



Original Scientific Paper

KNOWLEDGE, ATTITUDES AND PERCEPTIONS OF ORTHODONTIC THERAPY AMONG NURSES AND DENTAL ASSISTANTS: A CROSS-SECTIONAL STUDY

Sanja Vuckovic Hrkac¹, Luka Simunovic¹, Adriano Friganovic², Senka Mestrovic¹

¹ Department of Orthodontics, School of Dental Medicine, University of Zagreb, Croatia

² University of Applied Health Sciences Zagreb, Department of Nursing

³ Faculty of Health Studies University of Rijeka, Department of Nursing

Author for correspondence: Senka Mestrovic  mestrovic@sfzg.hr

DOI: <https://doi.org/10.65241/wh.9.1.5>

For citation: Vuckovic Hrkac S, Simunovic L, Friganovic A, Mestrovic S. Knowledge, Attitudes and Perceptions of Orthodontic Therapy Among Nurses and Dental Assistants: A Cross-Sectional Study. *World of Health*. 2026;1(9):31-38. <https://doi.org/10.65241/wh.9.1.5>

Received: 30 December 2025 | Revised: 19 March 2026 | Accepted: 24 March 2026

ABSTRACT

Background: Nurses and dental assistants play a critical role in orthodontic care, supporting treatment delivery and patient management. Although educational background has been shown to influence attitudes toward dental procedures, limited research has examined how education and clinical exposure affect orthodontic treatment acceptance among dental healthcare professionals.

Methods: This cross-sectional study was conducted among 62 nurses and dental assistants employed at the Department of Dental Medicine, University Hospital Centre Zagreb. Data were collected using an anonymous electronic questionnaire distributed via Google Forms. The survey included demographic items, self-assessment questions, and 16 knowledge-based questions assessing key concepts in orthodontics. Group differences were analyzed using nonparametric statistical tests, including the χ^2 test for categorical variables.

Results: A statistically significant association was found between educational qualifications and willingness to undergo orthodontic therapy involving tooth extraction ($\chi^2 = 14.477$, $df = 4$, $p = .006$). Respondents with higher educational levels demonstrated greater acceptance of treatment when extractions were required.

Conclusions: Educational qualifications and clinical exposure are significantly associated with attitudes toward orthodontic therapy among nurses and dental assistants. Higher levels of education appear to increase acceptance

of invasive orthodontic procedures, highlighting the importance of targeted educational strategies within dental healthcare teams.

Keywords: Orthodontic therapy, nurses, dental assistants, attitudes, knowledge.

INTRODUCTION

Orthodontic therapy has become increasingly recognized as an essential aspect of dental health, not only for aesthetic improvements but also for functional benefits, including the correction of malocclusions and the prevention of long-term oral health problems (1,2). Despite the clinical advantages of orthodontic treatment, patients often experience psychological barriers, such as fear, anxiety, and misconceptions, which can significantly impact their willingness to undergo treatment (3). These psychological factors are critical in determining patient compliance, especially in cases involving more invasive procedures like tooth extractions, which are sometimes necessary as part of the orthodontic treatment planning (4). While a considerable body of literature has focused on clinical outcomes and patient compliance, less attention has been paid to the role of psychological factors in treatment acceptance, particularly among dental professionals themselves, who may also experience similar concerns (5).

Nurses and dental assistants, as primary healthcare providers, are crucial in the process of orthodontic care, providing

essential support to orthodontists and ensuring efficient patient management (6-8). Their knowledge and attitudes towards orthodontics not only affect their professional practice, but also the outcomes of treatments and patient satisfaction (9, 10)

Dental anxiety, which is prevalent even among professionals, can stem from a variety of factors, including perceived vulnerability, fear of pain, and a lack of familiarity with certain procedures (11). Although dental professionals have more experience with treatment processes, their willingness to undergo or recommend invasive procedures may still be influenced by psychological barriers, particularly if they lack direct exposure to certain types of treatments. Studies have demonstrated that healthcare professionals who are more frequently exposed to dental procedures exhibit lower levels of anxiety and greater acceptance of treatments, suggesting that familiarity and clinical experience play a pivotal role in shaping attitudes towards invasive dental care (12).

The existing literature highlights the importance of educational background in influencing attitudes toward dental treatments. Research by Brondani et al. (13) showed that individuals with higher levels of education are more likely to accept complex dental procedures, largely due to their increased knowledge and understanding of the benefits and risks associated with treatment. In this context, education and clinical exposure may be associated with reduced psychological barriers, such as fear and anxiety, by providing individuals with the confidence to make informed decisions about their healthcare. However, there is a notable gap in research examining the influence of these factors specifically among dental professionals.

This study aims to investigate the relationship between educational qualifications, clinical experience, and psychological responses to orthodontic therapy among dental professionals. By focusing on healthcare workers in various dental departments, this study seeks to understand how factors like familiarity with orthodontic procedures, educational background, and clinical exposure influence their acceptance of orthodontic treatments, particularly when more invasive procedures, such as tooth extractions, are required. Furthermore, this study explores how psychological barriers, including fear and perceived stress, may vary across different professional groups, providing insights into the role of clinical experience in reducing anxiety and improving treatment acceptance.

METHODS

STUDY DESIGN AND PARTICIPANTS

This cross-sectional study was conducted among nurses and dental assistants employed at the Department of Dental Medicine, University Hospital Centre Zagreb, Croatia. A total of 62 participants were included in the analysis. Participants

represented all eight clinical departments within the clinic: Department of Family Dentistry, Orthodontics, Prosthodontics, Oral Surgery, Oral Medicine, Department of Restorative Dentistry and Endodontics, Periodontology, and Pediatric and Preventive Dentistry. Each department plays a key role in delivering comprehensive dental care to patients, and the work of nurses and dental assistants in these departments provides insights into their specific needs and challenges in practice. Participants varied in their educational backgrounds, including Practical Nursing (PN)/ Dental assistant (DA), Bachelor's Degree in Nursing (BSN), and Master's Degree in Nursing (MSN).

DATA COLLECTION AND QUESTIONNAIRE

Data were collected using an anonymous electronic questionnaire distributed via Google Forms. The survey link was sent through institutional email to ensure equal access for all eligible employees. Participation was voluntary and anonymous, and respondents completed the questionnaire independently without supervision.

The questionnaire was developed based on relevant literature addressing orthodontic treatment, professional knowledge, and attitudes toward dental procedures. It consisted of three sections:

1. Demographic and professional characteristics (10 items), including age, gender, department, years of experience, and educational level.
2. Self-assessment and attitude-related questions (13 items) evaluating perceptions of orthodontic therapy, perceived stress, and willingness to undergo treatment under various conditions.
3. Knowledge assessment (16 multiple-choice questions) covering fundamental orthodontic concepts and clinical principles.

For the knowledge section, each correct response was assigned one point, while incorrect and "don't know" responses were scored as zero. The knowledge score was calculated as the number of correct responses divided by 16 (total number of knowledge questions) and expressed as a percentage

$$\text{Knowledge Score (\%)} = \frac{\text{Number of correct answers}}{\text{Total number of questions}} \times 100$$

with higher values indicating greater knowledge.

STATISTICAL ANALYSIS

Data processing was performed using IBM SPSS software (version 29.0.1.0). The Shapiro-Wilk test confirmed that the data did not meet the assumptions of normality. The Kruskal-Wallis test was used to compare continuous variables across educational groups. Categorical variables were analyzed using Pearson's χ^2 test. Expected cell counts were examined to verify test assumptions,

and Fisher’s exact test was applied where appropriate due to small subgroup sizes. Effect sizes were calculated using Cramer’s V to evaluate the strength of associations. The threshold for statistical significance was set at $p < 0.05$.

ETHICAL CONSIDERATIONS

Ethical approval for the study was granted by the Ethical Committee of University Hospital Centre Zagreb. Participants were informed about the study’s objectives through an informed consent. Survey responses were verified and entered in a database by the principal investigator from Croatia. Participants were informed that they could leave the research anytime if they decide without explanation. Research followed all recommendations of the Declaration of Helsinki.

RESULTS

The study sample included 62 participants employed at the Department of Dental Medicine of the University Hospital Centre Zagreb. The median age was 46.5 years, with the 25th and 75th percentiles being 35 and 55 years, respectively. Most participants were female (93.5%), while 6.5% were male. Regarding educational qualifications, most participants (74.2%) had a Diploma in Practical Nursing (PN)/ Dental assistant (DA), while 12.9% had a Bachelor’s Degree in Nursing (BSN), and the same percentage had a Master’s Degree in Nursing (MSN).

The participants were employed in various clinical departments, with the largest number working in the Department of Dental Diseases (24.2%), followed by the Department of Prosthodontics and the Department of Pediatric and Preventive Dentistry, each

representing 21.0% and 12.9% of employees, respectively. The lowest number of participants were from the Department of Family Dentistry and the Department of Oral Diseases (4.8% each).

In terms of work experience, 43.5% of participants had more than 20 years of experience, while 25.8% had been employed in the profession for up to 5 years.

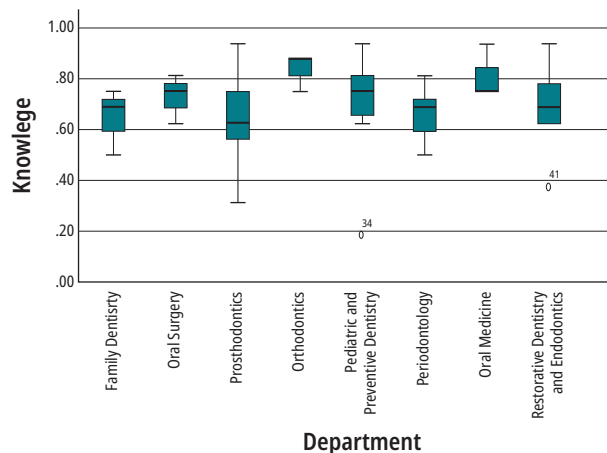


Figure 1: Distribution of knowledge regarding department.

These results suggest that, after correction for multiple comparisons, there are no significant differences in the distribution of knowledge between different departments, except between the Department of Prosthodontics and the Department of Orthodontics, where the difference is statistically significant but very close to the threshold of significance (Figure 1).

Table 1. Distribution of educational qualifications per department

	PN/DA	BSN	MSN	Total
	Count (%)	Count (%)	Count (%)	
Department of Family Dentistry	1 (33.3)	1 (33.3)	1 (33.3)	3
Department of Oral Surgery	6 (85.7)	0 (0.0)	1 (14.3)	7
Department of Prosthodontics	11 (84.6)	1 (7.7)	1 (7.7)	13
Department of Orthodontics	4 (66.7)	0 (0.0)	2 (33.3)	6
Department of Pediatric and Preventive Dentistry	7 (87.5)	0 (0.0)	1 (12.5)	8
Department of Periodontology	6 (85.7)	1 (14.3)	0 (0.0)	7
Department of Oral medicine	1 (33.3)	2 (66.7)	0 (0.0)	3
Department of Restorative Dentistry and Endodontics	10 (66.7)	3 (20.0)	2 (13.3)	15

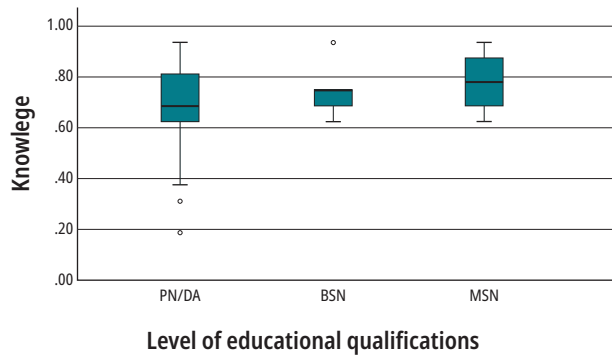


Figure 2: Distribution of knowledge regarding qualifications.

The distribution of knowledge based on the level of educational qualifications did not show a statistically significant difference ($p = .220$). In other words, the level of knowledge among the respondents does not vary significantly according to their educational qualifications, although a certain trend of increasing knowledge with higher levels of education can be observed (Figure 2).

The distribution of attitudes and perceptions regarding orthodontic therapy based on educational qualifications is presented in Table 2. The distribution of responses to the question "Would you agree to undergo orthodontic therapy if you knew that some teeth would need to be extracted during the treatment?" showed a statistically significant difference depending on educational qualifications ($\chi^2 = 14.477, df = 4, p = .006$). The distribution indicates that most respondents with PN/DA (63.0%) would not agree to orthodontic therapy, while 23.9% would agree. Among respondents with

Table 2. The distribution of attitudes and perceptions regarding orthodontic therapy based on educational qualifications

		PN/DA	BSN	MSN	p value
Do you consider orthodontic treatment stressful?	Yes	34.8%	25.0%	37.5%	.048
	Don't know	8.7%	50.0%	12.5%	
	No	56.5%	25.0%	50.0%	
Do you consider yourself a candidate for orthodontic therapy?	Yes	43.5%	25.0%	25.0%	.492
	Don't know	6.5%	0.0%	0.0%	
	No	50.0%	75.0%	75.0%	
Would you agree to undergo orthodontic therapy if your dentist recommended it?	Yes	43.5%	75.0%	75.0%	.172
	Don't know	21.7%	12.5%	25.0%	
	No	34.8%	12.5%	0.0%	
Would you agree to undergo orthodontic therapy if you knew that some teeth would need to be extracted during the treatment?	Yes	23.9%	37.5%	62.5%	.006
	Don't know	13.0%	50.0%	25.0%	
	No	63.0%	12.5%	12.5%	
Do you think that orthodontic therapy is possible at any age?	Yes	67.4%	62.5%	100.0%	.001
	Don't know	0.0%	25.0%	0.0%	
	No	32.6%	12.5%	0.0%	
Do you consider orthodontic therapy expensive?	Yes	67.4%	87.5%	100.0%	.233
	Don't know	10.9%	12.5%	0.0%	
	No	21.7%	0.0%	0.0%	
Would you agree to undergo orthodontic therapy if it lasted longer than 2 years?	Yes	30.4%	37.5%	50.0%	.213
	Don't know	13.0%	37.5%	25.0%	
	No	56.5%	25.0%	25.0%	
Which type of orthodontic therapy would you choose first?	Fixed therapy with metal braces	34.8%	50.0%	0.0%	.008
	Fixed therapy with esthetic braces	37.0%	50.0%	100.0%	
	Aligner treatment	28.3%	0.0%	0.0%	

BSN, most are uncertain (50.0%), while 37.5% would agree to the therapy. For respondents with MSN, the majority (62.5%) would agree to the therapy. The value of Cramer's V coefficient is .342 (p = .006), indicating a moderately strong association between these two variables.

Additionally, the results of Pearson's chi-square test reveal a statistically significant association between educational qualifications and the respondents' belief regarding whether orthodontic therapy is possible at any age ($\chi^2 = 18.052$, df = 4, p = .001).

Table 3. The distribution of attitudes and perceptions regarding orthodontic therapy based on department

		Family Dentistry	Oral surgery	Prosthodontics	Orthodontics	Pediatric and Preventive Dentistry	Periodontology	Oral medicine	Restorative Dentistry and Endodontics	p value
Do you consider orthodontic treatment stressful?	Yes	33.3%	28.6%	46.2%	0.0%	12.5%	85.7%	0.0%	26.7%	.105
	Don't know	33.3%	0.0%	23.1%	0.0%	12.5%	14.3%	33.3%	13.3%	
	No	33.3%	71.4%	30.8%	100.0%	75.0%	0.0%	66.7%	60.0%	
Do you consider yourself a candidate for orthodontic therapy?	Yes	33.3%	57.1%	53.8%	16.7%	25.0%	85.7%	33.3%	26.7%	.055
	Don't know	0.0%	0.0%	7.7%	0.0%	0.0%	0.0%	0.0%	0.0%	
	No	66.7%	42.9%	38.5%	83.3%	75.0%	14.3%	66.7%	73.3%	
Would you agree to undergo orthodontic therapy if your dentist recommended it?	Yes	66.7%	57.1%	23.1%	83.3%	50.0%	71.4%	66.7%	46.7%	.599
	Don't know	33.3%	28.6%	23.1%	16.7%	25.0%	14.3%	33.3%	20.0%	
	No	0.0%	14.3%	53.8%	0.0%	25.0%	14.3%	0.0%	33.3%	
Would you agree to undergo orthodontic therapy if you knew that some teeth would need to be extracted during the treatment?	Yes	66.7%	71.4%	15.4%	83.3%	37.5%	14.3%	33.3%	6.7%	.041
	Don't know	33.3%	0.0%	15.4%	0.0%	25.0%	28.6%	33.3%	26.7%	
	No	0.0%	28.6%	69.2%	16.7%	37.5%	57.1%	33.3%	66.7%	
Do you think that orthodontic therapy is possible at any age?	Yes	100.0%	57.1%	46.2%	100.0%	87.5%	71.4%	66.7%	73.3%	.084
	Don't know	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	6.7%	
	No	0.0%	42.9%	53.8%	0.0%	12.5%	28.6%	0.0%	20.0%	
Do you consider orthodontic therapy expensive?	Yes	66.7%	71.4%	84.6%	66.7%	62.5%	85.7%	66.7%	73.3%	.537
	Don't know	33.3%	0.0%	0.0%	0.0%	25.0%	14.3%	33.3%	6.7%	
	No	0.0%	28.6%	15.4%	33.3%	12.5%	0.0%	0.0%	20.0%	
Would you agree to undergo orthodontic therapy if it lasted longer than 2 years?	Yes	66.7%	28.6%	23.1%	100.0%	37.5%	28.6%	0.0%	20.0%	.047
	Don't know	0.0%	28.6%	15.4%	0.0%	12.5%	0.0%	66.7%	26.7%	
	No	33.3%	42.9%	61.5%	0.0%	50.0%	71.4%	33.3%	53.3%	
Which type of orthodontic therapy would you choose first?	Fixed therapy with metal braces	0.0%	28.6%	30.8%	16.7%	37.5%	57.1%	33.3%	33.3%	.326
	Fixed therapy with esthetic braces	66.7%	14.3%	46.2%	83.3%	50.0%	14.3%	66.7%	53.3%	
	Aligner treatment	33.3%	57.1%	23.1%	0.0%	12.5%	28.6%	0.0%	13.3%	

These results suggest an association between respondents' willingness to undergo orthodontic therapy and their level of education, with higher educational qualifications being linked to a greater likelihood of agreeing to treatment, even when tooth extractions are required.

Table 3. presents attitudes toward orthodontic therapy across employees from different clinical departments. It is interesting to analyze the specific tendencies that are more pronounced among employees from the Department of Orthodontics compared to their colleagues from other departments. Employees from the Department of Orthodontics appeared to demonstrate a greater willingness to accept orthodontic treatments, even when more invasive procedures like tooth extractions or extended therapy durations are involved. Their perception of stress related to orthodontic therapy appeared to be less pronounced compared to colleagues from other departments.

Furthermore, employees from the Department of Orthodontics exhibit a higher level of understanding and acceptance of the fact that orthodontic therapy is possible and effective at any age, which may reflect their specialized education and experience working with patients across different age groups. On the other hand, employees from other clinical departments, who may encounter orthodontic procedures less frequently or have a different clinical focus, tend to hold more reserved attitudes toward certain aspects of therapy, such as invasive procedures or prolonged treatment durations.

DISCUSSION

This study is the first to explore the relationship between educational qualifications and the willingness of dental healthcare professionals to undergo orthodontic therapy, particularly when invasive procedures like orthodontically indicated tooth extraction are involved. While most existing literature on orthodontic therapy has focused on clinical outcomes, patient compliance, and technical advancements (14–18), the perceptions of dental professionals themselves have received comparatively less attention. This paper fills a gap in understanding how education level, clinical exposure, and familiarity with orthodontic procedures influence healthcare professionals' attitudes toward orthodontic therapy.

Prior studies have examined patients' psychological responses to orthodontic treatment, emphasizing the impact of factors such as fear, anxiety, and misinformation on treatment acceptance (19–23). Brondani et al. (13) demonstrated that higher educational attainment is associated with greater acceptance of complex dental procedures, suggesting that knowledge and understanding reduce treatment-related uncertainty. Our findings align with this literature, showing that respondents with higher educational qualifications (MSN)

were more likely to accept orthodontic therapy, even when tooth extraction as a part of the treatment plan was necessary. This pattern may reflect greater familiarity with orthodontic principles and a more accurate perception of treatment risks and benefits.

Additionally, our study highlights the psychological barriers faced by respondents with lower educational qualifications (PN/DA), who were less inclined to agree to orthodontic treatment that involved extractions. Conversely, respondents with lower educational qualifications (PN/DA) were less willing to accept extraction-based therapy. This may reflect reduced familiarity with orthodontic indications and greater sensitivity to perceived invasiveness, a relationship also described in broader models of dental care utilization (24).

Another novel contribution of this study is the strong association between education level and the belief that orthodontic therapy is feasible at any age. While much of the existing literature has focused on orthodontic outcomes for different age groups, few studies have explored how healthcare professionals perceive the applicability of these treatments across life stages. Our results show that respondents with higher education were more likely to view orthodontic therapy as suitable for patients of any age, in line with research that supports the efficacy of orthodontic treatments for adults and even older populations (25).

This study sheds light on the influence of clinical experience, particularly among professionals working in orthodontic departments. These individuals demonstrated greater acceptance of orthodontic therapy, including invasive procedures such as tooth extractions, and reported lower levels of perceived stress related to treatment. Familiarity with orthodontic procedures, gained through daily clinical practice, likely plays a significant role in reducing anxiety and apprehension. Çoban et al. (26) showed that healthcare professionals familiar with dental treatments, especially those with greater exposure to complex procedures, exhibit lower levels of anxiety and avoidance behavior. Their findings highlighted perceived vulnerability as a central determinant of dental fear, with greater clinical familiarity associated with lower avoidance behavior. Similarly, Kvale et al. (12) reported lower anxiety levels among individuals regularly exposed to dental procedures, suggesting that familiarity reduces uncertainty and perceived pain. This suggests that increased exposure through clinical experience may be associated with a greater sense of control and understanding, which helps mitigate psychological stress.

Armfield (11) further supports these findings, demonstrating that individuals with regular contact with dental procedures are less likely to experience high levels of dental anxiety. His research highlighted that familiarity not only improves technical competence but also contributes to a greater psychological resilience to stress and fear, particularly regarding invasive procedures. Dental professionals, due to their direct involvement with these treatments, are likely to develop a more rational and

less emotionally-driven response to potential discomfort, which contrasts with patients or professionals who lack such exposure.

Moreover, additional research has underscored the relationship between clinical experience and psychological adjustment to stress in medical settings. For example, a study by Appukuttan (5) reinforced the notion that anxiety in dental patients is closely related to fear of the unknown, while familiarity with procedures significantly reduces apprehension. This is consistent with our findings, as professionals working in orthodontic departments demonstrated greater acceptance of extraction-based therapy and reported lower perceived stress. Their extensive clinical exposure may help them navigate the emotional challenges of treatment with greater ease, resulting in lower anxiety and higher compliance.

This study has several limitations that should be considered when interpreting the findings. First, the sample size was relatively small and limited to a single tertiary institution, which may restrict generalizability. Subgroup sizes were small and uneven across departments and educational levels, which may have reduced statistical power and affected the robustness of the analyses. Furthermore, multiple comparisons were performed, increasing the possibility of type I error. Second, the cross-sectional design precludes causal inference; therefore, associations between educational level, clinical exposure, and attitudes toward orthodontic therapy should not be interpreted as causal relationships. Third, the study relied on self-reported data, which may be subject to response bias or social desirability effects. Although participation was anonymous, respondents may have provided answers they perceived as professionally appropriate. Finally, although the questionnaire was developed based on relevant literature and reviewed for content clarity, it was not a previously standardized instrument, which may limit direct comparability with other studies. Despite these limitations, the study provides valuable insight into educational and experiential factors influencing orthodontic treatment acceptance among dental healthcare professionals.

CONCLUSION

This study suggests that educational qualifications and clinical exposure are associated with attitudes toward orthodontic therapy among dental healthcare professionals. Participants with higher levels of education and greater exposure to orthodontic procedures tended to report greater acceptance of treatment, including more invasive approaches. However, due to the cross-sectional design, small and uneven subgroup sizes, and the use of a non-validated questionnaire, these findings should be interpreted with caution. Additionally, multiple comparisons may have influenced the observed statistical significance. Further research with larger and more balanced samples, as well as validated instruments, is needed to confirm these associations.

REFERENCES

1. Cremona M, Bister D, Sheriff M, Abela S. Quality-of-life improvement, psychosocial benefits, and patient satisfaction of patients undergoing orthognathic surgery: a summary of systematic reviews. *Eur J Orthod.* 2022;44(6):603–13. <https://doi.org/10.1093/ejo/cjac015>
2. Zhou Y, Wang Y, Wang X, et al. The impact of orthodontic treatment on the quality of life: a systematic review. *BMC Oral Health.* 2014;14:66. <https://doi.org/10.1186/1472-6831-14-66>
3. Kragt L, Dharmo B, Wolvius EB, Ongkosuwito EM. The impact of malocclusions on oral health-related quality of life in children: a systematic review and meta-analysis. *Clin Oral Investig.* 2016 Nov;20(8):1881–94. doi: 10.1007/s00784-015-1681-3.
4. Saatchi M, Abtahi M, Mohammadi G, Mirdamadi M, Binandeh ES. The prevalence of dental anxiety and fear in patients referred to Isfahan Dental School, Iran. *Dent Res J (Isfahan).* 2015;12(3):248–53. PMID: 26005465.
5. Appukuttan DP. Strategies to manage patients with dental anxiety and dental phobia: literature review. *Clin Cosmet Investig Dent.* 2016;8:35–50. <https://doi.org/10.2147/CCIDE.563626>
6. Pachêco-Pereira C, Pereira JR, Dick B, Perez AJ, Flores-Mir C. Factors associated with patient and parent satisfaction after orthodontic treatment: a systematic review. *Am J Orthod Dentofacial Orthop.* 2015;148(4):652–9.
7. Utari E, Ismah N. Relationship between orthodontic treatment outcome and patient satisfaction. *J Int Dent Med Res.* 2017;10:503–14.
8. Oliver R, Knapman Y. Attitudes to orthodontic treatment. *J Orthod.* 1985;12:179–88.
9. Fernandes LM, Espeland L, Stenvik A. Patient-centered evaluation of orthodontic care: a longitudinal cohort study of children's and parents' attitudes. *Am J Orthod Dentofacial Orthop.* 1999;115(3):227–32.
10. Hua F, Qin D, Yan J, Zhao T, He H. COVID-19 Related Experience, Knowledge, Attitude, and Behaviors Among 2,669 Orthodontists, Orthodontic Residents, and Nurses in China: A Cross-Sectional Survey. *Front Med (Lausanne).* 2020;7:481. doi: 10.3389/fmed.2020.00481.
11. Armfield JM. Towards a better understanding of dental anxiety and fear: cognitions vs. experiences. *Eur J Oral Sci.* 2010;118(3):259–64. <https://doi.org/10.1111/j.1600-0722.2010.00740.x>
12. Kvale G, Berg E, Raadal M. The ability of Corah's Dental Anxiety Scale and Spielberger's State Anxiety Inventory to distinguish between fearful and regular Norwegian dental patients. *Acta Odontol Scand.* 2004;62(1):47–52. <https://doi.org/10.1080/00016350310007560>
13. Brondani MA, MacEntee MI, Bryant SR, O'Neill B. Using written vignettes in focus groups among older adults to discuss oral health as a sensitive topic. *Qual Health Res.* 2008 Aug;18(8):1145-53. doi: 10.1177/1049732308320114.
14. Papageorgiou SN, Gözl L, Jäger A, Eliades T, Bourauel C. Lingual vs. labial fixed orthodontic appliances: systematic review and meta-analysis of treatment effects. *Eur J Oral Sci.*

- 2016 Apr;124(2):105-18. doi: 10.1111/eos.12250. Epub 2016 Feb 25. Erratum in: *Eur J Oral Sci.* 2017 Feb;125(1):93. doi: 10.1111/eos.12338.
15. Almasri AMH, Hajeer MY, Ajaj MA, Almusawi AOA, Jaber ST, Zakaria AS, Alam MK. Patient Satisfaction Following Orthodontic Treatment: A Systematic Review. *Cureus.* 2024 Jul 25;16(7):e65339. doi: 10.7759/cureus.65339.
 16. Pandis N, Polychronopoulou A, Eliades T. Active or passive self-ligating brackets? A randomized controlled trial of comparative efficiency in resolving maxillary anterior crowding in adolescents. *Am J Orthod Dentofacial Orthop.* 2010 Jan;137(1):12.e1-6; discussion 12-3. doi: 10.1016/j.ajodo.2009.08.019.
 17. Al-Moghrabi D, Salazar FC, Pandis N, Fleming PS. Compliance with removable orthodontic appliances and adjuncts: A systematic review and meta-analysis. *Am J Orthod Dentofacial Orthop.* 2017 Jul;152(1):17-32. doi: 10.1016/j.ajodo.2017.03.019.
 18. Melsen B. Northcroft lecture: how has the spectrum of orthodontics changed over the past decades? *J Orthod.* 2011 Jun;38(2):134-43; quiz 145. doi: 10.1179/14653121141362.
 19. Serogl HG, Klages U, Zentner A. Pain and discomfort during orthodontic treatment: causative factors and effects on compliance. *Am J Orthod Dentofacial Orthop.* 1998 Dec;114(6):684-91. doi: 10.1016/s0889-5406(98)70201-x.
 20. Bos A, Hoogstraten J, Prah Andersen B. Attitudes towards orthodontic treatment: a comparison of treated and untreated subjects. *Eur J Orthod.* 2005 Apr;27(2):148-54. doi: 10.1093/ejo/cjh071.
 21. Scheurer PA, Firestone AR, Bürgin WB. Perception of pain as a result of orthodontic treatment with fixed appliances. *Eur J Orthod.* 1996 Aug;18(4):349-57. doi: 10.1093/ejo/18.4.349.
 22. Phillips C, Bennett ME, Broder HL. Dentofacial disharmony: psychological status of patients seeking treatment consultation. *Angle Orthod.* 1998 Dec;68(6):547-56. doi: 10.1043/0003-3219(1998)068<0547:DDPSOP>2.3.CO;2.
 23. de Souza RA, de Oliveira AF, Pinheiro SM, Cardoso JP, Magnani MB. Expectations of orthodontic treatment in adults: the conduct in orthodontist/patient relationship. *Dental Press J Orthod.* 2013 Mar-Apr;18(2):88-94. doi: 10.1590/s2176-94512013000200019.
 24. Grembowski D, Andersen RM, Chen M. A public health model of the dental care process. *Med Care Rev.* 1989 Winter;46(4):439-96. doi: 10.1177/107755878904600405.
 25. Proffit WR, Fields H, Larson B, Sarver DM. *Contemporary Orthodontics-E-Book.* 5th ed. Elsevier Health Sciences; 2018.
 26. Çoban Büyükbayraktar Z, Doruk C. Dental Anxiety and Fear Levels, Patient Satisfaction, and Quality of Life in Patients Undergoing Orthodontic Treatment: Is There a Relationship? *Turk J Orthod.* 2021 Dec;34(4):234-241. doi: 10.5152/TurkJOrthod.2021.21177.