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ORIGINAL RESEARCH

Factors Influencing the Adoption of Artificial Intelligence Among Medical and Dental Students: A Cross-Sectional Study at the University of Jordan

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Background: Artificial intelligence (AI) is being rapidly adapted in the medical fields due to its ability in enhancing diagnosis and patient care. Recent data reported that students showed positive attitude and moderate knowledge while some had concerns regarding ethical perspective. Therefore, the goal of this study is to examine the variables affecting attitudes, awareness, and comprehension of AI.

Methods: A cross-sectional investigation between November 2022 and March 2023 was performed. It utilized survey with five sections that addressed demographics, technological background, attitude, awareness, and AI comprehension. SPSS was utilized to run descriptive analysis, the Mann–Whitney *U*-test, the chi-square test, Spearman correlation. Further, general linear regression was applied to investigate the factors influencing these scales.

Results: The questionnaire was completed by 517 medical and 283 dental students. Pre-clinical students were the most in both groups (84.1%). Medical students were significantly more likely to have taken AI-related courses before (OR: 1.436, 95% CI: 1.007–2.046). The multivariate analysis showed that AI-related courses and prior programming experience were significantly positive factors for the medical students' awareness and understanding of AI among the medical group. While prior programming experience was also significantly a positive factor for the dental students' awareness and understanding of AI among the medical group.

Conclusion: As the role of AI in healthcare is improving, there is an obvious call to prepare students for adopting integration with AI technology equipped with both technical competencies and the ethical considerations that are tied to AI applications.

Keywords: artificial intelligence, AI adoption, attitude, medical education, dental education, University of Jordan

Introduction

Artificial intelligence (AI) is revolutionizing healthcare today with tools that can plan, comprehend, learn, and act. Defined as "a process where a computer is trained to mimic human behaviour".[1] AI is transforming the medical industry in numerous ways. The healthcare industry uses AI for patient diagnosis, medication research and development, improving doctor patient communication, transcribing medical data and remote patient treatment.[2] One of the most exciting applications of AI is to improve the diagnostic process and can predict and detect diseases faster than most medical professionals. For example, machine learning (ML) algorithms are now critical in medicine because they can catch diseases such as cancer early on, enabling more effective treatment.[3] Additionally, the use of AI in dentistry has steadily increased in the past decade, as researchers and dental practitioners are recognizing that AI can improve patient

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care and improve clinical processes.[4] AI's influence extends across specialties, including dermatology,[5,6] neurology,[7] psychiatry,[8] and medical research.[9] A key issue in medical care is the loss of empathy and compassion, which only humans can provide.[10] Though AI technology holds the promise of ubiquitous change in the world of healthcare, its implementation also raises ethical concerns, including risks to patient privacy, bias in algorithm training, and cybersecurity threats.[10] To effectively integrate AI into clinical settings while maintaining a patient-centred approach, future professionals must be educated on both technical skills and ethical considerations.[10]

Despite the increasing presence of AI in healthcare, its inclusion in medical and dental curricula remains limited, particularly in the Middle East. Several previous studies have explored gaps in AI education among healthcare students in the region. For example, in Palestine, although medical students recognized AI's potential, most reported no official training in AI.[11] A study conducted in Jordan found moderate AI knowledge but limited structured education among students in medicine, dentistry, pharmacy, nursing, and physical therapy.[12] Another regional study involving students from Jordan, Saudi Arabia, the UAE, and Egypt revealed that 66.4% had low AI knowledge, with most of their learning and training coming from extracurricular activities and social media.[13] Despite some awareness, these findings indicate a deficiency in education and training for various AI modalities. Dental students in Qatar showed disparities in their readiness related to ethics and technical ability. They also expressed a desire for deeper understanding and knowledge of AI.[14] Other studies in the region found that while most participants in Saudi Arabia were hesitant to adopt AI technologies in their careers,[15] physicians in Oman were more receptive expressing no significant concerns about job security and a willingness to integrate AI into practice if it aligns with international guidelines.[16] For better student education, these findings highlight the necessity of integrating organized AI education into healthcare fields. Although students often hold positive attitudes toward AI's potential,[13,17,18] optimism is tempered by limited ethical literacy: Jordanian medical students and professionals exhibit low awareness of AI-related moral risks, including those arising from Big Data applications.[19] This highlights the need not only to assess attitudes but also students' readiness to learn and adopt AI. Assessing this readiness is a crucial step before designing educational interventions. Tailored programs that align with students' needs and professional pathways can ensure effective, ethical integration of AI into future practice.[20–24]

While prior work in Jordan has measured AI readiness among 391 medical students at the University of Jordan, it was limited in scope and discipline.[25] Our study builds on this foundation by expanding the sample to include both medical and dental students at the University of Jordan, enabling the exploration of discipline-specific differences in AI awareness and understanding. It uses a larger, more diverse cohort to improve generalizability and focuses on quantifying awareness and conceptual understanding as predictors of adoption intent. Additionally, it examines key factors, such as ethical concerns, perceived utility, and institutional support, that influence students' readiness to integrate AI into clinical practice. By linking baseline knowledge to adoption drivers, this study seeks to inform targeted educational strategies like ethics workshops, dedicated AI modules, and interdisciplinary seminars. These interventions aim to prepare future clinicians with the skills, insight, and ethical foundation needed for success in an AI-augmented healthcare landscape.

Methods

Study Design and Setting

This cross-sectional study used both online and in-print form to collect data from both medical and dental students in the University of Jordan between November 20, 2022, and March 1, 2023. And the eligible participants were all University of Jordan's medical and dental students who agreed to participate by answering "yes" to the first survey question ("Would you like to participate in this study?"). Those who declined to participate and non-medical/dental students were excluded. Participants were provided with detailed information about the study's purpose, objectives, and procedures, with an emphasis on voluntary participation and the option to withdraw at any time. Confidentiality was assured, and it was made clear that the collected data would be used exclusively for research purposes.

The sample size for both online and in-print survey were calculated using a formula based on a single population proportion:

n = *[(Za/2)2. P (1—P)]/d2].*

- *Confidence level= 95%*
- *Z a/2 = 1.96*

- *The margin of error=5%*
- *P = Proportion to be estimated =50%*

Based on these parameters, the required sample size to show significance was at least 385. Of the 820 students invited to complete the questionnaire, 800 participated.

Data Collection and Study Instrument

A survey, modeled after a previous investigation by Bisdas et al,[26] was used to collect data. To ensure data integrity, the survey was distributed in English via social media platforms like Facebook and WhatsApp student groups to potential participants. It was also made available in the libraries, laboratories, and outpatient clinics to cover both pre-clinical and clinical students.

This survey consisted of 5 domains. The first domain investigated the sociodemographic information, the second assessed participants' technological familiarity, the third gauged their understanding of AI fundamentals, the fourth evaluated their awareness of AI's role in medicine and dentistry, and the fifth section explored their attitudes and sentiments toward AI. Structured as a five-point Likert scale, the questionnaire utilized the following descriptors: 1 = "Strongly disagree", 2 = "Disagree", 3 = "Somewhat agree", 4 = "Agree", and 5 = "Strongly agree". The response scores, which measured students' understanding, awareness, and attitudes, were employed to establish their overall levels in these categories. To guarantee clarity and validity, pilot research was conducted. Sixty randomly selected medical and dental students at the university who were not included in the main study were given access to the survey. After the pilot phase, the questionnaire's efficacy was verified, and its high level of internal consistency was preserved (Cronbach's alpha varied between 0.715 and 0.867).

Demographic Characteristics of Participants

In this subsection, participants' sociodemographic details were collected, encompassing sex, age, field of study (medicine or dentistry), training phase (pre-clinical or clinical), social status, monthly income, and residing governorates.

Technological Background

This section examined various factors, including familial involvement in the technology sector, participation in university-affiliated courses related to technology and AI, experience with programming, involvement in AI-related research projects, concerns about AI, and potential uses of AI.

Participants' Understanding of AI Basic Principles

In this section, three statements were presented to assess participants' understanding of AI's basic principles. These statements evaluated familiarity with the definitions of AI and ML, proficiency in AI's medical applications, and awareness of AI's practical uses in daily life. The cumulative score, ranging up to 15, reflected the participants' level of knowledge regarding AI basics.

Participants' Awareness of AI in Medicine and Dentistry

This segment featured three statements to gauge participants' consciousness regarding AI's role in medicine and dentistry. The cumulative score, up to fifteen, indicated the level of awareness. The questions assessed recognition of rapid AI advancements in medical research funding, awareness of the prominence of deep learning and AI in medicine, and self-assessment of understanding the fundamentals of deep learning and AI.

Participants' Attitudes and Perceptions Toward AI

Nine items examining participants' attitudes toward AI were included in this section; attitude levels were indicated by a total score of up to 45. The questions addressed opinions about AI as a helper, how it may change healthcare, concerns about physicians being replaced, excitement for new developments in AI, the value of human doctors, the benefits of AI, and support for integrating AI into medical and dental school.

Ethical Considerations

This study gained approval from the University of Jordan Institutional Review Board (Approval No. 10/2023/4534) and strictly adhered to ethical guidelines established by the institution and/or the national research committee, aligning with the principles elucidated in the World Medical Association's Declaration of Helsinki.

Statistical Analysis

After collecting data via Google Forms, the data exported to an Excel spreadsheet and processed to analysis by using Statistical Package for the Social Sciences (SPSS) version 26. To quantify the data we applied descriptive statistics, with categorical variables represented as frequencies and percentages, while the median and interquartile range were used to summarized numerical variables. The normality of the data was assessed using the Shapiro–Wilk test. To examine potential differences between medical and dental students, the Mann–Whitney *U*-test and chi-square test were employed. General Linear Models (GLM) were used to evaluate the relationships between multiple predictors and the dependent variables. In our study we used both univariate and multivariate linear regression models. In the univariate analysis, we assessed each predictor separately to determine its unadjusted impact on the dependent variables. A multivariate model was used to find their adjusted effects by including the predictors identified in the univariate analysis with a p-value < 0.05. Multicollinearity was checked using the variance inflation factor (VIF), and variables with a VIF greater than 10 were excluded from the final model. Additionally, Spearman correlation was employed to assess the relationships between the variables. A p-value of less than 0.05 was considered statistically significant.

Results

Demographic and Technological Background

A total of 517 medical students and 283 dental students completed the survey. Of medical group, 292 (56.5%) participants were female compared to 145 (51.2%) in the dental group. In both groups most of the participants were in the pre-clinical phase 435 (84.1%) medical students and 238 (84.1%) dental students. Also, regarding income 298 (57.6%) medical students and 152 (53.7%) dental students reported a comfortable income. In addition, a family member working in technology sectors was reported by 205 (39.7%) medical students and 105 (37.1%) dental students. For AI-related coursework, it was reported that 133 (25.7%) medical students participated, compared to 55 (19.4%) dental students. A total of 313 (60.5%) medical students and 162 (57.2%) dental students indicated that they possessed programming experience. Additionally, 90 (17.4%) medical students and 54 (19.1%) dental students reported prior engagement in research related to AI. In comparison to dental students, medical students exhibited a higher likelihood of having completed AI-related courses (OR: 1.436, 95% CI: 1.007–2.046, $p = 0.045$). The comparative overview of demographic and technological backgrounds between the two groups is presented in Table 1.

A total of 271 (52.4%) medical students expressed concerns regarding the potential decline in patient communication because of AI integration, whereas 48.4% of dental students focused mainly on issues related to cybersecurity and hacking risks. In the context of AI applications, 325 (62.9%) medical students and 165 (58.3%) dental students expressed agreement that AI has the potential to enhance diagnostic processes. Figures 1 and 2 present these findings.

Attitude Toward AI

The median attitude score was similar for both groups, as medical and dental students each achieved a median of 33 (range: 33–35). The univariate analysis indicated that there were no significant predictors of elevated attitude scores among the medical group ($p > 0.05$). Nonetheless, within the cohort of dental students, prior involvement in AI-related research correlated with a diminished attitude score ($\beta = -0.097$, 95% CI: −0.414 to 0.220, $p = 0.026$). Tables 2 and 3 provide a comprehensive analysis of the univariate assessments that explore the factors affecting attitude scores among medical and dental students. The analysis using Spearman correlation revealed no significant relationship between attitude scores and the scores for awareness or understanding ($p > 0.05$). The correlations are presented in Table 4.

Table 1 Comparison of the Demographic and Technological Backgrounds Between Medical and Dentist Students

Variables	Major		P – value
	Medicine, n = 517 (%)	Dentistry, n = 283 (%)	
Age, median (IQR)	20 (17–24)	19 (17–23)	**< 0.001**
Sex			0.154
Male	225 (43.5)	138 (48.8)	
Female	292 (56.5)	145 (51.2)	
Training phase			0.988
Pre-clinical	435 (84.1)	238 (84.1)	
Clinical	82 (15.9)	45 (15.9)	
Social status			0.613
Single	507 (98.1)	276 (97.5)	
Married	10 (1.9)	7 (2.5)	
Monthly income			0.284
Modest income	219 (42.4)	131 (46.3)	
Comfortable income	298 (57.6)	152 (53.7)	
Governorates			0.588
Central region	385 (74.5)	216 (76.4)	
North region	87 (16.8)	40 (14.1)	
South region	45 (8.7)	27 (9.5)	
Family members working in technological sector			0.479
Yes	205 (39.7)	105 (37.1)	
No	312 (60.3)	178 (62.9)	
Previous AI related courses			**0.045**
Yes	133 (25.7)	55 (19.4)	
No	384 (74.3)	228 (80.6)	
Previous experience in programming			0.364
Yes	313 (60.5)	162 (57.2)	
No	204 (39.5)	121 (42.8)	
Previous AI related research projects			0.556
Yes	90 (17.4)	54 (19.1)	
No	427 (82.6)	229 (80.9)	

Note: Bold p-values indicate statistically significant results.
Abbreviations: AI, Artificial intelligence; IQR, Interquartile range.

Awareness of AI

The median awareness score was the same for both groups, recorded at 9 (range: 6–10). In the medical group, univariate analysis revealed several positive factors linked to higher awareness scores. These factors included age (β = 0.151, 95% CI: 0.006–0.297, p = 0.042), having a family member in the technology sector (β = 0.564, 95% CI: 0.083–1.045, p = 0.022), previous completion of AI-related coursework (β = 1.068, 95% CI: 0.535–1.601, p < 0.001), and prior programming experience (β = 0.726, 95% CI: 0.247–1.206, p = 0.003). Multivariate analysis provided additional evidence that AI coursework (β = 0.836, 95% CI: 0.290–1.383, p = 0.003) and programming experience (β = 0.534, 95% CI: 0.055–1.013, p = 0.029) were significant positive predictors for elevated awareness scores. Conversely, the univariate analysis conducted for dental students indicated that there were no significant predictors for awareness (p > 0.05). Table 2 and 3 present the univariate and multivariate analyses of the awareness scale among medical and dental students. Spearman correlation analysis revealed a significant and strong positive correlation between awareness and understanding scores among medical students (ρ = 0.502, p < 0.001). The relationship among dental students was also found to be positively moderate in strength (ρ = 0.481, p < 0.001). The results of the correlation analysis are displayed in Table 4.

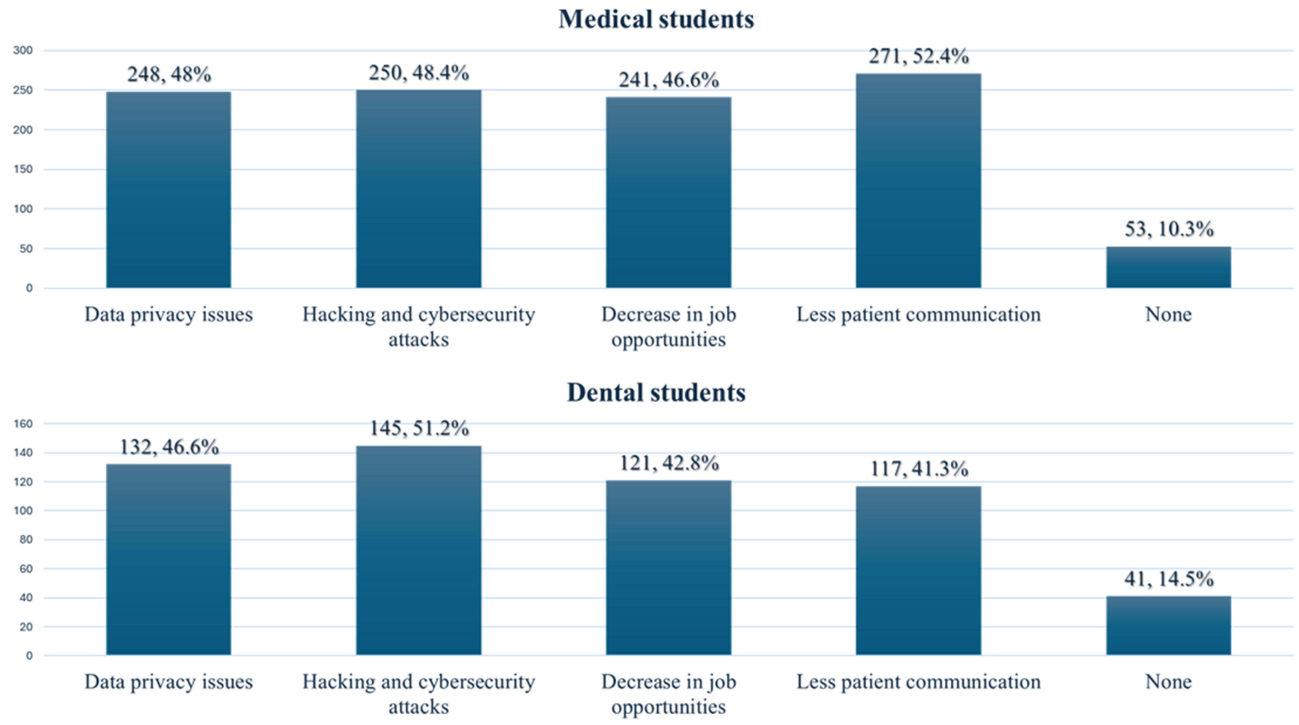

Figure 1 Concerns on AI among medical and dental students.

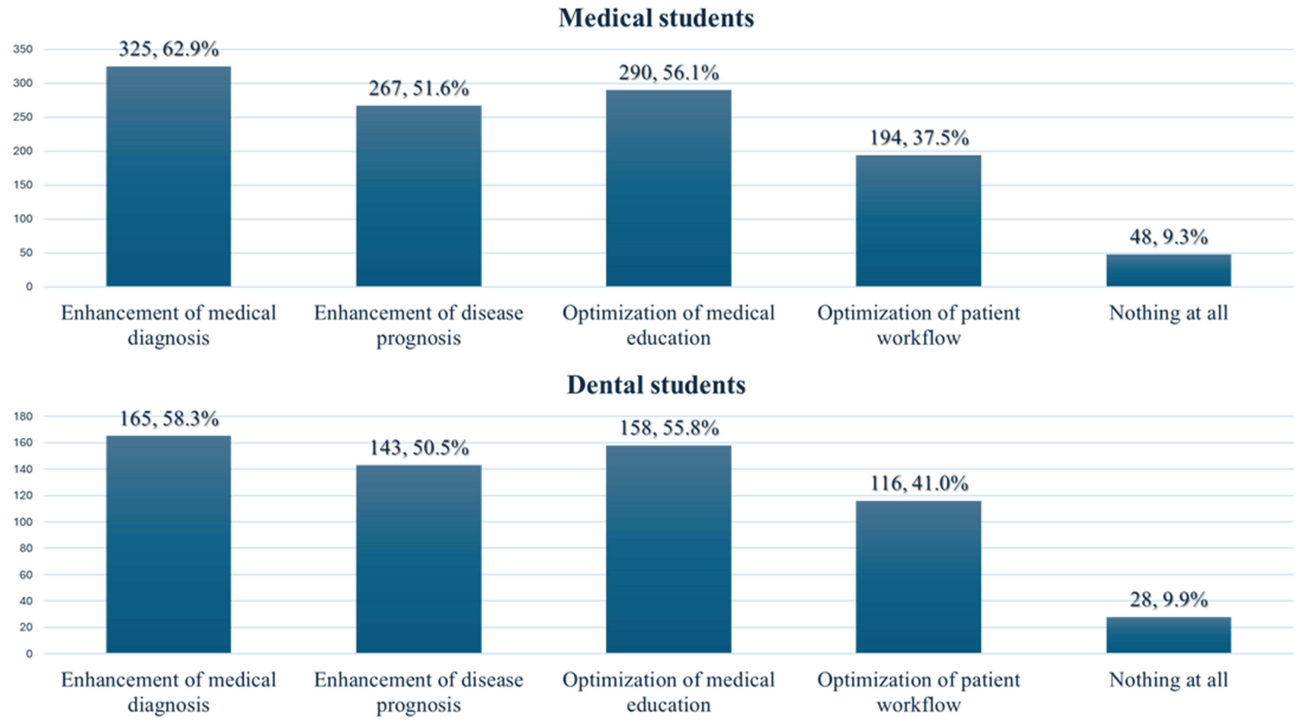

Figure 2 Potential uses of AI.

Table 2 Univariate and Multivariate Analysis of Factors Influencing the Level of Attitude, Awareness, and Understanding of Medical Students

	Attitude				Awareness				Understanding			
	Univariate		Multivariate		Univariate		Multivariate		Univariate		Multivariate	
Variables	**B (95% CI)**	**P – value**	**B (95% CI)**	**P – value**	**B (95% CI)**	**P – value**	**B (95% CI)**	**P – value**	**B (95% CI)**	**P – value**	**B (95% CI)**	**P – value**
Age	0.046 (- 0.191–0.282)	0.705			0.151 (0.006–0.297)	**0.042**	0.126 (- 0.018–0.270)	0.086	0.159 (0.027–0.291)	**0.018**	0.134 (0.005–0.262)	**0.042**
Sex												
Male Female	0.654 (- 0.112–1.419)	0.094			− 0.354 (- 0.830–0.122)	0.144			0.129 (- 0.304–0.562)	0.559		
Training phase												
Pre-clinical Clinical	− 0.088 (- 1.130–0.954)	0869			0.610 (- 0.035–1.255)	0.064			0.764 (0.181–1.348)	**0.010**	0.608 (0.042–1.175)	**0.035**
Social status												
Single Married	0.054 (- 2.710–2.818)	0.969			1.262 (- 0.451–2.975)	0.148			0.066 (- 1.492–1.624)	0.933		
Monthly income												
Modest Income Comfortable Income	0.208 (- 0.563–0.978)	0.597			− 0.458 (- 0.934–0.019)	0.060			− 0.404 (- 0.837–0.029)	0.067		
Governorates												
Central region North region South region	− 0.300 (- 1.664–1.064) − 0.603 (- 2.193–0.987)	0.666 0.457			− 0.421 (- 1.264–0.422) 0.303 (- 0.679–1.286)	0.327 0.544			− 0.335 (- 1.104–0.434) − 0.245 (- 1.141–0.651)	0.393 0.591		
Family members working in technological sector												
Yes No	0.114 (- 0.664–0.892)	0.773			0.564 (0.083–1.045)	**0.022**	0.354 (- 0.129–0.837)	0.150	0.410 (- 0.028–0.847)	0.066		
Previous AI related courses												
Yes No	0.390 (- 0.480–1.260)	0.379			1.068 (0.535–1.601)	**< 0.001**	0.836 (0.290–1.383)	**0.003**	0.959 (0.475–1.443)	**< 0.001**	0.665 (0.182–1.148)	**0.007**
Previous experience in programming												
Yes No	− 0.324 (- 1.102–0.455)	0.414			0.726 (0.247–1.206)	**0.003**	0.534 (0.055–1.013)	**0.029**	1.118 (0.690–1.546)	**< 0.001**	0.966 (0.540–1.392)	**0.042**
Previous AI related research projects												
Yes No	− 0.239 (- 1.243–0.765)	0.640			0.425 (- 0.197–1.047)	0.180			0.406 (- 0.159–0.970)	0.159		

Note: Bold p-values indicate statistically significant results.
Abbreviations: B, Beta coefficient; CI, Confidence interval.

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Table 3 Univariate and Multivariate Analysis of Factors Influencing the Level of Attitude, Awareness, and Understanding of Dental Students

	Attitude				Awareness				Understanding			
	Univariate		Multivariate		Univariate		Multivariate		Univariate		Multivariate	
Variables	**B (95% CI)**	**P – value**	**B (95% CI)**	**P – value**	**B (95% CI)**	**P – value**	**B (95% CI)**	**P – value**	**B (95% CI)**	**P – value**	**B (95% CI)**	**P – value**
Age	− 0.097 (- 0.414–0.220)	0.547			− 0.077 (- 0.279–0.125)	0.453			− 0.042 (- 0.243–0.160)	0.684		
Sex												
Male Female	− 0.071 (- 1.043–0.901)	0.885			− 0.088 (- 0.707–0.532)	0.781			− 0.333 (- 0.949–0.283)	0.288		
Training phase												
Pre-clinical Clinical	0.096 (- 1.233–1.425)	0.887			− 0.219 (- 1.066–0.627)	0.610			− 0.429 (- 1.271–0.413)	0.317		
Social status												
Single Married	1.746 (- 1.376–4.869)	0.272			0.820 (- 1.173–2.812)	0.419			− 0.012 (- 1.998–1.974)	0.991		
Monthly income												
Modest Income Comfortable Income	0.695 (- 0.276–1.666)	0.160			− 0.279 (- 0.899–0.342)	0.378			0.005 (- 0.613–0.624)	0.986		
Governorates												
Central region North region South region	0.935 (- 0.732–2.602) 1.235 (- 0.799–3.270)	0.270 0.233			0.213 (- 0.853–1.278) 0.165 (- 1.135–1.465)	0.694 0.803			− 1.032 (- 2.084–0.019) − 1.432 (- 2.716 – - 0.149)	0.054 **0.029**	 − 1.439 (- 2.705 – - 0.173)	 **0.026**
Family members working in technological sector												
Yes No	− 0.709 (- 1.712–0.293)	0.165			− 0.211 (- 0.852–0.430)	0.517			0.079 (- 0.559–0.717)	0.808		
Previous AI related courses												
Yes No	− 0.941 (- 2.164–0.283)	0.131			0.510 (- 0.271–1.291)	0.200			0.566 (- 0.211–1.342)	0.153		
Previous experience in programming												
Yes No	0.131 (- 0.851–1.113)	0.793			0.504 (- 0.120–1.127)	0.113			0.916 (0.302–1.530)	**0.004**	0.915 (0.304–1.526)	**0.003**
Previous AI related research projects												
Yes No	− 1.395 (- 2.621 – - 0.169)	**0.026**			0.411 (- 0.376–1.198)	0.305			0.309 (- 0.476–1.093)	0.439		

Note: Bold p-values indicate statistically significant results.
Abbreviations: B, Beta coefficient; CI, Confidence interval.

Table 4 Correlation Between Attitude, Awareness, and Understanding of AI Among Medical and Dentist Students

Medicine				
		Attitude	**Awareness**	**Understanding**
Attitude	***ρ***	1	− 0.017	0.044
	P-value		0.695	0.320
Awareness	***ρ***	− 0.017	1	0.502*
	P-value	0.695		**< 0.001**
Understanding	***ρ***	0.044	0.502*	1
	P-value	0.320	**< 0.001**	
Dentistry				
		Attitude	**Awareness**	**Understanding**
Attitude	***ρ***	1	0.116	0.033
	P-value		0.051	0.579
Awareness	***ρ***	0.116	1	0.481*
	P-value	0.051		**< 0.001**
Understanding	***ρ***	0.033	0.481*	1
	P-value	0.579	**< 0.001**	

Notes: *ρ*: Spearman's coefficient. Bold p-values indicate statistically significant results. *Correlation is significant at the 0.05 level (two-tailed).

Understanding Scale

The median understanding score was 9 (range: 6–10) for medical students and 9 (range: 7–10) for dental students. Univariate analysis of the medical group identified age (β = 0.159, 95% CI: 0.027–0.291, p = 0.018), preclinical training phase (β = 0.764, 95% CI: 0.181–1.348, p = 0.010), prior AI-related coursework (β = 0.959, 95% CI: 0.475–1.443, p < 0.001), and programming experience (β = 1.118, 95% CI: 0.690–1.546, p < 0.001) as positive predictors of higher understanding scores. Multivariate analysis confirmed the significance of these factors, with age (β = 0.134, 95% CI: 0.005–0.262, p = 0.042), preclinical training phase (β = 0.608, 95% CI: 0.042–1.175, p = 0.035), AI-related coursework (β = 0.665, 95% CI: 0.182–1.148, p = 0.007), and programming experience (β = 0.966, 95% CI: 0.540–1.392, p = 0.042) all showing a positive influence. Among dental students, residence in northern governorates were associated with lower understanding scores in both univariate and multivariate analyses (β = −1.439, 95% CI: −2.705 to −0.173, p = 0.026), while programming experience remained a positive factor (β = 0.915, 95% CI: 0.304–1.526, p = 0.003). Table 2 and 3 detail the results for univariate and multivariate analyses.

Discussion

The integration of AI in healthcare is rapidly transforming the field, offering opportunities to improve patient care, diagnosis, and treatment. However, formal education on AI remains limited, particularly in the Middle East. While several studies have examined healthcare students' knowledge and perceptions of AI, this research at the University of Jordan provides deeper insights into the awareness, understanding, and attitudes of medical and dental students toward AI, highlighting both commonalities and key differences between the two groups. According to previous research, healthcare students aware the potential of AI but lack formal training in the field, as showed by Jebreen et al in Palestine and Al-Qerem et al in Jordan.[11,12] Both medical and dental students at the University of Jordan showed basic awareness of AI but lacked comprehensive, in-depth knowledge which was also aligned with the pattern in this evidence. Also, we find that medical students were more likely to have taken AI-related courses (25.7%) than dental students (19.4%), which shows a clear difference between these two groups. This difference shows the increased involvement of AI in medical curricula, which is consistent with findings from the Palestinian study. Providing AI-related courses for dental student

might help in reducing this disparity and preparing dental students to be more involved in the role of AI in the healthcare. In line with other regional studies, such as that by Al-Qerem et al, which found moderate awareness of AI among healthcare students in Jordan, our research delved deeper into the factors influencing students' AI knowledge. Our study explored the impact of programming experience, prior AI coursework and socioeconomic background, while Al-Qerem et al emphasized on the absence of formal AI education. Our findings indicate that socioeconomic factors led to increased AI awareness among students. Notably, having relatives working within such technology and being familiar with programming courses were relevant to improved AI understanding for self-adjusted students. Specifically, there is a higher percentage of medical and dental students having family members working in the tech industry: 39.7% of medical students and 37.1% of dental students. Also, 60.5% of medical students and 57.2% of dental students have participated in programming courses. These findings complement previous studies expanding on social and educational influences on students' AI literacy, which Al-Qerem et al[12] did not analyze.

Concerning AI specifically, dental students in Qatar conveyed a wish for increased curricular content in this field, especially focusing on radiology and health research.[14] Reflecting on our results, Dental students at the University of Jordan similarly pushed for enhanced education in AI. However, the genuine worries of dental students revealed a fascinating difference. In contrast to the Qatari research that emphasized students' interest in a greater AI presence in clinical settings, this study pointed out that Jordanian dental students were particularly worried about the threat of cyberattacks. Approximately half of the dental students (48.4%) articulated concerns pertaining to data protection, in contrast to 52.4% of medical students, who were more preoccupied with the potential depersonalization of patient care. This distinction accentuates the variability of concerns related to AI across different healthcare disciplines, with dental students demonstrating a pronounced focus on the imperative of safeguarding patient data in the contemporary digital landscape.

Research experience also indicated a significant impact on students' perception towards AI. Dental students who were previously involved in AI research tended to be more apprehensive about the technology, unlike the study that was conducted among healthcare students from Jordan, KSA, UAE, and Egypt,[13] where research experience was not considered. This could be since hands-on experience through conducting actual AI research would form a more realistic perception of its potential and limitations. In addition, contrary to many studies, including Mosleh et al, which reported that health professional students generally had positive outlooks towards AI despite their limited exposure to AI technologies,[18] our study suggested that it is more likely for students with previous AI research experiences to have positive perceptions towards AI when compared with mere exposure.

In our results it became evident that there is a gap in ethical understanding, particularly with regard to issues like patient depersonalization and cybersecurity risks, consistent with the study by Al-Ani et al that examined Jordanian medical students' limited awareness of the ethical risks associated with AI in healthcare.[19] However, the necessity of including both technical and ethical AI instruction is highlighted by our research, particularly in the dentistry curriculum where data privacy issues are more pressing. The relationship between technical expertise and ethical issues was less emphasized in previous studies.

Spearman correlation analysis revealed that the relationship between awareness and understanding of AI was stronger in medical students, with a significant positive correlation ($\rho = 0.502$) compared to dental students ($\rho = 0.481$). This suggests that medical students, with their greater exposure to AI-related coursework, were better able to understand AI's applications. Remarkably, attitude scores were comparable across both groups, with each group exhibiting a median score of 33. However, a more in-depth analysis revealed that dental students who possessed prior AI research experience revealed lower attitude scores ($\beta = -0.097$), suggesting that they were more cautious about AI because of a better understanding of its limitations. Students generally maintain positive attitudes toward AI, yet prior experience with the technology can significantly affect their level of awareness.

This study shares similarities with the research by Al-Ani et al[19] on the ethical challenges of AI among Jordanian medical students and Mosleh et al[18] on AI knowledge among medicine and pharmacy students in Jordan and Palestine. Univariate and multivariate analysis in this study showed that demographic factors like age, sex, and social status had little impact on students' attitudes and understanding of AI, a common conclusion between all three studies. In the research by Al-Ani et al being a pre- clinical or a clinical student demonstrated a difference toward AI understanding, however this study did not observe such a difference.

This study's emphasis on regional variations is what sets it apart. As a result of having less access to AI tools, it is evident that dental students in the north showed lower comprehension scores. In addition, dental students had fewer significant predictors; while medical students' awareness and comprehension of AI were associated with factors like age, family, technology background, and completion of AI coursework. Programming experience was the most important factor associated with increased knowledge and comprehension of AI among dental students. This study is unique since it focuses on how students' knowledge may be shaped by attending AI-related courses and working on research projects. Compared to the previous two studies by Al-Ani et al[19] and Mosleh et al[18] which mostly concentrated on ethical issues and general knowledge of AI, this provides a deeper depth of insight into the elements that drive AI comprehension, making our study unique.

Future Implications

The ensuing conclusion of the study has far-reaching impacts for the future of healthcare about the introduction of AI education. The difference in programming experience and AI-related courses among medical and dental students indicates that an integrated approach to AI training should be adopted so that all health professional fields are prepared for the growing role of AI. It's crucial that all healthcare disciplines are given equal opportunities to learn and prepare for the growing role of AI in the field. Factors like family background in technology and socioeconomic status affect students' understanding of AI. Future educational programs should provide AI resources and support to diverse students. Dental students' concerns about cybersecurity stress the need for ethical training in AI courses. Preparing healthcare professionals for AI requires inclusive education that balances technical skills with societal and ethical challenges.

Strengths and Limitations

This cross-sectional study surveyed 517 medical and 283 dental students at a single institution (the University of Jordan) in early 2023, creating a two-year gap before analysis and publication. During this interval, AI tools, curricular offerings (eg, AI coursework completed by 25.7% of medical vs 19.4% of dental students), and extracurricular exposures (programming experience rates of 60.5% vs 57.2%) may have evolved, potentially altering levels of awareness, understanding, and attitudes. Reliance on self-reported data may introduce recall or social-desirability bias, and we did not measure personal interest in AI or access to external learning resources. Finally, although we touched on data-privacy and ethical concerns, we did not explore these dimensions in depth. Despite these limitations, our study's large sample (n=800) increases reliability relative to prior research. By distinguishing between awareness (basic AI knowledge) and understanding (in-depth grasp of AI's applications, risks, and challenges), we identify precise educational gaps. Field-specific concerns—medical students' worries about depersonalization versus dental students' focus on cybersecurity—underscore the need for tailored curricula. Finally, our use of multivariate analysis provides nuanced insights into the demographic and experiential factors that drive AI readiness.

Conclusion

This research delves into healthcare students' awareness and attitudes toward AI, exploring differences between medical and dental students in their exposure to AI, concerns about its integration, and how factors like socioeconomic background and programming experience shape their perspectives. It highlights the need for a more balanced approach to AI education—one that not only equips students with technical skills but also addresses ethical considerations, ensuring they are prepared to navigate the evolving role of AI in healthcare. By fostering comprehensive, thoughtful education across disciplines, we can better support future professionals in embracing AI responsibly and effectively.

Data Sharing Statement

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Submission Statement

This work has not been submitted for publication elsewhere and all the authors listed have approved the manuscript enclosed.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The authors declare that they do not have conflicts of interest relevant to this work.

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