Patient Preference and Adherence

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ORIGINAL RESEARCH

# Attitudes of the Iranian Public Toward the Clinical Use of Artificial Intelligence in Medicine: A Cross-Sectional Survey

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**Purpose:** The integration of Artificial Intelligence (AI) into healthcare is a global trend, yet its success hinges on public acceptance. This study aimed to provide one of the first comprehensive assessments of awareness, trust, and preferences regarding the clinical use of medical AI among a sample of Iranian hospital visitors and to identify the key predictors shaping these views to inform national digital health policy.

**Patients and Methods:** A descriptive-analytical, cross-sectional survey was conducted between August 2024 and March 2025 at the Imam Khomeini Hospital Complex in Tehran, Iran. A validated questionnaire was administered to a convenience sample of 388 hospital visitors (inpatients, outpatients, and their companions). Data were analyzed using descriptive statistics and multivariate logistic regression.

**Results:** Of 388 participants, 53.6% (208/388) had heard of medical AI, yet only 2.6% claimed full knowledge. A phenomenon regarding conflicting attitudes, which we term the "trust-preference paradox", was observed: while ~87% expressed conditional trust in AI's diagnostic and therapeutic capabilities, a significant majority preferred human physicians in disagreement scenarios (Diagnosis: 66.2%; Treatment: 66.8%), primarily due to the desire for personalized care. Preference for AI diagnosis was significantly associated with being male (Odds Ratio [OR] 2.06), having a non-medical/computer science occupation (OR 2.64), and prior AI awareness (OR 1.72). The top perceived advantage was accuracy (46.1%), while the main drawback was lack of empathy (60.1%). A collaborative model where AI assists physicians was favored by 70.6%.

**Conclusion:** Participants demonstrated high trust in AI's technical potential but strongly preferred human oversight in high-stakes decisions. Successful AI integration in Iran requires "human-in-the-loop" collaborative models and targeted education to bridge the gap between technical trust and clinical preference.

**Plain Language Summary: Why was the study done?** Physicians and hospitals are increasingly using Artificial Intelligence (AI) to help diagnose and treat patients, but public trust is essential for success. We conducted this study to understand the opinions and trust levels regarding medical AI among patients and visitors at a large teaching hospital in Tehran.

**What did the researchers do and find?** We surveyed 388 adults about their knowledge and trust in AI. We found that while a large majority (about 87%) trusted AI's ability to analyze medical information, most still preferred a human doctor to make the final decision. This was especially true if the AI and the doctor disagreed. Participants emphasized that they value the empathy and personal connection provided by human doctors, which they felt AI lacks.

**What do these results mean?** The results suggest that patients accept AI as a helpful tool but do not want it to replace doctors. They prefer a system where doctors and computers work together, with the doctor remaining in charge. Keeping a human doctor involved in important decisions is crucial to maintaining patient trust.

**Keywords:** machine learning, algorithmic aversion, human oversight, patient trust, physician empathy, human-AI collaboration

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# Introduction

Artificial Intelligence (AI) has emerged as a transformative force in healthcare, offering unprecedented opportunities to enhance diagnostic accuracy, personalize treatment protocols, and optimize clinical workflows.[1,2] From interpreting medical images with superhuman precision to predicting disease outbreaks, AI applications promise to revolutionize both personalized medicine and precision public health.[3] However, the successful and ethical integration of these powerful technologies into clinical practice is not merely a technical challenge; it depends critically on public acceptance and trust. The ultimate goal of modern healthcare is patient empowerment, and a lack of acceptance can hinder successful implementation and compromise potential clinical outcomes.[4]

A growing body of international research reveals a complex and often ambivalent landscape of patient attitudes. While there is general optimism about AI's potential to improve efficiency and reduce errors, this is frequently tempered by significant concerns regarding data privacy, algorithmic bias, accountability, and the potential erosion of the human element in care.[5,6] A landmark systematic review by Young et al in *The Lancet Digital Health* synthesized these global perspectives, concluding that patient acceptance is often conditional upon demonstrable safety, transparency, and a model of human-AI collaboration where the physician retains ultimate oversight and responsibility.[7]

Studies from diverse cultural and geographical contexts have further illuminated these nuances. Research in China found high levels of conditional trust among cancer patients, yet an overwhelming preference for a human physician's judgment in cases of clinical disagreement.[8] Similarly, a survey in Germany revealed that while patients were open to AI, they insisted on robust physician supervision.[9] These studies collectively highlight a near-universal desire for a "human-in-the-loop" framework, where technology augments rather than replaces human expertise.

Despite this global discourse, public perceptions in Iran remain largely unexplored. While previous studies have examined the attitudes of Iranian healthcare professionals,[10,11] the views of the general public—the ultimate end-users—are notably absent from the literature. This lack of patient-centered data hinders the development of effective digital health strategies aligned with societal values, potentially leading to low adoption rates and exacerbating health disparities.

To situate these findings within the local context, it is necessary to consider Iran's evolving digital health landscape. The country has made significant strides in establishing a nationwide Electronic Health Record system (SEPAS), although evaluations suggest that its full implementation continues to face technical and structural challenges regarding system benefits and user satisfaction.[12] Culturally, Iranian patients place a profound emphasis on the emotional and empathic dimensions of the physician-patient relationship, viewing it as the essential "gateway" to effective care; consequently, there is a prevailing sensitivity toward "mechanical" interactions which may affect how automated AI tools are perceived.[13] Theoretically, research on technology acceptance in Iran's healthcare sector, specifically the Iranian Health Information Technology Acceptance Model (IHITAM), posits that while performance expectancy is crucial, user acceptance is also heavily influenced by subjective norms and empowering conditions, necessitating a culturally adapted approach to adopting new technologies.[14]

This study aims to help fill this gap by providing a foundational assessment of awareness, trust, and preferences regarding medical AI among a sample of Iranian hospital attendees. Our findings are intended to contribute to an essential evidence base for crafting a national AI in health strategy that is not only technologically advanced but also ethically sound and publicly endorsed.

# Materials and Methods

## Study Design and Setting

This descriptive-analytical, cross-sectional study was conducted from August 2024 to March 2025. The study setting was the Imam Khomeini Hospital Complex in Tehran, Iran. As a major tertiary academic medical center and one of the largest in the country, it serves a highly diverse patient population referred from primary and secondary care centers across Iran, making it a suitable environment for capturing a heterogeneous sample of public opinion.

## Participants and Sampling

The study population included all hospital visitors (inpatients, outpatients, and their companions) aged 18 years or older. Exclusion criteria were: (a) patients in a critical condition or in the emergency department; (b) unwillingness to participate; and (c) submission of an incomplete questionnaire.

A convenience sampling method was employed due to logistical constraints. To ensure a diverse sample, trained researchers approached potential participants in the waiting areas of outpatient clinics and inpatient wards during various shifts (morning and evening). After explaining the study's aims and obtaining verbal agreement, the questionnaire was administered. Researchers ensured inclusivity by assisting participants who required help, as detailed in the Instrument section.

The required sample size was calculated using Cochran's formula, assuming a 95% confidence level, a 5% margin of error, and an estimated proportion (p) of 0.5 for key attitudes. This yielded a minimum required sample of 385 participants. In total, 404 questionnaires were collected. After excluding 16 incomplete forms, the final analysis was performed on a sample of 388 participants, which exceeded the minimum required sample size.

## Data Collection Instrument

The primary data collection tool was a structured questionnaire. It was adapted from a previously validated instrument used by Yang et al[8] to assess the attitudes of Chinese cancer patients, which was deemed suitable for its comprehensive coverage of awareness, trust, and preferences. The questionnaire was primarily self-administered. For participants who required assistance in reading or comprehension (eg, those with lower educational attainment), a trained researcher read the questions aloud verbatim and recorded their responses to ensure inclusivity and data accuracy without influencing the participants' choices. Completing the questionnaire took approximately 10 to 15 minutes per participant, and the data were collected in a single session.

To ensure all participants had a common frame of reference, the questionnaire began with a clear and simple definition of medical AI (adapted from Kaplan et al[15]): Medical Artificial Intelligence refers to computer systems or robots that perform clinical medical activities, such as diagnosis or treatment, independently or as an auxiliary tool for human physicians. These systems can also operate on mobile phones or other devices.

The questionnaire was divided into three sections:

1. Demographics: Age, gender, highest level of education, and occupation.
2. Awareness: Two questions assessing whether participants had heard of medical AI and their self-rated level of knowledge.
3. Attitudes: A series of questions covering trust in independent AI diagnosis and treatment, the necessity of physician supervision, preferences in scenarios of disagreement between AI and a human physician, reasons for those preferences, preferences for communicating clinical results, perceived advantages and disadvantages of AI, and the expected future role of AI in medicine.

The complete English version of the questionnaire is provided in the Supplementary Materials.

## Instrument Validity and Reliability

A rigorous process was undertaken to ensure the validity and reliability of the Persian-language questionnaire.

1. Translation and Validation: The original English questionnaire was translated into Persian by a bilingual physician and then back-translated into English by an independent translator. The back-translated version was compared with the original to ensure conceptual and semantic equivalence. The content validity of the translated instrument was then assessed by a panel of eight experts in medicine and AI, whose feedback was incorporated to refine the items.

2. Face Validity: A preliminary study was conducted with 13 participants from the target population to assess face validity and clarity. The items were read aloud, and participants' understanding was queried to identify and resolve any ambiguities.
3. Reliability: Test-retest reliability was assessed on a separate pilot sample of 30 participants who completed the questionnaire twice with a three-week interval. Cohen's Kappa and weighted Kappa were used to assess agreement. The results showed substantial agreement for single-choice items ($\kappa$ = 0.620–0.800) and moderate to substantial agreement for multiple-choice items ($\kappa$ = 0.526–0.734).
4. Internal Consistency: The internal consistency of the core attitude scale (items related to trust and preference for AI in diagnosis and treatment) was evaluated using Categorical Principal Components Analysis (CATPCA), an appropriate method for the mix of nominal and ordinal data. The analysis yielded a Cronbach's alpha of 0.815, indicating very good internal consistency for the construct measuring propensity to trust and prefer AI.

## Statistical Analysis

All data from the 388 completed questionnaires were entered into SPSS (Version 27.0, IBM Corp). Data entry was double-checked for accuracy. Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize participant characteristics and responses.

Associations between categorical variables (eg, demographics and attitudes) were examined using the chi-square test or Fisher's exact test where appropriate. To identify independent predictors of key outcomes (eg, awareness of AI, trust in AI, preference for AI), a multivariate logistic regression analysis was performed. Variables with a $P$ value <0.1 in the univariate analysis were included in the initial multivariate model, and a backward stepwise approach was used. The results are reported as Odds Ratios (ORs) with 95% Confidence Intervals (CIs).

Before conducting the regression analyses, multicollinearity among independent variables was assessed using the Variance Inflation Factor (VIF). All VIF values were below 2.0, indicating that multicollinearity was not a concern. For all inferential tests, a two-tailed $P$ value <0.05 was considered statistically significant.

## Ethical Considerations

The study was conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval was obtained from the Institutional Review Board of the Imam Khomeini Hospital Complex (IKHC), the primary teaching hospital affiliated with Tehran University of Medical Sciences (TUMS), where the research was conducted (Ethics Code: IR.TUMS.IKHC.REC.1402.394). Written informed consent was obtained from all participants before they completed the questionnaire. For participants who required assistance in reading or comprehension, a trained researcher read the consent form aloud in the presence of an impartial witness. After verbal agreement, the participant made a mark (eg, a thumbprint) on the form, which was then signed by the witness to attest that consent was freely and informedly given. Participation was voluntary, and all data were collected and analyzed anonymously to ensure confidentiality.

# Results

## Participant Characteristics

The final sample consisted of 388 participants with a mean age of 40.95 years (SD 12.3, range 18–77). As detailed in Table 1, the sample was slightly majority male and educational backgrounds were diverse, with the majority holding post-secondary qualifications. The vast majority of participants worked in fields outside of medicine or computer science.

## Awareness, Trust, and Preferences

Our assessment of prior awareness was conducted in two steps to distinguish between basic exposure and self-reported knowledge confidence. The first question, intended to gauge basic public exposure to the topic, found that 53.6% of participants reported having heard about the use of AI in medicine, while 46.4% had not. This binary measure (Heard/Not Heard) was used as the primary "Awareness" variable in the subsequent multivariate regression analysis. However,

**Table 1** Demographic Characteristics of Study Participants (N=388)

| Characteristic | Category | n (%) |
|---|---|---|
| **Gender** | Male | 209 (53.9%) |
| | Female | 179 (46.1%) |
| **Education Level** | Below High School Diploma | 78 (20.1%) |
| | High School Diploma | 93 (24.0%) |
| | Associate Degree | 27 (7.0%) |
| | Bachelor's Degree | 122 (31.4%) |
| | Master's Degree | 48 (12.4%) |
| | PhD or Higher | 20 (5.2%) |
| **Occupation** | Medical Science | 44 (11.3%) |
| | Computer Science | 3 (0.8%) |
| | Other Occupations | 341 (87.9%) |

the subsequent measurement of self-reported knowledge revealed that deep familiarity was extremely rare, with only 2.6% claiming to be fully knowledgeable.

A high proportion of respondents expressed conditional trust in AI's independent diagnostic and therapeutic capabilities. However, this trust did not translate into preference in high-stakes situations. As summarized in Table 2, in scenarios of disagreement, a significant majority preferred the human physician's judgment for both diagnosis and treatment. Consistent with this preference for human involvement, the expectation for physician oversight was nearly universal, and the majority of participants envisioned a future where AI assists, rather than replaces, physicians. Similarly, regarding the communication of prognosis, most participants preferred a joint approach involving both the physician and AI (Table 2).

These preferences were driven by specific rationales. The predominant reason for preferring a human physician was the perceived ability to provide care "better suited to the patient's unique individual conditions." Conversely, those who

**Table 2** Key Attitudes Toward Clinical Use of AI (N=388)

| Attitude Question | Response | n (%) |
|---|---|---|
| Expectation of physician supervision over AI | Yes | 305 (78.6%) |
| | No | 32 (8.2%) |
| | Does not matter / Not sure | 51 (13.1%) |
| Trust in AI's independent diagnosis | At least some trust | 336 (86.6%) |
| | No trust (Not at all) | 52 (13.4%) |
| Preference in diagnostic disagreement | Human physician | 257 (66.2%) |
| | AI | 131 (33.8%) |
| Trust in AI's independent treatment | At least some trust | 338 (87.1%) |
| | No trust (Not at all) | 50 (12.9%) |
| Preference in treatment disagreement | Human physician | 259 (66.8%) |
| | AI | 129 (33.2%) |
| Preference for discussing results/prognosis | Both physician and AI | 204 (52.6%) |
| | Human physician only | 147 (37.9%) |
| | AI only | 36 (9.3%) |
| | No follow-up desired | 1 (0.3%) |
| Future outlook for AI in medicine | AI will assist physicians | 274 (70.6%) |
| | Physicians will assist AI | 51 (13.1%) |
| | AI will replace physicians | 53 (13.7%) |
| | AI will be eliminated | 10 (2.6%) |

**Abbreviation**: AI, Artificial Intelligence.


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preferred AI primarily cited its higher accuracy and lower susceptibility to human error for diagnosis, and its ability to provide more up-to-date treatments for therapy (detailed in Supplementary Tables S1 and S2).

## Perceived Advantages and Disadvantages

Tables 3 and 4 summarize the participants' views on the potential impacts of AI. The most frequently cited advantage was the potential to improve the accuracy of a physician's advice, while the greatest perceived drawback was AI's lack of emotional understanding and empathy. Additional open-ended responses regarding other perceived advantages and disadvantages are detailed in Supplementary Tables S3 and S4, respectively.

## Predictors of Attitudes

Multivariate logistic regression analysis identified key predictors for awareness and attitudes (Table 5). Individuals with medical or computer science backgrounds and those with academic education were significantly more likely to be aware of medical AI. Prior awareness was identified as the strongest predictor of trust in both AI diagnosis and treatment recommendations. Furthermore, the preference for an AI diagnosis in disagreement scenarios was significantly associated with being male, having a non-medical/computer science occupation, and possessing prior awareness of medical AI.

# Discussion

## Principal Findings

This study offers one of the first empirical assessments of public attitudes toward the clinical use of AI within a major academic medical setting in Iran. Our findings reveal a nuanced position of "cautious optimism," characterized by a significant gap between general awareness and deep understanding, a high degree of conditional trust in AI's technical abilities, and an overwhelming preference for human oversight and judgment in high-stakes clinical decisions. The prevailing sentiment strongly favors a collaborative future, where AI serves as a powerful tool to assist, rather than replace, human physicians. This complex perspective is best encapsulated by what we term the "trust-preference paradox."

**Table 3** Perceived Advantages of AI in Medicine

| Perceived Advantage | n (%) |
|---|---|
| Improves the accuracy of a physician's advice | 179 (46.1%) |
| Reduces diagnostic errors and omissions | 154 (39.7%) |
| Reduces quality gaps in medical services between different regions | 142 (36.6%) |
| Reduces costs and provides easier access | 141 (36.3%) |
| Helps treatment adhere to a specific plan | 124 (32.0%) |
| Other | 6 (1.5%) |

**Notes**: Participants could select multiple options (N=388).
**Abbreviation**: AI, Artificial Intelligence.

**Table 4** Perceived Disadvantages of AI in Medicine

| Perceived Disadvantage | n (%) |
|---|---|
| Lack of emotional understanding and empathy | 233 (60.1%) |
| Provides standardized treatment without considering individual conditions | 144 (37.1%) |
| Inability to manage complex diseases | 102 (26.3%) |
| Lack of creative problem-solving | 80 (20.6%) |
| Increased costs | 31 (8.0%) |
| Other | 4 (1.0%) |

**Notes**: Participants could select multiple options (N=388).
**Abbreviation**: AI, Artificial Intelligence.

**Table 5** Significant Predictors of AI Awareness, Trust, and Preference from Multivariate Logistic Regression

| Outcome | Predictor | OR (95% CI) | *P* Value |
|---|---|---|---|
| **Awareness of Medical AI** | Occupation (Medical/Computer Science vs Other) | 4.38 (1.98–9.72) | <0.001 |
| | Education (Academic vs Non-Academic) | 1.91 (1.29–2.81) | 0.023 |
| **Trust in Independent AI Diagnosis** | Awareness of Medical AI (Heard vs Not Heard) | 5.28 (2.62–10.64) | <0.001 |
| **Trust in Independent AI Treatment** | Awareness of Medical AI (Heard vs Not Heard) | 3.11 (1.67–5.79) | <0.001 |
| | Education (Academic vs Non-Academic) | 1.93 (1.03–3.60) | 0.040 |
| **Preference for AI in Diagnostic Disagreement** | Gender (Male vs Female) | 2.06 (1.32–3.20) | 0.001 |
| | Occupation (Other vs Medical/Computer Science) | 2.64 (1.23–5.67) | 0.013 |
| | Awareness of Medical AI (Heard vs Not Heard) | 1.72 (1.10–2.69) | 0.017 |

**Abbreviations**: AI, Artificial Intelligence; CI, Confidence Interval; OR, Odds Ratio.

## The Trust-Preference Paradox: Reconciling High Trust with a Preference for Human Judgment

The core finding of our study is a striking paradox: while nearly 9 out of 10 participants expressed some level of trust in AI's independent diagnostic and therapeutic capabilities, two-thirds would defer to a human physician in a direct disagreement. This highlights that for patients, trust in a medical context is multifaceted. It is not solely based on perceived technical accuracy—a domain where AI was seen as advantageous—but is deeply intertwined with qualities such as empathy, accountability, and the ability to provide personalized care tailored to an individual's unique circumstances.

The roots of this paradox may lie in fundamental psychological and socio-cultural factors. The preference for a human physician in high-stakes situations could be linked to the concept of accountability. Patients may feel that a human physician can be held responsible for their decisions in a way that a faceless algorithm cannot, creating a crucial "accountability gap" that erodes trust in autonomous systems.[16] Furthermore, the core ethical requirement for human agency and the therapeutic value of the physician-patient relationship remain deeply ingrained in medical practice.[17] In a cultural context like Iran, where interpersonal relationships are highly valued, our findings suggest that for many participants, the relational aspect of care—empathy, reassurance, and shared decision-making—may be just as important as the technical accuracy of a diagnosis. Patients seem to differentiate between the *cognitive* task of processing data (where they trust AI) and the *affective and contextual* task of delivering care (where they prefer humans).

## The Role of Awareness, Education, and Demographics in Shaping Attitudes

Our findings unequivocally demonstrate that awareness of medical AI is the gateway to acceptance. Prior awareness was the most powerful predictor of trust in both AI diagnosis (OR 5.28) and treatment (OR 3.11). This suggests that unfamiliarity breeds skepticism, and that targeted educational initiatives could significantly improve public acceptance. The demographic predictors also offer valuable insights. The greater preference for AI among males (OR 2.06) aligns with broader research on gender differences in techno-optimism and risk perception.[18] Women have been shown to report lower knowledge and comfort with AI in healthcare, which may explain their greater caution.[19]

More intriguingly, individuals *outside* the medical and computer science fields were more likely to prefer an AI diagnosis over a human's in a disagreement (OR 2.64). This counterintuitive finding may suggest that domain experts, being more cognizant of the technology's current limitations, inherent biases, and the complexities of clinical medicine, are more cautious. In contrast, the general public may perceive AI as a more objective, data-driven, and infallible authority, less susceptible to the human errors or biases they might associate with physicians.[20]

## Human Oversight and the Collaborative Future

Our findings regarding the preference for human oversight align closely with international benchmarks, revealing a nearly universal consensus across diverse cultures. Consistent with the study by Fritsch et al[9] in Germany and the findings of Yang et al[8] in China, where 86.8% of participants expected physician presence, Iranian participants exhibited

a similarly strong demand for supervision (78.6%). Similarly, Ahmed et al[21] reported that a majority of participants in Saudi Arabia (58.4%) also expected a human doctor's presence in AI clinics.

However, a critical distinction in the drivers of this preference emerges when comparing baseline trust levels. Participants in the study by Ahmed et al[21] expressed relatively low trust in AI's independent capabilities (~25-31%), making their reliance on human physicians a logical consequence of skepticism. In contrast, our sample—remarkably similar to the participants in the study by Yang et al[8]—reported high conditional trust in AI (~85-90%). Yet, despite this high technical confidence, both our participants and Yang's sample overwhelmingly sided with the human physician in disagreement scenarios. This convergence suggests that the "trust-preference paradox" is not born of "technophobia" or a lack of faith in AI's potential, but rather stems from a profound cultural reverence for the physician's role as a compassionate healer and moral agent.

This sentiment translates into a clear vision for the future: the vast majority of participants (70.6%) preferred a collaborative model where AI assists, rather than replaces, physicians. This preference was further corroborated when participants were asked about discussing treatment results or prognosis. Unlike previous studies by Yang et al[8] and Ahmed et al,[21] which did not offer a joint option—effectively forcing a choice between AI alone or the physician alone that resulted in >80% preference for the physician—our inclusion of a "collaborative" option revealed that the majority (52.6%) actually prefer engaging with both the physician and AI. Collectively, these findings strongly reject the narrative of AI substitution and instead supports a vision of "augmented intelligence." Patients want the best of both worlds: the analytical power of AI combined with the wisdom, empathy, and accountability of a human clinician. This desire for a collaborative model is a consistent finding across different healthcare contexts, from dermatology to diabetic retinopathy screening,[22,23] underscoring the public's view that while AI can handle data, only a human can handle a patient.

## Implications for Policy and Practice

The message from the participants in our study is clear: the future of medical AI should be collaborative, not autonomously substitutional. Based on these findings, we propose a strategic framework for the integration of AI into Iran's healthcare system. First, policymakers and developers must prioritize the creation of human-AI collaborative models that function as decision-support tools to augment, rather than replace, clinical expertise. Second, to maintain patient trust, it is imperative to establish clear national regulations mandating human oversight, ensuring that a qualified physician retains ultimate responsibility for high-stakes decisions. Finally, health authorities should launch targeted public education campaigns to demystify AI; these initiatives must transparently explain the technology's benefits, such as accuracy, while honestly acknowledging its limitations regarding empathy, thereby addressing public concerns about accountability and ethics.

# Limitations

This study has several limitations that necessitate a cautious interpretation of the findings. First, the potential for selection bias stems from the use of a convenience sample at a single, urban, academic referral center in the capital of Iran. Consequently, the findings reflect the views of a specific segment of healthcare users and may not be fully generalizable to the broader Iranian population, particularly those in rural areas or smaller cities. Second, our sample exhibited a higher proportion of university-educated individuals compared to the general trends observed in the last national census. This overrepresentation may be partly attributed to the study's topic, as individuals with higher education are often more familiar with emerging technologies like AI and may have been more willing to participate. While this demographic represents potential early adopters, to empirically assess whether this skew compromised our conclusions, we conducted a post-hoc subgroup analysis (see Supplementary Table S5). The results confirmed that the strong preference for human oversight in disagreement scenarios was statistically consistent ($P$ value >0.05) across both academic and non-academic educational groups, suggesting that these attitudes are shared societal values rather than artifacts of educational attainment.

Third, regarding data collection, the education level variable did not include a separate category for "illiterate"; therefore, participants with no formal education were grouped into the "Below High School Diploma" category.

Additionally, our primary measure of "awareness" assessed basic exposure ("Have you heard of?") rather than objective technical knowledge. While we attempted to mitigate comprehension issues by having researchers read questions aloud verbatim for those requiring assistance, self-reported awareness may not equate to true understanding. Fourth, the study relied on hypothetical clinical scenarios, and stated preferences may differ from actual behavioral choices in high-stakes decisions. Despite these limitations, by employing multivariate logistic regression to adjust for key demographic imbalances (such as education and occupation), we have endeavored to mitigate the influence of these potential confounders on the identified associations, thereby strengthening the study's internal validity.

To build upon this foundational work, future research should employ stratified sampling methods aligned with national census data to ensure demographic representativeness across educational and socioeconomic strata. Additionally, investigating the influence of digital literacy, economic status, disease severity, and cultural values would provide a more granular understanding of public acceptance drivers.

## Conclusion

The participants in this study demonstrate a conditional acceptance of medical AI, rooted in a desire to leverage its technological benefits while strongly maintaining the core principles of human oversight, personalized care, and physician accountability. The "trust-preference paradox" observed in our findings indicates that the path to successful AI integration is not through the deployment of autonomous systems, but through the development of transparent, human-in-the-loop models that empower clinicians and build patient trust. This study provides an essential evidence base that can contribute insights to the development of a national digital health strategy in Iran that is not only technologically advanced but also ethically sound and, most importantly, aligned with public values.

## Abbreviations

AI, Artificial Intelligence; CATPCA, Categorical Principal Components Analysis; CI, Confidence Interval; CS, Computer Science; OR, Odds Ratio; VIF, Variance Inflation Factor.

## Data Sharing Statement

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

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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.

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