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Perceived Impact of Artificial Intelligence Usage on Academic Performance Among Undergraduate Health Science Students in Mirpurkhas, Sindh-Pakistan: A Multi-Center Study

Samia Khalil Ahmed[1], Irfan Ali Chandio[2], Anum Pervaiz[3], Aiman Fatima[4], Khadija[5] & Sheela Davi Malhi[6]
[1,3,4,5]BSN Scholar, College of Nursing Female Mirpurkhas-Pakistan.
[2]Clinical Instructor, College of Nursing Female Mirpurkhas-Pakistan.
[6]Master Scholar, Conservatoire national des arts et métiers, (CNAM) Université, Paris, France.
samiarain72@gmail.com, irfanchandio40@gmail.com, anukhan075@gmail.com, aimanwahab588@gmail.com

***Corresponding Author: Irfan Ali Chandio** (ORCID: 0009-0002-2163-833X)
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ABSTRACT

Background: Many medical and nursing students are increasingly utilizing artificial intelligence tools such as Telemedicine, Jeni.AI, Gemini, and ChatGPT to support both academic and clinical activities. These tools offer rapid responses and can save valuable time. However, there is growing concern that students in cities like Mirpurkhas may become overly reliant on AI, which could potentially compromise the development of critical thinking, problem-solving, and research skills.

Methods: A descriptive cross-sectional study was conducted among undergraduate health science students at selected public and private centers in Mirpurkhas. Stratified random sampling was used to recruit a total of 197 participants, and data were collected via Google Forms from January to February 2026. An adapted questionnaire was employed, with minor modifications based on expert review to ensure validity. The collected data were analyzed using SPSS version 27.0, and descriptive statistics were generated for demographic subgroups.

Findings: Among the 197 participants, the majority were BSN students (76.1%), aged 18–22 years (67.5%), and enrolled in private institutions (63%). Most students had a CGPA between 3.01–3.50. High perception scores were observed for General Use of AI (3.79 ± 0.40), Future of AI in Education (3.75 ± 0.46), and Impact on Student Skills (3.65 ± 0.48). Effectiveness of AI in Education was rated moderately high (3.49 ± 0.45), while Accuracy and Reliability received a moderate score (2.60 ± 0.50). These findings suggest that students generally find AI tools easy to use; however, they also express concerns about potential erosion of their natural skills and critical thinking.

Conclusion: The healthcare undergraduate students demonstrated a high level of acceptance and utilization of artificial intelligence (AI) as a supportive academic tool. While AI use was generally associated with enhanced academic performance, concerns regarding accuracy and potential over-reliance remain. Implementation of structured training programs and clear ethical guidelines is recommended to ensure responsible and effective integration of AI in healthcare academia.

Keywords: Artificial Intelligence; Healthcare Education; Academic Performance; Undergraduate Students; Perception; Mirpurkhas; Sindh, Pakistan.

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INTRODUCTION

The rapid developments in Artificial Intelligence (A.I) have triggered a major shift in various fields, fundamentally transforming the framework of higher education, especially in the realm of medical training (Duan, Liu, Rong, Zhao, & Liu, 2025). Worldwide, AI technologies are revolutionizing healthcare and education by enhancing efficiency, accuracy, and decision-making processes. This shift in AI is reshaping global healthcare and, in turn, the training of future medical professionals (Garg, Jayashree, & Vijayashree, 2025). This paradigm shift is particularly pertinent within medical education, where AI's capacity to personalize learning experiences and streamline assessment processes holds significant transformative potential (Sunmboye, Strafford, Noorestani, & Wilison-Pirie, 2025). AI in education, known as AIEd, includes various applications, such as intelligent tutoring systems, adaptive learning platforms, AI-powered chatbots, and immersive virtual patient simulations (Alkhaaldi et al., 2023). These cutting-edge tools have the potential to transform medical education by offering personalized feedback, facilitating self-directed learning, and increasing student involvement with intricate medical concepts (Patil, Kou, Baptista-Hon, & Monteiro, 2025).

In developing countries such as Pakistan, healthcare colleges are gradually exploring AI-assisted learning platforms, yet adoption remains limited and largely concentrated in major cities such as Islamabad, Karachi and Lahore (Alkhaaldi et al., 2023; Risana et al., 2024). Healthcare students typically view AI as an effective learning tool that can optimize study time, provide accurate answers, and ultimately improve learning outcomes (Sami et al., 2025). AI tools enhance the comprehension of intricate healthcare concepts more effectively than conventional methods and provide personalized learning experiences that cater to the distinct needs and learning styles of individual students. In addition to cognitive advantages, AI also plays a significant role in the development of practical skills, including enhancements in presentation and writing capabilities (Mir et al., 2023). Students feel at ease collaborating with AI to enhance their learning, acknowledging its ability to provide personalized support, especially in addressing their unique strengths and weaknesses during both individual studies and group projects. Similarly, faculty members see the promise of AI in improving educational outcomes but emphasize the importance of integrating it into a structured curriculum and ensuring proper training (Dumitru, Muttashar Abdulsahib, Ibrahim Khalaf, & Bennour, 2024). Furthermore, AI can streamline the learning process by curating relevant content, automating assessments, and providing instant feedback, allowing students to focus more on applying complex healthcare concepts (Silva, Godwin, & Jayanagara, 2024).

A key issue relates to the precision and dependability of content generated by AI. Research indicates that AI chatbots may create “fabricated, incorrect, or unfounded information,” commonly known as “hallucinations,” which can lead to the spread of misinformation and diminish the trustworthiness of scientific publications (Bhattacharyya et al., 2023). High rates of fabricated and inaccurate references have been found in AI-generated medical content, with common errors including incorrect publication details.

Such inaccuracies can lead to healthcare students being misguided and making clinical decisions without critical evaluation, as AI systems may lack transparency regarding their conclusions (Gutiérrez-Cirlos et al., 2023). Another critical challenge is the potential for over-reliance on AI tools, which can

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hinder the development of essential critical thinking, independent problem-solving, and clinical reasoning skills (Ahmad & Ahmed, 2024). Students might inadvertently develop an "automation bias," over-relying on AI and potentially carrying this mentality into their professional lives, which could lead to harm if AI provides erroneous outcomes (Oanh & Phuong, 2024). However, the capacity of AI to generate seemingly satisfactory answers for medical exams might also encourage academic dishonesty.

Additionally, the shallow understanding often produced by artificial intelligence, coupled with the creation of fake citations, poses serious risks to academic integrity and critical engagement. Ethical concerns also arise, including data privacy, informed consent, algorithmic biases, and professional accountability (Alam, Lim, & Zulkipli, 2023). Many healthcare professionals express concerns that AI may reduce the humanistic aspect of medicine and challenge patient-physician trust, that emphasizing the need for AI to complement rather than replace humanistic training (Busch, Adams, & Bressem, 2023).

Therefore, a pressing need exists for localized, empirical evidence that moves beyond exploring perceptions to measuring actual academic impact. Despite growing interest, few studies have quantitatively measured the impact of AI usage on measurable academic outcomes such as exam scores or clinical skills performance in Pakistan (Preetha Jackson et al., 2024). While studies in major Pakistani cities have explored student perceptions and practical applications of AI, however, there is limited published research perception of AI usage on academic performance among healthcare students in Mirpurkhas, Sindh. Therefore, this study aims to address this critical gap through a quantitative examination into perceived AI usage and academic performance among healthcare students in Mirpurkhas. Sindh.

Problem Statement

Since AI is becoming an integral part of modern education, there is a need to study its real impact on students' academic achievements. Despite the increasing use of AI tools in healthcare education, there is limited empirical evidence regarding their perceived impact on academic performance among students, such as Bachelor of Science in Nursing (BSN), Doctor of Physical |Therapy (DPT), and Bachelor of Medicine and Bachelor of Surgery (MBBS). Without proper training, excessive or inappropriate use of AI may negatively affect essential academic skills. This study aims to evaluate the perceived impact of AI usage on academic performance among healthcare students at the public and private colleges of Mirpurkhas. Sindh.

Aim of the Study

The aim of this study was to assess the impact of Artificial Intelligence usage on academic performance among medical undergraduate students, i.e. BSN, DPT and MBBS at the public and private colleges of Mirpurkhas, Sindh.

Objectives

1. To assess the level of AI usage among healthcare students at the selected public and private colleges of Mirpurkhas.
2. To determine healthcare students' perception regarding AI usage on academic performance at the selected public and private colleges of Mirpurkhas.

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METHODOLOGY

Study Design, Setting and Duration

A descriptive cross-sectional study was conducted across multiple healthcare colleges, including both public and private institutions, in Mirpurkhas, Sindh, Pakistan. The study was carried out from December 2025 to February 2026 and included undergraduate healthcare students from all academic years.

Study Population and Inclusion Criteria

- Students enrolled in BSN (Generic), DPT, and MBBS programs at selected healthcare colleges were included in the study.
- All those students who had prior experience using AI tools for academic purposes were eligible to participate.
- Students who were available during the data collection period and willing to voluntarily take part in the research were included.

Exclusion Criteria

- Students who had no prior exposure to AI-based learning tools were considered ineligible.
- Those who were unwilling to participate or unable to complete the questionnaire were also excluded.

Sample Size Determination

The sample size was calculated using the www.calculator.net a sample size calculator with a 5% margin of error, 95%, given a total population (N) of 400, a 95% confidence level, 5% margin of error, and final sample size 197.

Sampling Technique

A stratified random sampling technique was employed and divided into three strata based on academic discipline, and participants were randomly selected from each group.

Data Collection Tool

Data were collected using a structured, self-administered questionnaire which was adapted from previously published studies (P. Jackson et al., 2024). The questionnaire (ATAIME) consists of six parts. Apart from the first section, which collects sociodemographic information and the second part, “general use of artificial intelligence” comprises three items, the third part consists of six items “perceived effectiveness of AI in education”, fourth part assesses “the impact of AI on students’ skills” through seven items, while fifth part comprises of two items of “perceptions of the accuracy and reliability of AI tools” and sixth part consists of three items aimed to understand future of AI in Education. All tools’ responses were recorded using a five-point Likert scale ranging from strongly disagree to strongly agree. The research instruments' content validity was verified by a panel of experts in healthcare education and technology to ensure the items reflect AI effectiveness, skill impact, and future implications. To establish reliability, a pilot study was conducted using 10% of the excluded samples, measuring internal consistency with Cronbach’s Alpha, targeting a coefficient of 0.70 or higher for each section. For each area, the overall mean score was determined by adding the appropriate item scores within that area and dividing by the total number of items. Additionally, to make interpretation easier, composite scores were classified into three categories following standard practices in Likert-scale research: low (1.00–2.49), moderate (2.50–3.49), and high (3.50–5.00).

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Data Collection Procedure

The data were collected using an online platform, and the questionnaire was distributed through Google Forms via official institute WhatsApp groups with institutional permission. Before data collection, participants were informed about the study's objectives, procedures, and significance. Participants were required to provide informed consent before proceeding with the survey and were assured that their participation was voluntary. Confidentiality of responses was maintained, and participants were informed that their data would be used solely for academic and research purposes.

Data Analysis

Collected data were coded, cleaned, and entered into SPSS version 26 for statistical analysis. Descriptive statistics includes frequencies, percentages, means, and standard deviations were used to summarize demographic characteristics and AI usage patterns. Inferential statistical tests, including correlation tests, were applied to examine the relationship between AI usage and academic performance. A p-value of less than 0.05 was considered statistically significant.

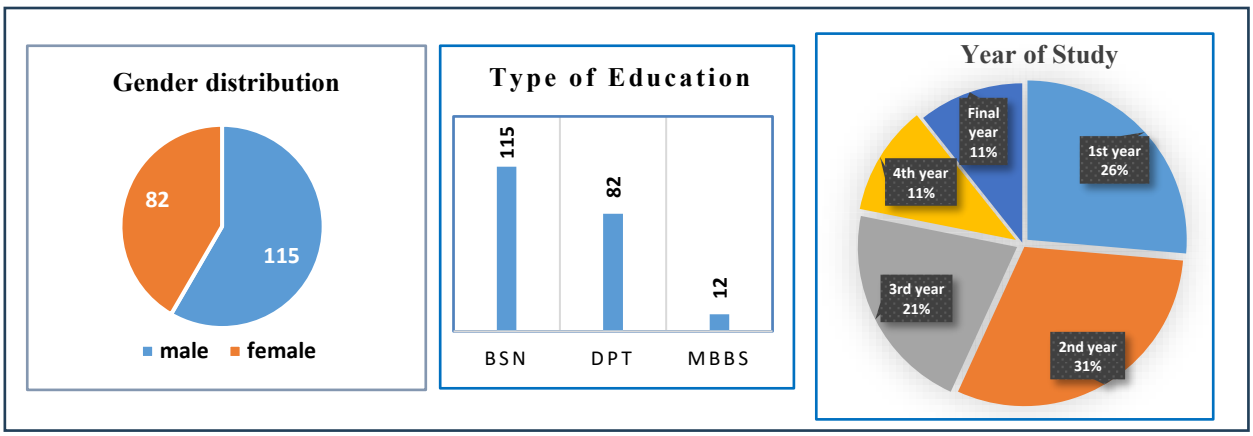
Ethical Considerations

Ethical approval for this study was obtained from the Institutional Review Board (IRB) and administrative permission from all participating healthcare colleges in Mirpurkhas. Participation was voluntary, and all eligible students were informed about the study's purpose and their right to withdraw without penalty. Written informed consent was obtained from all participants. Confidentiality was maintained, with no personally identifiable information collected; data were analyzed in aggregate. The study adhered to ethical principles, ensuring respect, beneficence, and justice.

RESULTS

The figure one illustrates the distribution of gender, education, and year of study among the participant, The study reveals that a significant majority, 76.1%, of participants are enrolled in the Bachelor of Science in Nursing (BSN) degree program, followed by Doctor of Physical Therapy (DPT) and Bachelor of Medicine and Bachelor of Surgery (MBBS) students. Among these participants, 58% are male. Regarding the year of study, first-year (26%) and second-year (31%) students make up more than half of the selected participants.

Figure No 1: Demographic Information of the Participants



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The **Table No1** revealed the description on age and types of institutes, the results indicate young adults' dominancy, specifically, 67.5% (n=133) of the respondents were in the 18–22 years age group, followed by 29.9% (n=59) in the 23–27 years category, and only a small fraction (2.5%) was aged 28 or above. Furthermore, the data indicates that a significant majority of participants, 63%, were enrolled in private institutions. The majority of students had a CGPA between 3.01–3.50, indicating overall moderate to high academic performance among the participants.

Table No 1: Demographic Information of the Participants

Variables	Frequency	%
Age of the participants		
18-22	133	65.5%
23-27	59	29.9%
28--30	4	2%
Ove r 30	1	5%
Type of institution		
Private institutes	130	63.5%
Government institutes	76	36.9%
Current CGPA:		
Below 2.50	18	9.1%
2.50 – 3.00	54	27.4%
3.01 – 3.50	78	39.6%
Above 3.50	47	23.9%

The findings in **Table No 2** show a high level of AI utilization and positive perceptions among respondents. A majority reported using AI tools for academic work, with 46.7% agreeing and 34% strongly agreeing. Over half used AI-based chatbots for homework assistance (52.3% agree; 17.3% strongly agree), while 34.5% felt pressured to use AI tools unnecessarily. Regarding effectiveness, most respondents viewed AI positively. Over half agreed that AI aids in assessment (50.8%) and creates engaging academic content (53.8%). Additionally, 51.8% agreed that AI supports research, and nearly half indicated it aids in teaching tasks (48.7% agree; 28.4% strongly agree). A significant portion (45.2% agree; 19.8% strongly agree) believed AI replaces some aspects of traditional teaching.

Table No 2: General use of Al & Effectiveness of Al in Education

Variables	SD n (%)	D n (%)	N n (%)	A n (%)	SA n (%)
Section B: General use of Al					
I use A.I tools for academic work?	2 (1)	8 (4.1)	28 (14.2)	92 (46.7)	67 (34.0)
I feel pressure to use Al tools even when they are not necessary?	5 (2.5)	59 (29.9)	39 (19.8)	68 (34.5)	25 (12.7)
1 use Al based chat bots or virtual assistants for home work help?	4 (2)	25 (12.7)	30 (15.2)	103 (52.3)	34 (17.3)
Section C: Effectiveness of Al in Education					

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Al helps in students' assessment and marking?	1 (. 5)	14 (7.1)	31 (15.7)	100 (50.8)	50 (25.4)
Al help in creating engaging and interactive academic content?	2 (1)	6 (3.0)	36 (18.3)	106 (53.8)	46 (23.4)
Al assists me in research-related tasks.	3 (1.5)	13 (6.6)	28 (14.2)	102 (51.8)	51 (25.9)
Al supports teaching-related tasks?	3 (1.5)	14 (7.1)	26 (13.2)	96 (48.7)	56 (28.4)
Al replaces some aspects of traditional teaching?	5 (2.5)	25 (12.7)	37 (18.8)	89 (45.2)	39 (19.8)
Students receive proper training to use Al effectively?	1 (. 5)	33 (16.8)	31 (15.7)	93 (47.2)	37 (18.8)
Students receive proper training to use Al effectively?	10(5.1)	30 (15.2)	25 (12.7)	89 (45.2)	42 (21.3)

SD= Strongly agree, D= Disagree, N=Neutral, A=Agree & SA= Strongly Agree

Table No 3 shows that the majority reported using AI tools for academic work (46.7% agree; 34% strongly agree), and over half used AI-based chatbots for homework assistance (52.3% agree; 17.3% strongly agree), while 34.5% felt pressured to use AI tools unnecessarily. Regarding effectiveness, most respondents viewed AI positively. Over half agreed that AI aids in assessment (50.8% agree; 25.4% strongly agree) and creates engaging academic content (53.8% agree; 23.4% strongly agree). Additionally, 51.8% agreed that AI supports research, and nearly half indicated it aids in teaching tasks (48.7% agree; 28.4% strongly agree). A significant portion (45.2% agree; 19.8% strongly agree) believed AI replaces some aspects of traditional teaching.

Table No 3: description on Impact of Al on Students Skills, Accuracy and Reliability of Al & Future of Al in Education

Variables	SD n (%)	D n (%)	N n (%)	A n (%)	SA n (%)
Section D: Impact of Al on Students Skills					
Al helps develop critical thinking communication skill?	48 (24.4)	40 (20.3)	30 (15.2)	75 (38.1)	4 (2.0)
Al improves creativity and critical thinking?	9 (4.6)	35 (17.8)	35 (17.8)	74 (37.6)	42 (21.3)
Al improves Self-directed learning skill?	41 (20.8)	29 (14.7)	38 (19.3)	84 (42.6)	4 (2.0)
Al increases motivation to learn?	6 (3.0)	24 (12.2)	43 (21.8)	76 (38.6)	48 (24.4)
Al increases engagement in learning activities?	7 (3.6)	24 (12.2)	32 (16.2)	92 (46.7)	40 (20.3)

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Al increases focus and concentration on studies?	6 (3.0)	27 (13.7)	36 (18.3)	85 (43.1)	42 21.3)
Relying on Al reduces essential skill such as research analysis, and problem-solving?	5 (2.4)	12 (6.1)	35 (17.8)	95 (48.2)	49 (24.9)
Section E: Accuracy and Reliability of Al					
Al accurately assesses student performance?	5 (2.5)	29 (14.7)	46 (23.4)	78 (39.6)	38 (19.3)
Al helps overcome academic struggles and learning gaps?	43 (21.8)	19 (9.6)	40 (20.3)	90 (45.7)	4 (2)
Section F: Future of Al in Education					
Al positively impacts the future of teaching and learning?	4 (2)	22 (11.2)	31 (15.7)	89 (45.2)	48 (24.4)
Al Improves staff-students' relationships?	33 (16.8)	48 (24.4)	41 (20.8)	69 (35)	4 (2)
Al enhances creativity and innovation in teaching or research?	3 (1.5)	18 (9.1)	30 (15.2)	104(52.8)	42 (21.3)

SD= Strongly agree, D= Disagree, N=Neutral, A=Agree & SA= Strongly Agree

Table No 4: Domain-wise Mean ± SD and Interpretation of AI

The findings indicate that participants hold a strong perception of AI across various domains. The general use of AI received a high rating of 3.79 ± 0.40 with positive correlations (r = 0.58, p = 0.003) between AI usage and CGPA, while its future potential in education was rated at 3.75 ± 0.46. The impact of AI on student skills was also rated positively at 3.65 ± 0.48, highlighting AI's contribution to enhancing creativity, critical thinking, and motivation. The effectiveness of AI in education was rated at 3.49 ± 0.45, placing it in the upper range of the moderate category, which indicates generally favorable opinions on AI's support for content creation, research, and teaching. However, the accuracy and reliability of AI were rated lower at 2.60 ± 0.50, reflecting a moderate level of cautious confidence in its precision for academic assessment.

Table No 4:

Domain(s)	Mean ± SD	r with CGPA	p-value
General Use of AI	3.79 ± 0.40	.58	.003
Effectiveness of AI in Education	3.49 ± 0.45	.61	.002
Impact on Student Skills	3.65 ± 0.48	.71	.001
Accuracy and Reliability of AI	2.60 ± 0.50	.49	.005
Future of AI in Education	3.75 ± 0.46	.55	.004

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DISCUSSION

The results of this study showed that most of the participants were female (58.4%) and belonged to the younger age bracket of 18–22 years (67.5%). This demographic trend is typical for healthcare colleges in Sindh and suggests that the healthcare workforce in Pakistan is undergoing a significant generational shift. These results align with the observations made by (Hakro et al., 2025), who noted that socio demographic and socioeconomic factors are primary determinants of academic performance among female undergraduate health sciences students in the region. Furthermore, the findings indicated that younger students expressed greater comfort with digital technology, implying that age is a primary determinant of technology adoption in clinical education. The finding that 63.1% of students were from private institutes suggests that socioeconomic status plays a role in AI access. These results are consistent with the analysis by (Monteverde-Suárez et al., 2024), which utilized artificial neural networks to demonstrate that students' academic progress and technological attributes were deeply influenced by their institutional and socioeconomic backgrounds.

The study found that the highest participation was from BSN students (76.1%), showing that nursing students were more prone to using AI technologies compared to other disciplines in the selected areas. This represents a significant shift in the traditional medical education hierarchy. While medical students were historically early adopters, our results indicate that nursing students are now bridging this gap, likely due to the substantial workload of nursing care plans that AI assists in managing. The "Umbrella Review on the Role of AI in Nursing Education and Practice" states that AI has become a core component of modern learning, not just an optional tool (Salimi, Paul, Thomas, Mathew, & Akhoondian, 2025). However, the finding that 47.2% of students felt a "Digital Pressure" to use AI because of their peers suggests that adoption is not always driven by a desire for learning, but often by social trends. This psychological mediation is explained by (Amer et al., 2025) , who found that the relationship between AI chatbots and student performance is heavily influenced by the dual forces of "technophobia" and technophilia.

Moreover, our study revealed that 77.2% of students felt that AI makes learning more interactive and interesting, bridging the gap between complex medical theories and student understanding. This is consistent with (Isaza, Restrepo, & Uribe, 2025; Preetha Jackson et al., 2024), who found that medical students generally perceive AI as a tool that enhances engagement and simplifies the comprehension of complex healthcare concepts. Furthermore, the study by (Jaafar et al., 2025) on Iraqi healthcare students showed a clear positive effect of generative AI tools on their academic achievements, indicating that the advantages of intelligent learning are emerging as a global norm in the Middle East and South Asia. Whereas, in Mirpurkhas, 77.7% of students reported using AI specifically for research tasks. Supporting our findings,. A study by (Heston & Khun, 2023) warns that this trend could diminish deep-reading habits, as students tend to prefer quick summaries generated by AI over thorough literature reviews. Despite the high usage of AI, only 58.9% of healthcare students believed that its outputs are entirely accurate. This skepticism aligns with concerns about (Lee et al., 2023) AI hallucinations" and highlights the serious risks of misinformation in healthcare education.

A significant finding revealed that 73.1% of healthcare students believe that excessive reliance on AI diminishes their research and problem-solving skills. This supports the concept of "Automation Bias" as mentioned in source by (Pang et al., 2025). This concern is especially pertinent for nursing students; if they depend on AI for clinical reasoning, they may face challenges in real-life hospital emergencies where AI is not accessible. This is further complicated by the findings of (Fazlollahi et al., 2022) whose randomized clinical trial showed that while AI tutoring is effective, it cannot match the nuance of expert human instruction in complex clinical skills.

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Even though some studies (37%) of students who felt AI improved their relationship with teachers suggest that AI is viewed strictly as a functional tool. As highlighted by previous research (Park, Paul, & Siegel, 2021), healthcare students continue to appreciate the role of human instructors for their emotional and professional guidance. Although AI can impart factual knowledge, it is unable to convey the empathy and care that are fundamental to healthcare education.

According to this study findings mean score, the domain general use of AI was rated at 3.79 ± 0.40, with its future potential in education rated at 3.75 ± 0.46. This indicates strong enthusiasm among healthcare students for AI's role in academics, despite varying levels of foundational knowledge. Many medical students are excited about using AI technologies in clinical practice, recognizing their potential to transform healthcare delivery (Baseer et al., 2025). The domain AI positively impacts student skills, rated at 3.65 ± 0.48, and research by (Varshney, Bisht, & Bhandari, 2025), revealed that enhancing creativity, critical thinking, and motivation. Many healthcare students also believe AI effectively personalizes learning and supports clinical decision-making. The effectiveness of AI in education received a rating of 3.49 ± 0.45, positioning it within the higher spectrum of the moderate category, which suggests generally positive views on AI's assistance in content creation, research, and teaching (Zouhaier, 2023). However, the accuracy and reliability of AI were rated lower at 2.60 ± 0.50, indicating a moderate cautious confidence in its precision for academic assessment. This suggests that students recognize AI's utility while remaining aware of its limitations in high-stakes contexts. Additionally, students expressed interest in improved AI integration in clinical practice and enhanced educational content and infrastructure to better support its role in healthcare education (Meroua & Noudjoud, 2024).

Limitations of the Study

This study has several limitations that should be considered when interpreting the findings.

- First, its descriptive cross-sectional design prevents establishing causal relationships between AI use and academic performance, reflecting only associations at one point in time.
- Second, relying on self-reported data from an online questionnaire may introduce biases that affect response accuracy.
- Third, academic performance was measured using categorized CGPA instead of verified records, limiting precision.
- Fourth, the unequal representation of academic disciplines, particularly lower participation from MBBS students, may have influenced results.
- Lastly, the study only assessed perceptions of AI usage without evaluating practical competencies, crucial for healthcare education outcomes.

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study evaluates the perception of Artificial Intelligence (AI) and its impact on academic performance among healthcare undergraduate students in Mirpurkhas, Sindh province of Pakistan. Most participants were BSN students (76.1%) aged 18 to 22 (67.5%) and reported moderate to high academic performance (CGPA 3.01-3.50). Students showed high AI utilization and positive perceptions: General Use of AI (3.79 ± 0.40), Future of AI in Education (3.75 ± 0.46), and Impact on Student Skills (3.65 ± 0.48). AI's effectiveness in education was rated moderately (3.49 ± 0.45), while accuracy and reliability received a cautious rating (2.60 ± 0.50). A positive correlation was noted between AI usage and CGPA, suggesting that better-performing students use AI more effectively. AI is seen as a supportive educational tool, but structured integration and careful evaluation are essential to maintain academic integrity. Healthcare institutions are encouraged to create guidelines and training programs for ethical AI integration into curricula.

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Recommendations

- Curriculum Integration: Healthcare institutions should incorporate structured AI training programs in undergraduate curricula for responsible use.
- Digital Literacy Training: Students need training to critically assess AI-generated information to combat misinformation and avoid over-reliance on AI.
- AI Guidelines Development: Healthcare colleges should establish standardized policies and ethical guidelines for academic AI use to uphold integrity and accountability.
- Balanced AI Use: AI should serve as a supportive tool in education, complementing traditional teaching and mentorship essential to healthcare training.
- Research Expansion: Future studies should use longitudinal and experimental designs to assess AI's impact on healthcare students' academic performance and skills.

Implications of the Study

- This study has important educational, institutional, policy, and research implications for healthcare education in Mirpurkhas, Sindh, Pakistan.
- Educational: The positive relationship between AI use and academic performance indicates that AI can serve as a valuable supplementary learning tool in undergraduate healthcare education. However, concerns regarding accuracy and moderate effectiveness ratings emphasize the need for structured guidance and supervised implementation.
- Institutional: Healthcare institutions should formally integrate AI into educational systems through clear policies, ethical guidelines, and faculty training programs to ensure responsible use while maintaining academic standards and professional competencies.
- Policy: Regulatory bodies at provincial and national levels should establish ethical frameworks governing AI use in healthcare education to prevent misuse, reduce over-reliance, and promote academic integrity.
- Research: Since the study employed a cross-sectional design, future longitudinal and experimental studies are necessary to determine the long-term impact of AI on academic outcomes, clinical reasoning, and professional skill development.
- Overall, AI is perceived as a supportive academic tool, but its integration must be carefully planned, ethically regulated, and aligned with educational objectives to preserve quality and integrity in healthcare training.

DATA AVAILABILITY

The data supporting the findings of this study are not publicly available due to restrictions imposed by the institute and the supervising authority. As the corresponding author, I can provide the data upon reasonable requests, subject to approval from the relevant institutional authorities.

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest regarding the publication of this manuscript. There are no financial, personal, or institutional relationships that could influence or be perceived to influence the work reported in this study.

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