e2070. <https://doi.org/10.1002/nop2.2070>
- Salameh, B., Ayed, A., Fashafsheh, I., Alrazeeni, D. M., Batran, A., & Ahmed, F. (2023). Nursing students' understanding of palliative care in Palestine. *Critical Care Nursing Quarterly, 46*(2), 203–216. <https://doi.org/10.1097/CNQ.0000000000000453>
- Salameh, B., Ewais, A., & Salameh, O. (2020). Integrating M-learning in teaching ECG reading and arrhythmia management for undergraduate nursing students.
- Salameh, B. S., & Salameh, B. S. (2017). Self-confidence and satisfaction among nursing students with the use of high fidelity simulation at Arab American University, Palestine. *International Journal of Health and Life-Sciences, 3*(2), 15–23. <https://doi.org/10.20319/ijhls.2017.32.1523>
- Schepman, A., & Rodway, P. (2020). Initial validation of the general attitudes towards Artificial Intelligence Scale. *Computers in Human Behavior Reports, 1*, 100014. <https://doi.org/10.1016/j.chbr.2020.100014>
- Tuohy, T. (2019). Artificial Intelligence Health Care Information Technology Total Value Delivery. Lulu. com.