

# The relationships of personality traits on perceptions and attitudes of dentistry students towards AI



Furkan Ozbey<sup>1\*</sup> and Yasin Yasa<sup>1</sup>

## Abstract

**Introduction** Artificial intelligence (AI) has gained significant attention in dentistry due to its potential to revolutionize practice and improve patient outcomes. However, dentists' views and attitudes toward technology can affect the application of AI. This perception and attitude can be affected by the personality traits of individuals. This study aims to evaluate the perceptions and attitudes of dentistry students toward AI.

**Methods** This cross-sectional study was conducted on dental students at Ordu University Faculty of Dentistry, involving a sample of 83 students. The study utilized the Big Five 50 Test to evaluate personality traits and a 5-point Likert scale to gather data on 20 statements regarding AI in dentistry. Data were analyzed using IBM SPSS Statistics software, and a chi-square test was employed to assess the relationship between the personality traits of dental students and their attitudes towards artificial intelligence, as well as the relationship between the gender of dental students and their attitudes towards artificial intelligence. Statistical significance was set at *P* < 0.05.

**Results** The study involved 83 participants, with 29 male and 54 female participants. The most common personality traits were Openness and Agreeableness, whereas the least common was Extraversion. Participants found AI useful and believed it could help dentists evaluate radiographs. However, the least agreed statement was that they would trust AI more than a dentist in evaluating radiograph results. A statistically significant difference was found between personal traits of dental students and in expressions comparing dentists and AI. Males were more familiar with AI than females.

**Conclusion** This study found that attitudes towards AI in dentistry vary based on personality traits. Developing educational strategies tailored to these traits can help foster more positive attitudes and improve AI integration into dental practice.

Keywords Artificial Intelligence, Dental Students, Personal Traits

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#### Introduction

Artificial Intelligence (AI) is a branch of computer science aiming to replicate human cognitive processes, learning abilities, and information storage [1]. AI encompasses various sub-fields, including machine learning (ML), natural language processing (NLP), computer vision, robotics, and more [2]. In recent years, AI technologies have generated a great deal of interest in the field of dentistry. The reason for this interest is that AI has the potential to revolutionize dental practice and significantly improve patient outcomes [3]. In dentistry AI, are used in dental caries [4-6], maxillary sinus diseases [7, 8], periodontal diseases [9–11], Temporomandibular joint problems [12–14], oral cancer [15, 16], tooth detection/numbering [17], detection of various types of oral pathology [18], in the design of inlays, onlays, crowns and bridges [19-21] orthodontic treatments [22, 23] and endodontic treatments [24]. These technologies assist dentists make quick and accurate diagnoses, guide treatment planning, and enhance the quality of patient care.

One area where AI is being used in dentistry is medical imaging, which can help radiologists detect and diagnose diseases more accurately and quickly [25]. As dentistry continues to embrace AI, we can expect to see even more innovations that will improve patient care [3]. However, dentists' views and attitudes towards this new technology may affect the implementation of AI [26].

Besides the above advantages, Limitations such as the cost of artificial intelligence applications in dental practice, the need for special training to use artificial intelligence effectively, and potential ethical concerns [27-30] regarding the use of artificial intelligence in dentistry constitute the disadvantages of artificial intelligence.

There may be individuals who welcome AI as a revolution and those who are concerned about these technological developments [31].

Personality traits reflect people's characteristic patterns of thoughts, feelings, and behaviors [32]. Various methodologies have been developed to identify these personal traits. The most widely used trait system is called the Five Factor Model [33, 34]. The Big Five Test measures five broad dimensions of personality: Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. The Five Factor Model consists of a series of questions, and the answers to these questions result in a score for each personality trait. For example, a person with a high extraversion score is expected to be sociable in different situations and over time [35].

The relationship between personality traits and attitudes towards technology or innovation has been the subject of extensive research, with several studies emphasising the pivotal role of individual personality characteristics in shaping one's perception and acceptance of technology [36–38]. Based on each personality trait, only some in dentistry are expected to have the same perspective on AI. Studies in the literature investigate the perceptions and attitudes of medical doctors, dentists, or patients toward AI [31, 39–47]. Koşan et al. [39] evaluated patients' perspectives on AI according to their characteristics. Koşan et al. reported that anxious individuals have slower perceptual processing, indicating that anxiety affects the AI tool. To the best of our knowledge, no studies in the literature have addressed the perspectives of dentistry students on AI according to their personality traits.

This study aims to evaluate dentistry students' perspectives and perceptions of AI in dentistry based on their personality traits and to explore how these traits influence their attitudes toward AI in dentistry.

#### **Materials and methods**

#### **Ethical considerations**

This cross-sectional study was approved by the Ordu University Research Ethics Committee (2023/210) and was conducted in accordance with the Declaration of Helsinki.

#### Study design

The study was conducted with students in the 5th year of the undergraduate dentistry program at Ordu University who were taking practical courses with patients. All students who wanted to participate in the study were asked to sign an informed consent form. The study sample consisted of eighty-nine dental students who were willing to participate in the study and signed an informed consent form. Six students were excluded from the study during the data collection process due to errors in completing the data collection tool, including inaccuracies, illegibility, or incomplete responses. A survey was created to assess participants' perspectives on AI. The survey was developed from a narrative literature review of topics in attitude surveys regarding AI [31, 39, 40]. The survey was piloted on a small group of 7 Oral, Dental, and Maxillofacial Radiology residents from the same university. Questions were revised for clarity based on feedback from the pilot group. In the survey, 20 situations related to "Artificial Intelligence in Dentistry" were given.

The Big Five 50 Test was used to evaluate students' personality traits. This test was translated into Turkish by Tatar [34] translated into Turkish by the original version. The test's factors are I-Extroversion, II-Agreeableness, III-Conscientiousness, IV-Neuroticism, and V-Openness. Then, on a Likert scale of 1 to 5, with five being the most appropriate, there are 50 items total, with 10 items in each factor. The students' scores for each personality trait were calculated. If a participant's score on any personality trait was above average, they were considered to have that personality trait. Demographic data such as name,

Personality Traits	Students	Total		
	Male	Female		
	N (%)	N (%)	N (%)	
Extraversion	8 (44,4%)	10 (55,6%)	18 (100%)	
Agreeableness	19 (28%)	49 (72%)	68 (100%)	
Conscientiousness	7 (16,7%)	35 (83,3%)	42 (100%)	
Neuroticism	12 (50%)	12 (50%)	24 (100%)	
Openess	26 (56,5%)	20 (43,5%)	46 (100%)	

N=Number of Persons

age and gender were also included in the surveys. Both surveys were administered to participants in class during class hours.

For data analysis, the responses were tabulated and analyzed using the IBM SPSS Statistics software (version 24.0; IBM Corporation, Armonk, NY, USA). Descriptive statistics (frequencies and percentages) were used to describe the categorical variables. A chi-square test was employed to assess the relationship between the personality traits of dental students and their attitudes towards artificial intelligence, as well as the relationship between the gender of dental students and their attitudes towards artificial intelligence. Dunn Bonferroni test, one of the post-hoc tests, was used to determine the difference between the personel traits. The level of statistical significance was set at P<0.05.

Results

A total of 83 participants, 29 male and 54 female, who were taking practical lessons with patients in the 5th year of Ordu University Dentistry undergraduate program were included in present study. The overall mean age were  $22.32\pm0.12$  years. Females mean age were  $22.26\pm0.09$  years and  $22.53\pm0.20$  years for males.

In the personality analysis, according to the Big Five Test, the most common personality trait was Agreeableness (n=68), while the least common personality trait was Extraversion (n=18) (Table 1).

Participants in the study generally found AI useful (4.16 $\pm$ 0.85). Furthermore, the participants believed AI could help dentists evaluate radiographs (4.10 $\pm$ 0.65). However, the least agreed statement was that "I would trust AI more than a dentist in evaluating the results of a radiograph" (2.40 $\pm$ 1.04) (Table 2).

Personality traits and the statements associated with these traits are presented below:

*Extraversion* Individuals with high Extraversion scores most agreed with "AI is useful" (4.33  $\pm$  0.65). They least agreed with "I can have more confidence in my diagnosis when supported by AI" (2.17  $\pm$  1.33).

Agreeableness Participants with high Agreeableness scores found the statement "I think AI will lead to great developments in dentistry and medicine" (4.40  $\pm$ 0.50) most agreeable. Conversely, they least agreed with "I am afraid that AI can replace dentists" (2.85  $\pm$  1.18).

Table 2	Distribution of	f participants	'answers to t	he statements
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Statements	Mean (SD)
1. "Al is useful."	4.16 (0.85)
2. "In principle, I would rather rely on humans than rely on robots or AI."	3.30 (0.96)
3. "I have security concerns about using AI."	3,25 (0.90)
4. "I believe AI improves people's quality of life."	3,96 (0.63)
5. "The use of Al in dentistry worries me."	3,34 (1,02)
6. "I think AI will support the diagnosis of dentists in the future."	3,93 (0.77)
7. "Al can prevent mistreatment."	3,64 (0.72)
8. "I can be more confident in my diagnosis when supported by AI."	2,40 (1.55)
9. "I believe AI can act as a quality control for the dentist's diagnosis."	3,88 (0.75)
10. "I am afraid that AI may make mistakes and lead to wrong decisions."	3,40 (0.88)
11. "I'm afraid that Al can replace Dentists."	2,69 (1.27)
12. "Al can help dentists evaluate radiographs."	4,10 (0.65)
13." I rely more on AI than the dentist in evaluating the results of a radiograph"	2,40 (1.04)
14. "I think people make more mistakes than computers."	3,29 (0.92)
15. "I think AI will lead to great advances in dentistry and medicine"	4.12 (0.72)
16. "I find the use of AI in dentistry and medicine exciting."	4.07 (0.64)
17. "Al can be used as a "treatment planning tool" for diagnosis and treatment planning in dentistry."	3,92 (0.77)
18. "Al can be used in the radiographic diagnosis of pathologies in the jaws."	3,87 (0.76)
19."I am familiar with the concept of AI"	3.65 (0.77)
20. "I see AI as a helpful tool rather than a competitor"	4.08 (0.63)
SD=Standard Deviation	

Table 3 Evaluation of the Questionnaire accordir	ng to personality traits and gender
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Statements	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openess		Male	Female	
	N (SD)	N (SD)	N (SD)	N (SD)	N (SD)	<b>P</b> *	N (SD)	N (SD)	P**
1	4.33 (0.65)	4.15 (0.67)	4.05 (0.97)	3.83 (1.03)	4.35 (0.87)	0,472	4.31 (0.85)	4.07 (0.84)	0.357
2	3.67 (1.07)	3.10 (1.02)	3.47 (0.69)	3.58 (0.79)	2.95 (1.05)	0,136	3.31 (0.93)	3.30 (0.98)	0,405
3	3.67 (0.65)	3.40 (0.88)	3.05 (0.84)	3.33 (1.07)	3.00 (0.97)	0,234	3.17 (1.03)	3.30 (0.83)	0,186
4	4.08 (0.28)	4.05 (0.51)	3.89 (0.65)	3.50 (1.00)	4.15 (0.48)	0,052	3.83 (0.75)	4.04 (0.54)	0,370
5	3.42 (0.66)	3.30 (1.12)	3.37 (1.06)	3.25 (1.05)	3.35 (1.13)	0,995	3.41 (1.18)	3.30 (0.94)	0,672
6	4.00 (0.60)	4.20 (0.52)	4.00 (0.47)	3.42 (1.08)	3.85 (0.98)	0,084	4.07 (0.70)	3.85 (0.81)	0,575
7	3.67 (0.65)	3.70 (0.80)	3.47 (0.69)	3.58 (0.51)	3.75 (0.85)	0,802	3.66 (0.81)	3.63 (0.68)	0,526
8	2.17 (1.33)	3.15 (1.78)	2.00 (1.49)	2.58 (1.24)	2.05 (1.50)	0,114	2.14 (1.64)	2.54 (1.50)	0,061
9	4.08 (0.28)	4.05 (0.51)	3.89 (0.65)	3.50 (1.00)	4.15 (0.48)	0,319	3.83 (0.84)	3.91 (0.70)	0,647
10	3.17 (0.83)	3.55 (0.99)	3.42 (0.83)	3.58 (0.67)	3.25 (0.96)	0,650	3.59 (0.98)	3.30 (0.81)	0,017
11	2.75 (1.05)	2.85 (1.18)	2.79 (1.12)	2.83 (1.64)	2.30 (1.34)	0,660	2.66 (1.37)	2.70 (1.23)	0,810
12	4.08 (0.51) <sup>a, b</sup>	4.35 (0.48) <sup>a</sup>	4.00 (0.66) <sup>a, b</sup>	3.50(0.90) <sup>b</sup>	4.30 (0.47) <sup>a</sup>	0,003	4.07 (0.84)	4.11 (0.53)	0,257
13	2.50 (1.16)	2.55 (1.35)	2.68 (0.94)	1.83 (0.83)	2.25 (0.71)	0,211	2.31 (1.03)	2.44 (1.05)	0,977
14	3.17 (0.93)	3.55 (0.82)	3.11 (0.80)	3.25 (1.21)	3.30 (0.92)	0,634	3.24 (1.05)	3.31 (0.84)	0,266
15	4.08 (0.51) <sup>a, b</sup>	4.40 (0.50) <sup>a</sup>	3.79 (0.78) <sup>a, b</sup>	3.75 (0.96) <sup>b</sup>	4.42 (0.59) <sup>a</sup>	0,008	4.17 (0.84)	4.09 (0.65)	0,463
16	4.08 (0.51) <sup>a, b</sup>	4.30 (0.65) <sup>a</sup>	3.89 (0.46) <sup>a, b</sup>	3.67 (0.65) <sup>b</sup>	4.25 (0.71) <sup>a</sup>	0,030	4.10 (0.72)	4.06 (0.59)	0,442
17	4.08 (0.79) <sup>a, b</sup>	4.15 (0.67) <sup>a</sup>	3.79 (0.71) <sup>a, b</sup>	3.25 (0.86) <sup>b</sup>	4.10 (0.64) <sup>a</sup>	0,008	3.86 (0.91)	3.94 (0.68)	0,412
18	4.17 (0.38) <sup>a</sup>	4.15 (0.58) <sup>a</sup>	3.53 (0.69) <sup>a, b</sup>	3.33 (1.07) <sup>b</sup>	4.05 (0.68) <sup>a</sup>	0,002	3.83 (0.88)	3.89 (0.69)	0,472
19	3.58 (0.90)	3.70 (0.57)	3.37 (0.68)	3.75 (0.62)	3.85 (0.98)	0,380	3.93 (0.84)	3.50 (0.69)	0,015
20	3.83 (0.57)	4.10 (0.64)	3.95 (0.40)	4.00 (0.95)	4.40 (0.50)	0,085	4.17 (0.71)	4.04 (0.58)	0,119

\*One-Way Anova, \*\*Chi-Square Test, Analysis of variance with post-hoc Bonferroni was applied to compare the data between the groups, Different superscript lowercase letters in the same line indicate statistically significant difference ( $\rho$ <0.05).

Conscientiousness Participants with high Conscientiousness scores found the statement "AI is useful" (4.05  $\pm$ 0.97). Their least agreed statement was "I can have more confidence in my diagnosis when supported by AI" (2.00  $\pm$ 1.49).

*Neuroticism* Participants with high Neuroticism scores agreed most with "I see AI as a helpful tool rather than a competitor" ( $4.00 \pm 0.95$ ). They least agreed with "I trust AI more than a dentist in evaluating the results of a radiograph" ( $1.83 \pm 0.83$ ).

*Openness* Participants with high Openness scores found the statement "I think AI will lead to great advances in dentistry and medicine" ( $4.42 \pm 0.50$ ). The least agreeable statement for this group was "I can have more confidence in my diagnosis when supported by AI" ( $2.05 \pm 1.50$ ).

A statistically significant difference was found between the personal characteristics of dental students and the following statements;

"AI can help dentists evaluate radiographs."

"I think AI will lead to great advances in dentistry and medicine."

"I find the use of AI in dentistry and medicine exciting."

"AI can be used as a "treatment planning tool" for diagnosis and treatment planning in dentistry."

"AI can be used in the radiographic diagnosis of pathologies in the jaws." (p=0.003, p=0.008, p=0.030, p=0.008 and p=0.002 respectively).

"I am familiar with the concept of AI" statements to response It was observed that males  $(3.93\pm0.84)$ were more familiar with AI than females  $(3.50\pm0.69)$  (p=0.017). (Table 3)

### Discussion

AI technology's applications in dentistry offer many benefits and provide faster and more accurate results in patients' diagnosis and treatment processes [48]. The development of artificial intelligence in dentistry is quite rapid and the reactions of professionals working in this field to this development are also remarkable. For this reason, essential to undertake evaluation of the attitudes and perceptions of dentists towards AI.

This present study assessed the perceptions and attitudes of dentistry students towards artificial intelligence in the midst of the artificial intelligence revolution that is expected to have a profound and comprehensive impact on the future of dentistry. The present study found that participants were familiar with AI ( $3.65\pm0.77$ ). Oh et al. [40], in a relatively older study compared to other studies in the literature, found that only 5.9% of Korean doctors were familiar with the concept of AI. In two studies conducted in a similar period, Keser et al. [41] and Sur et al. [43] found that 60% and 68% of the participants, respectively, stated that they were familiar with the concept of AI. In 2023 Rogonovic et al. [47], 72.9% of the participants were partially familiar with AI. In the studies conducted, the increase in the familiarity of the participants with artificial intelligence over the years can be interpreted as the increase in the recognition of artificial intelligence over the years.

The present study, most participants found AI useful and believed it could help dentists in radiograph evaluation ( $4.16\pm0.85$ ). This result shows that there is a positive perception of AI among dental students. In the study conducted by Kosan et al. [39] the participants expressed the view that the use of AI in dentistry is beneficial at a high rate ( $4.20\pm0.80$ ). Oh et al. [40] and Yüzbaşioğlu [31] also found similar results. In both studies, 73.4% and 75.8% of the participants found AI useful, respectively. It was shows that other studies in the literature generally showed results compatible with this study and that they were observed in the view that AI is useful.

Shan et al. [49] stated that AI is advancing rapidly with potential applications in diagnosis, treatment and prognosis predictions. While AI is making rapid progress in dentistry, there are some concerns arise. The view that artificial intelligence will replace humans in many areas is one of the biggest concerns about AI [50]. However, the study by Yüzbaşıoğlu [31] also showed that participants generally disagreed that AI could replace dentists (52.6%), while 18.9% did not have any opinion on this issue. A more recent study by Romero et al. [32] found that participants had a more negative attitude towards this issue, recording a lower rate than in other studies (45%). The statements with which participants in this study least agreed was "I am afraid that Artificial Intelligence will replace Dentists"  $(2.85 \pm 1.18)$ . Similarly, the Pauwels [33] study found that participants were not concerned about this issue. In Pauwels [33] study, 94.8% of the participants disagreed that AI would replace dentists before receiving training on AI. However, this rate decreased to 86.5% after the participants received training on AI. These results may indicate that there are discussions and some concerns that AI may replace dentists.

The analysis of the Big Five factors has grouped the general characteristics we use to describe individuals into five main terms. The five major traits that make up the Big Five are Extraversion, Agreeableness, Conscientiousness, Neuroticism, Openness [51]. According to the Big Five Test, the most common personality trait among the participants was Agreeableness (n=68), while the least common personality trait was Extraversion (n=18) (Table 1).

In present study, it was seen that the individuals who showed the openness personality trait among the participants agreed with the "AI is Useful" statement the most  $(4.35\pm0.87)$ . Riedl stated that Individuals with high openness are likely to have positive attitudes toward AI due to their receptiveness to change [52]. Additionally, this appeared to support existing knowledge that openness is associated with positive perceptions of technology [36, 53, 54].

In present study, individuals with Agreeableness personality trait were the most likely to agree with the statement "I can trust my diagnosis more when supported by AI."  $(3.15\pm1.78)$ . Therefore, they may be less anxious about trusting and collaborating with AI in diagnosis. It was observed that agreeable individuals were more likely to agree with the views on cooperation and collaboration with AI rather than positive-negative views on AI. Although not in the field of dentistry, Kaya et al. [36], in their study evaluating personal characteristics' perspectives on AI and new technologies, revealed that people with Agreeableness personalities have a more positive view towards AI. Stein et al. [55] stated that in their study, they evaluated people's perspectives on artificial intelligence according to their personal characteristics and found that higher compatibility was associated with more positive views about artificial intelligence technology in their sample.

In the literature, Özbek et al. [56] reported that individuals with high levels of Agreeableness were more likely to perceive smartphone technology as more useful, while those with high levels of neuroticism perceived smartphone technology as less useful. In present study, like these results, it was observed that individuals with high Agreeableness and Openness perceived AI technology more positively, while neurotic individuals had more concerns.

Conscientious individuals exhibit a strong work ethic, are reliable, pay attention to details and show commitment [57]. This present study individuals with the trait of conscientiousness were the most likely to agree with the statement "I trust AI more than a dentist in evaluating the results of a radiograph" ( $2.68\pm0.94$ ). They may tend to trust the AI more than the dentist because of the consistency shown by the AI. On the contrary, individuals with neurotic personality traits might be expected to hesitate to trust AI in evaluating the results of a radiograph because neuroticism is negatively associated with interpersonal trust [39, 57]. Consistent with this, individuals with neurotic personality traits were the least likely personality group to agree with the statement "I trust AI more than a dentist in evaluating the results of a radiograph" (1.83±0.83).

Addionaltiy in present study, as a result of the post hoc analysis performed on the statements with statistically significant difference, it was seen that the difference was caused by neurotic individuals. There was a difference between neurotic individuals and individuals with agreeable and open personality traits. Salem et al. [54] similarly reported that neurotic individuals have a negative view of artificial intelligence, while individuals with openness have a positive view. In the present study, Neurotic individuals were found to perceive AI more as a helpful tool rather than a competitor, aligning with Salem et al. [54]'s findings that neurotic individuals tend to have negative views about AI. However, while Salem et al. emphasized the general negativity of neurotic individuals toward AI, our findings suggest a nuanced perspective where neurotic individuals see AI as a supportive tool but remain hesitant to trust it over human expertise.

Schepman [37] showed a negative correlation between extroversion and attitudes toward AI. On the contrary, in present study, the statement in which extraversion individuals agree the most is the statement in which "AI is useful" ( $4.33\pm0.65$ ). Previous studies have suggested that cultural factors can influence attitudes toward technology, supporting the idea that a similar cultural background may lead to consistent attitudes. The difference between the studies may be due to this [53, 58].

As a result, consistent with the literature, differences in attitudes towards AI were observed according to personality traits [36, 52–55]. Specifically, in this study highly imaginative individuals were more likely to agree that AI is useful, as they tend to embrace new ideas and innovations. On the other hand, neurotic individuals perceived AI as a helpful tool but were hesitant to fully trust it, especially in situations requiring high confidence. These finding highlights the impact of personality traits on attitudes toward AI, where openness fosters enthusiasm for technological advancements, and neuroticism introduces cautious acceptance.

Gender was found to affect the perception of AI. Males were found to be more familiar with the concept of AI. This difference suggests that gender may have an impact on their perceptions towards AI and is consistent with the literature [59–61].

One of the main limitations of current study is related to the data collection method. When using a self-report questionnaire, there is a possibility of social desirability bias on the part of the respondents, who complete the questionnaire in a socially accepted way and not according to their criteria. However, we believe that this is offset by the reliability and validity obtained from the survey. The strength of our study is that it is the first study in the literature, to the authors' knowledge, to address dental students' perspectives on AI according to their personality traits.

#### Conclusion

As a result, while AI has gained a place in dentistry, it has been observed that individuals' familiarity with the concept of AI and an increasing trend in their concerns. In this study, differences in attitudes towards AI were observed according to personality traits. These findings suggest that by developing targeted educational strategies based on the personality traits of dental students, we can achieve more effective integration of AI into dental practice. The formation of positive attitudes towards AI can be supported by these educational interventions. Future studies with more participants are needed in this area.

#### Supplementary Information

The online version contains supplementary material available at https://doi.or g/10.1186/s12909-024-06630-5.

Supplementary Material 1

#### Acknowledgements

Not applicable.

#### Author contributions

F.O and Y.Y wrote the main text of the manuscript and F.O prepared the tables. All authors reviewed the article.

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#### Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

#### Declarations

#### Ethics approval and consent to participate

This study was approved by the ethical approval obtained from Ordu University Clinical Research Ethics Committee (2023/210). All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Written informed consent was obtained from all individual participants included in the study.

#### **Consent for publication**

Not applicable.

#### Competing interests

The authors declare no competing interests.

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#### References

- Krittanawong C, Zhang HJ, Wang Z, et al. Al in Precision Cardiovascular Medicine. J Am Coll Cardiol. 2017;69:2657–64. https://doi.org/10.1016/j.jacc.2017.0 3.571.
- Ghaffari M, Zhu Y, Shrestha A. (2024). A review of advancements of Artificial Intelligence in Dentistry. Dentistry Rev, 100081.
- Schwendicke F, Samek W, Krois J. Al in Dentistry: chances and challenges. J Dent Res. 2020;99:769–74. https://doi.org/10.1177/0022034520915714.
- Khanagar SB, Alfouzan K, Awawdeh M et al. (2022) Application and performance of AI technology in detection, diagnosis and prediction of Dental Caries (DC)—A systematic review. Diagnostics 12:. https://doi.org/10.3390/di agnostics12051083
- Prados-Privado M, Villalón JG, Martínez-Martínez CH, et al. Dental caries diagnosis and detection using neural networks: a systematic review. J Clin Med. 2020;9:1–13. https://doi.org/10.3390/jcm9113579.

- Devito KL, de Souza Barbosa F, Filho WNF. An artificial multilayer perceptron neural network for diagnosis of proximal dental caries. Oral surgery. Oral Med Oral Pathol Oral Radiol Endodontology. 2008;106:879–84. https://doi.org/10.1 016/j.tripleo.2008.03.002.
- Kim KS, Kim BK, Chung MJ, et al. Detection of maxillary sinus fungal ball via 3-D CNN-based AI: fully automated system and clinical validation. PLoS ONE. 2022;17:1–19. https://doi.org/10.1371/journal.pone.0263125.
- Kim K, Lim CY. Enhanced Al-based diagnosis using CBCT with internal denoising: clinical validation for discrimination of fungal ball, sinusitis, and normal cases in the maxillary sinus. (arXiv:2211.15950v1 [eess.IV]). 1–21.
- Revilla-León M, Gómez-Polo M, Barmak AB, et al. Al models for diagnosing gingivitis and periodontal disease: a systematic review. J Prosthet Dent. 2022;1–9. https://doi.org/10.1016/j.prosdent.2022.01.026.
- Miller A, Huang C, Brody ER, et al. Al applications for the Radiographic detection of Periodontal Disease: a scoping review C. J Calif Dent Assoc. 2023;51. https://doi.org/10.1080/19424396.2023.2206301.
- Alotaibi G, Awawdeh M, Farook FF, et al. Al (Al) diagnostic tools: utilizing a convolutional neural network (CNN) to assess periodontal bone level radiographically—a retrospective study. BMC Oral Health. 2022;22:1–7. https: //doi.org/10.1186/s12903-022-02436-3.
- Lee CS, Nagy PG, Weaver SJ, Newman-Toker DE. Cognitive and system factors contributing to diagnostic errors in radiology. Am J Roentgenol. 2013;201:611–7.
- Bianchi J, Ruellas A, Prieto JC, et al. Decision support systems in Temporomandibular Joint Osteoarthritis: a review of Data Science and Al applications. Semin Orthod. 2021;27:78–86. https://doi.org/10.1053/j.sodo.2021.05.004.
- Jha N, Lee KS, Kim YJ. Diagnosis of temporomandibular disorders using Al technologies: a systematic review and meta-analysis. PLoS ONE. 2022;17:1– 18. https://doi.org/10.1371/journal.pone.0272715.
- García-Pola M, Pons-Fuster E, Suárez-Fernández C, et al. Role of Al in the early diagnosis of oral cancer. A scoping review. Cancers (Basel). 2021;13:1–25. https://doi.org/10.3390/cancers13184600.
- Ilhan B, Lin K, Guneri P, Wilder-Smith P. Improving oral Cancer outcomes with imaging and Al. J Dent Res. 2020;99:241–8. https://doi.org/10.1177/00220345 20902128.
- Yasa Y, Çelik Ö, Bayrakdar IS, et al. An Al proposal to automatic teeth detection and numbering in dental bite-wing radiographs. Acta Odontol Scand. 2021;79:275–81. https://doi.org/10.1080/00016357.2020.1840624.
- Araújo ALD, da Silva VM, Kudo MS, et al. Machine learning concepts applied to oral pathology and oral medicine: a convolutional neural networks' approach. J Oral Pathol Med. 2023;52:109–18. https://doi.org/10.1111/jop.133 97.
- Bernauer SA, Zitzmann NU, Joda T. The use and performance of artificial intelligence in prosthodontics: a systematic review. Sensors. 2021;21(19):6628. https://doi.org/10.3390/s21196628.
- Kong HJ, Kim YL. Application of artificial intelligence in dental crown prosthesis: a scoping review. BMC Oral Health. 2024;24(1):937. https://doi.org/10.118 6/s12903-024-04657-0.
- Alshadidi AAF, Alshahrani AA, Aldosari LIN, et al. Investigation on the application of artificial intelligence in prosthodontics. Appl Sci. 2023;13(8):5004. https://doi.org/10.3390/app13085004.
- Bichu YM, Hansa I, Bichu AY, Premjani P, Flores-Mir C, Vaid NR. Applications of artificial intelligence and machine learning in orthodontics: a scoping review. Prog Orthodont. 2021;22:1–11. https://doi.org/10.1186/s40510-021-00361-9.
- Monill-González A, Rovira-Calatayud L, d'Oliveira NG, Ustrell-Torrent JM. Artificial intelligence in orthodontics: where are we now? A scoping review. Orthod Craniofac Res. 2021;24:6–15. https://doi.org/10.1111/ocr.12517.
- Boreak N. Effectiveness of artificial intelligence applications designed for endodontic diagnosis, decision making, and prediction of prognosis:a systematic review. J Contemp Dent Pract. 2020;21:926–34. https://doi.org/10.5005/jp-jou rnals-10024-2894.
- Asha P, Srivani P, iqbaldoewes R, et al. Al in medical imaging: an analysis of innovative technique and its future promise. Mater Today Proc. 2022;56:2236– 9. https://doi.org/10.1016/j.matpr.2021.11.558.
- Tandon D, Rajawat J. Present and future of Al in dentistry. J Oral Biol Craniofac Res. 2020;10:391–6. https://doi.org/10.1016/j.jobcr.2020.07.015.
- Mörch CM, Atsu S, Cai W, Li X, Madathil SA, Liu X, Ducret M. Artificial intelligence and ethics in dentistry: a scoping review. J Dent Res. 2021;100(13):1452–60. https://doi.org/10.1177/00220345211013808.
- Ducret M, Mörch CM. Focus on artificial intelligence ethics in dentistry. J Dent Sci. 2023;18(3):1409. https://doi.org/10.1016/j.jds.2022.12.003.

- Rokhshad R, Ducret M, Chaurasia A, Karteva T, Radenkovic M, Roganovic J, Schwendicke F. Ethical considerations on artificial intelligence in dentistry: a framework and checklist. J Dent. 2023;135:104593. https://doi.org/10.1016/j.j dent.2023.104593.
- Franco R, Taghizadeh M, Iranmanesh P, Mirmohammadi H, Hasselgren G, Bang H, Kolahi J. Whether enough attention is being paid to the ethical concerns regarding the Use of Artificial Intelligence in Dentistry? Dent Hypotheses. 2023;14(3):69–70. https://doi.org/10.4103/denthyp.denthyp\_96\_23.
- Yüzbaşıoğlu E. Attitudes and perceptions of dental students towards Al. J Dent Educ. 2021;85:60–8. https://doi.org/10.1002/jdd.12385.
- Möttus R, Wood D, Condon DM, et al. Descriptive, predictive and explanatory personality research: different goals, different approaches, but a Shared need to move beyond the big few traits. Eur J Pers. 2020;34:1175–201. https://doi.o rg/10.1002/per.2311.
- Block J. A contrarian view of the five-factor approach to personality description. Psychol Bull. 1995;117:187–215. https://doi.org/10.1037/0033-2909.117.2 .187.
- Tatar A. Büyük beş-50 kişilik testinin türkçeye çevirisi ve beş faktör kişilik envanteri kısa formu ile karşılaştırılması. Anadolu Psikiyatr Derg. 2017;18:51– 61. https://doi.org/10.5455/apd.220580.
- 35. Brewer L. (2019) General psychology: required reading. Personal Trait 1–324.
- Kaya F, Aydin F, Schepman A, et al. The roles of personality traits, Al anxiety, and demographic factors in attitudes toward Al. Int J Hum Comput Interact. 2022;0:1–18. https://doi.org/10.1080/10447318.2022.2151730.
- Schepman A, Rodway P. The general attitudes towards artificial intelligence scale (GAAIS): confirmatory validation and associations with personality, corporate distrust, and general trust. Int J Hum Comput Interact. 2022;39(13):2724–41. https://doi.org/10.1080/10447318.2022.20854.
- Zhang J, Ge P, Li X, Yin M, Wang Y, Ming W, Li J, Li P, Sun X, Wu Y. Personality effects on Chinese public preference for the COVID-19 vaccination: discrete choice experiment and latent profile analysis study. Int J Environ Res Public Health. 2022;19:8. https://doi.org/10.3390/ijerph19084842.
- Kosan E, Krois J, Wingenfeld K, et al. Patients' perspectives on Al in Dentistry: a controlled study. J Clin Med. 2022;11. https://doi.org/10.3390/jcm11082143.
- 40. Oh S, Kim JH, Choi SW, et al. Physician confidence in Al: an online mobile survey. J Med Internet Res. 2019;21. https://doi.org/10.2196/12422.
- KESER G, PEKINER FMN. Attitudes, perceptions and knowledge regarding the future of AI in oral radiology among a group of dental students in Turkey: a survey. Clin Exp Heal Sci. 2021;11:637–41. https://doi.org/10.33808/CLINEXPH EALTHSCI.928246.
- 42. Sit C, Srinivasan R, Amlani A et al. Attitudes and perceptions of UK medical students towards AI and radiology: a multicentre survey. https://doi.org/10.1 186/s13244-019-0830-7
- Sur J, Bose S, Khan F, et al. Knowledge, attitudes, and perceptions regarding the future of Al in oral radiology in India: a survey. Imaging Sci Dent. 2020;50:193–8. https://doi.org/10.5624/ISD.2020.50.3.193.
- 44. John R, Golombok S. (2014) No Title.
- Karan-Romero M, Salazar-Gamarra RE, Leon-Rios XA. Evaluation of attitudes and perceptions in students about the Use of Al in Dentistry. Dent J. 2023;11:1–13. https://doi.org/10.3390/dj11050125.
- Pauwels R, Del Rey YC. Attitude of Brazilian dentists and dental students regarding the future role of Al in oral radiology: a multicenter survey. Dentomaxillofac Radiol. 2021;50. https://doi.org/10.1259/DMFR.20200461.
- Roganović J, Radenković M, Miličić B. Responsible use of Al in Dentistry: Survey on dentists' and final-year undergraduates' perspectives. Healthc. 2023;11. https://doi.org/10.3390/healthcare11101480.
- Carrillo-Perez F, Pecho OE, Morales JC, et al. Applications of Al in dentistry: a comprehensive review. J Esthet Restor Dent. 2022;34:259–80. https://doi.org/ 10.1111/jerd.12844.
- Shan T, Tay FR, Gu L. Application of Al in Dentistry. J Dent Res. 2021;100:232– 44. https://doi.org/10.1177/0022034520969115.
- Huang MH, Rust R, Maksimovic V. The feeling economy: managing in the Next Generation of AI (AI). Calif Manage Rev. 2019;43–65. https://doi.org/10.1 177/0008125619863436.
- Power RA, Pluess M. Heritability estimates of the big five personality traits based on common genetic variants. Transl Psychiatry. 2015;5:10–3. https://do i.org/10.1038/tp.2015.96.
- 52. Riedl R. Is Trust in Artificial Intelligence systems related to user personality? Review of empirical evidence and future research directions. Berlin, Germany: Springer; 2022.

- Salem GMM, El-Gazar HE, Mahdy AY, Alharbi TAF, Zoromba MA. (2024). Nursing Students' Personality Traits and Their Attitude toward Artificial Intelligence: A Multicenter Cross-Sectional Study. Journal of Nursing Management, 2024(1), 6992824. https://doi.org/10.1155/2024/6992824
- Stein JP, Messingschlager T, Gnambs T, Hutmacher F, Appel M. Attitudes towards AI: measurement and associations with personality. Sci Rep. 2024;14(1):2909. https://doi.org/10.1038/s41598-024-53335-2.
- Özbek V, Alnıaçık Ü, Koc F, et al. The impact of personality on Technology Acceptance: a study on smart phone users. Procedia - Soc Behav Sci. 2014;150:541–51. https://doi.org/10.1016/j.sbspro.2014.09.073.
- Shahzad K, Raja U, Hashmi SD. Impact of big five personality traits on authentic leadership. Leadersh Organ Dev J. 2021;42:208–18. https://doi.org/10.1108 /LODJ-05-2019-0202.
- Mousavi Baigi SF, Sarbaz M, Ghaddaripouri K, Ghaddaripouri M, Mousavi AS, Kimiafar K. Attitudes, knowledge, and skills towards artificial intelligence among healthcare students: a systematic review. Health Sci Rep. 2023;6. https://doi.org/10.1002/hsr2.1138. e1138.

- Fietta V, Zecchinato F, Di Stasi B, Polato M, Monaro M. Dissociation between users' explicit and implicit attitudes toward artificial intelligence: an experimental study. IEEE Trans Human-Machine Syst. 2022;52(3):481–9. https://doi.o rg/10.1109/THMS.2021.3125280.
- 60. Schepman A, Rodway P. Initial validation of the general attitudes towards Artificial Intelligence Scale. Computers Hum Behav Rep. 2020;1:100014. https://doi.org/10.1016/j.chbr.2020.100014.
- Sindermann C, Yang H, Elhai JD, Yang S, Quan L, Mi L, Montag C. Acceptance and fear of artificial intelligence: associations with personality in a German and a Chinese sample. Discover Psychol. 2020;2:1–12. https://doi.org/10.1007 /s44202-022-00020-y.

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