The effect of malocclusion and self-perceived aesthetics on the self-esteem of a sample of Jordanian adolescents

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SUMMARY The aims of this study were to evaluate the effect of normative treatment need, perceived social impact of malocclusion and satisfaction with dental appearance on self-perceived treatment need, self-perceived aesthetics, and self-esteem; the influence of self-perceived need and aesthetics on self-esteem; and whether receipt of orthodontic treatment influences self-esteem.

A questionnaire was administered to a random sample of 410 students (195 males and 215 females) aged 14–16 years. Self-esteem was measured using the Global Negative Self-Evaluation (GSE) scale. The Aesthetic and Dental Health Components (AC and DHC) of the Index of Orthodontic Treatment Need (IOTN) were used to assess orthodontic treatment need. Students' AC scores determined their self-perceived dental aesthetics. Spearman correlation coefficient was used to analyse the association between all variables, and multiple stepwise regression analysis to study the effect of independent variables on self-perceived need for treatment, self-perceived aesthetics, and self-esteem.

A correlation existed between the students' and examiner's AC scores ($P < 0.01$); however, students were less critical in evaluating their aesthetic appearance. Students who perceived themselves in need of treatment had a great need for treatment, as assessed by the DHC and the AC of the IOTN ($r = 0.421$ and 0.489, respectively), were dissatisfied with their dental appearance ($r = 0.542$) and avoided smiling to hide their teeth ($r = 0.457$). Students who scored high on the GSE scale perceived a need for orthodontic treatment, evaluated their dental aesthetics poorly, perceived an impact of malocclusion on social acceptance, and had a great normative orthodontic treatment need; the correlation, however, was weak with r values ranging from 0.134 to 0.317. Students who had received orthodontic treatment showed greater self-esteem than those who had not, although the correlation was weak. Dissatisfaction with dental appearance had a strong predictive effect on self-esteem.

Introduction

Studies in social psychology on the effect of physical appearance on self-concept and social acceptance of individuals have led to positive findings (Barocas and Daroly, 1972; Dion, 1973; Dion and Berscheid, 1974). Based on such findings, orthodontists assume that an aesthetic dental appearance would lead to a greater self-esteem and social well-being. Thus, much emphasis has been placed on the importance of orthodontic treatment for the psychosocial well-being of individuals and improving their self-concept and self-esteem. A review of the literature, however, provides little evidence to suggest that self-concept is enhanced after orthodontic treatment (Korabik, 1994; Varela and Garcia-Camba, 1995; Shaw *et al.*, 2007) or that individuals who perceive their dental appearance as attractive have a higher self-concept or self-esteem (Birkeland *et al.*, 1996; Mandall *et al.*, 1999).

Longitudinal studies that compared the self-esteem of individuals before and after orthodontic treatment did not demonstrate a correlation between treatment changes and self-esteem (Dann *et al.*, 1995; Birkeland *et al.*, 2000; Shaw *et al.*, 2007). Similarly, self-concept for subjects who had received orthodontic treatment was comparable with that of a group receiving no treatment (Klima *et al.*, 1979; O'Regan *et al.*, 1991; Albino *et al.*, 1994; Dann *et al.*, 1995).

Only a few investigations have found that physical attractiveness has an impact on the social well-being of individuals (Baldwin, 1980; Shaw, 1981a). Such studies, however, were conducted on children. While several investigators have reported that self-esteem increases with age (Alsaker and Olweus, 1993; Birkeland *et al.*, 2000), there is no clear-cut evidence in the literature that having 'straight teeth' improves one's self-esteem.

The aims of this study were to evaluate the effect of normative treatment need on self-perceived aesthetics, self-perceived orthodontic treatment need, and self-esteem; the effect of perceived social impact of malocclusion and satisfaction with dental appearance on self-perceived treatment need, self-perceived aesthetics, and self-esteem; the influence of self-perceived need and aesthetics on self-esteem; and whether receipt of orthodontic treatment influences self-esteem.

Subjects and methods

Subjects

The study was conducted in Amman, Jordan. Sample size calculation revealed that for a 95 per cent confidence level and 5 per cent precision, the study should include at least 385 subjects (Lerman, 1996). A total of 410 Jordanian students (195 males and 215 females) aged 14–16 years (mean 15 years) were randomly selected from 12 representative schools located in four demographic areas of the city.

Ethical approval was obtained from the Deanship of Academic Research at the University of Jordan. Furthermore, each head of the school was contacted to obtain approval to examine the students. Written consent was obtained from the parents.

Students who consented were clinically examined in the school premises under natural lighting by the author. Students who were undergoing orthodontic treatment were not included in the study. Alginate impressions were taken for each student and poured in stone the same morning.

Variables

A questionnaire (Table 1) was handed individually to each student to fill out in the presence of an interviewer for guidance. In addition to demographic data, the questionnaire included an assessment of satisfaction with dental appearance, perceived need of orthodontic treatment, social benefits of dental attractiveness (perceived impact of malocclusion on social acceptance), and a Global Negative Self-Evaluation (GSE) scale (Alsaker and Olweus, 1986).

Self-perceived aesthetics. After completing the questionnaire, each student was shown the 10 photographs of the Aesthetic Component (AC) of the Index of Orthodontic Treatment Need (IOTN; Brook and Shaw, 1989) and asked to select the photograph that best represented the attractiveness of his/her dental appearance. This was used as a measure of their self-perceived aesthetics.

Perceived need, satisfaction with appearance, and social impact of malocclusion. The perceived need for orthodontic treatment was determined by asking each student whether he/she considered they needed treatment. Satisfaction with dental appearance was assessed by asking the students if they were satisfied with the way their teeth looked. The social impact of malocclusion was obtained from questions on social acceptance that were derived from the study of Mandall *et al.* (1999). The students recorded their response to each question on a four-point Likert scale. The sum of the scores determined the self-perceived social impact of malocclusion or benefits of dental attractiveness as reported by the students (Table 1).

Self-esteem. The GSE scale (Alsaker and Olweus, 1986), an adaptation of the self-esteem scale of Rosenberg (1965), was

Table 1 Questionnaire.

Need for treatment (score 1–4)
Do you think you need orthodontic treatment?
(1: not at all, 2: maybe, 3: most probably, 4: definitely)
Satisfaction with dental appearance (score 1–4)
Are you satisfied with the way your teeth look?
(1: not at all, 2: a little, 3: satisfied, 4: very satisfied)
Social impact of malocclusion (score 1–4)
Do you think having straight teeth makes you more popular?
(1: not at all, 2: a little, 3: probably, 4: definitely)
Do you think having straight teeth makes you successful in life?
(1: not at all, 2: a little, 3: probably, 4: definitely)
Have you been told by other people that you need to have your teeth straightened?
(1: never, 2: sometimes, 3: most of times, 4: always)
Have you been teased about your teeth?
(1: never, 2: sometimes, 3: most of times, 4: always)
Do you avoid smiling to hide your teeth?
(1: never, 2: sometimes, 3: most of times, 4: always)
Global Negative Self-Evaluation scale (score 1–6)
(1: does not apply at all, 6: applies exactly)
At times I feel I'm no good at all
I feel I don't have much to be proud of
I certainly feel useless at times
All in all I'm inclined to feel that I'm a failure
I would like to change many things about myself
I have often wanted to become someone else

used to measure students' self-esteem. The questions for the GSE scale are shown in Table 1. Each question contained six response options scored from 1 to 6: 1, does not apply at all; 2, does not apply well; 3, applies somewhat well; 4, applies fairly well; 5, applies well; and 6, applies exactly. The scores were summed to obtain the average self-esteem of each student.

Study models. The study models were used for assessment of malocclusion using the IOTN (Brook and Shaw, 1989). Both the Dental Health Component (DHC) and the AC of the IOTN were recorded by the author who had previously been calibrated in the use of the IOTN.

Kappa values for the DHC and the AC were 0.92 and 0.80, respectively, which indicated good agreement (Bulman and Osborn, 1989).

The DHC of the IOTN ranks malocclusions according to the severity of various occlusal traits into five grades; grades 1 and 2 represent no or little need, grade 3 a borderline need, and grades 4 and 5 a definite need for treatment.

The AC of the IOTN consists of 10 coloured photographs with different levels of dental attractiveness ranked from the most attractive (grade 1) to the least attractive (grade 10). Grades 1–4 represent no or little aesthetic need, grades 5–7 borderline aesthetic need, and grades 8–10 definite aesthetic need for orthodontic treatment (Richmond *et al.*, 1995).

Error of the method

The questionnaire was piloted for understanding on 20 children. Cronbach's alpha was used to measure reliability of the answers to questions about social impact of malocclusion and self-esteem.

Twenty-five study models were randomly selected after 1 month from the initial assessment, and the DHC and AC were recorded. The intra-examiner reproducibility of the DHC and the AC was assessed using weighted kappa.

Statistical analyses

The chi-square test was applied to test distribution differences between genders and the differences between the student's self-perceived aesthetics (AC student) and the examiner's AC of the IOTN.

Spearman correlation coefficient was used to analyse the association between satisfaction with dental appearance, self-perceived need for treatment, social impact of malocclusion, and self-esteem, and multiple stepwise regression analysis to study the effect of independent variables on self-perceived need for treatment, self-perceived aesthetics, and self-esteem.

The statistical analyses were performed using the Statistical Package for the Social Sciences (version 14; SPSS Inc., Chicago, Illinois, USA).

Results

Of the 410 study models collected, a total of 400 were included in the study. Ten study models had to be excluded from the analysis due to inaccuracies.

Reliability analyses of reproducibility for the answers to questions about social impact and GSE scale resulted in alpha coefficients of 0.69 and 0.66, respectively.

Intra-examiner kappa values for the DHC and the AC were 0.98 and 0.90, respectively, which indicated good agreement (Bulman and Osborn, 1989).

Normative treatment need and self-perceived treatment need and aesthetics

The results of normative treatment need, measured using the DHC and AC of the IOTN, for the students who did not undergo orthodontic treatment are shown in Table 2.

A significant but weak correlation was found between the students' and examiner's AC scores ($r = 0.387$, $P < 0.01$). Students were less critical in evaluating their aesthetic appearance.

Students who perceived themselves in need of orthodontic treatment had a great normative treatment need, as assessed by both the AC and DHC of the IOTN, were dissatisfied with their dental appearance and tended to hide their smile (Table 3).

There was no significant difference between males and females in their self-perceived need for treatment.

Table 2 Normative treatment need according to gender measured using the Index of Orthodontic Treatment Need.

IOTN	Dental Health Component		Aesthetic Component	
	Males, n (%)	Females, n (%)	Males, n (%)	Females, n (%)
Little need	80 (57.1)	60 (42.9)	111 (48.9)	116 (51.1)
Borderline need	38 (45.5)	45 (54.2)	35 (43.2)	46 (56.8)
Definite need	46 (40)	69 (60)	18 (60)	12 (40)
Total	164 (48.5)	174 (51.5)	164 (48.5)	174 (51.5)

Table 3 Stepwise multiple regression analysis of the effect of independent variables on self-perceived need for orthodontic treatment and self-perceived aesthetics in untreated subjects using the Index of Orthodontic Treatment Need (IOTN)

Dependent variable	Regression coefficients				P	R^2	95% confidence interval for B	
	Statistically significant independent variables	Unstandardized coefficients		Standardized coefficients			Lower bound	Upper bound
		B	Standard error	Beta				
Perceived need for treatment	Dissatisfaction with dental appearance	0.399	0.065	0.320	<0.001	0.423	0.271	0.527
	Aesthetic Component of the IOTN (examiner)	0.370	0.094	0.209	<0.001		0.186	0.554
	Hide smile	0.262	0.072	0.176	<0.001		0.121	0.403
	Dental Health Component of the IOTN	0.203	0.067	0.153	0.003		0.070	0.336
Self-perceived aesthetics (students' Aesthetic Component score)	Aesthetic Component of the IOTN (examiner)	0.130	0.030	0.252	<0.001	0.210	0.071	0.188
	Dissatisfaction with dental appearance	0.058	0.022	0.159	0.009		0.015	0.101
	Gender	0.092	0.033	0.138	0.005		0.028	0.157
	Perceived treatment need	0.036	0.018	0.124	0.046		0.001	0.072

Perceived aesthetics, satisfaction with appearance, and social impact of malocclusion

Students who were assessed by the examiner as having high AC scores, and hence a great need for treatment based on aesthetics, had significantly higher self-perceived AC scores (Table 3).

Those who perceived themselves as unattractive were significantly less satisfied about their dental appearance than students who perceived themselves as attractive. They also reported a greater self-perceived need for treatment.

Males in general viewed themselves as less attractive than females (Table 3).

There was a significant correlation between perceived social impact of malocclusion and perceived treatment need, normative treatment need, and self-perceived aesthetics (Table 4).

Self-esteem

Chi-square analysis revealed no significant difference in the GSE scale between males and females.

Students who had received orthodontic treatment had significantly higher self-esteem than those who had not received treatment, but the correlation was weak ($r = 0.165$, $P < 0.05$).

Table 4 shows the Spearmans correlation coefficients for the independent variables that had a significant effect on self-esteem; students with a great normative treatment need, a high self-perceived need for treatment, and high AC scores demonstrated higher negative self-esteem scores; i.e. low self-esteem.

Perceived social impact of malocclusion was correlated with self-esteem: students who reported being teased about their teeth, who were more likely to hide a smile, who were not satisfied with the looks of their teeth, and who perceived people with straight teeth as more popular and more successful were those who showed the lowest self-esteem (Table 5). The results also show that the students' self-perceived need for treatment was greatly influenced by the opinions of other people about whether they needed treatment or not. Although r values were significant, they all had moderate to weak correlations.

However, when analysing the data in a stepwise multiple regression to assess which of the independent variables had the greatest influence on self-esteem, it was found that students' dissatisfaction with the appearance of their teeth was the most significant factor ($P < 0.001$). Students who had a low self-esteem were also those who were more likely to avoid smiling ($P = 0.001$) and felt that having straight teeth made a person more popular ($P = 0.022$).

Discussion

Treatment need and self-perceived aesthetics

In this study, the student's perception of his/her dental aesthetics was measured using the AC of the IOTN where

Table 4 Spearman's rho correlation coefficient between Global Negative Self-Evaluation (GSE) scale, perceived social impact of malocclusion, perceived dental aesthetics [student's Aesthetic Component (AC) score], perceived need for treatment, and normative need for treatment [Dental Health Component (DHC) and AC of the Index of Orthodontic Treatment Need (IOTN)].

	Perceived social impact	Students' AC score	Perceived treatment need	DHC of IOTN	Examiner's AC score
GSE scale	0.317**	0.138*	0.204**	0.134*	0.200**
Perceived social impact		0.252**	0.610**	0.293**	0.420**
Perceived treatment need	0.610**	0.298**		0.421**	0.489**
Student's AC score	0.252**		0.298**	0.256**	0.360**

Correlation significant at the *0.05 and **0.01 level (two tailed).

Table 5 Spearman's rho correlation coefficient between the components of perceived social impact of malocclusion and satisfaction with dental appearance, self-perceived aesthetics [student's Aesthetic Component (AC) score], perceived treatment need, and self-esteem [Global Negative Self-Evaluation (GSE) scale].

	Teased about teeth	Told they need treatment	Hide smile	Satisfaction with dental appearance	Subjects having straight teeth are more popular	Subjects having straight teeth are more successful in life
GSE	0.272**	0.141**	0.336**	−0.305**	0.164**	0.112*
Student's AC score	0.213**	0.263**	0.237**	−0.304**	−0.016 (NS)	0.059 (NS)
Perceived treatment need	0.354**	0.670**	0.457**	−0.542**	0.012 (NS)	0.012 (NS)

NS, not significant.
Correlation significant at the *0.05 and **0.01 level (two tailed).

each student had to choose the photograph that most resembled his/her dental aesthetics. The validity of using dental photographs or the AC of the IOTN in representing dental attractiveness has previously been reported (Howells and Shaw, 1985).

The results of the present research showed that there was a significant association between the adolescents' self-perceived need for treatment and their self-perceived dental aesthetics as evaluated by their AC scores. Self-perceived need for treatment also correlated with normative orthodontic treatment need (examiner's DHC and AC of IOTN).

Although some studies using the AC of the IOTN as a measure of aesthetic perception reported that individuals' perceptions of dental aesthetics did not significantly agree with that of the examiner (Mandall *et al.*, 1999, 2001), others found a significant agreement (Evans and Shaw, 1987; Holmes, 1992; Birkeland *et al.*, 1996; Abdullah and Rock, 2002; Kerosuo *et al.*, 2004; Mugonzibwa *et al.*, 2004; Abu Alhaija *et al.*, 2005). The conflict may be attributed to differences in the age of the subjects as well as cultural differences; a study carried out on a sample of Jordanians found that the correlation between the examiner's AC rating and the students' self-perceived aesthetics was higher in the older age groups (Abu Alhaija *et al.*, 2005).

The findings in this investigation regarding the association between the subjective and normative AC of the IOTN was in agreement with a study conducted on Arab high school students in Kuwait (Kerosuo *et al.*, 2004) and another on north Jordanians (Abu Alhaija *et al.*, 2005).

However, the students in this study were less critical in their aesthetic evaluation than the examiner, which corresponds with many other studies (Evans and Shaw, 1987; Shaw *et al.*, 1991; Holmes, 1992; Burden and Pine, 1995; Kerosuo *et al.*, 2004; Abu Alhaija *et al.*, 2005).

When assessing their attractiveness, females placed themselves at the more attractive end of the scale than males, which was in line with another study (Abu Alhaija *et al.*, 2005). This is somewhat expected since females aspire to look more attractive and place more emphasis on their looks than males.

The most significant factor affecting self-perceived need of treatment in this study was the dissatisfaction of the students with their own dental appearance.

Perceived psychosocial benefits of dental attractiveness

Self-esteem. The results of this study showed a significant association between self-esteem and perceived dental aesthetics. Individuals who saw themselves as 'less attractive' had a lower self-esteem than those who viewed themselves as 'attractive'. This implies that self-esteem might be affected by self-perceived aesthetics.

There was no significant difference in the GSE scale between males and females, which was in agreement with the study of Birkeland *et al.* (1996).

Individuals who had received orthodontic treatment had greater self-esteem than those who had not. Although many studies that compared the effect of orthodontic treatment on self-esteem did not reveal a significant change in self-esteem after treatment (Klima *et al.*, 1979; O'Regan *et al.*, 1991; Albino *et al.*, 1994; Korabik, 1994; Dann *et al.*, 1995; Birkeland *et al.*, 2000; Shaw *et al.*, 2007), other investigators found that orthodontic treatment may enhance body image (Varela and Garcia-Camba, 1995).

Students who had a need for orthodontic treatment as measured by the DHC and AC of the IOTN demonstrated a lower self-esteem than those with little or no need for orthodontic treatment. Other studies reached the same conclusion (Mandall *et al.*, 1999, 2001).

In this study, both students' self-esteem and self-perceived aesthetics and need for treatment were influenced by the opinion of other people. Burden and Pine (1995) found the role of peer groups to be important when determining orthodontic treatment.

Self-perceived aesthetics and treatment need in this study influenced self-esteem. The same result was obtained by Kenealy *et al.* (1991).

Even though there was a significant association between the above-mentioned variables and self-esteem, the correlation values were low. Therefore, it would be difficult to conclude that these findings are clinically significant. Moreover, there might be other factors that play a more significant role in an individual's self-esteem and this needs to be further investigated.

Social impact. It appears that malocclusion and an unattractive dental appearance have a negative social impact on an individual. Students in this study, who reported being teased about the appearance of their teeth and who avoided smiling to hide their teeth were those who had a great normative treatment need as measured by the AC and DHC of the IOTN. They were also greatly dissatisfied with the appearance of their teeth, placed themselves at the least attractive end of the AC scale, perceived a great need for treatment, and suffered from low self-esteem.

Other studies reported that children with a normal dental appearance are judged to be better looking, more desirable as friends, and more intelligent (Shaw, 1981a; Shaw *et al.*, 1985), while those with a poor appearance are more subjected to teasing and harassment (Shaw *et al.*, 1980; Shaw, 1981b).

Although the results were statistically significant, correlation values were low, which may lead us to question whether the results are clinically significant. However, the psychosocial effects of malocclusion should never be underestimated no matter how small. Depending on the individual's character, some may be more susceptible than others to psychological distress that results from teasing and bullying; hence, the impact on their psychological health might be great.

In view of the above, the merit of using objective indices to prioritize treatment need in countries where orthodontic treatment is provided by the health service system should be reconsidered. Indices that include an aesthetic evaluation of the malocclusion are especially important since more weight is placed on the aesthetic aspect of malocclusion.

Burden and Pine (1995) reported that the main reason patients seek orthodontic treatment is to minimize psychosocial problems related to their dental and facial appearance. In this study, individuals who were not satisfied with their dental appearance and who perceived a great need for treatment were those who reported more social problems and demonstrated lower self-esteem than subjects who were satisfied with their appearance. They also had a great normative treatment need based on the examiner's AC of the IOTN.

Based on these findings, the psychosocial detriment of an unattractive dental appearance should not be overlooked. Implementing aesthetic self-evaluation methods may be a useful tool to consider when prioritizing orthodontic treatment.

Conclusions

1. The use of normative (clinician) IOTN, especially the AC, correctly reflects subjective treatment need and self-perceived aesthetics. However, lay people tend to be less critical in their aesthetic evaluation than the clinician. Therefore, a modification of the AC of the IOTN to better reflect lay persons' evaluation of their own dental aesthetics should be considered.
2. Students who had received orthodontic treatment had a higher self-esteem than those who had not undergone treatment.
3. The students who had a great self-perceived need for treatment were those who demonstrated a greater negative self-evaluation of their own aesthetics.
4. Dissatisfaction with dental appearance is a strong predictor for low self-esteem.
5. Students who had a low self-esteem were those who avoided smiling to hide their teeth, reported having been teased about the appearance of their teeth, and believed that having straight teeth improved ones popularity and success in life.

Acknowledgement

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