Original Article

Orthodontic Treatment Need, Self-Esteem, and Oral Health-Related Quality of Life Assessment of Primary Schoolchildren: A Cross-Sectional Pilot Study

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ABSTRACT

Objective: The aims of this study were (1) to determine orthodontic treatment need, self-esteem, and oral health-related quality of life (OHRQoL) of primary schoolchildren and (2) to investigate possible influences of orthodontic treatment need on self-esteem and OHRQoL.

Methods: The subjects of this cross-sectional study were 219 children aged 13–14 years attending public schools in Bornova, Izmir, Turkey. None of the children were undergoing active orthodontic treatment or had previously received orthodontic treatment. Index of Orthodontic Treatment Need Dental Health Component (IOTN-DHC) was used to determine normative orthodontic treatment need, and scores of 4 and 5 were defined as treatment need. IOTN Aesthetic Component (IOTN-AC) was used for the determination of child perception as well as the orthodontist perception of treatment need, and scores of 8–10 were defined as treatment need. Rosenberg Self-Esteem Scale was applied for self-esteem level determination. OHRQoL was evaluated using Child-Oral Impact on Daily Performance (C-OIDP) questionnaire. Correlations of the obtained data were tested using Spearman rho, and groups presenting correlations were further tested using Kruskal-Wallis and chi-square test. Interoperator and intraoperator reliability of the applied tests was evaluated using weighted kappa scores.

Results: Prevalence of dental normative orthodontic treatment need was 37%, with 7.3% of the children presenting no malocclusion. Of the whole population, 5.5% of the children described themselves as having definite treatment need according to IOTN-AC scores. OHRQoL was positively influenced when self-esteem was higher (p=0.01). Presence of normative orthodontic treatment need according to IOTN-DHC did not have an influence on OHRQoL (p=0.745).

Conclusion: Orthodontic treatment need derived by the orthodontist might not necessarily influence OHRQoL and self-esteem of primary schoolchildren. Assessment of OHRQoL as an adjunct to conventional diagnostic tools and normative measures may be feasible for the interpretation of treatment need and priority. (*Turkish J Orthod* 2014;26:182–189)

KEY WORDS: Child-Oral Impact on Daily Performance, Index of Orthodontic Treatment Need, Oral health-related quality of life, Self-esteem

INTRODUCTION

Quality of life is defined as a sense of well-being that stems from satisfaction or dissatisfaction with areas of life that are important to the individual.[1,2] In the case of orthodontic treatment demand, the principal factor for a patient's decision of treatment need is not the presence of malocclusion, it is generally the subjective perception influenced by judgments depending on esthetic standards of the individual and society.[2,3] Due to this awareness, patient evaluation is becoming increasingly dependent on care-seeker's own perceived attractiveness, social acceptance, and psychologic well-being.[4–6] These dimensions form the domains that are studied

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in oral health-related quality of life (OHRQoL) measures in children and adults.[1,2,4]

In contrast to this considerable focus on patient driven assessments, oral health-related quality of life and orthodontic treatment need is not easy to associate when self-esteem and cultural background play a key role in self-perception of esthetics.[3,5–7] Minor irregularities may be very disturbing for some people, while severe malocclusions may not be of any concern for others.[6,8,9] Patients, parents, and even dentists and orthodontists have been shown to differ in their perception of dental esthetics and malocclusion.[6,8–13] It seems important to gain a better understanding of this variation and to evaluate how oral health-related quality of life and self-esteem can affect each other under the influence of normatively determined orthodontic treatment need.

Evaluation of these somewhat dynamic subjects has been a question of interest because relative subjectivity makes this process hard to standardize. Determination of the normative orthodontic treatment needs using measures developed for this specific purpose was reported to be rather reliable following the adequate training of the operator.[8–11] However, assessment of OHRQoL was reported to be more complex because of its more subjective nature and because of its many cultural and linguistic influences. Several methods have been developed that focus on different conditions and age groups. In general, adverse effects of oral conditions on function and psychosocial status are being examined.[2–6,8,14,15]

Among these measures, Child-Oral Impact on Daily Performance (C-OIDP) is a questionnaire capable of determining specific dental conditions such as malocclusion that impact quality of life.[3,14] The C-OIDP assesses the impacts of oral conditions regarding the ability of the child to perform 8 major activities, namely eating, speaking, cleaning teeth, sleeping, emotion, smiling, study, and contact, which encompass the functional and psychosocial domains.[14–16] The direct questioning of which oral condition causes the impact and separate calculation of condition-specific scores are advantages that confirm the use of this index for needs assessment and treatment planning.[3,14–16]

Since the driving force for orthodontic treatment demand is usually the facial esthetic dissatisfaction due to malocclusion, it may be anticipated that patients with a defined treatment need would present negatively affected OHRQoL domains, which might also influence the self-esteem level. Therefore, the aims of this study were (1) to determine orthodontic treatment need, self-esteem, and OHRQoL of primary schoolchildren and (2) to investigate possible influences of orthodontic treatment need on OHRQoL and self-esteem. The tested hypothesis was that presence of defined orthodontic treatment need would have a negative influence on OHRQoL and self-esteem.

SUBJECTS AND METHODS

Approval of the Scientific Research Ethics Committee, University of Ege, Turkey (reference B.30.2.EGE.0.20.05.00/EY/927) was obtained for this cross-sectional investigation design. The participants' parents signed a letter that described the method and requested consent for their children to take part in the study. All school administrations and local authorities granted permission for the procedure.

Sample

The study sample consisted of 258 sixth year primary school students attending 5 public schools in Bornova, Izmir, Turkey. Inclusion criteria for the respondents were age (13–14 years) and no history of previous orthodontic treatment. Following initial contact and informed consent, 219 children (84.9% positive response, 113 boys and 106 girls), aged 13–14 years and their families agreed to take part in the study. No incentives or compensation for participating in the study were offered. Data were collected through self-administered questionnaires, personal interviews, and dental screenings.

Determination of Orthodontic Treatment Need

The Index of Orthodontic Treatment Need (IOTN) was used to assess the children's normative treatment need and subjective treatment perception.[17,18] The dental component of this index (IOTN-DHC) includes assessments of the following occlusal traits: overjet, overbite, crossbite, open bite, displacement of the teeth-crowding, impeded eruption, hypodontia, clefts of lip and/or palate, and molar relation. Grading of IOTN-DHC is as follows: grade 1, normal or minor occlusion-no need; grade 2, minor occlusion–little need; grade 3, moderate malocclusion–borderline need; grade 4, severe malocclusion–treatment need; and grade 5, very severe malocclusion–treatment need.[18] The esthetic component (IOTN-AC) involves scoring of the occlusion using 10 provided photo-

graphs with first being the most attractive and last being the least attractive. Following the explanation of this grading system, the children were asked to give a grade of their own esthetic appearance without correlating the specific photograph with their own teeth. Grading of IOTN-AC is as follows: grade 1–4, no need; grade 5–7, moderate need; and grade 8–10 definite need.[18]

Oral Health-Related Quality of Life Measurement

The C-OIDP questionnaire was used to assess OHRQoL.[14,16,19,23] This measure consists of 2 sections. First, oral health problems perceived in the last 3-month period are identified. Then, causes and frequencies of these problems are investigated in relation to 8 daily performances, namely eating, speaking, cleaning teeth, relaxing-sleeping, smiling–showing teeth without embarrassment, maintaining emotional state, study–going to school, and social contact.[14,16,19,20] The oral impact score of each performance is obtained by multiplying severity and frequency scores (0,1,2,3) in relation to that performance. Therefore, the scores range from 0 to 9 per performance. The overall impact score is the sum of all 8 performances divided by 72 and multiplied by 100.[14,16,19,20] The adaptation of this index to Turkish language performed previously.

Self-Esteem Assessment

Level of self-esteem was determined using Rosenberg Self-Esteem Scale (RSES).[21–23] This scale consists of 5 positive and 5 negative items sequenced in a randomized manner. Items 1-2-4-6-7 are scored as follows: 3, strongly agree; 2, agree; 1, disagree; and 0, strongly disagree. Items 3-5-8-9-10 are scored as follows: 0, strongly agree; 1, agree; 2, disagree; and 3, strongly disagree 3. The final scores range from 0–30, where 0–15 represents low self-esteem, 15–25 represents normal self-esteem, and 25–30 represents high self-esteem.[21–23]

Administration of Questionnaires and IOTN

World Health Organization recommendations were followed for the assessment of children who were first taken in small groups at a time to a separate room where they were examined intra-orally, sitting on a chair under a 60 W lamp light by the orthodontist (E.Y.). Disposable mouth mirrors, probes, pencils, and rulers for marking and measuring occlusal relations were used. The children were given scores according to IOTN-DHC and IOTN-AC by the same examiner.[17,18] Following this procedure, the children rated their own IOTN-AC score, and they were not allowed to discuss afterwards. Finally, the children were recruited back in their classrooms for self-esteem and OHRQoL assessments that were carried out using the RSES and C-OIDP measure, respectively. Both questionnaires were in Turkish and were self-administered. Main variables and measures used are summarized in Table 1.

Data Analysis

Prior to data collection, the IOTN examiner was trained for scoring of the different scales in order to obtain adequate agreement coefficients within and between groups. Test-retest reliability of the data was assessed by random duplication of 20 patient evaluations. The time interval between the screenings was 2 weeks. Weighted kappa scores for the IOTN-DHC and IOTN-AC were 0.811 and 0.612, respectively, indicating good agreement.

The obtained data were assessed using Spearman rho correlation analysis for possible associations, and the groups presenting significant correlations were further evaluated using Kruskal-Wallis and chi-square tests.

RESULTS

A total of 219 sixth year schoolchildren from Izmir, Turkey were assessed. Their mean age was 13.6

Table 1. Main study variables, measures, and performers

Variables	Measures[a]	Performer
Perception of self dental esthetics	IOTN-AC	Subject
Normative evaluation of dental esthetics	IOTN-AC	Examiner (E.Y.)
Normative evaluation of orthodontic need	IOTN-DHC	Examiner (E.Y.)
Oral health-related quality of life	C-OIDP (impact)	Subject
	C-OIDP (frequency)	Examiners (C.V., E.E., C.Y.)
Level of self-esteem	Rosenberg	Subject

[a] IOTN-AC indicates Index of Orthodontic Treatment Need Aesthetic Component; IOTN-DC, Dental Health Component; and C-OIDP, Child-Oral Impact on Daily Performance.

Table 2. Frequency and prevalence (%) of Index of Orthodontic Treatment Need Dental Health Component (IOTN-DHC) and IOTN Aesthetic Component (IOTN-AC) scores

	Frequency	Prevalence, %
IOTN-DHC		
1: No need	16	7.3
2: Little need	84	38.4
3: Borderline	38	17.4
4: Treatment need	62	28.3
5: Severe treatment need	19	8.7
IOTN-AC by examiner		
1–4: No need	159	72.6
5–7: Moderate need	41	18.7
8–10: Definite need	19	8.7
IOTN-AC self perception		
1–4: No need	186	84.9
5–7: Moderate need	21	9.6
8–10: Definite need	12	5.5

years; girls comprised 48.4% of the population, indicating a relatively even gender distribution.

Orthodontic Treatment Need

The prevalence of definite orthodontic treatment need was 37%. Percentage of children who did not have any type of malocclusion was 7.3%. According to IOTN-AC, the examiner determined 8.7% of the children had a definite treatment need, whereas 5.5% of the children described themselves as having definite treatment need (Table 2). There was a significant correlation between esthetic perceptions of the children and the examiner (rho=0.246, $p<0.05$). In addition, IOTN-DHC was significantly correlated with IOTN-AC scores given by the examiner himself (rho=0.650, $p<0.05$) and the children (rho=0.242, $p<0.05$). All significant correlations are shown in Table 3.

Oral Health-Related Quality of Life

OHRQoL was positively affected by higher self-esteem (rho=–0.174, $p=0.01$), whereas the presence of normative orthodontic treatment need did not have a significant effect ($p=0.745$). During the past 3 months, 69.9% of the children had experienced an oral impact with no significant difference between the girls and boys (chi-square test). Eating was the most affected performance (35.2%) followed by cleaning teeth (33.3%), smiling (25.6%), and emotion (16.4%), which were relatively higher than the rest (Table 4). The 2 highest reported causes of impact were bleeding gum and sensitive tooth, with 51.4% and 46.6%, respectively. Of the children evaluated, 34.9% attributed position of teeth as a cause of impact, which is a sign of malocclusion. The prevalence of affected performances and the intensity of being affected are shown with the mean impact scores and standard deviations in Table 4. The percentage frequencies of oral conditions claimed by the children are summarized in Table 5, and the percentage frequency of oral conditions above 10% resulting in claims of affected performances recorded by the examiners are shown in a graphic in Figure 1.

Self-Esteem Assessment

Self-esteem level of subjects was significantly correlated with OHRQoL scores (rho=–0.174, $p=0.01$). Thirteen (5.9%) of the children scored low self-esteem levels, whereas the majority of children were found to have a normal level of self-esteem (78.1%). No significant difference was found between boys and girls (chi-square test). No significant change in the self-esteem level was observed in the group with normative orthodontic treatment need. Of the low self-esteem children, 38.5% had a definite orthodontic treatment need score (5 subjects). Self-esteem levels of children with different treatment needs are shown in Table 6.

DISCUSSION

In this study, possible effects of defined orthodontic treatment need presence on OHRQoL and self-esteem were assessed. The oral health impacts reported by children and the self-esteem levels were

Table 3. Significant correlation between assessed variables[a]

	IOTN-AC Normative	IOTN-AC Subjective	C-OIDP
IOTN-DHC	*rho = 0.650, $p < 0.05$	*rho = .242, $p < 0.05$	
IOTN-AC normative		*rho = .246, $p < 0.01$	
RSES			*rho = –0.174, $p = 0.01$

[a] IOTN-AC indicates Index of Orthodontic Treatment Need Aesthetic Component; IOTN-DC, Dental Health Component; C-OIDP, Child-Oral Impact on Daily Performance; and RSES, Rosenberg Self-Esteem Scale.

* rho: Pearson's rho correlation coefficient

Table 4. Prevalence (%) of performances affected by oral conditions, frequency of intensity, and mean impact scores

	Performances							
	Eating	**Speaking**	**Cleaning Teeth**	**Relaxing**	**Emotion**	**Smiling**	**Study**	**Contact**
Prevalence	35.15	7.3	34.24	7.76	17.35	26.48	3.19	2.73
Frequency								
Very little	5.02	2.28	4.56	2.28	6.84	4.56	0.45	0.45
Little	7.3	2.73	7.76	1.82	1.36	3.65	0.45	0.91
Moderate	10.04	0.45	15.98	0.91	3.65	8.67	0.45	0.45
Severe	9.13	0.45	4.56	1.82	3.65	3.19	0.45	0
Very severe	3.65	1.36	1.36	0.91	1.82	6.39	1.36	0.91
Mean impact score	3 ± 2.83	2.44 ± 1.51	2.71 ± 1.05	2.65 ± 1.46	2.53 ± 1.5	3.1 ± 1.36	3.57 ± 1.62	3 ± 1.67

not correlated with the treatment need determined by the orthodontist. Rather, self-esteem levels showed a correlation with OHRQoL scores, suggesting children with high self-esteem can deal with oral health problems better than others. The hypothesis cannot be accepted.

Despite the increasing attention drawn to the field of quality of life studies, orthodontic treatment need and patient triage is often carried out using clinically defined norms in Turkey.[24–27] Dogan *et al.*[27] evaluated the normative orthodontic treatment need in a group of referred children using IOTN and found that 74% of the population had a definite treatment need according to IOTN-DHC, whereas only 33.6% perceived themselves as needing treatment according to IOTN-AC. Ucuncu and Ertugay[25] performed a similar study in which they defined 38.8% of a population of schoolchildren with treatment need. However, the perceived treatment need of this population was only 9.6%. Results of their referred population were parallel as well, where definite treatment need was 83.2% and perceived need was 36.8%. These inconsistencies between the treatment need defined by the orthodontist using clinical norms and the esthetic perception of subjects may be a sign of lack of influence on the psychosocial aspects of present malocclusion on quality of life. In this present study, the definite treatment need determined by the orthodontist was 37%, whereas the perceived esthetic scores given by the children suggesting definite treatment was only 5.5%. This result may confirm a possible disassociation between clinical norms and perception. The question that arises is: Would the assessment of treatment need be more precise when combined with a quality of life measure? Alternatively, would adding a psychosocial assessment be helpful in better understanding of varying responses to similar scale oral impacts?

Table 5. Frequency of oral conditions

Oral Condition	**Frequency, %**
Toothache (t-ache)	21.91
Sensitive tooth (t-sensitive)	46.57
Tooth decay, hole in tooth	36.30
Exfoliating primary tooth (exfoliate)	15.07
Tooth space (due to unerupted teeth)	10.96
Fractured permanent tooth	13.01
Color of teeth (color)	17.81
Shape or size of teeth	19.86
Position of teeth (position)	34.93
Bleeding gum (bleed)	51.37
Swollen or inflamed gum (swollen)	14.38
Calculus	5.48
Oral ulcer	36.99
Bad breath	25.34
Deformity of mouth or face	1.37
Erupting permanent tooth	28.08
Missing permanent tooth	7.53

Tsakos *et al.*[28] investigated the first question by evaluating the agreement between orthodontist determined need and oral health-related quality of life scores. Their results demonstrated that there was a discrepancy between OHRQoL and normative orthodontic treatment need, especially in the case of appearance-related conditions such as malocclusion. This was further confirmed by Kok *et al.*[29] in their study assessing the treatment need and concern of 274 children. There was a low correlation between the normative need determined according to clinical norms and perceived need determined by children. Judging from these 2 studies, it seems beneficial to use OHRQoL measures to supplement clinical norms in assessing the perceived need for orthodontic treatment need. Accordingly, no statistically significant correlation existed between the IOTN and OHRQoL scores in this present study.

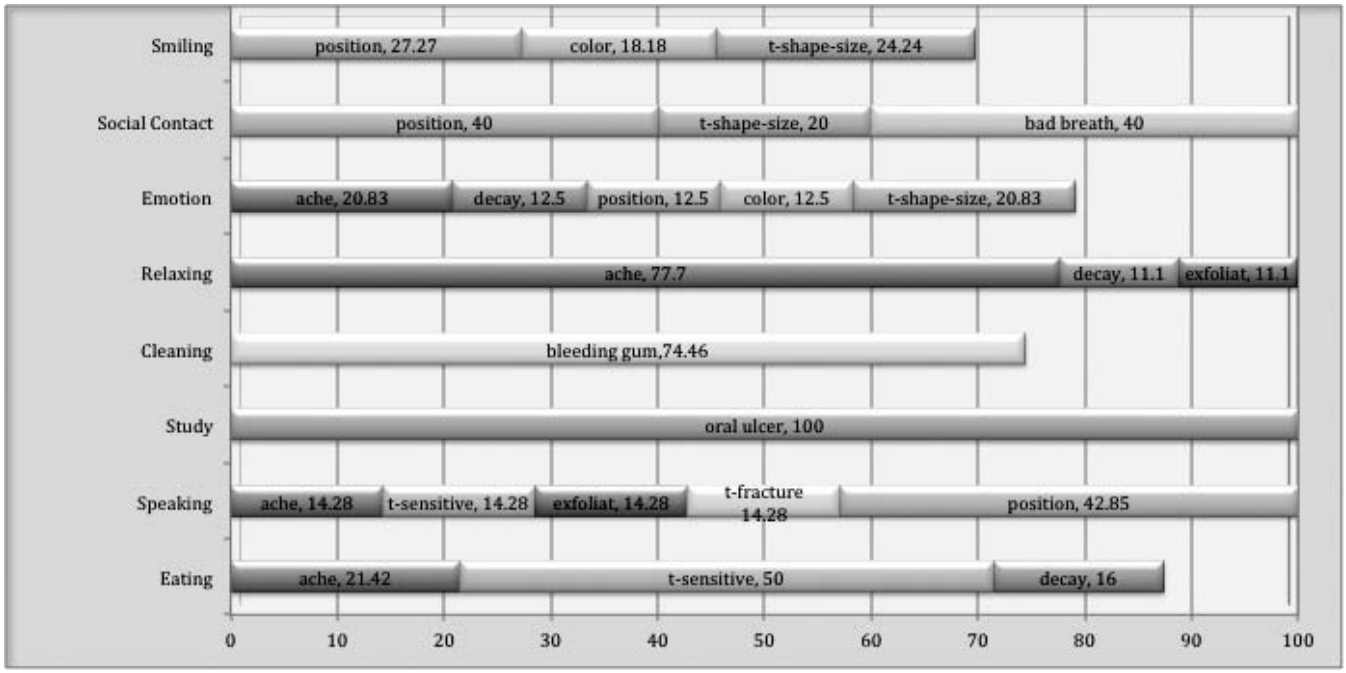


Figure 1. Prevalence of oral conditions affecting daily performances over 10%.

Thirty-seven percent of the population was diagnosed as having orthodontic treatment need, and 69.9% had reported some kind of oral impact during the last 3 months. However, focusing only on the prevalence of all oral impacts masks the large variation in problems that may be related to orthodontics. Within the whole population, 74.4% had no impacts on smiling performance, 83.6% on emotional state, and 97.3% on social contact. Of particular interest to the diagnosing orthodontist, 27.3% of the smiling impacts and 40.0% of the social contact impacts were attributed to tooth position; in total 47.3% of the impacted performances were attributed to malocclusion. It seems reasonable to assume that these results may supply the orthodontist with better understanding of the psychosocial factors that may play a role both on necessity of the treatment and the outcome.

Table 6. Self-esteem levels according to gender and normative definite treatment need

Self-Esteem	Male	Female	Total	Definite Treatment Need
Low (0–15)	5	8	13	5
Normal (15–25)	88	83	171	61
High (25–30)	20	15	35	15

To address the potential influence of self-esteem on OHRQoL, Klages *et al*.[5] assessed the perception of dental esthetics and OHRQoL including the self-awareness factor. Their results demonstrated that people with a higher level of private and public self-consciousness were more prone to the impacts of dental esthetics. They concluded that self-awareness might be a factor determining how the person can cope with esthetic problems affecting their quality of life. Accordingly, Agou *et al*.[6] investigated the effects of self-esteem on OHRQoL of children with malocclusion. An interesting finding was that high levels of self-esteem made a helping effect on dealing with oral-facial problems and resulted in more positive OHRQoL outcomes in children. In a more recent study, Agou *et al*.[7] investigated the psychologic factors possibly affecting children's perceptions of oral health status in a longitudinal study set-up. Children reporting better psychological well-being scores were more likely to report better OHRQoL regardless of their treatment status, but the correlation was weak. The assumption that improving dental esthetics would have a significant positive effect on a child's psychologic well-being was not supported with these findings.[7] There was further confirmation of this when the association of C-OIDP and RSES scores of this study was examined. The correlation between OHRQoL scores and self-esteem level was significant, suggesting

better tolerance of oral health problems in children with higher self-esteem. Only 5.9% of the whole sample had low self-esteem, and only 11.8% of this group had a definite treatment need; this supports the result that self-esteem was not affected significantly by the presence of orthodontic treatment need.

OHRQoL cannot be determined solely by using a validated measure due to influences of many factors such as age, gender, culture, and socioeconomic level. The interactions of such covariates determine the perception of the individual. This study was conducted among sixth year primary schoolchildren in order to have a sample in permanent dentition stage. The rationale behind this decision was twofold. Primarily, the intention was to prevent misinterpretations of IOTN-AC scoring and C-OIDP relevant questions about missing teeth and teeth shape due to the mixed dentition stage. In addition, higher self-awareness was expected at this age for more reliable answers. One other limitation of the study might be that only local primary schools were visited, restricting the cultural and socioeconomic background to a limited population. Therefore, the study sample might not be a representative sample of all Turkish children of this age, and caution must be exercised when interpreting these results. However, this pilot study might project suggestions for future large-scale longitudinal research where very few OHRQoL data of the Turkish children have been reported to date.

CONCLUSION

Within the limits of this study, it could be suggested that orthodontic treatment need derived by the orthodontist might not necessarily influence OHRQoL and self-esteem. Assessment of OHRQoL as an adjunct to conventional diagnostic tools and normative measures may be beneficial for the determination of treatment need.

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