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Trust, Ethical Awareness, and Clinical Reliance on Artificial Intelligence: A Comparative Cross-Sectional Study Among Senior Medical and Dental Students

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ABSTRACT

Objectives: This study compared trust, ethical awareness, and clinical reliance on artificial intelligence (AI) among senior medical and dental students in Pakistan and examined their associations with AI exposure, anxiety, and demographic factors.

Methods: A comparative cross-sectional study was conducted from June to September 2025 across Pakistani medical and dental institutions. Stratified sampling by discipline was used. The questionnaire comprised an AI trust scale, an ethical awareness scale, an AI anxiety scale, and a vignette-based clinical reliance index. Construct validity was assessed using an exploratory factor analysis, and reliability was assessed using Cronbach's alpha. Between-group comparisons, multivariable regression, and bootstrapped mediation analysis were performed using SPSS v29 and R v4.3.

Results: A total of 1,856 responses were analyzed (medical: 1,032; dental: 824; 61.3% female; mean age 23.4 ± 1.2 years). Internal consistency was strong across all scales (α: 0.81–0.87). Dental students reported significantly higher AI trust (70.2 ± 10.8 vs 65.9 ± 12.0; $p < 0.001$) but lower ethical awareness (70.3 ± 10.1 vs 74.1 ± 9.2; $p < 0.001$) compared with medical students. Over-reliance was more prevalent among dental trainees (32.3% vs 25.4%; $p < 0.001$). In multivariable models, dental discipline ($\beta = 0.19$) and formal AI exposure ($\beta = 0.27$) independently predicted higher trust, whereas AI anxiety ($\beta =- 0.23$) predicted lower trust (all $p < 0.001$). Mediation analysis indicated that AI trust accounted for 36% of the association between curriculum exposure and clinical reliance.

Conclusion: Dental students demonstrated higher AI trust but lower ethical awareness and greater overreliance than medical students. Integrating structured AI literacy and ethical training into healthcare curricula may be essential to promote responsible clinical use of AI.

Keywords: Artificial intelligence; Clinical decision-making; Education, Medical; Ethics, Professional; Students, Health occupations

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Introduction

The medical act, in its traditional essence, serves a diagnostic–therapeutic purpose, grounded in the doctor–patient relationship and the integration of signs, symptoms, and clinical data to formulate a diagnosis and define treatment plans. Digitalization in medicine and dentistry is not a recent phenomenon but has developed in parallel with the evolution of information and biomedical technologies. The introduction of digital radio-diagnostic techniques, CAD/CAM technologies, and guided surgery has revolutionized clinical practice, reducing surgical variability and increasing the reliability of treatments.[1] These advances have improved diagnostic precision, reduced the invasiveness of interventions, and promoted more equitable access to care through telemedicine and the digitalization of clinical data.[2]

However, critical issues remain, including the risk of compromising the doctor–patient relationship, delegating decision-making to automated systems or unauthorized personnel, and the algorithmic standardization of medicine. The integration of digital technologies and artificial intelligence (AI) has transformed multiple areas of dentistry, affecting diagnostics, treatment planning, and patient management.[3] AI-driven systems, such as deep learning models for radiographic analysis, virtual planning software, and AI-assisted diagnostic tools, have shown substantial benefits.[4] Increasing reliance on AI raises concerns about clinician autonomy, overdiagnosis, underdiagnosis, and ethical issues, including algorithmic bias and a lack of transparency.[5]

The incorporation of digital tools into diagnostic and therapeutic processes necessitates rigorous regulatory oversight and comprehensive professional training. Medicine should not be reduced to a purely technical process; the human element, including empathy and individualized care, remains indispensable. Furthermore, the increasing medicalization of society, characterized by continuous clinical monitoring and widespread use of digital technologies, underscores the need for bioethical reflection to balance innovation with preservation of the therapeutic relationship. The application of artificial intelligence in medicine must continue to recognize the essential role of the physician in understanding patient suffering, communicating information, and assuming therapeutic responsibility.[6]

Despite these shared concerns, medicine and dentistry differ in their timelines and approaches to integrating digital technologies. Dental training programs have historically incorporated automated diagnostic and fabrication tools, including CAD/CAM systems, digital radiographic analysis, and intraoral scanning, earlier and more routinely than many medical specialties.[7] Whether this earlier and more hands-on exposure to technology-assisted decision-making produces measurable differences in AI trust, ethical awareness, or clinical reliance between the two disciplines has not been systematically examined.[8] Understanding these differences is important for designing discipline-specific AI curricula that foster both technological competence and ethical reasoning. This study aimed to compare levels of trust, ethical awareness, and clinical reliance on AI between senior medical and dental students in Pakistan, and to examine how these constructs relate to AI exposure, anxiety, and demographic factors.

Materials and Methods

Study Design and Setting

This analytical cross-sectional study compared trust, ethical awareness, and clinical reliance on artificial intelligence (AI) among senior medical and dental students. The study was undertaken at different medical and dental institutions of Pakistan, comprising accredited faculties of medicine and dentistry with comparable clinical training structures. Data were collected over three months from June to September 2025.

The study protocol was reviewed and approved by the concerned Institutional Review Board (IRB) (Reference number: IRB/DCP: 23-165/08). All procedures conformed to the ethical principles of the Declaration of Helsinki. Participation was voluntary, and electronic informed consent was obtained prior to survey initiation. No personally identifiable information was collected. Responses were anonymized at the point of submission, and participants were informed that non-participation would not affect their academic standing or evaluation.

Participants and Sampling

Target Population

The study was undertaken at 12 medical and 8 dental institutions across Lahore, Karachi, Islamabad, Rawalpindi, Faisalabad, Multan, Peshawar, and Sialkot in Pakistan. The target population comprised 3rd-, 4th-, and final-year undergraduate medical students, and 3rd- and final-year dental students, enrolled during the 2024-25 academic year.

Inclusion and Exclusion Criteria

Eligible participants were the clinical-year students enrolled in either the medical or dental program who were actively engaged in clinical rotations at the time of data collection. Students were excluded if they had completed a formal degree or certified postgraduate training in artificial intelligence, data science, or biomedical informatics beyond standard curricular exposure. Additionally, survey responses with more than 20% missing data were excluded from the final analysis to ensure data integrity and analytical validity.

Sampling Strategy

A stratified, total-population sampling strategy was employed. Eligible students were stratified by discipline (medicine vs dentistry), and all students who met the inclusion criteria were invited via institutional email distribution lists. Stratification ensured balanced representation from both faculties.

Sample Size Calculation

Sample size was calculated using G*Power (Version 3.1.9.7). Assuming a moderate effect size (Cohen's d = 0.50) for between-group differences in AI trust scores, an alpha level of 0.05 (two-tailed), and statistical power between 0.80 and 0.90, the required minimum sample size ranged from 128 to 172 participants (64–86 per group). To account for an anticipated response rate of 50–60% and potential exclusions, the recruitment target was set at ≥250 participants.

Study Instrument Development

Questionnaire Structure

The survey instrument was developed through a literature review and the adaptation of validated measures in trust-in-automation and AI perception research.[9-11] The questionnaire comprised five sections:

1. **Demographics (8 items):** Age, gender, academic program, cumulative GPA (self-reported), prior exposure to AI coursework (hours), prior AI tool usage, and intended specialty.
2. **AI Exposure and Training (5 items):** Formal curriculum exposure (hours), workshops attended, self-directed learning, and frequency of AI tool usage (5-point Likert scale: never to very frequently).
3. **AI Trust Scale (10 items):** Adapted from validated trust-in-automation frameworks. Items assessed the perceived reliability, transparency, dependability, and clinical usefulness of AI systems. Responses were measured on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Three negatively worded items were reverse-coded. Total scores ranged from 10 to 50, with higher scores indicating greater trust.
4. **Ethical Awareness Scale (8 items):** Assessed awareness of algorithmic bias, data privacy, accountability, informed consent, and transparency in AI systems. Items used a 5-point Likert scale. Two items were reverse-coded. Higher scores reflected stronger ethical awareness.
5. **AI Anxiety Scale (6 items):** Evaluated apprehension regarding job displacement, diagnostic over-reliance, and medico-legal liability. Responses were recorded on a 5-point Likert scale. Higher scores indicated greater AI-related anxiety.
6. **Clinical Reliance Index (Vignette-Based; 4 scenarios):** Two medical and two dental AI-assisted clinical scenarios were presented (described below). Decision options were categorical (Accept AI recommendation; Modify after critical appraisal; Reject AI recommendation).

Composite scores were calculated by summing item responses within each construct and standardizing to a 0–100 scale to facilitate comparability across domains.

Clinical Vignette Design

Parallel AI-assisted clinical scenarios were constructed to simulate realistic decision-making contexts. Each vignette included a brief clinical history, relevant diagnostic data (e.g., radiographic image description or laboratory results), and an AI-generated diagnostic recommendation accompanied by a probability confidence level (e.g., "AI prediction: Bacterial pneumonia, 85% confidence"). Participants were required to select one of three categorical responses: accept the AI

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recommendation without modification, modify after independent clinical assessment, or reject the AI recommendation. The complete text of all four clinical vignettes is provided in Supplementary File S2.

Operational Definitions

'Over-reliance' was defined as acceptance of the AI recommendation in scenarios deliberately designed with subtle conflicting clinical cues suggesting possible inaccuracy. 'Calibrated trust' was defined as a modification of the AI recommendation following critical appraisal when uncertainty cues were present. 'Defensive rejection' was defined as rejection of the AI recommendation despite high concordance between the AI output and clinical indicators.

Expert Validation and Pilot Testing

An interdisciplinary expert panel (three medical faculty members, three dental faculty members, and one health informatics specialist) evaluated the realism of the vignettes and their alignment with curricular learning objectives. Content validity was quantified using the Content Validity Index (CVI). Items achieving I-CVI ≥ 0.80 were retained. Pilot testing was conducted among 20 senior students (excluded from final analysis) to assess clarity, timing, and technical functionality. Minor wording revisions were implemented based on feedback.

Validity and Reliability Testing

Face validity was established through expert review and pilot feedback. Construct validity was evaluated using Exploratory Factor Analysis (EFA) with principal axis factoring and oblique rotation. Kaiser–Meyer–Olkin (KMO) measure $\geq$ 0.70 and Bartlett's test of sphericity ($p < 0.05$) were considered acceptable. Internal consistency reliability was assessed using Cronbach's alpha ($\alpha \geq 0.70$ considered acceptable). Test–retest reliability was evaluated in a subset of 30 participants who completed the survey twice within a two-week interval, using intra-class correlation coefficients (ICC). Incomplete responses with <20% missing items were handled using multiple imputation under the missing-at-random assumption.

Data Collection Procedure

Data were collected electronically using Qualtrics (Qualtrics XM, Provo, UT, USA). Survey links were distributed via institutional email lists. Two reminder emails were sent at two-week intervals. The estimated completion time was 10–12 minutes. Duplicate responses were prevented using single-use institutional login authentication while preserving anonymity. Data were stored on encrypted institutional servers with restricted access. No IP addresses were retained.

Outcome Measures

The primary outcomes were AI trust score, measured as a continuous standardized score ranging from 0 to 100; clinical reliance score, calculated as the proportion of over-reliant decisions across the four vignettes (range 0–4) and categorized as low, moderate, or high reliance; and ethical awareness score, measured as a continuous standardized score ranging from 0 to 100. Secondary outcomes included AI anxiety score, measured as a continuous standardized score, and the association between curriculum exposure and trust, assessed as the correlation between self-reported AI exposure hours and AI trust score.

Statistical Analysis

Statistical analyses were performed using SPSS Version 29 (IBM Corp., Armonk, NY) and R Version 4.3. Data were screened for completeness and outliers prior to analysis. Normality was assessed using Shapiro–Wilk tests and Q–Q plots. Continuous variables were summarized as mean ± standard deviation (SD) or median with interquartile range (IQR), as appropriate. Categorical variables were reported as frequencies and percentages. Multicollinearity was assessed using Variance Inflation Factors (VIF), with values < 10 considered acceptable. Model fit for linear regressions was evaluated using R^2 and the F-statistic. Between-group comparisons (medical vs dental) were conducted using independent samples t-tests or Mann–Whitney U tests for continuous variables and chi-square tests for categorical outcomes. Multivariable linear regression models examined predictors of AI trust and ethical awareness, adjusting for gender, GPA, and prior AI exposure. Logistic regression was used to identify predictors of over-reliance behavior (binary outcome). Mediation analysis was conducted using bootstrapped structural equation modeling to test

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whether AI trust mediated the relationship between curriculum exposure and clinical reliance. Statistical significance was set at $p < 0.05$ (two-tailed). Bonferroni correction was applied for multiple comparisons where appropriate.

Bias Mitigation

Selection bias was minimized by sampling the entire population. Response bias was reduced through anonymous participation and assurance of no academic consequences. Social desirability bias was mitigated by neutral wording and assurances of confidentiality. Recall bias was limited by focusing on current academic exposure. Common method bias was assessed using Harman's single-factor test. Harman's single-factor test demonstrated that the first unrotated factor accounted for 31.8% of variance, suggesting no substantial common method bias.

Ethical Considerations

The study was approved by the Institutional Review Board. Participation was voluntary, with electronic informed consent obtained prior to data collection. Students were informed of their right to withdraw at any time without penalty. Data were anonymized and handled in accordance with applicable data protection regulations, including the "Prevention of Electronic Crimes Act (PECA)" and local IRB standards applicable in Pakistan. This study is reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cross-sectional studies. A completed STROBE checklist is provided in Table S1.

Results

Participant Characteristics

From a total sampling frame of 2,284 eligible students across 20 institutions, 1,950 responses were received (response rate: 85.4%). After excluding 94 responses with >20% missing data, the final sample comprised 1,856 participants. A total of 1,856 complete responses were analyzed (medical: n = 1,032; dental: n = 824). The cohort was predominantly female (61.3%), with a mean age of 23.4 ± 1.2 years (Table 1). Medical students reported significantly greater formal AI exposure compared with dental students, while GPA differences were modest.

Table 1: Participant Characteristics (N = 1,856)

Variable	Total (N=1856)	Medical (n=1032)	Dental (n=824)	p-value
Age (years), mean ± SD	23.4 ± 1.2	23.5 ± 1.1	23.3 ± 1.2	0.08
Female, n (%)	1,138 (61.3%)	642 (62.2%)	496 (60.2%)	0.38
GPA (4.0 scale), mean ± SD	3.31 ± 0.42	3.33 ± 0.41	3.28 ± 0.44	0.02
Formal AI exposure (hours), mean ± SD	6.2 ± 4.8	7.1 ± 5.2	5.0 ± 4.1	<0.001
Regular AI use (≥ weekly), n (%)	870 (46.9%)	514 (49.8%)	356 (43.2%)	0.006

† SD = standard deviation; AI = artificial intelligence. p-values from independent samples t-tests (continuous variables) and chi-square tests (categorical variables).

Psychometric Validation of Study Instrument

The survey demonstrated strong construct validity (KMO = 0.89; Bartlett's test $p < 0.001$) and high internal consistency across all scales (Cronbach's α range 0.81–0.87) (Table 2). Test–retest reliability was acceptable, with intra-class correlation coefficients ranging from 0.79 to 0.86across scales (n = 30, two-week interval). Factor analysis confirmed the theoretical three-factor structure corresponding to trust, ethical awareness, and anxiety constructs. Content validity was supported, with item-level CVI (I-CVI) ranging from 0.83 to 1.0 and scale-level CVI (S-CVI/Ave) of 0.91. Exploratory factor analysis supported the intended latent structure, with all retained items demonstrating factor loadings ≥0.50 and no substantial cross-loadings.

Primary and Secondary Outcomes

Overall, AI trust was moderate to high (67.8 ± 11.6), with dental students demonstrating significantly higher AI trust but lower ethical awareness than medical students ($p < 0.001$). Over-reliance behavior was observed in 28.5% of

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students and was significantly more prevalent among dental trainees. AI anxiety was higher among medical students and negatively correlated with trust (r = –0.29, p < 0.001) (Table 3)

Table 2: Psychometric Properties of Study Scales

Scale	No. of Items	Cronbach's α	KMO	Variance Explained (%)
AI Trust	10	0.87	0.88	62.4
Ethical Awareness	8	0.84	0.85	59.1
AI Anxiety	6	0.81	0.82	55.7

† KMO = Kaiser–Meyer–Olkin measure of sampling adequacy. Variance explained refers to the first extracted factor per scale. Internal consistency was assessed using Cronbach's alpha (α ≥ 0.70 considered acceptable).

Table 3: Comparison of AI Outcomes Between Medical and Dental Students

Outcome	Medical (n=1032) Mean ± SD	Dental (n=824) Mean ± SD	Mean Difference (95% CI)	p-value
AI Trust (0–100)	65.9 ± 12.0	70.2 ± 10.8	4.3 (3.1–5.5)	<0.001
Ethical Awareness (0–100)	74.1 ± 9.2	70.3 ± 10.1	-3.8 (-4.7 to -2.9)	<0.001
AI Anxiety (0–100)	63.5 ± 12.1	58.4 ± 12.7	-5.1 (-6.3 to -3.9)	<0.001
Clinical Reliance Score (0–4)	1.29 ± 0.93	1.58 ± 0.98	0.29 (0.20–0.38)	<0.001
High Over-Reliance (%)	25.4%	32.3%	—	<0.001
Defensive Rejection (%)	24.3%	18.6%	—	0.002

† SD = standard deviation; CI = confidence interval. All scores standardized to a 0–100 scale. p-values from independent samples t-tests (continuous variables) and chi-square tests (categorical variables). Over-reliance is defined as the acceptance of an AI recommendation in vignette scenarios containing conflicting clinical cues.

Multivariable and Mediation Analyses

In adjusted regression models, dental discipline and formal AI exposure independently predicted higher trust, whereas AI anxiety predicted lower trust (p < 0.001) (Table 4). Over-reliance was independently associated with higher trust and lower ethical awareness. Mediation analysis demonstrated that AI trust partially mediated the relationship between curriculum exposure and clinical reliance (36% of the total effect). The mediation model demonstrated acceptable fit (CFI = 0.95, TLI = 0.93, RMSEA = 0.052).

Table 4: Multivariable and Mediation Analysis Results

Model	Predictor	Effect Size (β or OR)	95% CI	p-value	VIF
Linear Regression (Trust)	Dental Discipline	β = 0.19	0.13–0.25	<0.001	1.12
(Model Fit: R^2 = 0.31)	Formal AI Exposure	β = 0.27	0.21–0.33	<0.001	1.08
	AI Anxiety	β = -0.23	-0.29– -0.17	<0.001	1.15
Logistic Regression (Over-Reliance)	AI Trust (per 10-point increase)	OR 1.34	1.21–1.49	<0.001	—
(Model Fit:	Dental Discipline	OR 1.41	1.18–1.69	<0.001	—

Model	Predictor	Effect Size (β or OR)	95% CI	p-value	VIF
Nagelkerke $R^2 = 0.26$)					
	Ethical Awareness (per 10-point decrease)	OR 1.22	1.10–1.36	<0.001	—
Mediation Analysis	Exposure → Trust → Reliance	Indirect effect = 0.08	0.05–0.12	<0.001	—
	Proportion mediated	36%	—	—	—

† β = standardized regression coefficient; OR = odds ratio; CI = confidence interval; VIF = variance inflation factor. Linear regression: dependent variable = AI Trust Score (0–100). Logistic regression: dependent variable = over-reliance behavior (binary). Mediation analysis conducted using bootstrapped structural equation modeling (5,000 resamples). All models adjusted for gender, GPA, and prior AI exposure.

Discussion

This study investigated differences in trust, ethical awareness, and clinical reliance on AI between senior medical and dental students in Pakistan. Three principal findings were identified: dental students exhibited higher AI trust but lower ethical awareness compared with medical students; over-reliance on AI recommendations was significantly more common among dental trainees; and AI trust mediated over one-third of the association between curriculum exposure and clinical reliance. Nearly half of participants reported regular AI use (46.9%), with a slightly higher proportion among medical students (49.8%) than dental students (43.2%). These results are consistent with a multicenter survey of medical students, which found that 53.0% reported weekly use of AI tools for educational and clinical purposes.[12]

While medical students reported greater formal AI exposure, dental students exhibited higher overall trust (70.2 ± 10.8 vs 65.9 ± 12.0) but lower ethical awareness (70.3 ± 10.1 vs 74.1 ± 9.2). Although these differences were statistically significant, the standardized effect sizes were small to moderate (Cohen's d range 0.31–0.42). The combination of higher trust and lower ethical awareness among dental students may reflect the earlier and more routine integration of AI-assisted tools, such as CAD/CAM systems and automated caries detection, in dental curricula, potentially fostering AI acceptance without a corresponding emphasis on ethical evaluation.[13-15] Comparable attitudinal complexity has been documented among medical students, in which trust in AI coexists with unresolved ethical concerns about professional autonomy and decision-making.[7,9] Over-reliance behavior was observed in 28.5% of participants and was significantly more common among dental trainees (32.3% vs 25.4%). This higher prevalence among dental students may be partially explained by greater familiarity with AI-generated diagnostic outputs in routine practice, such as automated radiographic interpretation, which could reduce the threshold for uncritical acceptance. These findings align with evidence that increased trust in AI tools is associated with greater reliance, even when critical evaluation is lacking.[5] A systematic review and meta-analysis also found that AI-related anxiety is prevalent among medical students and varies with exposure and self-efficacy, influencing both attitudes and reliance behaviors.[16]

AI anxiety was higher among medical students and demonstrated a negative association with trust ($r = -0.29$, $p < 0.001$). Adjusted regression models indicated that dental discipline and formal AI exposure independently predicted higher trust, while AI anxiety predicted lower trust. This pattern is consistent with findings from other studies of AI perceptions among health professions trainees, which show that formal AI education is linked to more positive attitudes and greater enthusiasm for AI use, whereas anxiety is associated with less favorable attitudes.[17] For instance, medical students who received formal AI training reported increased confidence and readiness to apply AI in clinical settings, suggesting that structured exposure enhances trust and acceptance.[18]

A cross-sectional survey of healthcare workers also found that greater familiarity with AI correlated with lower anxiety and more positive attitudes, reinforcing the importance of exposure and emotional responses in determining trust in AI.[19] Additionally, AI anxiety has been shown to be negatively correlated with positive attitudes toward AI and may act as a mediator of trust and technology adoption, indicating that reducing anxiety through structured exposure could enhance AI acceptance among trainees.[20]

Over-reliance was independently associated with higher trust and lower ethical awareness. Mediation analysis indicated that AI trust partially mediated the relationship between curriculum exposure and clinical reliance. Although differences in AI trust and ethical awareness between medical and dental students were statistically significant ($p < 0.001$), the absolute mean differences (4.3 and 3.8 points on a 100-point scale, respectively) represent small effect sizes. In a large sample of nearly 1,900 participants, statistical significance may reflect minor variations. Consequently, these findings should be viewed as preliminary indicators of emerging professional differences rather than evidence of substantial divergence between the two disciplines. Further longitudinal research is necessary to determine whether these gaps expand as students advance into specialized clinical practice.

This study has several limitations. The cohort was predominantly female (61.3%), which may affect generalizability if gender influences perceptions of AI. The analysis adjusted for AI exposure and GPA but did not consider other potentially relevant variables, such as access to personal devices, socioeconomic status, or prior technology literacy. AI exposure was measured using self-reported survey items rather than objectively verified training records. The study was conducted exclusively in Pakistan, so findings may not be generalizable to contexts with different curricular structures or AI integration timelines. The cross-sectional design precludes causal inference; thus, mediation results should be interpreted as statistical associations rather than evidence of causality. Additionally, the Ethical Awareness Scale assesses knowledge of ethical principles rather than behaviorally calibrated responses, and scores should be interpreted with this limitation in mind.

Conclusion

This study identified significant differences in AI exposure, trust, anxiety, and ethical awareness between senior medical and dental students. Medical students reported greater formal AI exposure, while dental students demonstrated higher trust, lower ethical awareness, and greater clinical reliance on AI-assisted recommendations. Multivariable models showed that formal AI exposure and dental discipline independently predicted higher trust, whereas AI anxiety predicted lower trust. Over-reliance was independently associated with higher trust and lower ethical awareness. AI trust mediated 36% of the association between curriculum exposure and clinical reliance in cross-sectional mediation models, though causal interpretation is limited by the study design. These findings indicate that integrating structured AI literacy, critical appraisal skills, and ethical training into medical and dental curricula may be necessary to promote responsible clinical use of AI. Future longitudinal research is warranted to assess whether educational interventions can enhance ethical awareness and reduce over-reliance among healthcare students.

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Author Contribution

HYG conceptualized the study, designed the methodology, supervised data collection, and drafted the manuscript. HNN contributed to data collection, literature review, and manuscript revision. MFA performed the statistical analysis and contributed to data interpretation. IF assisted with instrument development, pilot testing, and data collection. UZM contributed to data collection and manuscript formatting. AN contributed to the literature review and critical revision of the manuscript. All authors reviewed and approved the final version of the manuscript.

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Data Availability Statement

All relevant data are presented within the manuscript and its supplementary files. The survey instrument and additional supporting data are available from the corresponding author upon reasonable request.

Conflict of Interest

The authors have no conflicts of interest to disclose.

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Supplementary Table S1. STROBE Checklist for Reporting of Cross-Sectional Studies

STROBE Item	Recommendation	Manuscript Location	Summary of Reporting
1	Indicate study design in title/abstract and provide a balanced summary	Title; Abstract	Study identified as a comparative cross-sectional study; the abstract summarizes objectives, methods, results, and conclusions.
2–3	Explain scientific background, rationale, and objectives	Introduction	Describes increasing integration of AI in medicine and dentistry, ethical concerns, and the rationale for comparing AI trust, ethical awareness, and clinical reliance between disciplines.
4	Present key elements of study design early in the manuscript	Methods: Study Design and Setting	An analytical cross-sectional design was conducted across Pakistani medical and dental institutions from June–September 2025.
5	Describe the setting, locations, and relevant dates	Methods: Study Design and Setting	Study setting, institutional context, and data collection timeline were clearly reported.
6	Describe participants, eligibility criteria, and sampling methods	Methods: Participants and Sampling	Inclusion/exclusion criteria, stratified total population sampling, and recruitment through institutional email lists are described.
7	Clearly define outcomes, exposures, predictors, and confounders	Methods: Outcome Measures; Study Instrument Development	Primary and secondary outcomes, AI exposure, anxiety, ethical awareness, and clinical reliance constructs are operationally defined.
8	Describe data sources and measurement methods	Methods: Questionnaire Structure; Clinical Vignette Design	Survey scales, vignette methodology, Likert scoring, and psychometric assessment procedures are detailed.
9	Describe efforts to address potential sources of bias	Methods: Bias Mitigation	Selection, response, recall, social desirability, and common-method bias mitigation strategies are described.
10	Explain study size determination	Methods: Sample Size Calculation	G*Power assumptions, target effect size, power, alpha level, and recruitment inflation strategy are

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STROBE Item	Recommendation	Manuscript Location	Summary of Reporting
			reported.
11	Explain the handling of quantitative variables	Methods: Statistical Analysis	Composite score construction, standardization to 0–100 scales, categorization of reliance outcomes, and regression handling are described.
12	Describe statistical methods, subgroup analyses, and handling of missing data	Methods: Statistical Analysis; Validity and Reliability Testing	t-tests, chi-square tests, regression models, mediation analysis, Bonferroni correction, multiple imputation, and psychometric analyses are reported.
13	Report participant flow and exclusions	Results: Participant Characteristics	Total analyzed sample (N = 1,856), discipline distribution, exclusions for missing data, and response characteristics are reported.
14	Present descriptive participant characteristics	Results: Table 1	Demographic characteristics, GPA, AI exposure, and AI usage frequencies are summarized.
15	Report outcome data and summary measures	Results: Tables 2–4	Psychometric properties, trust, ethical awareness, anxiety, reliance outcomes, regression analyses, and mediation findings are reported.
16	Present the main results with effect estimates and precision	Results: Tables 3–4	Mean differences, confidence intervals, odds ratios, regression coefficients, p-values, and mediation effects are provided.
17	Report additional analyses	Results: Multivariable and Mediation Analyses	Mediation modeling, adjusted regression analyses, VIF assessment, and subgroup comparisons included.
18	Summarize key findings with reference to objectives	Discussion	Findings interpreted in relation to AI trust, ethical awareness, and clinical reliance among medical and dental students.
19	Discuss study limitations and potential bias	Discussion: Limitations	Limitations related to gender imbalance, self-reported exposure, cross-sectional design, and generalizability are acknowledged.

STROBE Item	Recommendation	Manuscript Location	Summary of Reporting
20	Provide overall interpretation considering limitations and evidence	Discussion	Results interpreted cautiously in the context of existing literature and educational implications.
21	Discuss generalizability	Discussion; Conclusion	Applicability to AI-integrated healthcare curricula and need for longitudinal validation discussed.
22	Report funding source and role of funders	Funding Statement	The authors reported no specific funding support.

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Supplementary File S2: Clinical Reliance Index; Representative Vignette Scenarios

The following scenarios were utilized to assess the clinical reliance of participants. Each vignette was designed with "conflicting clinical cues" to distinguish between calibrated trust (independent critical appraisal) and over-reliance (uncritical acceptance of AI).

Scenario 1: Medical (Diagnostic Radiology)

Clinical History: A 68-year-old male, long-term smoker, presents with a three-day history of productive cough, high-grade fever ($102\circ F$), and pleuritic chest pain.
Physical Findings: Auscultation reveals localized crackles in the right lower lobe. Laboratory results show a significantly elevated White Blood Cell (WBC) count ($16{,}000/mm3$).
AI Output: Automated Chest X-ray (CXR) analysis identifies a right lower lobe opacity and predicts "High suspicion of Malignancy/Bronchogenic Carcinoma" with 92% confidence.
Conflicting Cue: The acute onset of fever and elevated WBC strongly suggests an infectious process (Pneumonia) over malignancy.
Response Options:

1. Accept AI recommendation: Refer to oncology for immediate biopsy. (Over-reliance)
2. Modify after independent appraisal: Treat for community-acquired pneumonia and schedule a follow-up CXR in 6 weeks to ensure resolution of opacity. (Calibrated Trust)
3. Reject AI recommendation: Disregard the opacity entirely as a technical artifact. (Defensive Rejection)

Scenario 2: Dental (Restorative/Radiographic)

Clinical History: A 24-year-old female presents for a routine six-month prophylaxis. She is asymptomatic and maintains excellent oral hygiene.
Clinical Examination: Visual-tactile inspection of the maxillary right first molar (#3) reveals deep pit and fissure staining on the occlusal surface, but the surface is firm upon probing with a dental explorer. No cavitation is noted.
AI Output: Analysis of bitewing radiographs flags the mesial-occlusal surface of tooth #3 as "Interproximal Caries extending into Dentin" with 88% confidence.
Conflicting Cue: The lack of tactile "catch" or shadowing on the visual exam suggests the AI may be misinterpreting an enamel artifact or deep staining as active decay.
Response Options:

1. Accept AI recommendation: Schedule patient for Class II composite restoration. (Over-reliance)
2. Modify after independent appraisal: Record as "Watch/Monitor" and apply concentrated fluoride varnish; re-evaluate at next recall. (Calibrated Trust)
3. Reject AI recommendation: Delete the AI flag and inform the patient no further action is needed. (Defensive Rejection)

Scenario 3: Medical (AI-Assisted Laboratory Interpretation)

Clinical History: A 21-year-old female presents with fatigue, palpitations, mild weight loss, and heat intolerance for three weeks.
Physical Findings: Pulse is 108 beats/minute. Mild tremor is present. No neck swelling or eye signs are noted.
Laboratory Findings: Thyroid-stimulating hormone (TSH) is mildly reduced, free T4 is within the upper-normal range, and C-reactive protein is mildly elevated.
AI Output: Automated laboratory interpretation predicts "High likelihood of Graves' disease" with 89% confidence.
Conflicting Cue: The absence of goiter, eye signs, and clearly elevated free T4 suggests that transient thyroiditis, early/subclinical hyperthyroidism, anxiety-related symptoms, or non-thyroidal illness should be considered before confirming Graves' disease.
Response Options:

1. Accept AI recommendation: Diagnose Graves' disease and immediately start antithyroid medication. (Over-reliance)
2. Modify after independent appraisal: Repeat thyroid function tests, assess thyroid antibodies, review medication history, and consider endocrinology referral before initiating definitive treatment. (Calibrated Trust)
3. Reject AI recommendation: Disregard thyroid findings entirely and attribute symptoms only to stress. (Defensive Rejection)

Scenario 4: Dental (AI-Assisted Periodontal Risk Assessment)

Clinical History: A 45-year-old male presents for a routine dental examination. He reports occasional

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gum bleeding while brushing, but no tooth mobility or pain.

Clinical Examination: Generalized mild plaque accumulation is present. Periodontal probing depths are mostly 3 mm, with isolated 4 mm pockets in posterior teeth. No radiographic bone loss is evident.

AI Output: AI-assisted periodontal software classifies the patient as “Advanced periodontitis requiring surgical periodontal therapy” with 91% confidence.

Conflicting Cue: The clinical findings indicate mild gingival inflammation or early periodontal changes rather than advanced periodontitis, as there is no mobility, no generalized deep pockets, and no radiographic bone loss.

Response Options:

1. Accept AI recommendation: Refer immediately for periodontal flap surgery. (Over-reliance)
2. Modify after independent appraisal: Provide oral hygiene instruction, scaling and root surface debridement where indicated, and schedule periodontal reassessment after initial therapy. (Calibrated Trust)
3. Reject AI recommendation: Ignore the bleeding and periodontal charting findings and provide no periodontal advice or follow-up. (Defensive Rejection)