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Review

Impact of Orthodontic Treatment on the Oral Health-related Quality of Life in Children

Ortodontik Tedavinin Çocuklarda Ağız Sağlığına Bağlı Yaşam Kalitesi Üzerindeki Etkisi

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ABSTRACT

Oral health-related quality of life has become an essential measure in dental research and clinical practice, capturing the impact of oral health on an individual's overall well-being across psychosocial domains. In children and adolescents, oral health-related quality of life assessments differ significantly when compared to adults, with a focus on factors like self-image, social acceptance, and school environment. The aim of this article is to present a general review of the relationship between malocclusions and oral health-related quality of life, examining how dental problems, especially those impacting aesthetics, can influence a young patient's social and emotional well-being. It also emphasizes the effectiveness of orthodontic treatment in enhancing oral health-related quality of life particularly in terms of socio-emotional aspects, underscoring patient-centered care. This review advocates for the integration of oral health-related quality of life measures into clinical decisions to better address patients' functional and emotional needs, by improving their overall quality of life.

Keywords: Oral health, quality of life, child health

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ÖZ

Ağız sağlığına bağlı yaşam kalitesi, ağız sağlığının psikososyal boyutlarda kişinin genel sağlığına etkisini ortaya koymasıyla diş hekimliği araştırmalarında ve klinik uygulamalarda önemli bir ölçüt haline gelmiştir. Çocuklarda ve ergenlerde, ağız sağlığına bağlı yaşam kalitesi değerlendirmeleri, benlik algısı, sosyal kabul ve okul ortamı gibi faktörlere dayanarak yetişkinlerden önemli ölçüde farklılık göstermektedir. Bu makalenin amacı, özellikle estetiği etkileyen dental sorunların genç hastalarda sosyal ve duygusal refahı nasıl etkilediğini inceleyerek maloklüzyonlar ve ağız sağlığı ile ilişkili yaşam kalitesi arasındaki ilişkinin genel bir derlemesini sunmaktır. Ayrıca ortodontik tedavinin sosyal ve duygusal açıdan ağız sağlığına bağlı yaşam kalitesini artırmadaki etkinliğini ve hastaya yönelik tedavinin önemini vurgulamaktır. Bu derleme, hastaların fonksiyonel ve duygusal ihtiyaçlarını daha iyi karşılamak ve genel yaşam kalitelerini artırmak için ağız sağlığı ile ilgili yaşam kalitesi ölçeklerinin klinik kararlara entegre edilmesini önermektedir.

Anahtar kelimeler: Ağız sağlığı, yaşam kalitesi, çocuk sağlığı

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INTRODUCTION

Health-related quality of life (HRQoL) was first defined by the World Health Organization in 1948 as not only the absence of disease but also as a state of physical, mental, and social well-being[1]. It reflects an individual's evaluation of how pain, physical ability, mental health, and social interactions impact his/her own overall well-being[2]. HRQoL started to receive attention in the field of dentistry only in the 1980s and was formally introduced as the "oral HRQoL" (OHRQoL) by Locker in 1988[3]. OHRQoL is defined as a standard health status measurement of oral tissues that contributes to overall well-being by enabling individuals to eat, communicate, and socialize without discomfort or distress[4]. It also emphasizes the positive sense of dentofacial self-confidence, and absence of negative impacts of oral conditions on social life[5].

OHRQoL is a multifactorial construct designed to assess the impact of oral health on an individual's life by capturing subjective experiences across various domains,

including oral health, functional and emotional well-being. By using OHRQoL measures, treatment outcomes benefiting individual patients can be better defined[6].

Measures of OHRQoL in Children

Patient perceptions are crucial in assessing overall need, particularly in OHRQoL, which is highly age-dependent, leading to notable differences in OHRQoL between children and adults[7,8]. While adult OHRQoL tools have been available for decades, instruments tailored specifically for children and adolescents have emerged more recently, allowing researchers to explore OHRQoL factors specific to younger populations, such as self-image, social acceptance, and the school environment (Table 1)[9].

Among these tools, the Child Perceptions Questionnaire (CPQ)[10,11] and the Child Oral Health Impact Profile (COHIP)[12] have become the most widely used approaches for assessing OHRQoL in preadolescent[13].

The CPQ was the first instrument designed specifically to evaluate OHRQoL in children[22]. It comes in two versions tailored to different age groups-one for children aged 8 to 10 and another for those aged 11 to 14 years. The CPQ assesses OHRQoL across four key domains: oral symptoms, functional limitations, emotional well-being, and social well-being[10,11]. While the emotional well-being subscale addresses internal feelings, such as worries, embarrassment, or concerns regarding physical appearance, the social well-being

Table 1. Measures of OHRQoL in children

Measures of OHRQoL	Abbreviation	Year published	Age range	Domains	Number of items	Informant (child/proxy)
Child Perceptions Questionnaire[10]	CPQ_{8-10}	2004	8-10	- Oral symptoms - Functional limitations - Emotional well- being - Social well- being	25	Child
Child Perceptions Questionnaire[11]	CPQ_{11-14}	2002	11-14	- Oral symptoms - Functional limitations - Emotional well- being - Social well- being	37	Child
Child Oral Health Impact Profile[12]	COHIP	2007	7-18	- Oral health - Functional well- being - Social/emotional well-being - School environment - Self- image	34	Child
Child Oral Health Impact Profile (Short Form)[14]	COHIP SF	2012	8-17	- Oral health - Functional well- being - Social/emotional well-being - School environment - Self- image	19	Child
Child Oral Health Impact Profile-Ortho[15]	COHIP-ortho	2016	8-13	- Oral health - Functional well- being - Social/emotional well-being - School environment - Self- image	11	Child
Child Oral Health Impact Profile-Preschool version[16]	COHIP-preschool	2017	2-5	- Oral health - Functional well- being - Social/emotional well- being - Self- image	11	Proxy/parent

Table 1. Devamı

Measures of OHRQoL	Abbreviation	Year published	Age range	Domains	Number of items	Informant (child/proxy)
Child-Oral Impacts on Daily Performances Index[17]	C-OIDP	2004	10-12	- Eating - Speaking - Cleaning mouth - Sleeping - Emotion - Smiling - Study - Social contact	8	Child
Scale of Oral Health Outcomes[18]	SOHO-5	2012	5	Not specified	7	Child
Pediatric Oral Health-Related Quality of Life[19]	POQL	2011	2-12	- Social functioning - Role functioning - Physical functioning - Emotional functioning	20	Child proxy/ parent
Parental Caregiver Perceptions Questionnaire[20]	P-CPQ	2003	8-14	- Oral symptoms - Functional limitations - Emotional well- being - Social well- being	31	Proxy/Parent
Early Childhood Oral Health Impact Scale[21]	ECOHIS	2007	3-5	- Child symptoms - Child function - Child psychological - Child self- image/social interaction - Parent distress - Family function	13	Proxy/Parent

OHRQoL: Oral health-related quality of life

subscale includes items that evaluate how oral health affects social interactions, such as participating in class, engaging in social activities, smiling, talking with peers, and feelings of being teased by other children[23]. Each item assesses the frequency of specific events affecting teeth, lips, and jaws over the previous three months with higher scores indicating worse OHRQoL. This measure has demonstrated its validity, reliability, and responsiveness across various settings[24-28].

COHIP on the other hand was designed for use in both research and clinical settings to distinguish between children with different clinical conditions of various levels of severity. Originating from the same initial item pool as the CPQ, the COHIP includes 34 items across five domains: oral health, functional well-being, social and emotional well-being, school environment, and self-image. Participants are asked to rate the frequency of events over the past three months using a scale that includes both positive and negative items. Negative items are reverse-scored, leading to lower scores indicating poorer OHRQoL[12,29,30]. Since COHIP incorporates both positive and negative impacts, it can assess not only the absence of conditions but also enhanced well-being, such as increased self-confidence due to care. A recently validated short form with 19 items further facilitates quick and efficient OHRQoL assessment in clinical studies[14].

Applications of OHRQoL Measures in Pediatric Dentistry

Children are often affected by various dentofacial disorders that impact their physical functioning and psychosocial well-being. Assessing the impact of oral health on their daily lives is essential, as oral diseases can restrict their current physical, social, and psychological well-being. During late childhood or pre-adolescence, children may experience high rates of caries, poor nutritional habits, dental anxiety, eating disorders, and heightened concerns about other people's perceptions

about themselves, all contributing to unique social and psychological needs. Therefore, a deeper understanding of OHRQoL and its impact on dental and clinical factors in children is crucial to delivering optimal oral healthcare and improving their overall oral health[31].

Unlike traditional objective criteria such as decay, missing teeth, and fillings, OHRQoL assessments are a valuable tool in pediatric caries research, since they capture satisfaction, symptom relief, and enhanced functional and emotional well-being. Research consistently shows a modest but significant link between unmet dental needs, such as decay, and children's OHRQoL[6]. Greater numbers of caries and tooth loss are significantly associated with lower OHRQoL, and children experience significant improvements in their OHRQoL after receiving dental treatment[6,32]. Anterior tooth extractions without replacement and untreated fractured anterior teeth are also associated with lower OHRQoL since they have a substantial socio-dental impact on children's daily lives compared to those without traumatic dental injuries[32].

Dental fear in 11-14-year-old patients has been strongly associated with poorer OHRQoL, potentially due to contributing factors such as infrequent dental visits and higher rates of dental caries. Research further highlights links between dental fear and various factors, including pain-related past and recent dental visits, lower family income, lower paternal education, larger family size, previous hospitalizations, and health issues, all of which have been associated with poorer OHRQoL. Conversely, having received a filling during previous dental visits is associated with improved OHRQoL[31]. Additionally, untreated dental caries and dental pain are linked to functional limitations, psychological challenges, and negative impacts on social and emotional well-being[31,33].

Poor periodontal health also results in higher total CPQ 11-14 scores across all domains. Conditions like gingivitis, gingival bleeding, and plaque buildup are likely linked to more profound negative perceptions of oral health and daily life. Gingival bleeding, in particular, influences children's social interactions and self-esteem, while overall unhealthy periodontal conditions negatively influence emotional and social well-being. Severe malocclusion has been linked to plaque accumulation, which can lead to the development of periodontitis[34].

Association Between OHRQoL and Orthodontic Treatment Need

Research on the physical, social, and psychological consequences of malocclusion has highlighted its significant impact on quality of life. Evidence shows that even very young 8-year-old patients, often prioritize the aesthetic and social aspects of OHRQoL when seeking orthodontic treatment. As orthodontic research increasingly adopts a more psychosocial perspective, there is also a growing interest in understanding and improving OHRQoL[35,36]. Orthodontic treatment is usually performed when the permanent dentition begins to emerge, coinciding with the period when children become more aware of their appearance and gain autonomy to request or refuse treatment[37]. Children with unaesthetic dental traits and untreated malocclusions often face teasing and negative social responses which may lead to psychological and social challenges, as they begin to experience increased self-awareness about their appearance[35,37,38].

Various malocclusion characteristics, such as an increased overjet, spaced dentition[38-41], and maxillary anterior crowding of 2 mm or more[42], have been linked to negative impacts on OHRQoL. Studies have shown that these malocclusions predominantly affect emotional and social well-being[37,40], with noticeable negative effects recorded as early as the age of eight[41]. Early orthodontic treatment is often recommended to protect the children from negative impacts on their OHRQoL, with potential benefits such as improved self-esteem and fewer negative social interactions[40,43]. Both children and parents commonly believe that orthodontic treatment can improve dental function, aesthetic dental appearance, and overall quality of life. The advantages of orthodontic treatment depend on the severity of the malocclusion and the child's perception of the issue[44].

Although malocclusion is not a disease but rather a deviation from societal aesthetic norms, there has been a demand for its orthodontic care for decades, driven largely by self-perceived dental appearance[45]. To objectively assess the need for treatment, various indices have been developed[46-49], with the Index of Orthodontic Treatment Need (IOTN)[50] being one of the most widely used indices due to its practical and efficient application. The IOTN evaluates the necessity for treatment through two components: the Dental Health Component, which assesses oral health factors, and the Aesthetic Component, which considers aesthetic impairments.

Orthodontic treatment is often sought not only for functional concerns but also to relieve the aesthetic impact of malocclusion, which can affect quality of life[44]. Traditionally, assessments of orthodontic needs have focused less on a patient's perspective about his/her malocclusion and more on how treatment can improve their daily lives. However, there is a growing

understanding that measuring OHRQoL should be central to clinical practice[39]. Orthodontic treatment need indices have limitations, as they fail to address how malocclusion affects quality of life, particularly in terms of functional limitations and psychological well-being[51]. Additionally, these tools may be insensitive to individual concerns and overlook minor irregularities that could matter deeply to the patient. There is also a risk of treating patients without a genuine psychosocial need, leading to potential over-treatment[51].

Over the past decade, focusing on patient-centered aspects of orthodontic treatment has gained greater momentum in medicine and dentistry. Understanding the need for orthodontic treatment from both the patient's and clinician's perspectives improves treatment planning and contributes to heightened quality of life. Research has shown that, for many patients, the appearance of their teeth and facial aesthetics is a more compelling reason for seeking orthodontic care than functional concerns. The need for orthodontic treatment can, therefore, stem from either the orthodontist's (normative) perspective or the patient's (subjective) viewpoint, or both[52].

Efforts to link OHRQoL with clinical orthodontic indicators have often yielded mixed results. Although numerous studies have demonstrated a significant relationship between the need for orthodontic treatment and OHRQoL[25,39,44,51-56], findings suggest that malocclusion itself has a negative impact, more deeply on emotional well-being[45,51] than on function or social domains[57]. Children with untreated malocclusions who desired orthodontic treatment reported significantly poorer OHRQoL[51] and the severity of malocclusion was found to be closely related to poorer OHRQoL[55]. Studies indicate that a child's psychological profile plays a significant role in shaping the social and emotional effects of malocclusion. Specifically, low self-esteem in children significantly impacts quality of life due to malocclusion, suggesting self-esteem is a more influential factor than the severity of malocclusion in determining orthodontic treatment need[45,58]. Studies examining ethnic, gender, and age differences in OHRQoL expectations have also found that young patients are more motivated by improved dental aesthetics or appearance than by improvements in oral function[36]. OHRQoL has been found to be poorer in girls while boys were more affected by functional restrictions[59,60].

However, some studies did not find a significant correlation between the requirement for orthodontic treatment and OHRQoL[61,62], and children with severe malocclusions were not always those who reported poorer OHRQoL[51,63]. This fact could be attributed to and might be explained by the possibility that some children with severe malocclusions exhibit greater resilience to the challenges posed by their condition[23]. Also, low self-reported OHRQoL did not necessarily indicate a stronger desire for treatment[51]. Consequently, precise interpretation of OHRQoL measures necessitates comprehension of their psychometric characteristics and the contextual elements that may affect assessments of health and well-being in these patients[23].

Impact of Orthodontic Treatment on OHRQoL

Studies using reliable OHRQoL measures have highlighted notable differences between orthodontic patients who have and have not undergone treatment[24,64], particularly in terms of socioemotional aspects like smiling, laughing, and displaying teeth without feeling self-conscious[36]. Studies have shown that children and adolescents who received orthodontic treatment experienced significant improvements in their OHRQoL compared to untreated peers matched for age, sex, and dental condition[23]. Adolescents who underwent two years of fixed orthodontic treatment reported particularly noticeable benefits in their emotional and social well-being. However, these positive effects were less evident in the oral function and functional limitations domains[65-67].

A longitudinal study tracking 197 adolescents during the first six months of fixed-appliance therapy observed an improvement in their CPQ domains, despite anticipated challenges and children's expectations of functional, emotional, and social problems to be experienced during treatment[68]. Additionally, a twenty-year observational study revealed that individuals with severe malocclusion, aged eleven to twelve years at baseline, who underwent orthodontic treatment during adolescence, reported greater satisfaction with their dental and general appearance. A superior quality of life was noted in comparison to untreated individuals with substantial treatment needs, underscoring the long-term advantages of orthodontic treatment[69].

Some studies suggest that the psychological benefits of orthodontic treatment may be less pronounced than commonly assumed. Analyses of the CPQ_{11-14} subscales reveal that the impact of treatment varies across four domains, with significant effects observed only in emotional well-being. In contrast, orthodontic treatment

does not immediately improve children's social well-being, possibly because it takes time for children to translate the emotional benefits of treatment into social contexts[23].

Moreover, the results of orthodontic treatment appear to be influenced by the interplay between psychological factors and the perceived social and emotional effects of dental health[42,70,71]. It seems that children exhibiting higher psychological well-being tend to report better OHRQoL, irrespective of their orthodontic treatment status. On the other hand, children with low psychological well-being who did not undergo orthodontic treatment reported worse OHRQoL compared to their treated counterparts. This may suggest that orthodontic treatment may be advantageous for children with lower psychological well-being[23]. Many studies have examined the effect of orthodontic treatment on self-esteem. Nonetheless, there is no definitive proof that orthodontic therapy improves self-esteem[36,38,69,72], as it has been shown to be a reasonably stable psychological construct[73]; hence, minimal or no impact of orthodontic treatment on self-esteem is expected[36,38,69,72].

CONCLUSION

OHRQoL has emerged as a critical measure in dentistry, highlighting the comprehensive impact of oral health on individuals' physical, emotional, and social well-being. The growing body of research underscores the importance of OHRQoL assessments, particularly in children and adolescents, as they reflect not only physical and functional health but also self-perception and social interactions. The association between malocclusion and OHRQoL is well-documented, with evidence pointing to its significant psychosocial and unfavorable impacts, such as teasing and reduced self-confidence.

This review highlights the importance of orthodontic treatment in improving OHRQoL, especially in the domains of emotional and social well-being. While some children experience notable psychological and social benefits after treatment, others may show limited improvements, suggesting that individual psychological factors play a key role in perceived treatment outcomes. This complexity highlights the need for a holistic, patient-centered approach in orthodontic care, where clinicians consider both objective clinical measures and the subjective experiences of patients.

Ethics

Author Contributions

Concept: G.A.S., M.G.K., Design: G.A.S., M.G.K., Literature Search: G.A.S., M.G.K., Writing: G.A.S., M.G.K.

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