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Pediatric Nursing Students and Artificial Intelligence: A Cross-Sectional Study

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ABSTRACT

Background: The rapid integration of Artificial Intelligence (AI) into healthcare necessitates that nursing education evolves to equip students with essential technological competencies. **Objectives:** To explore pediatric nursing students' perceptions of AI in nursing and analyze associations with sociodemographic factors and prior AI knowledge. **Methods:** A descriptive cross-sectional study was conducted from December 2024 to March 2025 across five universities in Baghdad. A non-probability sample of 500 pediatric nursing students completed the Shinners Artificial Intelligence Perception (SAIP) tool. Data were analyzed using descriptive statistics and inferential comparisons (*t*-tests/ANOVA) via SPSS. **Results:** Participants had a mean age of 21 ±1.02 years. While 79.8% reported previous knowledge of AI, 59.8% had not utilized it for academic purposes. Overall, students demonstrated a moderate level of perception toward AI (Mean score range: 24–36). Significant associations were found between perception levels and sex (p=0.009), socioeconomic status (p=0.05), and prior AI knowledge (p=0.03). Only 4% of students at Madenat Al-Elem University, Iraq exhibited "high" perception, which was the highest proportion among the universities surveyed. **Conclusion:** Pediatric nursing students possess moderate readiness for AI adoption but lack deep engagement with specific clinical applications. Curriculum reform integrating nursing informatics competencies is essential to bridge the gap between general awareness and professional application.

Keywords: Artificial Intelligence; Informatics Competencies; Iraq; Nursing Education; Pediatric Nursing

INTRODUCTION

Artificial Intelligence (AI) has become a transformative force globally, revolutionizing sectors including healthcare, education, and industry. In healthcare, AI applications range from diagnostic algorithms to decision-support systems, aiming to enhance patient outcomes and reduce professional workload. For nursing specifically, AI offers potential benefits in care planning, patient monitoring, and efficient resource management (Bali *et al*., 2024; Al Omari *et al*., 2024). In the field of nursing care and education, AI has been revolutionizing the process of education, such methods of simulation base learning and machine assistance decision making for enhancing nursing education efficiently (Alenazi, 2025; Ouyang & Jiao, 2021).

However, the integration of AI into nursing practice presents challenges. Ethical concerns regarding data privacy, algorithmic bias, and the potential displacement of human decision-making roles remain significant barriers. Despite the proliferation of AI technologies, nursing students' perceptions and readiness to adopt these tools remain under-explored. Understanding these perceptions is critical, as today's students must possess the informatics skills required for the future healthcare landscape (Paranjape *et al*., 2019; Cho & Seo, 2024).

During COVID-19 pandemic, the advanced technologies integrating AI applications has been accelerated and adopted in education as in other sectors (Buabbas *et al*., 2023). In spite of the previous benefits of AI application, students need to be aware of its potential risks. Data privacy and security are the main concerns globally, protection of their personal data need to be learned (Grunhut *et al*., 2022). Bias and unfair resources

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can be found in many applications of AI, this issue needs to be learned by the students (Jackson *et al*., 2024). In addition to the job displacement and the role of nurses in decision making and judgment (Lu *et al*., 2024).

In the nursing field, AI applications are used for various purposes including health promotion and disease prevention, treatment plans, consultation, and collaboration of healthcare teams. While AI is integrated in nursing care services, nursing students' perception toward AI remain relatively under explored territory (Bhandari *et al*., 2021). Understanding of this perception is important for the integration and adoption of AI in nursing profession. Nursing students need to foster the AI skills that required to develop nursing in future (Wang *et al.*, 2024). Nursing schools can play a significant role in improving students' knowledge and attitudes, by providing effective learning experience (Allam *et al*., 2024; Tarsuslu *et al*., 2024). For that, raising the awareness of future nurses in AI is important for keeping nursing field update. The collaboration between education and research by AI applications can enable deep understanding in nursing education with incorporation of using advanced technologies while keeping the value of human connection and prioritizing creativity (Alghamdi & Alashban, 2023).

Incorporate AI in nursing education provides optimal opportunities in improving learning outcomes, however, many challenges have arisen including ethical considerations, privacy, security, and adaptation resistance (Botwe *et al*., 2021). Students` privacy is the main challenge in using AI due to accessibility for their personal data, and its protection is crucial. Maintain students` confidentiality against any potential data could compromise their security (Issa *et al*., 2024).

While AI adoption is accelerating in the Arab region, including Iraq, data regarding nursing students' knowledge and attitudes toward these technologies is scarce. This study aims to bridge this gap by exploring pediatric nursing students' perceptions of AI and identifying sociodemographic factors influencing their readiness (Allam *et al*., 2024). For that, the current study looks for understanding the knowledge gap of nursing students in AI and try to highlight for a specific targeted program for using AI effectively and responsibly.

Aims of the Study

This paper aims to explore pediatric nursing students` perception on AI in nursing and find the association with their sociodemographic data and general information in AI.

METHODOLOGY

Study Design

A descriptive cross-sectional design used in the current study for its efficient, fast, and costly approach to collect the data from various universities in short time. The study ran from the period December 2024 to March 2025.

Study Setting

The data were collected from the following targeted college of nursing at: University of Baghdad, Al-Bayan University, Al-Farahidi University, Madenat Al-Elem University, and Al-Kitab University. More than 50% of the total college of nursing in Baghdad city were included. These selected universities were selected for their cooperation in data collection.

Study Sample

Non-probability (convince) sample that represent by nursing student at pediatric nursing department who continues nursing academic study. The participants were (500) students from both sexes. The sample size was calculated according to Richard Geiger equivalent population proportion = 50%, error probability = 5%, confidence level = 95%, and the level of confidence of 1.96. The minimum required sample size for each university was 100 students. The enrolled participants were at the third stage to ensure their experience in nursing research and ability to read and write in English language, because the instruments were in the English.

The Instrument of Study

The instrument of the study, Shinner's artificial intelligence perception tool, which is a questionnaire include 10 items concerning participants` beliefs on AI, clinical decision, care delivery, and health outcome. In

addition to their self-training and ethical issues for use AI in health care. The questionnaire used in the English language, for keeping the faithful meaning and content validity of the questionnaire content. The responses of students were rated on five Likert scales (1=strongly disagree, 2= disagree, 3= neutral, 4= agree, 5= strongly agree). It was a valid questionnaire (r=0.85) that used in literatures (Al Omari *et al*., 2024; Buabbas *et al*., 2023). The instrument used previously for nursing students and approved adequate reliability (0.88) and validity. The permission has obtained from the researcher by email before collecting the data. In addition, students` demographic data were collected including their: age, sex, university name, and socioeconomic status. General AI information involved: previous knowledge about AI, hours of using internet outside the university, types of AI application used, and using AI in study purposes (Labrague *et al*., 2023a; Shinners *et al*., 2022).

Scoring Classification: Total scores were categorized based on established cut-offs: Low Perception (10–23), Moderate Perception (24–36), and High Perception (37–50).

Demographics: Data on age, sex, Socioeconomic Status (SES), and general AI usage habits were also collected.

Data Collection

The data were collected by self-administrative method, directly by the participants, through an online Google Form. The pediatric nursing students receive the link of the form by their Google Classroom and Telegram applications. The agreement to participate was provided on the first page of the Google Form prior to data collection. Participation was entirely voluntary, participants were informed of their right to withdraw at any time without penalty, and all data collected were used solely for the purposes of the study. The time required for answering the questionnaire take about 10-15 minutes.

Data Analysis

Data was analyzed using SPSS version 23. Descriptive statistics (frequencies, means, standard deviations) summarize demographic data. Inferential statistics, including independent *t*-tests and Analysis of Variance (ANOVA), were used to examine associations between demographic variables and perception scores, replacing the previously mislabeled regression analysis. Statistical significance was set at $p \leq 0.05$.

Ethical Consideration

The research obtained Ethical clearance from the Committee of Research at College of Nursing, University of Baghdad, Iraq with reference number CNER206117N3 on 23rd May 2023.

RESULTS

Table 1: Nursing Students` Demographic Data

Characteristics	**Description**		
Students' age	**(19-40) years M ± SD= (21 ±1.017)**		
Characteristics		**Frequency**	**Percentage (%)**
Sex	Female	306	61.2
	Male	194	38.8
	Total	**500**	**100**
Socioeconomic status	Good	175	35
	Moderate	275	55
	Poor	50	10
	Total	**500**	**100**
University	University of Baghdad	100	20
	Al-Bayan University	100	20
	Al-Farahidi University	100	20
	Madenat Al-Elem University	100	20
	Al-Kitab University	100	20
	Total	**500**	**100**

The Table 1 shows that; the mean age of participants was 21 ±1.02 years. The majority were female (61.2%) and reported moderate socioeconomic status (55%). Distribution across the five universities was equal (20% each).

Table 2: Nursing Students` General Information on Artificial Intelligence

Items		Frequency	Percentage (%)
Have previous knowledge about AI	Yes	399	79.8
	No	101	20.2
Total		**500**	**100**
Using AI in study purposes	Yes	201	40.2
	No	299	59.8
Total		**500**	**100**

General AI Knowledge and Usage. While 79.8% of students reported having previous knowledge of AI, a significant portion (59.8%) had not used AI for academic purposes. Among those who used AI, the primary applications were translation (30%) and summarizing lectures, rather than clinical simulation or diagnostic training. Internet usage was high, with 40% of students spending 5–6 hours daily online outside of university hours (Table 2).

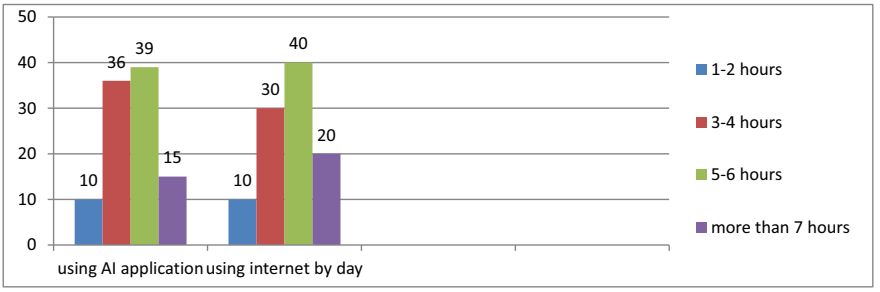

Figure 1: Description of Time Spent Using Internet and Artificial Intelligence among Students

The Figure 1 shows that, (39%) of nursing students using AI application weekly, and (40%) of them using internet (5-6) hours daily outside their universities

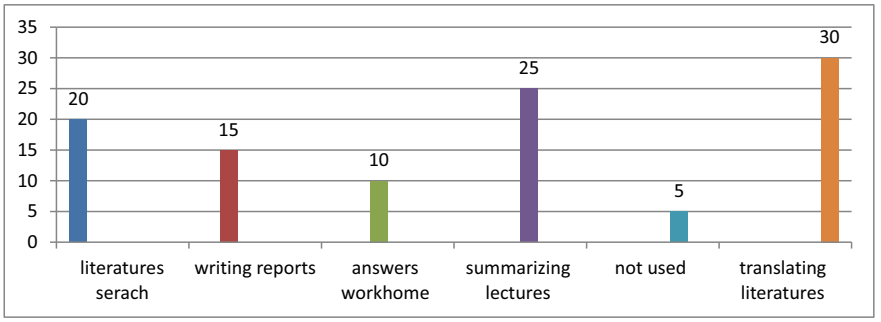

Figure 2: The Purposes of Artificial Intelligence Usage among Nursing Students in their Academic Pursuits

The Figure 2 revealed that, (30%) of students used AI application in searching for translation, while (5%) of them not used it.

The Table 3 reflects that, the majority of students across all universities demonstrated a moderate level of perception toward AI. University of Baghdad has10.8% moderate vs. 2.2% high. While Madenat Al-Elem University Showed the highest relative proportion of "high perception" students at just 4%, indicating that high perception is the least represented category across the total sample

Table 3: Nursing Students` Levels of Perception According their Universities

Universities	Students' Levels	Frequency	Percentage (%)
University of Baghdad	Low	35	7
	Moderate	54	10.8
	High	11	2.2
Al-Bayan University	Low	36	7.2
	Moderate	49	9.8
	High	15	3
Al-Farahidi University	Low	40	8
	Moderate	47	9.4
	High	13	2.6
Madenat Al-Elem University	Low	39	7.8
	Moderate	41	8.2
	High	20	4
Al-Kitab University	Low	48	9.6
	Moderate	36	7.2
	High	16	3.2
Total		500	100

Table 4: Analysis of Nursing Students Perception with their Sociodemographic Data and General Information in AI by Multiple Linear Regression

Characteristics	Perception in AI		
	M	SD	*P*-value
Sex			0.009
Female	31.11	2.64	
Male	33.93	2.95	
Socioeconomic status			0.05*
Good	31.4	2.45	
Moderate	33.8	6.34	
Poor	30.9	1.36	
Universities			0.08**
University of Baghdad	31.7	2.45	
Al-Bayan University	33.6	2.34	
Al-Farahidi University	36.8	1.87	
Madenat Al-Elem University	38.5	2.44	
Al-Kitab University	38.8	2.85	
Have previous knowledge about AI			0.03*
Yes	37.4	1.23	
No	34.8	1.85	
Using AI in study purposes			0.09**
Yes	35.8	3.01	
No	34.5	2.98	

** p value ≥ 0.05 consider significant ; ** p value < 0.05 consider non-significant*

Factors associated with AI perception were analyzed statistically, revealing significant associations between AI perception scores and specific variables (Table 4). Male students had significantly higher perception scores (33.93 ± 2.95) compared to females (31.11 ± 2.64), with a *p*-value of 0.009. Students with moderate socioeconomic status (33.8 ± 6.34) reported higher perception scores than those with good or poor socioeconomic status, with a *p*-value of 0.05. Students with prior AI knowledge had significantly higher perception scores (37.4 ± 1.23) compared to those without prior knowledge (34.8 ± 1.85), with a *p*-value of 0.03. No statistically significant difference was found in perception scores based on the university attended, with a *p*-value of 0.08.

DISCUSSION

This study highlights that while pediatric nursing students in Baghdad possess a baseline awareness of AI, their readiness to integrate it into clinical practice remains moderate.

Demographics and Digital Divide

The predominance of female students reflects the traditional gender distribution in nursing within Iraq.

However, male students demonstrated significantly higher perception scores. This aligns with findings by Alghamdi and Alashban (2023), suggesting a potential gender gap in technological self-efficacy that educators must address. Socioeconomic status also influenced perception, likely correlating with access to digital resources and paid internet services, which remains a challenge in the region

Nursing Students` Demographic Data:

Nursing student demographic data were collected to describe the sample and represent the population of the current study. The result in Table 1 showed, pediatric nursing students within age range from (19-40) years with mean (21 ±1.017). Female students' participants were higher than male. More than half of the participants were within moderate socioeconomic status. An equal percentage were representing for each included universities in the study (Labrague *et al*., 2023b; Alzahrani *et al*., 2023).

The Gap Between Awareness and Application

A critical finding is the disconnect between general internet usage and academic AI application. While students spend significant time online, their use of AI is limited to basic tasks like translation. This suggests a lack of exposure to nursing-specific AI tools (e.g., predictive analytics, robotic assistance) in the current curriculum. This mirrors findings by Swed *et al*. (2022), who noted that medical students often lack specific technical knowledge despite general digital literacy.

Nursing Students` General Information in Arterial Intelligence

This part of information highlights the general data in AI, for describing their background and finding any association with their perception in AI. Table 2 revealed most students have a previous knowledge in AI applications and used it previously, and more than half of them used it for the purposes of the study. Figure 1 showed students time in using internet and AI applications. High percentage of them using internet outside their universities about (3-6) hours in a day, and most of them used the applications of AI more than 3 hours weekly for different purposes. Figure 2 represented the purposes of using AI, that varied from literature searching, writing their reports, answering their homework, summarizing lectures, and translation purposes. The highest percentages were used for translation followed by summarizing lectures.

In facts nursing students were directed themselves toward using AI, many social media and students' channels were encouraging students to use AI application for its effective cost and time and easily applied. In addition to the advanced technologies that emerged in daily life. Most students depend on internet services for different reasons, using for more than 3 hours encouraged them to use AI application that invaded in all social media and advertising promotion. It is good to see some students apply AI in the ethical and useful usage for studying purposes, such summarize lectures and translation to mother language to be easily understood. This result supported by Alzahrani and his colleagues, that emphasized the importance of integration of advanced technologies in nursing curriculum and find its importance as a readiness of future nurses in new technologies (Alzahrani *et al*., 2023). Moreover, its necessary to increase nursing students' knowledge and strength nursing ethics for AI in nursing (Cho & Seo, 2024). A supported study by Wang and his colleagues in China documented that, most nursing students were used AI in nursing for summarize literatures and generating questions to facilitate their studies (Wang *et al.*, 2024).

Nursing students` perception of Artificial Intelligence in nursing

Generally, nursing students` perception in AI is involved their idea in using AI application for health care, solving problems, and the benefit and ethical issue regarding patients care (Kwak *et al.*, 2022). Table 3 revealed that high percentages of nursing students recorded a moderate perception in AI in all the universities included, followed by the low perception, and finally the high perception in using AI in nursing.

This result may be explained that AI is a new trend for Iraqi students, especially its applications. Moreover, the internet services were not adequate, which may effect on time spending and cost of using these services. This result was supported by one study, showing that most nursing students were declared an accepted levels of AI perception, while low percentage reported high levels (Sit *et al.*, 2020). Swed et al. also agreed with the current study to assess medical students` perception, knowledge and attitude of AI in Syria that, most of the

students demonstrated moderate to poor perception in medical education, and similar levels concerning their knowledge and attitudes (Swed *et al*., 2022). In a scoping review for summarizing the evidence base of health technologies in AI for nursing practices showed, 39 articles were found most nursing have average perception in using advance technologies in AI for the evidence base practices (Buchanan *et al*., 2020). The evidence showed that some students were anxious about using AI in future with their profession and taking their place in providing health care. On other hand, others view AI application as assistant tools for facilitating their profession and providing appropriate care for the admitted patients (Morrow *et al*., 2023).

The moderate perception was observed in majority of pediatric nursing students that underscores the importance of fostering a balanced understanding of AI within educational contexts. There is a serious need for effective education regarding the benefits, purposes, and challenges of AI in future of nursing profession. These results aligned with a previous study in nursing AI perception, which showed majority of students demonstrated a fair perception that was based on their knowledge and experiences in AI technologies (Allam *et al*., 2024; Amiri *et al*., 2024). Despite limited understanding of AI new technology, students need to update their experience and perception in AI revolutionize, rather than worried about replacing their job in future (Al-Mendalawi *et al.*, 2022; Busch *et al.*, 2024). The integrating of AI in education, especially for nursing curricula is important, for advance nursing profession and enhance learning outcomes (Abdulzahra & Shawq, 2024; Buabbas *et al*., 2023).

Nursing Informatics and Competencies

The moderate perception scores indicate a need to ground AI education in established frameworks. The Technology Informatics Guiding Education Reform (TIGER) initiative emphasizes that nurses must be competent in information management and new technologies. The current "moderate" perception suggests students are in the "awareness" phase but have not yet reached the "proficiency" required for modern practice. The low percentage of "high perception" students (speaking at only 4% in Madenat Al-Elem) reinforces the urgent need for structured informatics curricula.

Association between Nursing Students` Perception in AI

The finding showed, the sex of students has a significant association with their perception. Male were leaning toward using AI more than female, may be for their passion in using technologies or their attitudes in internet using. The socioeconomic SES status also approves a clear association, it was clear that when SES is moderate or good, and the perception of the students is increased. The justification of this result may be related that, for the cost of paid internet services in Iraq that required a financial support. Moreover, students` previous knowledge in AI was associated significantly with their perception. The fact that perception of any phenomena is related with individual knowledge and experience, when it increases the perception will also. A study in Saudi Arabia revealed that, students` perception is significant with their sex and SES (Alghamdi & Alashban, 2023; Eidan & Shawq, 2024). Previous experience in application of AI can reduce the worries of future technologies, if the new generation will be equipped with essential information in using AI in ethical way (Alenazi, 2025).

Limitations

This study was cross-sectional and limited to Baghdad, which may restrict generalizability. Additionally, the study focused on general perceptions rather than competency in using specific AI clinical tools.

CONCLUSION

Pediatrics nursing students in Baghdad demonstrate a moderate perception of AI, influenced significantly by gender, socioeconomic status, and prior exposure. The current educational landscape appears to foster general digital awareness rather than specific professional competency in AI.

Nursing programs should integrate AI-driven clinical scenarios into the curriculum rather than limiting instruction to basic computer literacy, ensuring alignment with global nursing informatics standards. Targeted training and workshops are needed to support female students and those with limited digital access, promoting equitable technological readiness. Educators should also emphasize using AI for clinical decision support and

care planning instead of relying on it solely for translation or summarization. Future research should focus on developing structured AI-integrated nursing curricula that enhance students' clinical decision-making and practical informatics competencies. Expanding studies across diverse regions and larger samples can provide deeper insights into factors influencing AI readiness and support targeted educational interventions.

Recommendation

The following recommendations are recommending by the authors: integrate AI in nursing curriculum, equip nursing educators by basic knowledge and skills needed on AI in nursing, encourage collaboration between AI developer in nursing, health care providers, and nursing faculties, exploring students` specific concern and barriers for using AI, focusing on human as a center in providing care with using AI for enhancing their skills and reduce cost of care, not for replacing their place.

Conflicts of Interest

The authors declare that they have no competing interests.

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