



Original Article

Analysis of Orthodontic Treatment Requirements and Their Influence on Quality of Life and Self-Esteem Among Adults

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Main Points

- Greater orthodontic treatment need was weakly associated with poorer oral health-related quality of life.
- Self-esteem did not differ significantly according to orthodontic treatment need.
- Adults seek orthodontic treatment mainly for psychological and aesthetic reasons.

ABSTRACT

Objective: To evaluate the the association of orthodontic treatment need on oral health-related quality of life (OHRQoL) and self-esteem in adult patients seeking orthodontic care.

Methods: A total of 110 adults were recruited for the study. Orthodontic treatment need was evaluated using the index of complexity, outcome and need (ICON). Patients with a score of 43 and above were classified as Group 1; those with a score below 43 were classified as Group 2. Oral health-related quality of life was evaluated using the Oral Health Impact Profile-14 (OHIP-14), and self-esteem was assessed using the rosenberg self-esteem scale (RSES). Statistical evaluation involved Spearman's rank correlation, Mann-Whitney U tests, and independent samples t-tests.

Results: The mean OHIP-14 score was higher in Group 1 (12.63 ± 7.46) than in Group 2 (10.61 ± 7.46). However, this difference was not statistically significant ($p=0.176$). Mean RSES scores did not differ significantly between the groups ($p=0.741$). A slight but meaningful positive correlation emerged between ICON and OHIP-14 scores, indicating that as orthodontic treatment need increased, OHRQoL tended to decrease. No significant correlation was observed between ICON and RSES. Additionally, gender was not significantly associated with either OHIP-14 or RSES scores.

Conclusion: The analysis revealed that increased need for orthodontic treatment is associated with a slight worsening of OHRQoL but does not significantly affect self-esteem in adult subjects.

Keywords: Adult orthodontics, quality of life, self-esteem

INTRODUCTION

The most significant consequences of malocclusion are its psychosocial impact on individuals and deterioration of dentofacial aesthetics. The psychological and social consequences of poor dentofacial aesthetics can have a more serious impact on quality of life than physiological issues do.¹ The orofacial region plays a central role in interpersonal

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communication, serving as a key medium for vocal, physical, and emotional expression. Individuals seeking orthodontic treatment are typically motivated more by a desire to enhance their appearance and social acceptance than by functional or oral health concerns.

Over the past decade, orthodontics has seen growing attention paid to these factors owing to a shift from a purely biomedical focus to a broader biopsychosocial approach. Enhancing quality of life has become an important reason for seeking orthodontic treatment. The World Health Organization defines quality of life as an individual's perception of their position in life within the context of their culture and value systems and in relation to their goals, expectations, standards, and concerns.² It is defined as "the feeling of well-being arising from satisfaction or dissatisfaction with areas of life".³ Oral health-related quality of life (OHRQoL), a more specific concept, is defined either as "the standard of oral and related tissue health that enables a person to eat, speak and socialize without active illness, discomfort or embarrassment" or as "the absence of negative effects of oral condition on social life and a positive sense of dentofacial self-confidence".⁴

It has long been recognised that individuals with malocclusion tend to be socially withdrawn and that their self-esteem is related to their facial and dental appearance. Therefore, orthodontic treatment is expected to improve self-esteem and reduce social anxiety. The complexity arises from the observation that certain adults are troubled by slight dental irregularities, while others with more severe malocclusions remain unconcerned. According to Birkeland et al.,¹ some individuals remained dissatisfied with their dental appearance both before and after treatment, whereas others expressed satisfaction at both time points. Previous research has also shown that individuals with malocclusion may feel embarrassed due to dental irregularities, and their self-confidence regarding facial appearance may be affected.^{5,6} Among the expected psychosocial benefits of orthodontic treatment are increased self-esteem and reduced social anxiety.^{1,5} Self-esteem is individuals' judgment about themselves and the attitudes they develop as a result of considering and evaluating the self. It is an individual's self-perception and self-assessment, as well as self-respect, self-confidence, self-acceptance, and self-approval. There is still a lack of definitive evidence that orthodontic treatment improves self-esteem.⁷⁻⁹ However, there is evidence that personal self-esteem can be affected by situations or events such as illness.^{10,11}

Oral health has long been recognized as a key determinant of quality of life, affecting individuals physically, socially, and psychologically.^{12,13} Clinical assessment of malocclusion and orthodontic treatment need has traditionally relied on standardized occlusal indices. Instruments such as the index of orthodontic treatment need, dental aesthetic index, index of complexity, outcome and need (ICON), and Peer Assessment Rating provide standardized approaches for evaluating different aspects of malocclusion, treatment need, complexity,

and treatment outcome.¹⁴ In contrast, orthodontic treatment need indices have traditionally emphasized the presence of anatomical deviations rather than the broader consequences of such deviations on daily functioning and well-being. With the growing emphasis on patient-oriented perspectives, there is increasing interest in examining whether measures of malocclusion, as determined by occlusal indices, are associated with impaired OHRQoL.

Despite the widespread use of clinical indices to assess malocclusion severity, limited evidence exists regarding how that severity differentially affects OHRQoL and self-perception in adults. In particular, the relative influence of malocclusion severity on OHRQoL, compared with its influence on self-esteem, has not been clearly established.

Therefore, this study aimed to evaluate the associations of orthodontic treatment need, assessed using the ICON, with OHRQoL and self-esteem in adults seeking orthodontic treatment. The null hypothesis was that orthodontic treatment need would not be significantly associated with either OHRQoL or self-esteem.

METHODS

The Ondokuz Mayıs University Clinical Research Ethics Committee reviewed and approved this cross-sectional observational study (approval no: OMÜ KAİK 2025/05, date: 15.01.2025). Sample size analysis was performed using G*Power 3.1 software, based on a t-test to compare two independent group means. An effect size of $d=0.50$ was estimated from preliminary data, with a type I error rate of 5% ($\alpha=0.05$), statistical power of 80%, and an allocation ratio ($N2/N1$) of 0.72. Based on these parameters, the minimum required sample size was calculated as approximately 104 participants.

A total of 110 patients aged 18 years and over who presented to the orthodontic clinic seeking treatment and did not require orthognathic surgery were included in the study. The mean patient age was 21.1 years. Written informed consent was obtained from all patients included in the study. The ICON index was used to assess the need for orthodontic treatment. In accordance with the original validation study by Daniels and Richmond,¹⁵ a cut-off value of 43 was applied to distinguish cases requiring treatment. Patients with a score of 43 or above were classified as Group 1 ($n=64$); patients with a score below 43 were classified as Group 2 ($n=46$). All ICON assessments were performed by a single orthodontist with 15 years of clinical experience who was blinded to the participants' group allocation and questionnaire outcomes. To ensure reliability, 20 randomly selected cases were reassessed, and intra-examiner agreement was determined using the intraclass correlation coefficient (ICC), indicating high consistency ($ICC=0.92$).

The abbreviated version of the Oral Health Impact Profile-14 (OHIP-14) was used to assess OHRQoL. The total score ranges from 0 to 56, where higher scores indicate poorer oral health and diminished quality of life. The rosenberg self-esteem scale

(RSES) was used to assess self-esteem. The scale consists of 10 items assessing global self-esteem and can be interpreted as comprising two subdimensions: positive self-esteem (5 items) and negative self-esteem (5 items), with total scores ranging from 0 to 30. High scores indicate high self-esteem. The OHIP-14 and RSES questionnaires, originally developed by respective authors,^{16,17} have previously been tested for reliability and validity in Turkish populations,^{18,19} demonstrating high internal consistency and reproducibility. The OHIP-14 and RSES questionnaires were administered directly to all participants during their initial clinical visit. All participants completed the questionnaires at a single time point under standardized conditions in the clinical setting, without external influence.

Statistical Analysis

Statistical analyses were performed using the SPSS, version 22.0 (IBM Corp., Armonk, NY, USA). The normality of continuous variables was assessed with the Kolmogorov-Smirnov and Shapiro-Wilk tests. An independent samples t-test was conducted to compare the means of two groups for variables that were normally distributed. For non-normally distributed variables, the Mann-Whitney U test was used for group comparisons. Associations between continuous variables that did not meet the normality assumption was evaluated using the Spearman rank correlation test. Statistical significance was set at $p<0.05$.

RESULTS

Table 1 displays descriptive statistics (mean and standard deviation) of ICON values for Groups 1 and 2, stratified by gender, providing an overview of the distribution and variability of orthodontic treatment need across the two study groups.

Table 2 compares the OHIP-14 scores between the two groups of adult subjects based on their orthodontic treatment need, classified by ICON scores (Group 1: $\text{ICON} \geq 43$, Group 2: $\text{ICON} < 43$). The mean OHIP score was higher in Group 1 (12.63 ± 7.46) than in Group 2 (10.61 ± 7.46). However, this difference did not reach statistical significance ($p=0.176$).

Table 3 compares self-esteem scores between the two groups. The mean RSES scores were similar in both groups (Group 1: 13.60 ± 1.99 , Group 2: 13.63 ± 2.11), and the difference was not statistically significant ($p=0.741$).

Table 4 presents the Spearman correlation coefficients for the associations among OHIP, RSES, ICON, and gender. A weak but statistically significant positive correlation was found between ICON and OHIP scores ($r=0.231$, $p=0.015$). No significant correlation was detected between ICON and RSES ($r=-0.084$, $p=0.380$). Additionally, gender showed no significant association with either OHIP ($r=-0.017$, $p=0.862$) or RSES ($r=0.111$, $p=0.247$) scores.

DISCUSSION

Traditionally, clinical assessments have been prioritized over patient-reported outcomes such as perceived functional capacity and psychological well-being. However, evidence consistently shows discrepancies between patients and clinicians in the evaluation of oral health and its consequences. Increasing recognition of these differences has led to a paradigm shift, emphasizing the integration of patients' perspectives-including expectations, satisfaction, and quality of life-into both research and clinical practice. The motivation of patients seeking orthodontic treatment is largely influenced

Table 1. Descriptive statistics of ICON values between groups and gender				
	ICON			
	Male		Female	
	Mean (n)	SD	Mean (n)	SD
Group 1	56.6 (21)	10.87	56.11 (43)	8.39
Group 2	32.9 (12)	8.98	34.41 (34)	7.42
ICON, index of complexity, outcome and need; SD, standard deviation.				

Table 2. Oral health-related quality of life measures of groups						
OHIP	N	Mean	SD	Min	Max	p
Group 1 (ICON ≥43)	64	12.63	7.46	3	33	0.176
Group 2 (ICON <43)	46	10.61	7.46	1	47	
p<0.05. ICON, index of complexity, outcome and need; SD, standard deviation; Min, minimum; Max, maximum.						

Table 3. Rosenberg self-esteem measurements of groups (RSES)						
RSES	N	Mean	SD	Min	Max	p
Group 1 (ICON ≥43)	64	13.60	1.99	9	18	0.741
Group 2 (ICON <43)	46	13.63	2.11	9	18	
p<0.05. ICON, index of complexity, outcome and need; SD, standard deviation; Min, minimum; Max, maximum.						

Table 4. Spearman correlations between OHIP and RSES with ICON and gender

		OHIP	RSES
ICON	Correlation coefficient	0.231*	-0.084
	p	0.015	0.380
	N	110	110
Gender	Correlation coefficient	-0.017	0.111
	p	0.862	0.247
	N	110	110

*Correlation is significant at the 0.05 level.
OHIP, Oral Health Impact Profile; ICON, index of complexity, outcome and need.

by aesthetic expectations rather than by objective clinical indications. This highlights the significant role of self-perceived dental appearance and social pressures in increasing demand for orthodontic procedures. The proportion of patients who applied for orthodontic treatment for aesthetic reasons was 80%, while the proportion who applied for functional reasons, such as chewing and speaking was as low as 20%.²⁰

Numerous indices have been developed to assess orthodontic treatment need, each emphasizing different aspects of malocclusion, including dental aesthetics, occlusal characteristics, treatment need, and complexity. In the present study, ICON was selected because previous evidence demonstrates that ICON is more closely associated with variations in OHRQoL than other indices.²¹ Specifically, ICON has been shown to better capture the relationship between occlusal traits and individuals' perceptions of the impact of oral health on quality of life, making it a more suitable measure for the objectives of this study.²¹ The present study examined the association between orthodontic treatment need and OHRQoL while considering self-esteem, using the OHIP-14 and RSES. Furthermore, the use of the ICON index in an adult population allowed for a more nuanced assessment of psychosocial impacts, thereby contributing novel evidence to the existing literature.

Quality of life is a multidimensional concept encompassing physical, psychological, and social components, as well as overall well-being. Studies exploring malocclusion and its relationship to quality of life indicate that its effects vary across age groups, particularly among children, adolescents, and adults.²² Previous studies have reported a close relationship between the need for orthodontic treatment and the emotional state of children and adolescents.^{23,24} Liu et al.²¹ demonstrated the lack of a relationship between physical discomfort, disability, and the need for orthodontic treatment in adult subjects, while Rusanen et al.,²⁵ stated that these problems are the most influential factors. Considering the studies conducted with similar age groups in the literature, the mean OHRQoL value in this study is similar to other studies,^{26,27} but it is considerably lower than that of patients requiring orthognathic surgery with dentofacial deformity.^{28,29}

Previous studies examining the relationship between malocclusion severity and OHRQoL have also produced

conflicting findings. Some have reported significant associations between greater malocclusion severity and poorer OHRQoL,³⁰⁻³² consistent with the correlation observed in the present study, whereas others have found no significant relationship.³³⁻³⁵ The inconsistency in the literature regarding the association between malocclusion severity and quality of life may be explained by several factors. First, cultural differences can influence how individuals perceive malocclusion, with some populations placing greater emphasis on esthetics while others prioritize functional aspects.³⁶ Second, the measurement instruments employed across studies vary considerably, which may account for divergent findings.^{21,37} Third, sample characteristics, such as age distribution, may also play a role, as adolescents are more likely to be concerned with appearance-related issues, whereas adults may place greater weight on functional and psychosocial consequences.³⁸ Collectively, these factors may help explain why findings regarding the impact of malocclusion on quality of life remain mixed across studies.

The conceptual model proposed by Wilson and Cleary³⁹ emphasizes that individual and psychological characteristics can influence the relationship between clinical health status and perceived quality of life. For this reason, personal self-perception and self-assessment as well as quality of life were evaluated in this study. The need for orthodontic treatment among adult patients is associated with pain, self-consciousness, tension, embarrassment, and irritability.^{40,41}

Research indicates that personal self-esteem is complex, influenced by factors beyond malocclusion, and can be enhanced by satisfaction with appearance.^{31,32} In parallel with the findings of this study, Bahar et al.⁴² reported no significant correlation between personal self-esteem and the malocclusion severity. The mean personal self-esteem score in our study population (13.62) was relatively low compared with previously reported values in similar cohorts. This discrepancy may be related to differences in demographic characteristics (including gender distribution) and sociocultural factors that influence perceptions of self-worth and dental appearance. Although previous studies^{43,44} have reported a greater impact of malocclusion on OHRQoL among women, no significant sex-related differences were observed in the present study. These findings suggest that sex alone may not adequately explain individual variation in the psychosocial impact of malocclusion.

From a clinical perspective, these findings highlight the importance of considering psychosocial factors alongside clinical indices when evaluating orthodontic treatment needs in adult patients. Orthodontic interventions may contribute not only to the correction of malocclusion but also to improvements in OHRQoL, irrespective of malocclusion severity.

Study Limitations

Several limitations should be considered when interpreting the findings of this study. First, although the sample size met the requirements of the power analysis, the relatively modest sample may have limited the ability to detect small associations. Second, the unequal distribution of male and female participants may have affected sex-related comparisons. This imbalance could influence the results and limit the extent to which the findings can be generalized across genders. Future prospective studies should aim to recruit a larger and more gender-balanced sample to address these limitations.

CONCLUSION

Greater orthodontic treatment need was weakly associated with poorer OHRQoL in adults seeking orthodontic treatment. However, no significant association was observed between malocclusion severity and self-esteem. These findings indicate that while malocclusion severity may influence OHRQoL, it does not appear to significantly affect self-esteem in adults.

Ethics

Ethics Committee Approval: The Ondokuz Mayıs University Clinical Research Ethics Committee reviewed and approved this cross-sectional observational study (approval no: OMÜ KAİK 2025/05, date: 15.01.2025).

Informed Consent: Written informed consent was obtained from all patients included in the study.

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Footnotes

Author Contributions: Concept - A.Z.Ö., A.A.Ö.; Design - A.Z.Ö., A.A.Ö.; Data Collection and/or Processing - Ö.Ö.; Analysis and/or Interpretation - A.Z.Ö., A.A.Ö.; Literature Search - A.Z.Ö., A.A.Ö., Ö.Ö.; Writing - A.Z.

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