Original Article

Psychosocial Impact of Dental Esthetics on Quality of Life in Adolescents

Association with Malocclusion, Self-Image, and Oral Health–Related Issues

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ABSTRACT

Objective: To test the hypothesis that several dimensions of the self-perceived psychosocial impacts of dental esthetics are not associated with grades of malocclusion, oral health–related quality-of-life measures, and body self-image in adolescents.

Materials and Methods: This cross-sectional study included a convenience sample of 301 adolescents (mean age 16.1 ± 1.8 years, 58.1% female subjects). Demographic data were collected and dental conditions were assessed. The Dental Aesthetic Index (DAI) was used for assessment of malocclusion and determination of orthodontic treatment needs. The short form of the Oral Health Impact Profile (OHIP-14), the Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ), and the Body Satisfaction Scale (BSS) were used to measure adolescents' self-perceived variables.

Results: All variables (DAI, OHIP-14, and BSS) were correlated with PIDAQ ($P < .001$). Stepwise multiple regression analysis revealed significant associations ($P < .001$) of independent variables with the total score of PIDAQ ($R^2 = 0.29$) and dental self-confidence ($R^2 = 0.30$), social impact ($R^2 = 0.14$), psychological impact ($R^2 = 0.23$), and esthetic concern ($R^2 = 0.13$).

Conclusion: The hypothesis is rejected. A broad range of adolescents' self-perceived impact of dental esthetics is influenced by severity of malocclusion, oral health–related quality of life, and body satisfaction. (*Angle Orthod.* 2009;79:1188–1193.)

KEY WORDS: Dental esthetics; Malocclusion; Adolescents

INTRODUCTION

Malocclusion represents an important health problem worldwide.[1] Epidemiological surveys of malocclusion in several countries, primarily in northern Europe and North America, have reported that this oral disorder is highly prevalent.[2] Malocclusion affects only oral function and appearance, but it also has economic, social, and psychological effects.[3,4]

Demand for orthodontic treatment is mainly motivated by personal concerns about appearance and other psychosocial factors.[5,6] However, traditional methods of estimating orthodontic need or evaluating treatment outcome are mainly based on assessment of normative need and use, with occlusal indices or cephalometric measurements used to define need for or success/failure of treatment.[7,8] These measures reflect only the viewpoint of professionals, rather than consumer expectations. This is a serious shortcoming, because there are considerable differences between professional and patient perceptions of dental appearance and the need for orthodontic intervention.[7,9,10]

Patient perceptions are important indicators of treatment needs and may complement conventional clinical measurements.[11,12] Treatment assessment requires the integration of multiple dimensions of health care, such as improvement in quality of life and self-image related to body satisfaction, effectiveness of intervention, and cost/benefit assessments.[13,14]

The use of sociodental indicators allows individuals with the greatest need to be a priority when financial resources are limited.[8,15] Moreover, efficient clinical

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management of orthodontic patients would predict their behavior and compliance during subsequent treatment, so that individuals with minor or borderline treatment needs can be safeguarded from the potential risks of unnecessary treatment.[6,8] In persons with minor dental malocclusion, there is insufficient evidence that orthodontic treatment enhances dental health and function. Treatment is often justified by the potential enhancement of social and psychological well-being through improvements in appearance.[16,17]

Traditional occlusal indices such as the Dental Aesthetic Index (DAI) and Index of Orthodontic Treatment Need (IOTN) evaluate the esthetic and anatomic components of malocclusion,[18] but they do not give any information about how malocclusion affects a patient's self-image and quality of life in terms of subjective well-being and daily functioning.[19] Recently there has been increasing interest in the incorporation of psychometric instruments that measure oral health–related quality-of-life (OHRQOL) outcomes[16,19,20] and assess body image perception[20,21] during the orthodontic treatment planning process. The usefulness of OHRQOL measures alongside normative indices in predicting orthodontic concerns has been investigated by several researchers.[9,11,12,14,22]

Adolescents tend to be strongly concerned about their body image, and body image plays an important role in psychological and social adjustment and educational success.[23,24] This population is considered to be a relevant age group for the study of esthetic perceptions and OHRQOL outcomes. Thus, the aim of this study was to investigate the effect of malocclusion, quality of life, and self-image on the psychosocial impacts of dental esthetics in a sample of adolescents.

MATERIALS AND METHODS

This cross-sectional study was designed to include a convenience sample of 301 adolescents (58.1% female, 41.9% male; age range 13 to 20 years, mean = 16.1, SD = 1.8) from a public school in the city of Goiania, Goias, Brazil. Excluded were students with any mental or behavioral disorder that reduced their ability for self-determination as well as those who did not agree to participate or whose legal representatives did not authorize participation in the study. Ethical approval was obtained from the Ethics Committee of the Federal University of Goias. Authorization for the study was provided by the State Education Council, and informed consent was obtained from the adolescents and their legal guardians.

Data were collected from August to November 2006 and included demographic information and information on subjects' dental conditions. The DAI was used for assessment of malocclusion and determination of orthodontic treatment need. Subsequently, the students answered a questionnaire that included instruments to identify oral health impact (short form of the Oral Health Impact Profile [OHIP]), perception of dental esthetics (Psychosocial Impact of Dental Aesthetics Questionnaire [PIDAQ]), and self-reported body satisfaction (Body Satisfaction Scale [BSS]). All examinations and questionnaires were applied individually.

Dental Examination

The dental examinations and diagnostic criteria followed the World Health Organization recommendations for oral health surveys.[25] Dental evaluation was performed by one experienced and trained orthodontist, who conducted all clinical exams. Adolescents with other dental treatment needs were notified and referred to other dental care facilities.

Dental Aesthetic Index

The esthetic component of the DAI[26] includes 10 parameters of dentofacial anomalies related to both clinical and esthetic aspects of the anterior teeth. Four grades of malocclusion are given, with priorities and orthodontic treatment recommendations assigned to each grade: grade 1 indicates normal or minor malocclusion/no treatment need or slight need (DAI $\leq$ 25); grade 2, definite malocclusion/treatment is elective (26 $\leq$ DAI $\leq$ 30); grade 3, severe malocclusion/treatment is highly desirable (31 $\leq$ DAI $\leq$ 35); and grade 4, very severe malocclusion/treatment is mandatory (DAI $\geq$ 36). The same orthodontist who performed the clinical examinations was trained and calibrated for measurement of dental parameters for the DAI score.

Short Form of the Oral Health Impact Profile

The Portuguese version of the OHIP-14[27] was used to measure OHRQOL impacts of oral problems in the last 6 months, capturing an overall measure of functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. Questions are scored on a five-point scale (4 indicates very often; 3, fairly often; 2, occasionally; 1, hardly ever; and 0, never). The sum of individual item responses were added together to generate an overall OHIP-14 score, with possible values ranging from 0 to 56.

Psychosocial Impact of Dental Aesthetics Questionnaire

The PIDAQ[28] is a 23-item psychometric instrument for assessment of orthodontic-specific aspects of quality of life, expressed in four domains: dental self-confidence (six items), social impact (eight items), psy-

Table 1. Clinical Characteristics of Subjects as Assessed Using the DAI, OHIP-14, PIDAQ, and BSS

	Possible Range of Total Scores	Min–Max	Mean (SD)	Median
DAI	≥13	15–50	26.25 (6.79)	26
Grade 1	13–25	15–25	20.81 (2.80)	21
Grade 2	26–30	26–30	27.79 (1.42)	28
Grade 3	31–35	31–35	32.53 (1.48)	32
Grade 4	≥36	36–50	39.74 (3.70)	39
OHIP-14	0–56	0–31	7.42 (6.88)	6
Functional limitation	0–8	0–6	0.88 (1.13)	0
Physical pain	0–8	0–8	2.05 (1.72)	2
Psychological discomfort	0–8	0–8	1.71 (2.04)	1
Physical disability	0–8	0–7	0.63 (1.22)	0
Psychological disability	0–8	0–8	0.90 (1.37)	0
Social disability	0–8	0–7	0.87 (1.38)	0
Handicap	0–8	0–4	0.36 (0.79)	0
BSS	16–112	16–112	38.71 (18.21)	36
Head parts	8–56	8–56	19.49 (9.72)	18
Body parts	8–56	8–56	19.19 (10.26)	17
PIDAQ	0–69	60–61	18.13 (12.28)	15
Dental self-confidence	0–18	0–18	9.68 (5.00)	10
Social impact	0–24	0–24	3.49 (4.25)	2
Psychological impact	60–18	0–18	3.36 (3.44)	2
Esthetic concern	0–9	0–9	1.71 (2.40)	0

chological impact (six items), and esthetic concern (three items). The PIDAQ instrument had been previously tested for its validity, reliability, and factorial stability across samples.[28] The subjects were asked to rate how much dental esthetics exerted a positive or negative impact using a five-point Likert scale ranging from 0 to 4 (0 indicates not at all; 1, a little; 2, somewhat; 3, strongly; and 4, very strongly). An overall PIDAQ score was obtained by summing all item scores, and the sum of the items in each domain produced subdomain scores. To ensure the same direction of scoring for all items of the questionnaire, some domains had scores reversed to produce a consistent measure of the impacts.

Body Satisfaction Scale

The BSS[29] is a self-administered scale to assess a person's satisfaction/dissatisfaction with 16 body parts: head, face, jaws, teeth, nose, mouth, eyes, ears, shoulders, neck, chest, belly, arms, hands, legs, and feet. The items are rated on a seven-point scale (from 1 to indicate "very satisfied," to 7, "very unsatisfied"; higher scores therefore indicate greater body dissatisfaction). Three summative scales are derived from the instrument with acceptable internal consistency: general, head parts, and body parts.[29]

Statistical Analysis

Descriptive statistics of clinical characteristics and scores were obtained. Bivariate analysis was performed using the Kruskal-Wallis test and Spearman correlation coefficient. Multiple linear regression analysis was used to test the influence of age, gender, OHIP-14, body self-image (BSS), and malocclusion on the PIDAQ scale and subscales. The significance level was set at $P < .05$. SPSS 14.0 for Windows (SPSS Inc, Chicago, Ill) was used for statistical analysis.

RESULTS

Most students (49.8%) had no treatment need or only a slight need (grade 1), and 10.3% (n = 31) had very severe malocclusion (grade 4). At least one oral impact on quality of life was reported by 88% of the adolescents, and 98.3% of subjects showed some level of psychosocial impact of dental esthetics. Dissatisfaction with some body part was revealed by 72% of the sample. Table 1 includes data on the clinical assessment using DAI and scores of perception of OHRQOL and body satisfaction. Reliability analysis showed that internal consistency was considered acceptable. Cronbach's alpha was 0.93 for PIDAQ (subscale alphas ranged from 0.82 to 0.92), 0.91 for BSS, and 0.85 for OHIP-14.

Subjects' perception scores of the PIDAQ scale and subscales (Table 2) were analyzed according to the grades of malocclusion determined by the DAI. Overall, scores on the PIDAQ scale and subscales were higher with a greater DAI score ($P < .001$).

Table 3 shows bivariate correlation between all continuous variables. Multiple linear regression analysis

Table 2. Means and Standard Deviations of PIDAQ Scale and Subscales According to DAI Grades of Malocclusion

Scale/Subscale	DAI grades 1	2	3	4	*P**
PIDAQ scale	14.1 (10.2)	21.1 (13.7)	21.2 (12.0)	24.9 (12.0)	< .001
Dental self-confidence subscale	8.1 (4.9)	11.1 (4.5)	10.4 (4.7)	12.8 (4.3)	< .001
Social impact subscale	2.6 (3.4)	4.2 (4.8)	4.2 (5.4)	5.0 (4.2)	< .001
Psychological impact subscale	2.4 (2.6)	4.1 (3.9)	4.3 (3.6)	5.0 (4.2)	< .001
Eesthetic concern subscale	1.2 (2.0)	2.1 (2.6)	2.2 (2.7)	2.7 (2.6)	< .001

* Kruskal-Wallis test.

Table 3. Correlation Coefficients for Analysis of Associations Between Continuous Measurements[a]

	DAI Score	OHIP-14	PIDAQ	PIDAQ DSC	PIDAQ SI	PIDAQ PI	PIDAQ AC	BSS	BSS (Head Parts)	BSS (Body Parts)
DAI Score	1									
OHIP-14	NS	1								
PIDAQ	0.307*	0.283*	1							
PIDAQ DSC	0.306*	0.220*	0.775*	1						
PIDAQ SI	0.201*	0.230*	0.828*	0.367*	1					
PIDAQ PI	0.278*	0.290*	0.880*	0.541*	0.747*	1				
PIDAQ AC	0.228*	0.205*	0.777*	0.475*	0.618*	0.632*	1			
BSS	NS	0.172*	0.295*	0.345*	0.168*	0.245*	0.153*	1		
BSS (head parts)	NS	0.220*	0.379*	0.415*	0.246*	0.314*	0.192*	0.901*	1	
BSS(body parts)	NS	NS	0.158*	0.211*	NS	0.133*	NS	0.912*	0.643*	1

[a] DSC indicates dental self-confidence subscale; SI, social impact subscale; PI, Psychological impact subscale; AC, esthetic concern subscale; and NS, not significant.

* Significant correlation ($P < .05$).

Table 4. Multiple Linear Regression for the Association of PIDAQ and Independent Variables

Regression Parameters	Independent Variables	Overall PIDAQ Scale	Dental Self-Confidence	Social Impact	Psychological Impact	Esthetic Concern
Beta coefficient	Constant	11.715	6.253	1.203	2.286	−0.030
	Age (y)	−0.714	−0.242	−0.124	−0.223	−0.043
	Gender (male = 0)	−0.117	−0.464	0.094	0.422	0.274
	OHIP-14	0.405*	0.123*	0.117*	0.124*	0.064*
	BSS (subscale head parts)	0.401*	0.192*	0.086*	0.088*	0.036*
	DAI score	3.915*	1.590*	0.883*	0.949*	0.591*
R^2		0.29	0.30	0.14	0.23	0.13
P		<.001	<.001	<.001	<.001	<.001

* Statistically significant association.

(Table 4) showed that the independent variables (OHIP-14, head parts subscale of BSS, and DAI score) had significant effects on patients' perceptions of the psychosocial impacts of dental esthetics. Age and gender were included in the regression models as control variables. The PIDAQ scale and subscales showed R^2 values indicating that the model accounted for 13% to 29% of the variance in perception scores.

DISCUSSION

Our study revealed that adolescents with higher DAI scores had greater esthetic impact scores, and adolescents with less attractive dentitions may be psychosocially disadvantaged and have esthetic concerns. Mandall et al[30] found that children with higher orthodontic treatment need perceived more negative psychosocial impacts. Al-Sarheed et al[31] showed that 11- to 14-year-old individuals with malocclusion reported significantly more impact and hence a worse quality of life compared with a group of individuals with no or minimal malocclusion. Although dissatisfaction with dental appearance is broadly related to the severity of irregularities, there are differences in the recognition and evaluation of them. It is not uncommon to observe that some patients with severe malocclusions are satisfied with or indifferent to their dental esthetics, while others are very concerned about minor irregularities.[12,14,24]

There was no association between the DAI, OHIP-14, and BSS, which was not surprising, as these instruments were not developed specifically to measure the impact of orthodontic problems, and some of the questions are not necessarily relevant to patients with malocclusion. O'Brien et al[32] suggested that the most significant impact of malocclusion on quality of life expresses itself in the psychosocial domain rather than in dissatisfaction with function. Psychometric scales reveal that questions related to emotional and social domains, including aspects such as shyness, embarrassment, being upset, and avoidance of smiling or laughing, are more relevant to an orthodontic patient.[32]

Disease does not always negatively affect subjective perceptions of well-being, and even when it does, its impact depends on expectations; preferences; material, social, and psychological resources; and, more important, socially and culturally derived values.[6,13,20,33] Data from the regression analysis also reinforced that there were differences in the psychosocial impact of dental esthetics according to gender, OHIP-14, self-image related to head parts, and DAI score. PIDAQ scores were higher in subjects with greater oral health impacts on quality of life and who expressed dissatisfaction with their facial self-image.

These results confirm the view that adolescents attribute high importance to an attractive dental appearance.[5,10,34] Grzywacz[34] reported that 100% of 84 children aged 12 years judged that healthy and well arranged teeth were important in facial appearance. Van der Geld et al[35] found that facial attractiveness was correlated with personality traits and self-confidence/self-esteem and highlighted the need for further study on the esthetic aspects of the oral region within the whole scope of facial esthetics and within the context of acceptance of one's own body. Phillips and Beal[12] showed that, in adolescents, the self-perceived level of the attractiveness or ''positive'' feelings toward the dentofacial region is a more important factor in one's self-concept than the severity or perceived severity of the malocclusion or the adolescent's perception of their malocclusion.

Higher PIDAQ scores in subjects with higher OHIP-14 scores corroborate the theory that dentofacial esthetics plays an important role in social interaction and psychological well-being.[36–38] The impact of oral health conditions on quality of life, especially in items of satisfaction with appearance, may result in feelings of shame in social contacts and those who are psychosocially disadvantaged.[10,15,17,24,30,38,39] Therefore, the expected benefits of orthodontic treatment would include an enhancement of self-esteem and a reduction in social anxiety.[7,10,20,39]

Gender has not been an important variable in predicting the psychosocial impact of dental esthetics, but it might be considered in the context of the other significant variables. Other studies found that women are more critical of their perception of impacts related to dental esthetics.[8,14,20,24,31,32,37] This might be a result of the commonly reported greater concern about health in women than in men, as expressed by higher attention to health care and greater awareness of oral health impacts, attractiveness of facial appearance, and quality-of-life considerations.[8,32]

Because patients' perceptions of psychosocial impact related to dental esthetics are multifactorial and are influenced by measures of normative orthodontic treatment need as well as subjective aspects, a multifactorial approach may also be useful in planning orthodontic services and in guiding public health practices. It may also minimize the risks of overtreatment and reduce costs by identifying those with a greater likelihood of benefiting from orthodontic treatment. Additional studies are needed to assess the predictive value of other clinical and sociodental variables on perceived esthetic impacts in adolescents, focusing on representative samples of normal populations. The specific sociodemographic characteristics of this convenience sample may have resulted in potential bias when clinical and epidemiologic inferences are considered.

CONCLUSIONS

- The hypothesis is rejected. Subjective self-perception of dental esthetics in adolescents is influenced by occlusal conditions, oral health–related quality of life, and self-image. Together, these measures can provide a good indication of treatment need.

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