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THE INTEGRATION BARRIER OF ARTIFICIAL INTELLIGENCE IN CLINICAL PRACTICE: ASSESSING PHYSICIANS' EDUCATIONAL NEEDS REGARDING AI

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Abstract:
This study examines the attitudes of Turkish physicians towards Artificial Intelligence (AI), specifically assessing their perceptions, evaluation of its potential, and their concerns and expectations across various demographic groups. A sample of 157 physicians from 36 different medical specialties was selected using a snowball sampling technique. Data were collected through a 20-item questionnaire measuring AI knowledge/perception, potential impact, and concerns/expectations. Analysis was performed using t-tests, one-way ANOVA, and regression analyses. The main finding indicates a negative correlation between seniority and AI knowledge. In particular, a physician's age and length of professional experience significantly and negatively predict their AI Knowledge and Perception scores (R^2=.068, p = .001). In other words, as physicians gain more experience, their self-assessed knowledge and perception of AI tend to decrease. In contrast, physicians generally share similar views regarding AI's overall potential and impact in medicine, as well as their general concerns and expectations. These dimensions were not significantly affected by demographic factors such as gender, age (except for the knowledge dimension), or the type of employing institution (p > .05). In conclusion, the results indicate broad acceptance among physicians of AI's benefits, but they also highlight significant gaps in AI literacy gaps.

Keywords: Artificial Intelligence (AI), physician perception, AI education

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1. Introduction

Artificial Intelligence (AI), broadly defined as computer systems capable of performing tasks that typically require human intelligence, is rapidly emerging as a powerful and transformative force in global healthcare (Dhiman *et al.,* 2020; Sakurada *et al.,* 2025; Debad & Metcalfe, 2023). The potential applications are immense, with the promise of enhancing diagnostic accuracy, predicting patient outcomes, and facilitating personalised treatment plans (Basu *et al.,* 2020; Roy & Baksi, 2022; Sakurada *et al.,* 2025). AI's advantages – spanning diagnosis, treatment planning, operational efficiency, and patient care – are now widely acknowledged (Basu *et al.,* 2020; Roy & Baksi, 2022; Sakurada *et al.,* 2025).

However, this rapid technological evolution also raises critical questions about the perceptions, attitudes, and fundamental knowledge levels of the technology's essential end-users: current practitioners and medical students (Abdullah & Fakieh, 2020; Burzyńska *et al.,* 2022; Castagno & Khalifa, 2020; Habib *et al.,* 2024; Kasaye *et al.,* 2025; Stewart *et al.,* 2023; Xiang *et al.,* 2020; Zainal *et al.,* 2023). The successful, safe, and effective integration of AI into health systems depends not only on its technical capabilities but, crucially, on how current and future clinicians perceive, adopt, and interact with the technology (Sujan *et al.,* 2022; Wang *et al.,* 2021).

The history of AI in medicine dates back to the 1960s, with early research focusing on computer-aided diagnosis (Basu *et al.,* 2020; Scott, 1993; Roy & Baksi, 2022). Since then, AI has grown significantly, evolving from simple rule-based expert systems to today's sophisticated machine learning (ML) and deep learning (DL) models. These advanced models can now process vast datasets and identify complex patterns without explicit programming (Basu *et al.,* 2020; Scott, 1993; Roy & Baksi, 2022; Sakurada *et al.,* 2025), making AI an integral part of daily life, from personalised recommendations to clinical support (Basu *et al.,* 2020; Debad & Metcalfe, 2023).

This study draws on a comprehensive synthesis of published articles that have examined the perceptions of a wide range of healthcare staff and students towards AI. The literature review included peer-reviewed journals and preprints, extracting key information on knowledge levels, general attitudes (positive or negative), job security concerns, ethical and practical challenges, and educational needs. The themes identified in this synthesis – AI perception, knowledge level, educational needs, ethical concerns, workforce impact, and technological barriers – provide essential context for the present work. While existing literature has identified several important commonalities and differences in the attitudes of healthcare staffs, the current study distinguishes itself from these broader studies. Instead of assessing the entire spectrum of healthcare staff, this research focuses specifically on examining the unique perspectives of practising medical doctors in Turkey.

2. Literature Review: Context and Consensus

2.1. AI Knowledge Level and Educational Deficiencies

Significant knowledge gap regarding AI and digital technologies is perhaps the most pervasive finding across nearly all relevant studies (AlAli *et al.,* 2022; Abdullah & Fakieh, 2020; Burzyńska *et al.,* 2022; Castagno & Khalifa, 2020; Habib *et al.,* 2024; Kasaye *et al.,* 2025; Stewart *et al.,* 2023; Xiang *et al.,* 2020; Zainal *et al.,* 2023). The data are globally consistent: the vast majority of Polish physicians (84.0%) reported needing additional digital skills training (Burzyńska *et al.,* 2022). In Western Australia, 87.5% of medical students had received no formal AI training, and few understood basic computational principles (Stewart *et al.,* 2023). Similar knowledge shortages have been reported in Saudi Arabia (74% of workers; Abdullah & Fakieh, 2020), Pakistan (78.7% never had formal training; Habib *et al.,* 2024), and Ethiopia (64.9% had not received formal training; Kasaye *et al.,* 2025). Notably, only a small fraction (6.0%) of Korean physicians felt that they had good AI knowledge (Oh *et al.,* 2019). This shortage is not limited to basic familiarity; it extends to fundamental AI principles, their limitations, and specific clinical applications (Alsultan, 2023; Kasaye *et al.,* 2025; Stewart *et al.,* 2023; Zainal *et al.,* 2023). Indian, German, and New Zealand medical students and radiologists have consistently highlighted the urgent necessity for curriculum reform to better integrate AI concepts (Balakrishna, 2023; Goyal *et al.,* 2024; Graßmann *et al.,* 2023; Koster *et al.,* 2021).

2.2. General Attitudes and Optimism towards Artificial Intelligence

Despite the identified knowledge shortage, healthcare professionals and medical students generally show positive and optimistic attitudes towards AI's potential to improve healthcare (AlAli *et al.,* 2022; Abdullah & Fakieh, 2020; Burzyńska *et al.,* 2022; Castagno & Khalifa, 2020; Habib *et al.,* 2024; Kasaye *et al.,* 2025; Stewart *et al.,* 2023; Xiang *et al.,* 2020; Zainal *et al.,* 2023). Participants usually believe that AI can improve efficiency, reduce errors, increase diagnostic accuracy, and support treatment (Basu *et al.,* 2020; Roy & Baksi, 2022; Sakurada *et al.,* 2025). For example, 74.3% of medical students in Western Australia approved that AI would generally improve medicine (Stewart *et al.,* 2023). Korean doctors find AI useful in medicine, with 83.4% agreeing (Oh *et al.,* 2019). Similarly, healthcare professionals in Ethiopia and China expressed positive views on the applicability of AI for diagnosis, treatment, and clinical decision support (Kasaye *et al.,* 2025; Wang *et al.,* 2021). This shared enthusiasm provides a strong foundation for the extensive adoption of AI, although legitimate concerns remain.

2.3. Job Security Concerns and the Importance of the Human Touch

Perceptions of AI's impact on job security are varied. Concerns do exist, with 78% of healthcare staffs in Saudi Arabia and 59.5% in Pakistan worried that AI could suplant certain jobs (Abdullah & Fakieh, 2020; Habib *et al.,* 2024). However, this anxiety is not collective; 56.6% of Australian medical students were not anxious about their future job security (Stewart *et al.,* 2023), and only 35.4% of Korean doctors felt that AI might take

their jobs (Oh *et al.,* 2019). Importantly, the prevailing consensus suggests that AI will not completely replace human physicians but will serve as a powerful auxiliary aid (Debad & Metcalfe, 2023; McCowan, 2020; Wang *et al.,* 2021). Studies constantly emphasise that AI cannot fully replicate the empathetic, communicative, and social aspects of medical practice, thereby preserving the vital importance of the patient-physician relationship (Bhattad & Jain, 2020; Debad & Metcalfe, 2023; Ooi, 2024). The ability to connect with and care for patients remains a uniquely human characteristic (Kim, 2017).

2.4. Key Challenges and Barriers to AI Implementation

Integrating AI into healthcare requires addressing significant technical, ethical, systemic, and educational challenges.

2.4.1 Data Quality and Algorithmic Bias

Poor quality, inconsistency, and inherent biases in medical data directly weaken AI reliability. Biases in training data, such as models primarily trained on Western populations, can result in poor performance and inequitable treatment recommendations for various demographic groups (Goyal *et al.,* 2024; Tehsin *et al.,* 2023; Zhang & Zhang, 2023).

2.4.2 Transparency and Explainability

The "black box" nature of complex AI algorithms challenges trust among clinicians and patients (Bhattad & Jain, 2020; Castagno & Khalifa, 2020; Sujan *et al.,* 2022; Zhang & Zhang, 2023). Clinicians are often unwilling to adopt recommendations that they cannot understand or explain to their patients (Castagno & Khalifa, 2020).

2.4.3 Security and Privacy

The extensive amount of confidential patient data within AI systems significantly enhances the risk of cyberattacks, security breaches, and deliberate data tampering (Castagno & Khalifa, 2020; McCowan, 2020; Ooi, 2024; Zhang & Zhang, 2023).

2.4.4 Attribution of Responsibility

When AI is involved in a clinical error, the legal and ethical responsibility remains unclear (Castagno & Khalifa, 2020; Ooi, 2024; Zhang & Zhang, 2023). This is a major concern for clinicians, who remain responsible for patient care (Oh *et al.,* 2019; Wang *et al.,* 2021).

2.4.5 Workflow Integration and Usability

Several practical difficulties hinder adoption, including clashes with current clinical procedures, interfaces that are too complex for users, and the resultant cognitive strain caused by poorly designed systems (Choudhury *et al.,* 2022; Wang *et al.,* 2021).

2.4.6 Curriculum Flexibility and Currency

Medical curricula often struggle to keep pace with digital developments and rely on outdated learning styles, significantly hindering the development of the necessary digital competencies (Burzyńska *et al.,* 2022; Zainal *et al.,* 2023).

2.4.7 Lack of Infrastructure and Support

Especially in resource-limited settings, the absence of adequate digital infrastructure, qualified mentors, and an institutional culture that supports innovation poses a major barrier to effective AI integration (Kasaye *et al.,* 2025; Zainal *et al.,* 2023).

3. Methodology

This study focuses on practising physicians in Turkey, aiming to clarify their attitudes towards AI – specifically their expectations, concerns, evaluation of its potential, and overall perception – in relation to their demographic characteristics. This section details the research design, sample, data collection instruments, and data analysis procedures used in the study.

3.1. Research Design

A quantitative survey model was used to describe the physicians' views. The study's aim was to attain the perspectives of physicians working in various sectors (private, public, and university hospitals) throughout Turkey.

3.2. Sample

The research sample involved 157 physicians from hospitals across various Turkish provinces. These participants, who were recruited using the snowball sampling method, represented a broad spectrum of expertise spanning 36 different medical specialties.

3.3. Data Collection Instrument

Data was collected using an online survey administered via Google Forms. The 20-question survey, developed using artificial intelligence, included 15 key questions designed to learn physicians' perspectives on AI.

These items were grouped into three key dimensions:

- Physicians' knowledge and perception of AI,
- Potential and impact of AI in medicine,
- Concerns and expectations regarding AI.

The data collection period began on 18 July 2025 and was completed on 3 October 2025.

3.4. Data Analysis

SPSS 20 (Statistical Package for the Social Sciences) was used to analyse the collected data. An independent samples t-test was applied to investigate significant differences in

physicians' perceptions of AI based on gender. One-way analysis of variance (one-way ANOVA) was used to examine significant differences in AI perceptions based on demographic variables such as age, employing institution, and duration of professional experience. The significance level for the analyses was set at $\alpha = 0.05$.

4. Findings

Table 1: Demographic Characteristics

Variables	Grup	Frequancy	%
Gender	Female	86	54,8
	Male	71	45,2
Age	25-35	61	38,9
	36-45	25	15,9
	46-55	33	21,0
	56 and over	38	24,2
Total		**157**	**100**
Professional Experience	0-5 years	33	21,0
	6-10 years	29	18,5
	11-20 years	26	16,6
	21 years and over	69	43,9
Type of Employing Institution	University Hospital	52	33,1
	Training and Research Hospital	27	17,2
	State Hospital	18	11,5
	Private Hospital/Clinic	14	8,9
	Family Health Center/Community Health Center	35	22,3
	Others	11	7,0
Total		**157**	**100**

Regarding the gender distribution of the participants (N=157), there were slightly more female participants (54.8%) than male participants (45.2%).

Examining the age distribution, the largest group was in the 25–35 age range, comprising 38.9% (n=61) of the sample. This was followed by the 56 years and over group at 24.2% (n=38), the 36–45 years group at 21.0% (n=33), and the 46–55 years group at 15.9% (n=25).

For professional experience, the largest proportion had 21 years or more of experience (n=69, 43.9%). The other groups were 0–5 years (n=33, 21.0%), 6–10 years (n=29, 18.5%), and 11–20 years (n=26, 16.6%).

Regarding the type of employing institution, University Hospitals represented the largest segment (n=52, 33.1%), followed by Family Health Centre/Community Health Centre/Other (n=35, 22.3%), Training and Research Hospitals (n=27, 17.2%), State Hospitals (n=18, 11.5%), and Private Hospitals/Clinics (n=14, 8.9%).

Table 2: T-Test Results for AI Perception and Related Factors by Gender

Dependent Variable	Gender	N	Mean	SD	t	df	p
AI Knowledge and Perception	Female	86	3.70	1.51	-0.794	155	0.428
	Male	71	3.89	1.48			
Potential and Impact	Female	86	5.18	1.15	-3.202	155	**0.002**
	Male	71	5.74	0.99			
Concerns and Expectations	Female	86	4.91	0.75	-1.559	155	0.121
	Male	71	5.10	0.81			
Concerns	Female	86	4.82	1.39	1.357	155	0.177
	Male	71	4.51	1.49			
Expectations	Female	86	4.94	0.97	-2.447	155	**0.016***
	Male	71	5.34	1.05			

Based on the t-test results, gender was no statistically significant difference in any dimension of physicians' perception of Artificial Intelligence ($p>0.05$).

- **AI Knowledge and Perception:** There was no statistically significant difference between the mean scores of female ($M=3.70$, $SD=1.51$) and male physicians ($M=3.89$, $SD=1.48$), $t(155)=-0.794$, $p=0.428$.
- **AI Potential and Impact:** Gender did not appear to significantly influence perception in this dimension. The mean score of female physicians ($M=5.18$, $SD=1.15$) did not differ significantly from that of male physicians ($M=5.74$, $SD=0.99$), $t(155)=-3.202$, $p=0.002$.
- **AI Concerns and Expectations:** The difference between the two groups was non-significant. No significant difference was found between female ($M=4.91$, $SD=0.75$) and male physicians ($M=5.10$, $SD=0.81$), $t(155)=-1.559$, $p=0.121$.

Table 3: Simple Linear Regression Analysis Results
for the Effect of Age on AI Knowledge and Perception

Variable	B	SE	β	t	p
Constant (α)	4.527	0.248		18.220	0.000
Age	-0.320	0.095	-0.260	-3.351	**0.001**

The simple linear regression analysis performed indicates that Age significantly predicts physicians' AI Knowledge and Perception scores, $F(1,155)=11.230$, $p=0.001$.

Model	R	R^2	Adjusted R^2	Standard Error
1	0.260	0.068	0.062	1.45014

The coefficient of determination (R^2), which shows the total variance explained by the model in AI Knowledge and Perception scores, was found to be 0.068. This means that the age variable explains only approximately 6.8% of the total variance in physicians' AI Knowledge and Perception scores. The correlation coefficient (R) is 0.260, indicating a low-to-moderate relationship between the predictor (Age) and the dependent variable (AI Knowledge and Perception).

4.1 Coefficients

The effect of the Age variable on AI Knowledge and Perception, the results in the coefficients table are the following.

Age has a negative and significant impact on AI Knowledge and Perception, as the data shows (B=−0.320, t (155) =−3.351, p=0.001). This negative coefficient (B=−0.320) signals that the older physicians become, the lower their AI Knowledge and Perception scores are.

The value of the standardized coefficient (β) is −0.260.

Table 4: Simple Linear Regression Analysis Results for the Effect of Age on Potential and Impact

Variable	B	SE	β	t	p
Constant (α)	5.526	0.191		28.928	0.000
Age	-0.040	0.073	-0.044	-0.548	0.585

The simple linear regression analysis shows that the Age variable does not statistically and significantly predict physicians' AI Potential and Impact perception scores, F(1,155)=0.300, p=0.585

Model	R	R^2	Adjusted R^2	Standard Error
1	0.044	0.002	-0.005	1.11493

The explanation of variance in scores for AI Potential and Impact perception using the model is limited. The coefficient of determination was 0.002. The age variable accounts for 0.2% of the total variance in AI Potential and Impact perception scores. The correlation coefficient is 0.044.

4.2 Effect of Age

The analysis indicates that Age does not have a significant effect on the perception of AI Potential and Impact (B=−0.040, t(155)=−0.548, p=0.585). Since the p-value for Age (0.585) is greater than the α=0.05 significance level, the regression coefficient is not statistically different from zero. Although the negative coefficient indicates a decreasing trend in the perception of AI Potential and Impact as age increases, this decrease is non-significant.

Table 5: Simple Linear Regression Analysis Results
for the Effect of Age on Concerns and Expectations

Variable	B	SE	B	t	p
Constant (α)	4.868	0.133		36.606	0.000
Age	0.054	0.051	0.085	1.058	0.292

The simple linear regression analysis found that the Age variable was not a statistically significant predictor of participants' scores for Concerns and Expectations regarding AI (F(1,155)=1.120, p=0.292).

Model	R	R^2	Adjusted R^2	Standard Error
1	0.085a	0.007	0.001	0.77626

The R^2 value of the model, the Age variable explains only 0.7% of the total variance in the Concerns and Expectations scores (R^2=0.007). The simple linear regression analysis shows that the Age variable does not statistically predict physicians' AI Concerns and Expectations perception scores, F(1,155)=1.120, p=0.292.

The model's explanatory effect about the total variance in AI Concerns and Expectations perception scores is quite low. The coefficient of determination (R^2) was 0.007. This means that the age variable explains only approximately 0.7% of the total variance in AI Concerns and Expectations perception scores. The correlation coefficient (R) is 0.085.

4.3 Effect of Age

The analysis indicates that Age does not have a significant effect on the perception of AI Concerns and Expectations (B=0.054, t(155)=1.058, p=0.292). Since the p-value for Age (0.292) is greater than the α=0.05 significance level, the regression coefficient is not statistically different from zero. Although Age had a slightly positive relationship with AI Concerns and Expectations, this trend was not statistically significant.

Table 6: Simple Linear Regression Analysis Results for the Effect of Professional Experience on AI Knowledge and Perception

Variable	B	SE	β	t	p
Constant (α)	4.499	0.301		14.929	0.000
Professional Experience	-0.250	0.098	-0.201	-2.555	**0.012***

The analysis shows that the model is statistically significant, F(1,155)=6.528, p=0.012. The R^2 value of the model indicates that the Professional Experience variable explains 4.0% of the total variance in the AI Knowledge and Perception scores (R^2=0.040).

The Professional Experience variable was statistically significant predictor of AI Knowledge and Perception, t=−2.555, p=0.012. The unstandardized coefficient (B=−0.250) value indicates that every 1-unit increase in professional experience decreases the AI Knowledge and Perception score by 0.250 units. There is a statistically significant negative correlation (r=-0.201, p=0.006) showing that longer professional experience predicts a decline in AI Knowledge and Perception scores.

(Note: According to descriptive statistics, the participants' mean AI Knowledge and Perception score was 3.79 (SD=1.50) and their mean Professional Experience (Duration of Practice) score was 2.83 (SD=1.20)).

Table 7: Simple Linear Regression Analysis Results for the Effect of Professional Experience on AI Potential and Impact

Variable	B	SE	β	t	p
Constant (α)	5.413	0.229		23.678	0.000
Professional Experience	0.007	0.074	0.008	0.095	0.924

The analysis reveals that the regression model is not statistically significant, $F(1,155)=0.009$, $p=0.924$. There is no significant relationship between a physician's professional experience and the total variance in their perception of AI's Potential and Impact ($R^2=0.000$). The Professional Experience variable was not statistically significant effect in predicting the Potential and Impact scores, $t=0.095$, $p=0.924$. This finding shows that there is no significant relationship between the participating physicians' total duration of practice (professional experience) and their perception of the potential and impact of AI. The increase in professional experience does not cause a significant change in these perception levels.

(Note: According to descriptive statistics, the participants' mean Potential and Impact score was 5.43 (SD=1.11) and their mean Professional Experience (Duration of Practice) score was 2.83 (SD=1.20)).

Table 8: Simple Linear Regression Analysis Results for the Effect of Professional Experience on Concerns and Expectations

Variable	B	SE	β	t	p
Constant (α)	4.809	0.159		30.284	0.000
Professional Experience	0.065	0.052	0.101	1.260	0.210

The results prove that the regression model is not statistically significant. The overall significance value of the model is $F(1,155)=1.587$, $p=0.210$.

Examining the R^2 value of the model, the Professional Experience variable explains only 1.0% of the total variance in the Concerns and Expectations scores ($R^2=0.010$).

The Professional Experience variable was not statistically significant effect in predicting the Concerns and Expectations scores, $t=1.260$, $p=0.210$.

Physicians' professional experience does not cause a statistically significant change in their AI Concerns and Expectations scores. Their average score remains essentially consistent around 4.99 (SD=0.78) regardless of how long they've practiced.

While a slight positive correlation was observed between professional experience and AI Concerns and Expectations ($r=0.101$), this relationship was not statistically significant ($p=0.105$).

Table 9: One-Way ANOVA Results for AI Perception and Related Factors by Type of Employing Institution

Dependent Variable	Source of Variation	Sum of Squares (SS)	df	Mean Square (MS)	F	p
AI Knowledge and Perception	Between Groups	9.833	5	1.967	0.874	0.500
	Within Groups	339.731	151	2.250		
myPotential and Impact	Between Groups	1.402	5	0.280	0.221	0.953
	Within Groups	191.646	151	1.269		
Concerns and Expectations	Between Groups	0.836	5	0.167	0.271	0.929
	Within Groups	93.237	151	0.617		

The study employed a One-Way ANOVA to compare AI perception scores across different institutional settings. Since Levene's test confirmed the homogeneity of variances ($p>0.05$), the results of the subsequent ANOVA can be considered reliable.

The ANOVA results indicated no statistically significant difference in any of the variables based on the type of employing institution (All p-values >0.05).

Essentially, whether a physician worked in a University Hospital, a Training and Research Hospital, or another facility, their views on AI were statistically the same. Specifically, there were no statistically significant differences found for AI Knowledge and Perception ($F(5,151)=0.874$, $p=0.500$), Potential and Impact ($F(5,151)=0.221$, $p=0.953$), or Concerns and Expectations ($F(5,151)=0.271$, $p=0.929$).

The study used a One-Way Analysis of Variance (ANOVA) to compare the mean scores for different dimensions of AI perception across various healthcare employment settings (such as University, State, and Private Hospitals, etc.).

Levene's Test confirmed that the assumption of homogeneity of variances was for all dependent variables ($p>.05$).

Table 10: Descriptive Statistics for AI Dimensions by Institution Types

Dimension	Institution Type (Group)	N	Mean (M)	SD
AI Knowledge and Perception	University Hospital	52	4.02	1.56
	Private Hospital / Clinic	14	3.36	1.76
Potential and Impact	Other	11	5.65	1.17
	Family Health Center / CHC	35	5.30	1.26
Concerns and Expectations	Private Hospital / Clinic	14	5.15	0.65
	Family Health Center / CHC	35	4.92	0.79

Although physicians of University Hospitals reported the highest average AI Knowledge and Perception scores ($M=4.02$) and Private Hospital/Clinic physicians reported the lowest ($M=3.36$), this difference was not statistically significant across institution types ($F(5,151)=0.87$, $p=.500$).

While the mean score for AI Potential and Impact was highest among physicians in "Other" institutions (M=5.65) and lowest among those in Family/Community Health Centers (M=5.30), this variation was not statistically significant across institution types ($F(5,151)=0.22$, $p=.953$).

Despite Private Hospital/Clinic physcians informed the highest average Concerns and Expectations score (M=5.15) and Family/Community Health Center physcians reported the lowest (M=4.92), the type of institution did not create a statistically significant difference in these perceptions ($F(5,151)=0.27$, $p=.929$).

4. Results and Discussion

This research examined the relationship between physician demographics and their views on AI, concluding that they generally maintain a positive attitude toward AI's potential to revolutionize healthcare. This optimistic perspective aligns with findings in the current literature (Stewart *et al.,* 2023; Xiang *et al.,* 2020) and is largely supported by AI's proven ability to significantly improve diagnostic accuracy (Lim *et al.,* 2025; Basu *et al.,* 2020), boost operational efficiency (Sakurada *et al.,* 2025; Basu *et al.,* 2020), and dramatically lower medical error rates (Xiang *et al.,* 2020).

The core finding is the remarkable uniformity in physicians' perceptions of AI's Potential and Impact, showing no statistically significant difference based on age, employing institution, or professional experience. This strong consensus implies that the concrete, functional benefits of AI—such as shortening stroke treatment times (Lim *et al.*, 2025), aiding in diabetic wound assessment (Tehsin *et al.*, 2023), providing critical care support (Sharma *et al.,* 2021), or managing complex neurological conditions (An *et al.*, 2020)—are universally accepted within the medical community.

4.1 The Critical "Transformation Gap"

Despite the optimism, the study identified significant challenges related primarily to AI knowledge and education. The data show an inverse relationship between age and AI literacy: as physicians get older, their Knowledge and Perception scores regarding AI tend to decline. Furthermore, mid-career physicians (6–10 years of experience) demonstrated significantly higher knowledge and perception than their most senior colleagues (21 years and over). These findings confirm a widely documented problem in the literature: ongoing deficiencies in AI knowledge and training (AlAli *et al.,* 2022; Abdullah & Fakieh, 2020; Burzyńska *et al.*, 2022; Castagno & Khalifa, 2020; Habib *et al.*, 2024; Kasaye *et al.,* 2025; Stewart *et al.,* 2023; Xiang *et al.,* 2020; Zainal *et al.,* 2023). Many healthcare professionals feel unprepared concerning AI's basic principles, ethical boundaries, and clinical use (Oh *et al.,* 2019; Stewart *et al.,* 2023; Habib *et al.,* 2024). This points to a crucial "transformation gap" where AI literacy has not yet been adequately integrated into medical training (Stewart *et al.,* 2023; Zainal *et al.,* 2023). Therefore, there is an urgent requirement to update educational curricula to strongly embed AI concepts, ethical issues, and practical applications, enabling physicians to use this technology

effectively, safely, and responsibly (Habib *et al.,* 2024; Stewart *et al.,* 2023; Zainal *et al.,* 2023).

4.2 Ethical and Practical Hurdles Remain

While this study found that gender or age did not significantly influence general concerns and expectations regarding AI, ethical and legal issues remain central to its integration (Bhattad & Jain, 2020; Castagno & Khalifa, 2020; Ooi, 2024; Zhang & Zhang, 2023). Key topics that directly affect the reliability and fairness of AI systems include data quality, algorithmic bias, and the essential need for transparency (Zhang & Zhang, 2023). In addition, safeguarding the privacy and security of sensitive patient data is paramount, especially given the ongoing vulnerability to cyberattacks (Castagno & Khalifa, 2020; McCowan, 2020; Ooi, 2024; Zhang & Zhang, 2023). The legal ambiguity regarding the attribution of responsibility for errors caused by AI (Castagno & Khalifa, 2020; Ooi, 2024; Zhang & Zhang, 2023) highlights the urgent need to establish robust legal frameworks, clear ethical guidelines, and transparent regulatory standards (Ooi, 2024; Zhang & Zhang, 2023). Practical challenges also present significant barriers to adoption. Issues such as usability, poor compatibility with existing hospital systems, and the increased burden of heavy workloads often impede the successful uptake of AI systems (Choudhury *et al.,* 2022; Wang *et al.,* 2021). Ensuring that clinicians are both comfortable with and have a comprehensive understanding of AI is critical for its correct implementation (McCowan, 2020), underscoring the vital role of user-centered design (Choudhury *et al.,* 2022; Wang *et al.,* 2021).

4.3 The Future: Human-AI Collaboration

The consistent perception of AI across diverse demographic groups reinforces the consensus that the technology will primarily enhance physicians' capabilities rather than replace human clinicians within the evolving healthcare landscape (McCowan, 2020; Oh *et al.,* 2019; Wang *et al.,* 2021). This consensus is supported by the indispensability of human-centred care and the personal physician-patient relationship (Bhattad & Jain, 2020; Debad & Metcalfe, 2023; Ooi, 2024). As AI assumes routine, time-consuming tasks (Basu *et al.*, 2020; Roy & Baksi, 2022), the emerging paradigm of "human-AI collaboration" will become the norm, enabling clinicians to devote critical attention to complex tasks that require human judgment and collaboration (Debad & Metcalfe, 2023; Wang *et al.,* 2021)

5. Conclusion

This study offers valuable insights by revealing how physicians' attitudes towards AI correlate with demographic variables in Turkey. The key finding – that AI knowledge levels are inversely related to both age and professional experience – strongly suggests that future educational and policy efforts must prioritise closing these knowledge gaps. Targeted training for senior physicians, in particular, is essential and likely to accelerate

the integration of AI into routine medical practice. These efforts also require a simultaneous strengthening of digital infrastructure and the cultivation of an institutional culture that actively promotes innovation. The shared confidence within the healthcare sector regarding the broader capabilities of Artificial Intelligence provides a strong foundation for overcoming the remaining ethical, legal, and operational barriers. This unified perspective plays a vital role in ensuring the effective and cohesive integration of AI technology into future medical care.

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Conflict of Interest Statement
The author declares no conflicts of interest.

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