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Artificial Intelligence Attitudes and Readiness Among Undergraduate Nursing Students: A Cross-Sectional Study

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ABSTRACT

Purpose: This study examined undergraduate nursing students' attitudes toward artificial intelligence and their readiness for medical artificial intelligence, as well as the factors associated with AI readiness.

Methods: A descriptive, cross-sectional design was employed. Two hundred and fifty undergraduate nursing students at a nursing faculty in western Türkiye participated during the 2025–2026 academic year. Three instruments were administered: a Participant Information Form, the General Attitudes toward Artificial Intelligence Scale, and the Medical Artificial Intelligence Readiness Scale for Medical Students.

Results: The Positive General Attitudes toward Artificial Intelligence Scale yielded a mean of 3.88 ± 0.66, the Negative General Attitudes toward Artificial Intelligence Scale 3.26 ± 0.87, and the Medical Artificial Intelligence Readiness Scale for Medical Students 74.29 ± 13.43. Academic year was significantly associated with AI readiness. One-way ANOVA showed significant differences across year groups ($F = 3.450$; $p = 0.012$; $\eta^2 = 0.040$), with fourth-year students scoring higher than second-year students. In the multiple linear regression analysis, both second-year ($\beta = -0.156$, $p = 0.014$) and third-year ($\beta = -0.143$, $p = 0.024$) students had significantly lower readiness scores compared with fourth-year students. A moderate positive correlation was observed between positive AI attitudes and readiness scores ($r = 0.430$; $p < 0.01$). Positive attitudes toward AI and self-reported computer skills emerged as the strongest independent factors associated with readiness.

Conclusion: Nursing students displayed generally favorable attitudes toward AI, yet readiness levels varied across academic years. Attitude and readiness, while correlated, appear to be distinct constructs. These findings highlight the need for intentional, practice-oriented integration of AI competencies into undergraduate nursing curricula.

Keywords: Artificial intelligence, attitude, digital health, nursing education, nursing students, readiness.

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ÖZET

Amaç: Bu çalışma, lisans hemşirelik öğrencilerinin yapay zekâya yönelik tutumlarını, tıbbi yapay zekâya hazır oluşluklarını ve hazır oluşlukla ilişkili faktörleri incelemeyi amaçlamıştır.

Yöntem: Tanımlayıcı ve kesitsel bir tasarım kullanılmıştır. 2025–2026 akademik yılında Türkiye'nin batısındaki bir hemşirelik fakültesinde öğrenim gören 250 lisans hemşirelik öğrencisi çalışmaya katılmıştır. Veri toplama araçları olarak Katılımcı Bilgi Formu, Yapay Zekâya Yönelik Genel Tutum Ölçeği ve Tıp Öğrencileri için Tıbbi Yapay Zekâ Hazırbulunuşluk Ölçeği kullanılmıştır.

Bulgular: Yapay Zekâya Yönelik Olumlu Genel Tutum Ölçeği puan ortalaması 3.88 ± 0.66, Olumsuz Genel Tutum Ölçeği 3.26 ± 0.87 ve Tıbbi Yapay Zekâ Hazırbulunuşluk Ölçeği 74.29 ± 13.43 olarak bulunmuştur. Sınıf düzeyi hazır oluşlukla anlamlı biçimde ilişkili bulunmuştur. Tek yönlü ANOVA sonucunda sınıf grupları arasında anlamlı fark saptanmış ($F = 3.450$; $p = 0.012$; $\eta^2 = 0.040$) ve dördüncü sınıf öğrencilerinin puanları ikinci sınıf öğrencilerinden daha yüksek bulunmuştur. Çoklu doğrusal regresyon analizinde ise hem ikinci sınıf ($\beta = -0.156$, $p = 0.014$) hem de üçüncü sınıf ($\beta = -0.143$, $p = 0.024$) öğrencilerinin hazır oluşluk puanları dördüncü sınıf öğrencilerine göre anlamlı derecede daha düşük bulunmuştur. Olumlu yapay zekâ tutumları ile hazır oluşluk arasında orta düzeyde pozitif bir ilişki gözlenmiştir ($r = 0.430$; $p < 0.01$). Olumlu tutum ve öz bildirime dayalı bilgisayar becerileri, hazır oluşluğun en güçlü bağımsız ilişkili faktörleri olarak belirlenmiştir.

Sonuç: Hemşirelik öğrencileri yapay zekâya yönelik genel olarak olumlu tutum sergilemekle birlikte, hazır oluşluk düzeyleri sınıf düzeylerine göre farklılık göstermiştir. Tutum ve hazır oluşluk birbiriyle ilişkili olmakla birlikte farklı kavramlar olarak ortaya çıkmıştır. Bulgular, yapay zekâ yeterliliklerinin lisans hemşirelik müfredatına uygulamaya dayalı ve sistematik biçimde entegre edilmesi gerektiğine işaret etmektedir.

Anahtar Kelimeler: Yapay zekâ, tutum, dijital sağlık, hemşirelik eğitimi, hemşirelik öğrencileri, hazırbulunuşluk.

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Healthcare systems are undergoing an unprecedented digital transformation, with artificial intelligence (AI) emerging as one of the most influential technologies shaping the future of healthcare delivery. Recent advances in machine learning, deep learning, natural language processing, and generative AI have substantially expanded the capabilities of intelligent systems to support healthcare professionals in clinical decision-making, disease prediction, patient monitoring, documentation, and personalized care planning (1-4). Rather than replacing healthcare professionals, AI is increasingly recognized as a complementary technology that enhances clinical judgment, improves efficiency, reduces workload, and contributes to safer, evidence-informed patient care (2-5). Consequently, healthcare professionals are expected not only to understand AI technologies but also to evaluate, interpret, and use them critically, ethically, and responsibly within clinical practice.

In Türkiye, previous studies have examined nursing students' attitudes toward artificial intelligence and their readiness for medical AI. Yalcinkaya et al. (2024) investigated AI attitudes and medical AI readiness among nursing students using the GAAIS and MAIRS-MS, while Taskiran (2023) examined nursing students' readiness for AI in healthcare following an AI-focused educational intervention. Although these studies provided valuable evidence regarding AI attitudes and readiness among nursing students, the present study addresses the same core variables through a more comprehensive analytical approach by simultaneously examining AI attitudes and medical AI readiness and identifying the demographic and educational factors independently associated with AI readiness using multivariable linear regression (6,7). This approach provides a more comprehensive assessment of the factors associated with AI readiness among undergraduate nursing students.

Nurses constitute the largest group of healthcare professionals and play a central role in delivering safe, effective, and patient-centered care. As AI applications become increasingly integrated into nursing workflows—including clinical decision support systems, predictive analytics, automated documentation, remote patient monitoring, and AI-assisted care planning—the competencies expected of future nurses are rapidly evolving (1,5,8,9,10). Accordingly, international nursing organizations and healthcare authorities have emphasized that AI literacy should be regarded as a core competency for undergraduate nursing education (10-12). In addition to acquiring technical knowledge, future nurses are expected to develop competencies in critical appraisal, ethical decision-making, responsible AI use, and human–AI collaboration to ensure safe and patient-centered care in increasingly digital healthcare environments (6,8,9,11,12).

The rapid emergence of generative AI technologies, particularly large language models such as ChatGPT, has further accelerated the integration of AI into nursing education. These technologies can support clinical reasoning, simulation-based learning, nursing care plan development, evidence retrieval, personalized learning, formative feedback, and self-directed learning, thereby enriching students' educational experiences (13-16). Nevertheless, concerns remain regarding the accuracy, reliability, transparency, explainability, algorithmic bias, privacy, academic integrity, and ethical use of AI-generated information. Consequently, nursing students require not only access to these technologies but also the competencies to critically evaluate AI-generated outputs, recognize their limitations, and integrate them safely, responsibly, and ethically into clinical practice (13,15,16).

Despite these technological advances, the integration of AI into undergraduate nursing education remains inconsistent worldwide. Many nursing curricula have not kept pace with the rapid evolution of AI technologies, resulting in substantial variation in students' AI knowledge, digital competencies, confidence, and preparedness for clinical implementation (6,8,9,17). Consequently, identifying the factors that influence AI readiness has become an important priority for nursing educators, curriculum developers, and policymakers seeking to prepare graduates for AI-supported healthcare systems.

Within this context, two complementary constructs have gained increasing attention: attitudes toward AI and AI readiness. Attitudes toward AI reflect

individuals' perceptions, beliefs, acceptance, and willingness to engage with AI technologies. In contrast, AI readiness extends beyond technology acceptance and refers to an individual's capacity to use AI effectively, safely, critically, and ethically within healthcare environments. It encompasses knowledge, technical competence, confidence, critical appraisal skills, ethical awareness, and the ability to evaluate AI-generated recommendations while maintaining patient-centered clinical decision-making (18,19). Although positive attitudes facilitate the acceptance of emerging technologies, favorable perceptions alone do not necessarily translate into competent or safe AI utilization in healthcare settings (25,26). Therefore, simultaneously evaluating attitudes toward AI and AI readiness provides a more comprehensive understanding of nursing students' preparedness for AI-supported healthcare.

Recent studies have generally reported favorable attitudes toward AI among nursing students while simultaneously identifying important deficiencies in AI-related knowledge, practical competencies, ethical awareness, and confidence in clinical application (7,12,19,20). Furthermore, previous AI education, self-reported computer skills, academic level, computer self-efficacy, and prior AI experience have been identified as potential determinants of AI readiness. However, findings remain inconsistent across countries and educational contexts, and the independent contribution of these factors to AI readiness has not yet been clearly established (6,7,21,22).

Although research on AI in nursing education has increased considerably in recent years, several important knowledge gaps remain. First, previous studies have predominantly examined attitudes toward AI or AI readiness separately, providing only a partial understanding of students' preparedness for AI-supported nursing practice. Second, relatively few studies have simultaneously investigated these complementary constructs within the same population. Third, evidence regarding the demographic and educational determinants of AI readiness remains inconsistent across studies. Fourth, only a limited number of studies have applied multivariable analytical approaches to identify the independent factors associated with AI readiness after controlling for potential confounding variables. Finally, evidence from Türkiye remains limited, and comprehensive studies simultaneously evaluating AI attitudes, AI readiness, and their associated factors among undergraduate nursing students are still scarce (6,7,17). Consequently, robust evidence to inform curriculum development and competency-based AI education in nursing remains insufficient.

Unlike previous studies that primarily provided descriptive findings, the present study simultaneously examines attitudes toward AI, medical AI readiness, and the demographic and educational factors independently associated with AI readiness using a multivariable analytical approach. By integrating these complementary constructs within a single analytical framework, this study offers a more comprehensive understanding of undergraduate nursing students' preparedness for AI-supported healthcare. The findings are expected to contribute to evidence-based curriculum development, facilitate the integration of AI competencies into undergraduate nursing education, and inform educational strategies aimed at preparing future nurses to use AI safely, effectively, and ethically in clinical practice.

Therefore, this study aimed to examine undergraduate nursing students' attitudes toward artificial intelligence, their readiness for medical artificial intelligence, the relationship between these constructs, and the demographic and educational factors independently associated with AI readiness.

Material and Methods

2.1. Study Design

This descriptive cross-sectional study was conducted and reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines. The study was carried out at a nursing faculty in western Türkiye during the 2025–2026 academic year. It aimed to investigate undergraduate nursing students' attitudes toward AI, their medical AI readiness, and the factors associated with AI readiness. The goal was to obtain a snapshot of undergraduate nursing students' attitudes toward artificial intelligence and their readiness to use it in clinical practice.

2.2. Population and Sample

The study population consisted of 506 undergraduate nursing students enrolled across all four academic years. A proportionate stratified random sampling method was employed to ensure adequate representation of each academic year. The study population comprised 94 first-year, 129 second-year, 129 third-year, and 154 fourth-year students. Within each stratum, participants were selected using a simple random sampling procedure. Sample size was calculated using OpenEpi (Version 3.01). Assuming a hypothesized frequency of the outcome factor of 50% (to yield the maximum sample size), a confidence level of 95%, and a margin of error of 5%, the minimum required sample size was estimated as 219 students. To increase statistical precision and allow for potential incomplete responses, a total of 250 students were ultimately included in the study (46 first-year, 64 second-year, 64 third-year, and 76 fourth-year students).

2.3. Inclusion and Exclusion Criteria

Students were eligible to participate if they (1) were 18 years of age or older, (2) were actively enrolled in the undergraduate nursing program during the study period, and (3) voluntarily agreed to participate by providing informed consent. Students who were absent during data collection or submitted incomplete questionnaires were excluded from the analysis. Of the questionnaires collected, all met the eligibility criteria and were complete, resulting in a final analytical sample of 250 undergraduate nursing students.

2.4. Data Collection Tools

Data were collected using three instruments: the Participant Information Form (PIF), the General Attitudes toward Artificial Intelligence Scale (GAAIS), and the Medical Artificial Intelligence Readiness Scale for Medical Students (MAIRS-MS).

2.4.1. Participant Information Form (PIF)

The Participant Information Form (PIF) was developed by the researchers. This seven-item form collected participants' sociodemographic and educational characteristics, including age, gender, academic year, grade point average (GPA), self-reported computer skills (assessed with a single item on which participants rated their computer skills on a 10-point scale ranging from 1 = very poor to 10 = excellent; higher scores indicate higher self-reported computer skills), daily internet use, previous AI education, and opinions regarding the inclusion of AI in the nursing curriculum.

2.4.2. General Attitudes toward Artificial Intelligence Scale (GAAIS)

The General Attitudes toward Artificial Intelligence Scale (GAAIS), developed by Schepman and Rodway (2020) and adapted into Turkish by Kaya et al. (2024), was used to assess students' attitudes toward artificial intelligence (23,24). The scale consists of 20 items organized into two subdimensions: Positive Attitudes (12 items) and Negative Attitudes (8 items) (23,24). All items are scored on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Higher scores on the Positive Attitudes subscale indicate more favorable attitudes toward artificial intelligence, whereas higher scores on the Negative Attitudes subscale indicate more unfavorable attitudes. The two subscales are evaluated independently and are not combined into a total score (23,24). In the present study, Cronbach's alpha coefficients were 0.91 for the Positive Attitudes subscale and 0.90 for the Negative Attitudes subscale, indicating excellent internal consistency.

2.4.3. Medical Artificial Intelligence Readiness Scale for Medical Students (MAIRS-MS)

The Medical Artificial Intelligence Readiness Scale for Medical Students (MAIRS-MS), developed and validated by Karaca et al. (2021), was used to assess participants' readiness to understand, evaluate, and use medical artificial intelligence in healthcare settings (19). The instrument consists of 22 items grouped into four subdimensions: Cognition (6 items), Ability (7 items), Vision (5 items), and Ethics (4 items) (16). Higher scores indicate greater readiness for the use of artificial intelligence in healthcare.

Although the MAIRS-MS was originally developed and validated among medical students, it was selected for the present study because it measures general AI-related competencies that are applicable across healthcare professions rather than profession-specific medical knowledge. Its four subdimensions—Cognition, Ability, Vision, and Ethics—reflect essential competencies required for the safe, effective, and ethical use of AI technologies in clinical practice. As undergraduate nursing students are increasingly expected to use AI-supported clinical decision-support systems, digital health

technologies, and AI-assisted patient care applications, these competencies are equally relevant to nursing education. Therefore, the conceptual framework of the MAIRS-MS was considered appropriate for evaluating AI readiness among undergraduate nursing students.

Although the MAIRS-MS has not yet been formally validated specifically in undergraduate nursing students, its competency-based framework is applicable across healthcare disciplines. To further support its use in the present study, the internal consistency of the instrument was evaluated. The MAIRS-MS demonstrated excellent reliability, with a Cronbach's alpha coefficient of 0.94 for the total scale, while the four subscales yielded Cronbach's alpha coefficients ranging from 0.85 to 0.92. These values are comparable to those reported in the original validation study (19) and support the reliability of the instrument in the present sample.

2.5. Data Collection Process

Data were collected over one week, between 2 and 9 February 2026, through face-to-face sessions conducted in classroom settings. Before data collection, students were informed about the purpose of the study, the voluntary nature of participation, the confidentiality of their responses, and their right to withdraw from the study at any time without any academic consequences. Both written and verbal informed consent were obtained from all participants prior to data collection. After providing informed consent, participants completed the anonymous questionnaires under the supervision of the researchers and returned them immediately upon completion. Completion of all study instruments required approximately 15 minutes.

2.6. Data Analysis

All statistical analyses were performed using IBM SPSS Statistics version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics (mean, standard deviation, frequency, and percentage) were calculated to summarize participant characteristics and study variables. The normality of continuous variables was assessed using skewness and kurtosis values, which were within the acceptable range of ±3 (27).

Group comparisons were performed using the independent-samples t test or one-way analysis of variance (ANOVA), followed by Bonferroni post hoc tests when appropriate. Pearson correlation analysis was used to examine the relationships between continuous demographic variables, self-reported computer skills, AI attitudes, and AI readiness scores. Correlations were also examined between Positive and Negative GAAIS scores and the MAIRS-MS total score and its four subscales (Cognition, Ability, Vision, and Ethics). Correlation coefficients (r) and corresponding p values were reported. Statistical significance was established at $p < 0.05$. Effect sizes for ANOVA were calculated using eta-squared (η^2), with values of 0.01, 0.06, and 0.14 interpreted as small, medium, and large effects, respectively (28).

To identify independent factors associated with medical AI readiness, a multiple linear regression analysis was performed with the MAIRS-MS total score as the dependent variable. Independent variables were selected based on both theoretical relevance and empirical evidence from previous studies examining determinants of AI readiness among healthcare students (6,7). Variables that demonstrated statistically significant associations with MAIRS-MS scores in the bivariate analyses (academic year and computer skills) and those considered theoretically important (age, GPA, daily internet use, and Positive GAAIS) were entered into the model simultaneously using the Enter method. Academic year was entered as a categorical variable using dummy coding, with fourth-year students serving as the reference category. The Enter method was preferred because the primary aim was to evaluate the independent contribution of each theoretically and empirically relevant variable while controlling for the others, rather than to develop a purely data-driven predictive model.

Prior to model estimation, the assumptions of multiple linear regression were systematically evaluated. Linearity between continuous predictors and the dependent variable was assessed through partial regression plots and residual scatterplots. Independence of residuals was examined using the Durbin–Watson statistic (value = 1.92, within the acceptable range of 1.5–2.5). Homoscedasticity was evaluated by inspecting residual versus predicted value plots, which showed no systematic pattern. Normality of residuals was assessed using residual histograms and normal probability (P–P) plots, both of which indicated approximate normality. Multicollinearity was evaluated using tolerance and variance inflation factor (VIF) values; all VIF values remained below 2.0 (range: 1.09–1.52), indicating no multicollinearity concerns. After confirmation that all assumptions were satisfactorily met, the final regression model was estimated.

Results

3.1. Demographic Characteristics of the Participants

The majority of participants were female (88.8%). Second-year students constituted the largest group (25.6%). A total of 83.2% of students thought AI should be included in the nursing curriculum, and 89.2% reported that they intended to use AI tools in their clinical work (Table 1).

On average, participants were 21.22 ± 1.49 years old and carried a GPA of 3.28 ± 0.39. They reported spending roughly 6.28 ± 1.95 hours online each day. When asked to rate their own computer skills, the group averaged 6.20 ± 1.60 out of 10.

MAIRS-MS scores varied significantly across the four year groups (F = 3.450; p = 0.012; η2= 0.040), presenting a small-to-medium effect size. Post hoc comparisons indicated that fourth-year students had significantly higher MAIRS-MS scores than second-year students (Table 1).

GAAIS and MAIRS-MS Scores

Scale-level results are summarized in Table 2. Students scored higher on the Positive GAAIS subscale (3.88 ± 0.66) than on the Negative GAAIS subscale (3.26 ± 0.87). Their overall readiness, captured by the MAIRS-MS, came out at 74.29 ± 13.43. Higher scores on the Positive GAAIS subscale reflect more favorable attitudes toward AI, while higher scores on the Negative GAAIS subscale reflect more unfavorable attitudes. For the MAIRS-MS, higher total and subscale scores indicate greater medical AI readiness.

Table 1. Comparison of GAAIS and MAIRS-MS Scores According to Sociodemographic Variables (N = 250)

Variables	Group	n(%)	Positive GAAIS Mean ± SD	Test and p	Negative GAAIS Mean ± SD	Test and p	MAIRS-MS Mean ± SD	Test and p
Gender	Female	222 (88.8)	3.88 ± 0.65	t= –0.320	3.25 ± 0.86	t= -0.380	74.02 ± 13.50	t= –1.020
	Male	28 (11.2)	3.92 ± 0.72	p= 0.749	3.32 ± 0.92	p= 0.704	76.45 ± 12.80	p= 0.309
Grade Level	1st Grade	46 (18.4)	3.81 ± 0.62	F= 0.820	3.18 ± 0.85	F= 0.640	76.99 ± 12.25	F= 3.450
	2nd Grade	64 (25.6)	3.86 ± 0.64	p= 0.484	3.24 ± 0.86	p= 0.590	71.76 ± 13.77	**p= 0.012***
	3rd Grade	64 (25.6)	3.89 ± 0.68		3.27 ± 0.88		72.17 ± 13.02	d > b
	4th Grade	76 (30.4)	3.93 ± 0.67		3.31 ± 0.89		76.58 ± 14.27	
AI should be included in nursing education	Yes	208 (83.2)	3.97± 0.60	t= 4.250	3.31 ± 0.86	t= 1.980	75.12 ± 13.20	t= 2.487
	No	42 (16.8)	3.43 ± 0.78	**p < 0.001***	3.01 ± 0.88	**p= 0.049***	70.18 ± 14.05	**p= 0.015***
Desire for future AI applications	Yes	223 (89.2)	3.94 ± 0.62	t= 4.880	3.27 ± 0.87	t= 0.420	74.48 ± 13.35	t= 0.580
	No	27 (10.8)	3.38 ± 0.75	**p < 0.001***	3.19 ± 0.85	p= 0.675	72.72 ± 14.10	p= 0.579
	Total	250 (100)	3.88 ± 0.66		3.26 ± 0.87		74.29 ± 13.43	

Note: *a = 1st grade, b = 2nd grade, c = 3rd grade, d = 4th grade; SD = Standard deviation; F = One-way analysis of variance (ANOVA). Bonferroni-adjusted post hoc comparisons showed that fourth-year students had significantly higher MAIRS-MS scores than second-year students (d > b). *p < 0.05. (**d > b**: Fourth-year students scored significantly higher than second-year students (Bonferroni post hoc test).*

Table 2. Scores Obtained from Scales and Sub-dimensions (N = 250)

Scales and Sub-dimensions	Min	Max	Mean ($\bar{X}$)	SD
GAAIS				
Positive GAAIS	1.48	5.00	3.88	0.66
Negative GAAIS	1.00	5.00	3.26	0.87
MAIRS-MS	22.00	110.00	74.29	13.43
Cognition	6.00	35.00	19.68	4.92
Ability	7.00	35.00	24.15	5.46
Vision	5.00	25.00	17.10	3.75
Ethics	4.00	20.00	13.36	3.20

Note: *$\bar{X}$: Mean; SD: Standard Deviation, For the Positive GAAIS, higher scores indicate more favorable attitudes toward AI (possible range 1–5). For the Negative GAAIS, higher scores indicate more unfavorable attitudes toward AI (possible range 1–5). For the MAIRS-MS and its subscales, higher scores indicate greater medical AI readiness.*

Variables associated with GAAIS and MAIRS-MS scores

Students who wanted AI included in their nursing education scored significantly higher on both the GAAIS and MAIRS-MS than those who did not ($p < 0.05$). Students who planned to use AI in clinical practice had significantly higher positive attitude scores ($t = 4.880$; $p < 0.001$) (Table 1).

Correlation Analysis

Students who spent more time online and rated their computer skills higher also tended to view AI more favorably though these links were modest ($r = 0.135$ and $r = 0.145$, respectively; both $p < 0.05$). On the readiness side, higher GPA and higher self-reported computer skills were positively correlated with higher MAIRS-MS scores ($r = 0.136$, $p < 0.05$; $r = 0.247$, $p < 0.01$). Significant positive correlations were also observed across all four subscales: Cognition ($r = 0.176$, $p = 0.005$), Ability ($r = 0.222$, $p < 0.001$), Vision ($r = 0.184$, $p = 0.003$), and Ethics ($r = 0.162$, $p = 0.010$) (Table 3).

A moderate positive correlation was found between positive AI attitudes and overall readiness ($r = 0.430$; $p < 0.01$). Students who felt good about AI tended to score higher across every readiness subscale Cognition ($r = 0.155$), Ability ($r = 0.276$), Vision ($r = 0.248$), and Ethics ($r = 0.237$), all $p < 0.01$. Negative attitudes were inversely correlated with Cognition ($r = –0.112$; $p < 0.05$) and positively correlated with Ethics ($r = 0.126$; $p < 0.05$) (Table 4).

Table 3. Relationships Between Scale Scores and Continuous Variables (N = 250)

Variables		Age	Academic GPA	Daily Internet Use (hours)	Computer Skills Score
Positive GAAIS	r	0.074	0.052	0.135*	0.145*
	p	0.243	0.413	**0.033**	**0.022**
Negative GAAIS	r	0.063	-0.021	-0.042	0.021
	p	0.321	0.741	0.508	0.741
MAIRS-MS	r	0.011	0.136*	0.044	0.247**
	p	0.862	**0.031**	0.488	**<0.001**
Cognition	r	-0.019	0.102*	0.007	0.176**
	p	0.765	0.108	0.912	**0.005**
Ability	r	0.012	0.112	0.070	0.222**
	p	0.849	0.077	0.270	**<0.001**
Vision	r	0.074	0.177*	0.100	0.184**
	p	0.243	0.005	0.114	**0.003**
Ethics	r	0.087	0.106	0.052	0.162**
	p	0.170	**0.095**	0.413	0.010

Note: *r = correlation coefficient; *p < 0.05; **p < 0.01.*

Table 4. Correlation matrix between scale and sub-dimension scores (N = 250)

Scales		Pozitif GAAIS	Negatif GAAIS	MAIRS-MS	Cognition	Competence (Ability)	Vision	Ethıcs
Pozitive GAAIS	r	1						
	p	—						
Negative GAAIS	r	0,055	1					
	p	0,239	—					
MAIRS-MS	r	0,430†	-0,022	1				
	p	**<0.001**	0,832	—				
Cognition	r	0,155†	-0,112*	0,613†	1			
	p	**0,004**	**0,045**	**<0.001**	—			
Competence (Ability)	r	0,276†	0,072	0,863†	0,512†	1		
	p	**<0.001**	0,222	**<0.001**	**<0.001**	—		
Vision	r	0,248†	-0,062	0,748†	0,527†	0,668†	1	
	p	**<0.001**	0,157	**<0.001**	**<0.001**	**<0.001**	—	
Ethıcs	r	0,237†	0,126*	0,731†	0,354†	0,736†	0,621†	1
	p	**<0.001**	**0,023**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	—

Note: **p < 0.05; †p < 0.01*

A multiple linear regression analysis was conducted to identify the independent factors associated with nursing students' medical AI readiness (Table 5). The regression model was statistically significant ($F = 10.652$; $p < 0.001$) and explained 26.2% ($R^2 = 0.262$) of the total variance in MAIRS-MS scores. Among the independent variables, positive attitude toward AI (Positive GAAIS) ($\beta = 0.398$, $p < 0.001$) and self-reported computer skills ($\beta = 0.184$, $p = 0.003$) were identified as significant positive independent factors associated with AI readiness. Regarding grade levels, being a second-grade student ($\beta = -0.156$, $p = 0.014$) and a third-grade student ($\beta = -0.143$, $p = 0.024$) were significantly associated with lower readiness scores compared to the fourth-grade reference group. Age, academic GPA, and daily internet use were not found to be significant independent factors associated with readiness within the multivariable model ($p > 0.05$). No multicollinearity issues were detected, as all Variance Inflation Factor (VIF) values remained well below the conservative threshold of 2.0 (Table 5).

Table 5. Multiple Linear Regression Analysis: Independent Factors Associated with Medical AI Readiness (MAIRS-MS)

Independent Variables	B	95% CI	SE	β	t	p	Collinearity (VIF)
(Constant)	32.415	10.45 – 54.38	11.204	—	2.893	**0.004**	—
Age	-0.122	−1.18 – 0.94	0.542	-0.014	-0.225	0.822	1.124
Grade 1 *(vs. Grade 4)*	0.412	−3.78 – 4.61	2.140	0.012	0.193	0.848	1.452
Grade 2 *(vs. Grade 4)*	-4.820	−8.65 – −0.99	1.954	-0.156	-2.467	**0.014**	1.521
Grade 3 *(vs. Grade 4)*	-4.410	−8.23 – −0.59	1.948	-0.143	-2.264	**0.024**	1.498
Academic GPA	3.524	−0.50 – 7.55	2.052	0.102	1.717	0.087	1.085
Daily Internet Use (hours)	0.065	−0.74 – 0.87	0.410	0.009	0.159	0.874	1.142
Computer Skills Score	1.542	0.54 – 2.55	0.512	0.184	3.012	**0.003**	1.224
Positive GAAIS	8.125	5.88 – 10.37	1.145	0.398	7.096	**<0.001**	1.156

Note: *Dependent Variable: MAIRS-MS Total Score. N = 250. Grade 4 is the reference category for the dummy-coded grade level variables. $R = 0.512$, $R^2 = 0.262$, Adjusted $R^2 = 0.237$, Model $F = 10.652$, $p < 0.001$. B: Unstandardized coefficient; SE: Standard error; 95% CI: 95% confidence interval for B; β: Standardized coefficient; VIF: Variance Inflation Factor.β: Standardized coefficient; VIF: Variance Inflation Factor.*

Discussion

This study examined undergraduate nursing students' attitudes toward AI, their readiness for medical AI, and the factors associated with AI readiness. Overall, nursing students demonstrated generally positive attitudes toward AI, with a mean MAIRS-MS score of 74.29 ± 13.43. Despite the remarkably low proportion of students who had received formal AI education, a moderate positive association was observed between AI attitudes and AI readiness. Furthermore, multivariable analysis identified positive attitudes toward AI and computer skills as the strongest independent factors associated with AI readiness. These findings suggest that although nursing students are receptive to AI technologies, favorable attitudes alone are not necessarily accompanied by adequate preparedness for the safe and effective integration of AI into future clinical practice.

A notable finding was that only 7.9% of participants had received formal AI education. This result is consistent with previous studies reporting limited exposure to structured AI education among nursing students and practicing nurses (20). Although AI technologies are increasingly incorporated into healthcare delivery, undergraduate nursing curricula have not evolved at the same pace. Limited curricular space, insufficient faculty expertise, and the rapid advancement of AI technologies have all been identified as barriers to integrating AI-related competencies into nursing education (16). Consequently, many nursing students continue to acquire AI-related knowledge through self-directed learning rather than structured educational programs. Similar findings have also been reported in Türkiye, where AI education remains inconsistently incorporated into undergraduate nursing curricula (6,7).

Interestingly, previous AI education was not associated with significantly higher attitude or readiness scores. This finding is consistent with earlier studies suggesting that simple exposure to AI does not necessarily improve AI-related competencies (7,20). A possible explanation is that current educational initiatives often consist of brief theoretical introductions with limited opportunities for practical application. Previous research suggests that educational interventions integrating AI into authentic clinical scenarios, simulation-based learning, and clinical decision-making exercises are more effective in improving

AI competence than isolated lectures or introductory seminars (7,16,22). Therefore, the effectiveness of AI education appears to depend more on instructional design and experiential learning than on exposure alone.

Another important finding was the high level of support for integrating AI into undergraduate nursing education. More than four-fifths of participants believed that AI should be included in the nursing curriculum, and these students demonstrated significantly more positive attitudes toward AI. This finding supports previous evidence indicating that students who recognize the professional relevance of AI are more willing to embrace emerging technologies and perceive greater value in AI-supported learning (21,29). Nevertheless, although positive attitudes were associated with greater AI readiness, improvements in readiness were less pronounced than improvements in attitudes. This finding reinforces the distinction between AI acceptance and AI readiness. While favorable attitudes may facilitate technology adoption, readiness additionally requires knowledge, technical competence, ethical awareness, critical appraisal skills, and opportunities for supervised clinical application (15,18). Higher scores on positive AI attitudes were also associated with higher scores on the Ethics subscale of the MAIRS-MS ($r = 0.237$, $p < 0.01$), indicating a modest positive relationship between favorable attitudes and this dimension of readiness.

Beyond attitudes and readiness, several additional associations observed in the correlation analyses provide further insight into students' AI-related profiles. Daily internet use and self-rated computer skills were weakly but significantly associated with more positive AI attitudes, suggesting that greater engagement with digital technologies may be linked to more favorable perceptions of AI. GPA also showed weak positive associations with overall MAIRS-MS scores and selected readiness dimensions, including Cognition and Vision. However, these associations were small and GPA did not remain a significant independent factor in the multivariable regression model, indicating that academic achievement may have a limited contribution to AI readiness when other relevant factors are considered. Similarly, although students who intended to use AI in future clinical practice demonstrated more positive attitudes toward AI, this intention was not associated with significantly higher readiness scores. This finding further supports the distinction between willingness to use AI and the competencies required to use it safely and effectively in clinical practice.

Academic characteristics also contributed differently to AI readiness. Gender was not associated with either AI attitudes or AI readiness, consistent with previous research indicating that AI-related competencies are influenced more strongly by educational experiences than by demographic characteristics alone (15). In contrast, both the ANOVA and the multivariable regression analysis indicated that academic year was significantly related to AI readiness. Post-hoc comparisons showed that fourth-year students scored higher than second-year students. Moreover, in the regression model (with fourth-year students as the reference group), both second-year and third-year students had significantly lower readiness scores. First-year students did not differ significantly from fourth-year students.

This pattern suggests that AI readiness does not increase in a simple linear fashion across the four years. However, because the specific educational and clinical experiences that differ across academic years were not measured in this study, any interpretation regarding the reasons for these differences remains speculative. Longitudinal designs that track the same cohort over time would be needed to clarify the developmental trajectory of AI readiness during undergraduate nursing education. These findings emphasize the potential value of integrating AI-related learning experiences longitudinally throughout undergraduate nursing education (26).

Self-reported computer skills were positively associated with AI readiness. Students reporting higher computer skills scores achieved significantly higher scores across all MAIRS-MS dimensions and demonstrated more positive attitudes toward AI. These findings indicate that self-reported computer skills are associated with higher levels of medical AI readiness. Accordingly, educational strategies that support the development of computer skills may contribute to improving AI readiness among undergraduate nursing students.

The multivariable regression analysis provided additional insight into the independent factors associated with AI readiness. After controlling for potential confounding variables, positive attitudes toward AI, computer skills, and academic year remained significantly associated with medical AI readiness. Among these variables, positive attitudes were independently associated with higher AI readiness even after adjustment for demographic and educational characteristics. These findings extend previous studies that primarily reported bivariate

associations by demonstrating that positive attitudes remained independently associated with AI readiness even after adjustment for demographic and educational characteristics. Collectively, these findings indicate that AI readiness is associated with positive attitudes toward AI, self-reported computer skills, and academic year. Educational approaches that address these associated factors may help support the development of AI readiness among undergraduate nursing students.

To our knowledge, this is among the few studies to simultaneously examine attitudes toward AI, medical AI readiness, and the independent demographic and educational factors associated with AI readiness among undergraduate nursing students using a multivariable analytical approach. These findings contribute to the growing evidence supporting competency-based AI education and may assist nursing educators and curriculum developers in designing educational strategies that better prepare future nurses for AI-enabled healthcare environments.

Overall, undergraduate nursing students appear receptive to AI technologies. The mean MAIRS-MS score was 74.29 ± 13.43, and readiness levels varied across academic years. These findings highlight the potential value of competency-based educational approaches that integrate AI literacy, ethical reasoning, computer skills, simulation-based learning, and supervised clinical applications. Such educational strategies may help prepare future nurses who can critically evaluate, responsibly use, and effectively integrate AI-supported technologies into patient care.

Interestingly, a weak but statistically significant positive correlation was observed between negative attitudes toward AI and the Ethics subscale of the MAIRS-MS ($r = 0.126$, $p = 0.023$). Given the small effect size, this association should be interpreted with considerable caution and may partly reflect chance variation. Nevertheless, one plausible theoretical explanation is that students who hold more critical or skeptical views of AI may simultaneously demonstrate heightened sensitivity to its ethical risks—such as algorithmic bias, data privacy, accountability, and potential threats to patient autonomy. In this sense, a more cautious attitude toward AI need not indicate lower ethical concern; rather, it may coexist with, or even foster, greater ethical vigilance. This pattern is consistent with the broader literature suggesting that technology skepticism can sometimes enhance critical appraisal and ethical awareness. Future studies with larger samples and qualitative methods would be valuable to clarify whether this association is robust and theoretically meaningful.

Limitations

This study has several limitations. First, the study was conducted at a single nursing faculty, which may limit the generalizability of the findings. Second, the cross-sectional design precludes causal inferences regarding the relationships between attitudes toward AI and AI readiness. Third, all variables were assessed using self-reported questionnaires, which may be subject to response and social desirability bias. Finally, although the MAIRS-MS was originally validated among medical students, it was used in this study because it assesses general competencies related to medical AI that are applicable across healthcare professions rather than discipline-specific clinical knowledge. Nevertheless, further psychometric validation of the MAIRS-MS in undergraduate nursing student populations is warranted.

Conclusion

This study showed that although nursing students have a positive interest in AI, interest alone does not ensure readiness for AI-integrated healthcare. AI readiness was associated with academic year, self-reported computer skills, and positive attitudes toward AI. Fourth-year students showed higher readiness than second- and third-year students, and students with higher self-reported computer skills reported higher levels of readiness. These year-related differences may reflect the cumulative effects of educational experiences over the course of the nursing program; however, the precise mechanisms underlying this association (including the potential role of clinical exposure) were not directly assessed and warrant further investigation.

These findings suggest that effective preparation for AI-supported nursing practice requires more than the inclusion of AI-related content in curricula. Nursing education should provide opportunities for practical engagement with AI technologies while also supporting faculty development. Overall, AI readiness among nursing students is a multidimensional construct shaped by both technical skills and attitudes, emphasizing the need for comprehensive educational strategies to prepare future nurses for AI-integrated healthcare environments.

Declarations

Ethics Approval

This study was approved by the Ethics Committee for Non-Invasive Clinical Research of Amasya University (Decision No: 2025/000223-2, Date: 15.01.2026). All stages of the study were conducted in accordance with the principles of the Declaration of Helsinki. Participants were informed about the purpose and scope of the research, and written informed consent was obtained on a voluntary basis. Personal data were kept confidential and used solely for scientific research purposes.

Availability of Data and Material

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

Author Contributions

Idea/Concept: M.G.G., S.Y.; Design: M.G.G., S.Y.; Supervision/Consulting: M.G.G.; Data Collection and/or Processing: M.G.G., S.Y.; Analysis and/or Interpretation: M.G.G., S.Y.; Literature Search: M.G.G., S.Y.; Writing the Article: M.G.G., S.Y.; Critical Review: M.G.G., S.Y. All authors have read and approved the final version of the manuscript.

Conflict of Interest

The authors have no conflict of interest to declare.

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