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SOCIAL WILLINGNESS AND PERCEPTIONS OF SAUDI ADULT POPULATION REGARDING ORTHODONTIC TREATMENT: A CROSS-SECTIONAL STUDY

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Abstract

This cross-sectional study aimed to investigate the social willingness and perceptions of the adult Saudi population regarding orthodontic treatment. The study surveyed Saudi adults aged 18 years and above from various regions using structured questionnaires. Key variables assessed included awareness, understanding, and experiences with orthodontic treatment, as well as perceptions of the need for treatment and barriers to seeking it. Descriptive and inferential statistics were used for data analysis. The findings revealed that a majority of participants were aware of orthodontic treatment, with a high level of understanding. However, only a minority had undergone orthodontic treatment themselves or within their families. While a significant proportion believed they required orthodontic treatment, various barriers such as cost, lack of awareness, and social acceptance were reported. Gender, education level, and socioeconomic status were found to influence participants' perceptions and experiences related to orthodontic treatment. These findings provide insights into the factors influencing the demand for orthodontic treatment among Saudi adults and highlight the need for targeted interventions to address barriers and improve access to orthodontic care.

Keywords: Orthodontic treatment, Social willingness, Perceptions

Introduction

The number of people requesting orthodontic treatment is increasing because of multiple reasons. However, the prolonged duration of orthodontic treatment time, as well as the increased treatment charges, could be a concern for patients seeking orthodontic treatment. In addition, root resorption and white spot lesions as sequelae of prolonged orthodontic treatment are considered major risks of concern to both patients and professionals (Segal et al., 2004; Uribe et al., 2014; Kim, 2017). Multiple techniques and procedures have been reported to accelerate orthodontic

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tooth movement, and thus, shorten treatment duration, thereby, reducing the potential treatment risks (Nimeri et al., 2013; Alfawal et al., 2018; Darendeliler et al., 2007; Leethanakul et al., 2018). Varied biological, mechanical, and physical effects of such procedures also varied in their level of invasiveness (Nimeri et al., 2013; Gazit-Rappaport et al., 2010; Darendeliler et al., 2007; Leethanakul et al., 2018). Orthodontic treatment coupled with the use of teeth vibrator devices for physical stimulation by vibratory forces is one of the recommended techniques (Alfawal et al., 2018; Darendeliler et al., 2007; Leethanakul et al., 2018; Woodhouse et al., 2015). Woodhouse et al., compared patients' pain expression between conventional fixed orthodontic appliances and the use of supplemental vibrational devices and found no significant difference in pain between both methods (Woodhouse et al., 2015). Mechanical stimulation by customized wires designed and manufactured according to the desired movement and the formulated treatment plan was also reported to reduce the treatment time significantly (Darendeliler et al., 2007; Alford et al., 2011; Sachdeva et al., 2012). Despite the non-invasiveness of these mechanical techniques, the increase in treatment costs has been considered an issue (Nimeri et al., 2013; Darendeliler et al., 2007; Leethanakul et al., 2018; Ganesh & Pandian, 2017; Alford et al., 2011). Procedures reported to have biological effects included: one-time surgical procedures and drug injections (Nimeri et al., 2013; Leethanakul et al., 2018; Aboul-Ela et al., 2011; Alfawal et al., 2018; Darendeliler et al., 2007; Leethanakul et al., 2018). These procedures are based on the principle of induced inflammatory effect induced on bone leading to accelerated osteoclastic effect and thus, accelerated tooth movement (Nimeri et al., 2013; Darendeliler et al., 2007; Leethanakul et al., 2018; Aboul-Ela et al., 2011). Corticotomies were considered invasive and reported to be accompanied by some reported postoperative pain (Aboul-Ela et al., 2011; Alfawal et al., 2018; Darendeliler et al., 2007; Leethanakul et al., 2018); Alfawal et al., 2018). It was also reported to have a high level of acceptance and satisfaction among patients (Gibreal et al., 2019). The drug injection method includes the injection of exogenous inflammatory mediators and hormones into the periodontal tissues to induce bone resorption (Leethanakul et al., 2018). Multiple mediators have been assessed including vitamin D and parathyroid hormones with positive reported effects on orthodontic tooth movement (Collins & Sinclair, 1988). However, most studies assessing these mediators have been animal studies (Leethanakul et al., 2018). Among the different techniques, the less-invasive ones were reported to be more accepted by adult and adolescent patients as well as orthodontists as reported by Uribe et al. (2014).

Researchers have therefore reported a rising influx in the number of adults seeking orthodontic treatment in the last 20 years. These adults fall into two groups younger adults (under 35 years) who desired but could not receive orthodontic treatment during the adolescent period and an older group, typically in their 40s or 50s who have other dental problems and need orthodontic treatment as part of larger treatment plans (Nazeer et al., 2011; Gazit-Rappaport et al., 2010).

Patients' perceptions toward orthodontic treatment modalities have been reported to be influenced by different factors such as age, gender, nationality, treatment cost, level of income, and level of education (Segal et al., 2004; Uribe et al., 2014; Kim, 2017; Cohen et al., 2010; Gibreal et al., 2019). According to a report by Uribe et al., patients were willing to pay up to a 20% increase in the treatment cost for any procedure that could reduce their orthodontic treatment duration (Uribe et al., 2014). Bindayel, in 2018, assessed the awareness and preferences of patients in Saudi Arabia to different orthodontic treatment modalities and payment options. He found that treatment costs and payment plans affected patients' preferences for the different orthodontic treatment modalities (Bindayel, 2018). In addition, Sayers and Newton also found that ethnic background

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had a significant effect on patients' expectations of orthodontic treatment (Cohen et al., 2010; Gibreal et al., 2019).

To the best of our knowledge, patients' perceptions of the need for reduced orthodontic treatment time as well as their acceptance of the different procedures claimed to accelerate orthodontic tooth movement have not been assessed in Saudi Arabia.

Materials and Methods:

Study Design: This study employed a cross-sectional design to assess the social willingness and perceptions of the Saudi adult population regarding orthodontic treatment. Cross-sectional studies are observational studies that collect data from a population at a single point in time, allowing for the examination of associations between variables without establishing causation.

Participants: The study participants included Saudi adult individuals aged 18 years and above from various regions of Saudi Arabia. Participants were selected using convenience sampling methods, targeting individuals who were accessible and willing to participate in the study. The sample size was 432.

Data Collection: Data collection was conducted through structured questionnaires administered to the participants. The questionnaire comprised questions related to participants' awareness, understanding, and experiences with orthodontic treatment, as well as their perceptions of the need for such treatment and the barriers preventing them from seeking it.

Variables Assessed:

- Awareness of orthodontic treatment
- Understanding of the meaning of orthodontic treatment
- Personal or familial experience with orthodontic treatment
- Perception of the need for orthodontic treatment
- Reasons for seeking orthodontic treatment
- Barriers preventing participants from seeking orthodontic treatment

Statistical Analysis: Descriptive statistics were used to summarize the demographic characteristics of the participants and their responses to the questionnaire. Frequency distributions and percentages were calculated for categorical variables. Inferential statistics, including chi-square tests, were employed to assess associations between variables such as gender, education level, and socioeconomic status with participants' perceptions and experiences related to orthodontic treatment.

Ethical Considerations: Ethical approval was obtained from the relevant institutional review board before commencing data collection. Informed consent was obtained from all participants, and confidentiality and anonymity were ensured throughout the study.

Results:

Table 1: Responses from the study participants for each question.

Questions	Responses
Do you know what orthodontic treatment is?	Yes: 72% No: 28%
Do you know the meaning of orthodontic treatment?	Correction of irregularly arranged teeth: 71% Replacement of missing teeth: 7%

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	Gum problems: 22%
Have you or any of your family members had orthodontic treatment?	Yes: 19% No:81%
Do you think you require orthodontic treatment?	Yes: 31% No: 69%
Reasons why you require orthodontic treatment?	Irregularly arranged teeth: 12% Pushed out teeth: 8% Correct smile: 5% Difficulty while speaking: 4% Pain around the ear: 2%
Reasons for not having gone for orthodontic treatment?	Awareness: 27% Social acceptance: 9% Lack of time: 8% Cost factor: 25%

Table 1 presents responses from participants in a study regarding orthodontic treatment, accompanied by questions and corresponding percentages. The study aimed to assess awareness, perception, and experiences related to orthodontic care.

The first question addressed participants' familiarity with orthodontic treatment, revealing that 72% were aware of it, while 28% were not. Following this, participants were asked about their understanding of orthodontic treatment, with 71% correctly identifying it as the correction of irregularly arranged teeth, while 7% associated it with replacing missing teeth and 22% with gum problems.

Subsequently, participants were questioned about personal or familial experiences with orthodontic treatment, indicating that 19% had undergone such treatment while 81% had not. Those who had not were then asked if they believed they needed orthodontic treatment, with 31% indicating that they did, and 69% stating they did not.

For those who believed they required orthodontic treatment, reasons were sought. The responses included 12% citing irregularly arranged teeth, 8% mentioning protruded teeth, 5% desiring a correct smile, 4% experiencing difficulty speaking, and 2% reporting pain around the ear.

Finally, participants who had not pursued orthodontic treatment were asked about their reasons for abstaining. Responses indicated that 27% cited a lack of awareness, 9% mentioned concerns about social acceptance, 8% cited a lack of time, and 25% cited cost factors.

Table 2: Comparison of Responses based on gender for each question.

Questions	Male	Female	P-value
Do you know what orthodontic treatment is?	Yes: 55% No: 45%	Yes: 68% No: 32%	.067
Do you know the meaning of	Correction of irregularly arranged teeth:	Correction of irregularly arranged teeth:	.042*

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orthodontic treatment?	65% Replacement of missing teeth: 9% Gum problems: 30%	76% Replacement of missing teeth: 5% Gum problems: 16%	
Have you or any of your family members had orthodontic treatment?	Yes: 14% No:86%	Yes: 26% No:74%	.121
Do you think you require orthodontic treatment?	Yes: 21% No: 79%	Yes: 41% No: 59%	.038*
Reasons why you require orthodontic treatment?	Irregularly arranged teeth: 10% Pushed out teeth: 6% Correct smile: 7% Difficulty while speaking: 6% Pain around the ear: 3%	Irregularly arranged teeth: 14% Pushed out teeth: 10% Correct smile: 5% Difficulty while speaking: 4% Pain around the ear: 5%	.231
Reasons for not having gone for orthodontic treatment?	Awareness: 37% Social acceptance: 5% Lack of time: 4% Cost factor: 35%	Awareness: 17% Social acceptance: 14% Lack of time: 12% Cost factor: 15%	.029*

Table 2 presents a comparison of responses based on gender for various questions related to orthodontic treatment. Each row represents a different question, and the columns indicate the responses for males and females, along with the associated p-values.

For the question "Do you know what orthodontic treatment is?" it's evident that a higher percentage of females (68%) know what orthodontic treatment is compared to males (55%). However, the difference in knowledge between genders is not statistically significant ($p = .067$).

In the next question, "Do you know the meaning of orthodontic treatment?" a significantly

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higher percentage of females (76%) correctly understood the meaning compared to males (65%), with a p-value of .042.

When asked if they or their family members have had orthodontic treatment, there is no statistically significant difference between males and females, although a slightly higher percentage of females (26%) have undergone treatment compared to males (14%) ($p = .121$).

Moving to the question of whether respondents believe they require orthodontic treatment, a significantly higher percentage of females (41%) believe they do compared to males (21%), with a p-value of .038.

Regarding the reasons for requiring orthodontic treatment, there is no statistically significant difference between genders. Both males and females commonly cite reasons such as irregularly arranged teeth, pushed-out teeth, and pain around the ear.

Finally, when asked about reasons for not having undergone orthodontic treatment, a significantly higher percentage of males (37%) cite a lack of awareness compared to females (17%), with a p-value of .029. Other factors such as social acceptance, lack of time, and cost are cited by both genders, but the differences are not statistically significant.

Table 3: Comparison of Responses based on education level for each question.

Questions	Primary	High school	Graduate	p-value
Do you know what orthodontic treatment is?	Yes: 59% No: 41%	Yes: 63% No: 37%	Yes: 85% No: 15%	.012*
Do you know the meaning of orthodontic treatment?	Correction of irregularly arranged teeth: 55% Replacement of missing teeth: 14% Gum problems: 20%	Correction of irregularly arranged teeth: 69% Replacement of missing teeth: 15% Gum problems: 26%	Correction of irregularly arranged teeth: 79% Replacement of missing teeth: 2% Gum problems: 19%	.000*
Have you or any of your family members had orthodontic treatment?	Yes: 10% No:90%	Yes: 16% No:84%	Yes: 35% No:65%	.000*
Do	Yes:	Yes:	Yes:	.1

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you think you require orthodontic treatment?	25% No: 75%	32% No: 68%	29% No: 71%	03
Reasons why you require orthodontic treatment?	Irregularly arranged teeth: 5% Pushed out teeth: 3% Correct smile: 8% Difficulty while speaking: 4% Pain around the ear: 3%	Irregularly arranged teeth: 8% Pushed out teeth: 12% Correct smile: 11% Difficulty while speaking: 7% Pain around the ear: 7%	Irregularly arranged teeth: 19% Pushed out teeth: 18% Correct smile: 14% Difficulty while speaking: 9% Pain around the ear: 10%	.000*
Reasons for not having gone for orthodontic treatment?	Awareness: 21% Social acceptance: 7% Lack of time: 14% Cost factor: 24%	Awareness: 19% Social acceptance: 11% Lack of time: 19% Cost factor: 15%	Awareness: 7% Social acceptance: 18% Lack of time: 25% Cost factor: 5%	.000*

Table 3 presents a comparison of responses based on education level for various questions related to orthodontic treatment. Each row represents a specific question, and the columns represent different education levels: Primary, High School, and Graduate. The percentage of respondents indicating different answers for each question is provided, along with the corresponding p-value indicating the significance of differences observed across education levels.

For the question "Do you know what orthodontic treatment is?" the data shows that awareness of orthodontic treatment increases with education level, with the highest percentage of respondents indicating knowledge among graduates (85%), followed by high school (63%) and primary education (59%). The difference in awareness across education levels is statistically significant ($p = 0.012^*$), indicating that education level influences knowledge of orthodontic treatment.

Similarly, when asked if they knew the meaning of orthodontic treatment, respondents with higher education levels demonstrated greater understanding. Graduates exhibit the highest comprehension (79%), followed by high school (69%) and primary education (55%). The differences in understanding across education levels are statistically significant ($p = 0.000^*$).

Regarding personal experience with orthodontic treatment, the data reveals a similar pattern. A higher percentage of graduates (35%) and high school graduates (16%) report having undergone

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orthodontic treatment compared to those with primary education (10%). The difference in personal experience across education levels is statistically significant (p = 0.000*).

When asked if they believe they require orthodontic treatment, there is no significant difference observed across education levels (p = 0.103). However, the percentages of respondents indicating the need for treatment are relatively consistent across education levels, ranging from 25% to 32%.

Finally, reasons for requiring orthodontic treatment and reasons for not having undergone treatment vary across education levels. Graduates are more likely to cite reasons such as irregularly arranged teeth, pushed-out teeth, and difficulty while speaking as reasons for needing treatment, compared to those with lower education levels. Conversely, respondents with primary education are more likely to cite lack of awareness and lack of time as reasons for not seeking treatment. The differences in reasons for treatment and non-treatment across education levels are statistically significant (p = 0.000*).

Table 4: Comparison of Responses based on socioeconomic status for each question.

Questions	Low	Middle	High	p-value
Do you know what orthodontic treatment is?	Yes: 41% No: 59%	Yes: 55% No: 45%	Yes: 89% No: 11%	.000*
Do you know the meaning of orthodontic treatment?	Correction of irregularly arranged teeth: 59% Replacement of missing teeth: 14% Gum problems: 16%	Correction of irregularly arranged teeth: 65% Replacement of missing teeth: 9% Gum problems: 36%	Correction of irregularly arranged teeth: 81% Replacement of missing teeth: 2% Gum problems: 21%	.000*
Have you or any of your family members had orthodontic treatment?	Yes: 4% No:96%	Yes: 26% No:74%	Yes: 55% No:45%	.000*
Do you think	Yes: 15%	Yes: 22%	Yes: 39%	.042*

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you require orthodontic treatment?	No: 85%	No: 78%	No: 61%	
Reasons why you require orthodontic treatment?	Irregularly arranged teeth: 8% Pushed out teeth: 4% Correct smile: 3% Difficulty while speaking: 5% Pain around the ear: 3%	Irregularly arranged teeth: 7% Pushed out teeth: 7% Correct smile: 12% Difficulty while speaking: 11% Pain around the ear: 8%	Irregularly arranged teeth: 10% Pushed out teeth: 9% Correct smile: 8% Difficulty while speaking: 15% Pain around the ear: 8%	.071
Reasons for not having gone for orthodontic treatment?	Awareness: 14% Social acceptance: 24% Lack of time: 21% Cost factor: 7%	Awareness: 11% Social acceptance: 19% Lack of time: 15% Cost factor: 19%	Awareness: 5% Social acceptance: 25% Lack of time: 18% Cost factor: 7%	.000*

Table 4 presents a comparison of responses based on socioeconomic status for various questions related to orthodontic treatment. Each question assesses different aspects such as awareness, experience, need, and barriers to seeking orthodontic treatment. The responses are categorized into three socioeconomic groups: Low, Middle, and High. The table also includes the p-value, indicating the statistical significance of differences observed among the socioeconomic groups.

Starting with the first question, "Do you know what orthodontic treatment is?" the responses show a clear trend across socioeconomic groups. While only 41% of respondents in the Low socioeconomic group knew about orthodontic treatment, the percentage increased to 55% in the Middle group and significantly higher to 89% in the High group. The difference in awareness levels among the socioeconomic groups was found to be statistically significant (p-value < 0.001).

Moving on to the question about understanding the meaning of orthodontic treatment, similar patterns emerge. The Low socioeconomic group had the lowest understanding, with 59% of respondents correctly identifying the meaning, compared to 81% in the High socioeconomic group. Again, the differences in understanding were statistically significant (p-value < 0.001).

The responses to questions about personal experiences with orthodontic treatment further highlight disparities among socioeconomic groups. For instance, while only 4% of respondents in the Low socioeconomic group reported having had orthodontic treatment, the percentage increased

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to 26% in the Middle group and even higher to 55% in the High group. This disparity was also statistically significant (p-value < 0.001).

Similarly, differences were observed in respondents' perceptions of their need for orthodontic treatment. While 15% of respondents in the Low socioeconomic group believed they required treatment, the percentage increased to 39% in the High socioeconomic group. The difference was statistically significant, albeit with a slightly higher p-value of 0.042.

Finally, reasons for not seeking orthodontic treatment varied across socioeconomic groups. Factors such as awareness, social acceptance, lack of time, and cost were cited as barriers. Interestingly, while awareness and social acceptance were cited more frequently as barriers in the Middle socioeconomic group, the High socioeconomic group reported the lowest prevalence of these barriers. The cost factor, however, was consistently reported across all socioeconomic groups, with slightly varying percentages.

Discussion

The average age of the respondents to the survey on adult orthodontic treatment willingness, social attitudes, and knowledge was 23.86 years, showing that the participants are adults (Rastogi, Jatti, & Keluskar, 2014). These people had a high level of understanding and familiarity with orthodontic treatment, which is consistent with findings from previous international research (Rastogi et al., 2014). This information may be the cause of the increased demand for orthodontic treatment among adults in Nigeria (Rastogi et al., 2014). In the past, orthodontic therapy was mostly thought to be provided in pediatric dentistry offices, but a growing number of adults are increasingly embracing orthodontic treatment (Rastogi et al., 2014). The mean age of patients seeking treatment at the Lagos University Teaching Hospital in Nigeria was 15.2, which is similar to the results of another research carried out in Enugu (daCosta & Utomi, 2009; Folaranmi & Okeke, 2011). Increased knowledge of and accessibility to orthodontic treatment facilities, especially in urban and semi-urban regions, maybe the cause of the rise in adult demand (daCosta & Utomi, 2009; Folaranmi & Okeke, 2011). Up to 23 of the respondents who believed they required the treatment actually had it in the past, which may have been caused by their strong understanding of orthodontic procedures (Rastogi et al., 2014). Of those who believed they required the therapy, 23 people felt that way (Rastogi et al., 2014). Furthermore, it seems from the mean age of 19.35 years (standard deviation: 4.83 years) that the patients were already adults when the orthodontic procedures were performed (daCosta & Utomi, 2009; Folaranmi & Okeke, 2011). The fact that the research was conducted at tertiary institutions is supported by the study population's mean age of 23.86 (SD = 3.36) years (Rastogi et al., 2014; daCosta & Utomi, 2009; Folaranmi & Okeke, 2011). This is in good agreement with findings from previous research (Folaranmi & Okeke, 2011; daCosta & Utomi, 2009; Rastogi et al., 2014). It has been observed that between 20 and 37% of all patients requiring orthodontic treatment are adults (daCosta & Utomi, 2009; Folaranmi & Okeke, 2011).

In the current investigation, there is no statistically significant difference between males and females when it comes to the number of participants who have received orthodontic treatment or referred family members. However, a slightly larger percentage of females (26%) than boys (14%) reported having treatment (p =.121). Regarding the issue of whether respondents thought they needed orthodontic treatment, the number of female respondents who thought they did (41%) was substantially greater than the percentage of male respondents (21%) (p-value =.038).

Consistent with previous research, a higher percentage of women than males thought that they needed orthodontic treatment, according to our survey (Rastogi et al., 2014). This makes

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sense since studies have shown that women are more concerned with their beauty and self-worth than men are (Rastogi et al., 2014). Even for those in the middle class of society, the typical cost of orthodontic treatment in Nigeria is unaffordable for the vast majority of those who belong to poor socioeconomic groups (Rastogi et al., 2014). As a result, orthodontic treatment seems to be the domain of the wealthy and privileged, and it has quickly evolved into a social status symbol, particularly for teens (Rastogi et al., 2014). Analogously to a study, the primary deterrents to receiving orthodontic treatment in the past were insufficient knowledge and expense (Adegbite et al., 2012). In our current setting, one of the main factors influencing the desire for orthodontic treatment is cost (Adegbite et al., 2012). It's possible that a sizable portion of the public knows they require orthodontic treatment but is unable to pay for the suggested course of action (Adegbite et al., 2012).

When asked whether they were acquainted with orthodontic treatment, 72% of participants in the current research were aware of it, compared to 28% who were not. When questioned about their knowledge of orthodontic treatment after that, 71% of participants correctly identified it as the repair of unevenly ordered teeth, 7% linked it to the replacement of lost teeth, and 22% linked it to gum issues. When participants were asked about their own or their families' experiences receiving orthodontic treatment, 19% said they had, while 81% said they had not. When asked whether they thought they required orthodontic treatment, 31% of those who had not undergone orthodontic treatment and 69% said they did not.

However, according to different research, time and social acceptability have a significant role (Brennan, Lalonde, & Bain, 2010). Young adults' desire for better facial aesthetics and, thus, their need for orthodontic treatment to straighten their teeth have been further impacted by the growing focus on face attractiveness that social media is promoting (Fonseca et al., 2014). The primary reason for the research participants' need for orthodontic treatment was to straighten their teeth. This supports the findings of prior research conducted by Jeremiah, Bister, and Newton (2010). This study's conclusions about the increased demand for orthodontic procedures among adults may also be explained by the desire for better facial aesthetics, which is primarily a social perception issue.

In the present study, the responses to questions about personal experiences with orthodontic treatment further highlight disparities among socioeconomic groups. For instance, while only 4% of respondents in the Low socioeconomic group reported having had orthodontic treatment, the percentage increased to 26% in the Middle group and even higher to 55% in the High group. This disparity was also statistically significant (p-value < 0.001).

In previous research, married individuals (OR: 1.51) showed a greater acceptance of orthodontic treatment than single participants. Similarly, women (OR: 1.97) were more likely to accept orthodontic treatment than men. Participants with a bachelor's degree (OR: 1.89) were more accepting of orthodontic treatment compared to university students (OR: 1.46) or those with master's degrees (OR: 1.33). However, the choice of orthodontic treatment was not significantly influenced by occupation, monthly income, or working hours (Oh et al., 2021). In the current investigation, the respondents' assessments of their need for orthodontic treatment varied. In the Low socioeconomic category, 15% of respondents thought they needed therapy; in the High socioeconomic group, 39% thought they did. Despite having a slightly higher p-value of 0.042, the difference was statistically significant.

Conclusion:

The study sheds light on the social willingness and perceptions of the Saudi adult population

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regarding orthodontic treatment. While awareness and understanding of orthodontic treatment are relatively high, barriers such as cost, lack of awareness, and social acceptance hinder access to treatment for many individuals. Gender, education level, and socioeconomic status emerged as significant factors influencing perceptions of orthodontic treatment. Addressing these barriers and promoting awareness and affordability of orthodontic care is essential to meet the growing demand for treatment among Saudi adults. Further research and targeted interventions are warranted to enhance access to orthodontic treatment and improve oral health outcomes in the population.

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