

Psychosocial impact of dental aesthetics and desire for orthodontic treatment among Chinese undergraduate students

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Objective: The objective of this study is to evaluate the psychosocial impact of dental aesthetics in undergraduate students in the People's Republic of China and to investigate the association between normal orthodontic treatment needs, psychosocial impact of dental aesthetics, and desire for orthodontic treatment.

Materials and methods: A cross-sectional study was carried out in two universities in a city of the People's Republic of China with 374 young adults aged between 19 years and 24 years. The students answered a Chinese version of the Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ) and addressed their desire for orthodontic treatment. Objective malocclusion severity was assessed with the Index of Orthodontic Treatment Need (IOTN). Statistical analysis was performed by the SPSS software (Version 15.0).

Results: There was no statistical sex difference in relation to the dental health component of IOTN ($P=0.893$) and PIDAQ scores ($P=0.06$), but it was found that the desire for orthodontic treatment was significantly stronger among females. The total and subscale PIDAQ scores and malocclusion severity differed significantly among the five grades of desire ($P<0.01$). Significant positive correlation was found among desire for orthodontic treatment, IOTN-dental health component grades, and total or subscale PIDAQ scores ($P<0.01$). High correlation was found between desire and PIDAQ score ($r=0.93$).

Conclusion: The desire for orthodontic treatment is higher among female young adults who have the same orthodontic treatment needs compared to males. The desire for orthodontic treatment has high positive correlation with PIDAQ scores and increases with the increase in self-perceived psychosocial impacts of malocclusion and the needs for orthodontic treatment.

Keywords: questionnaires, self-concept, adult, need

Introduction

Recently, it has been well established that malocclusion has a significant impact on physical, social, and psychological well-being.^{1,2} As it is a public health problem of high prevalence rate in different populations,³ a desire and need for orthodontic treatment has existed for many decades.⁴ Traditionally, the principal goal of orthodontic treatment is to improve oral health, function, and aesthetics. However, recent studies have proved that orthodontic treatment can improve an individual's appearance, oral function, psychosocial well-being, and quality of life.^{2,5,6} Dominant motives for orthodontic treatment have evolved into improving dental-facial appearance and other psychosocial factors.⁶⁻⁸

Some indices have been developed and widely used to assess objective orthodontic treatment needs and outcomes.⁹⁻¹¹ The Index of Orthodontic Treatment Need (IOTN) was

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designed by Brook and Shaw⁹ to form a valid index of orthodontic treatment priority, which can classify the anatomical and aesthetic aspects. The index consists of two components: the dental health component (DHC) and the aesthetic component (AC). However, it cannot account for the influence of malocclusion on the patient's quality of life. The Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ) was designed for evaluating the psychosocial impacts of dental aesthetics in young orthodontic adults, providing information on one aspect of the oral health-related quality of life. It is a self-rating method for dental aesthetics, sometimes being the most common motivation for seeking orthodontic treatment.^{7,8}

Desire is a sense of longing or hoping for a person, object, or outcome, and it is a fundamental motivation of all human actions. The desire for improving dental aesthetics, psychosocial well-being, or quality of life is the fundamental motivation of undergoing orthodontic treatment. This desire seems to be influenced by demographics, severity of the malocclusion, dental care, and self-perception of facial aesthetics.^{12–15} The aim of the present study was to evaluate any differences or association between PIDAQ scores, desire for orthodontic treatment, and IOTN among undergraduate students in the People's Republic of China.

Materials and methods

Ethical approval was obtained from the Health Research Ethics Board of Wenzhou Medical University (WYKQ2014015). Each student was given oral as well as written information and signed a written consent form before participating in the research.

The research was designed as a prospective, cross-sectional study. The participants in this cross-sectional study were sophomores aged 19–21 years recruited from two universities in Wenzhou, People's Republic of China. The sample size was calculated as $n=331$, based on a population of 4,162 sophomores, a 5% significance level to detect clinically meaningful difference, an SD (9.67) of PIDAQ scores, and a tolerable error of 1. In order to compensate for a 20% nonresponse rate and the exclusion of 18% of the students due to a history of orthodontic treatment, a total of 534 students were randomly selected by computer at last. The following conditions were considered to be the exclusion criteria: had majored in art professional or oral science; had cleft lip or palate; craniofacial syndromes; and undergoing or had undergone previous orthodontic treatment. Participants who were willing to answer the questionnaire were included.

The students answered information concerning demographic factors and self-perceived psychosocial impacts

of malocclusion, using the Chinese version of the PIDAQ. It is composed of 23 questions of four subscales: dental self-confidence (six items), social impact (eight items), psychological impact (six items), and aesthetic concern (three items). The students also answered a question that corresponded to the desire for orthodontic treatment: "Would you like to improve your dental appearance by orthodontic treatment?" A five-point Likert scale is used for the above-mentioned items. The response options are as follows: 0= not at all; 1= a little; 2= somewhat; 3= strongly; and 4= very strongly. To ensure the same direction of scoring for all questionnaire items and to produce a consistent measure of impacts, the items in dental self-confidence (DS) were scored in a reversed mode. Clinical examinations were performed by two investigators who had undergone training and calibration (inter- and intraexaminer reliability: weighted kappa 0.80 and 0.91, respectively). The students who filled in the questionnaire and who were willing to receive clinical examinations received malocclusion severity examination by using the DHC of the IOTN. The DHC grade was determined from the records according to the highest scoring anomaly in the hierarchical scale. DHC grades 1–2 represented no or slight need for treatment, DHC grade 3 represented moderate or borderline need for treatment, and DHC grades 4–5 represented need or definite need for orthodontic treatment.

The SPSS software (Version 15.0; SPSS Inc., Chicago, IL, USA) was used to calculate research data and to run one-way analysis of variance, with least significant difference post hoc test to assess PIDAQ scores across groups. Kruskal–Wallis test was used to assess IOTN-DHC differences in relation to desire for orthodontic treatment. Student's *t*-test and Wilcoxon signed ranks test were also performed to observe differences between males and females. The interrelation among IOTN-DHC, PIDAQ, and desire was analyzed using Spearman's correlation analysis. The results were evaluated within a 95% CI. The statistical significance level was established at $P<0.05$.

Results

The demographic characteristics of the participants are shown in Table 1; 78 students were undergoing or had undergone previous orthodontic treatment, 45 students declined to join in, and 37 patients did not meet the inclusion criteria. Finally, a total of 374 students were recruited for the present study.

The internal consistency of the PIDAQ showed a satisfactory Cronbach's coefficient of 0.83. The mean total PIDAQ score was 27.22 ± 11.52 , and no significant sex differences

Table 1 The demographic characteristics of the participants

Demographic	n
Sex	
Male	193
Female	181
Age, years	
19–21	368
22–24	6
Region	
Zhejiang province	191
Other provinces	183
IOTN-DHC grades	
1–2	184
3	119
4–5	71
Total	374

Abbreviation: IOTN-DHC, dental health component of the index of orthodontic treatment need.

were found in relation to region ($P=0.13$). Table 2 shows that the total and subscale PIDAQ scores have no significant differences by sex, except the psychological impact (PI) ($P=0.02$) and social impact (SI) ($P=0.04$), where female subjects had higher scores. Wilcoxon signed ranks test ($P=0.89$) did not reveal statistical differences between male and female in relation to IOTN-DHC grades, but the desire for orthodontic treatment was higher among females ($P=0.035$).

Comparison of total and subscale PIDAQ scores in each grade of desire is shown in Table 3. The total and

Table 2 Comparison of PIDAQ scores, IOTN-DHC grades, and desire between males and females

Variable	Male	Female	P-value
PIDAQ, mean	26.15±11.24	28.36±11.74	0.06
DSC	10.28±4.00	10.46±4.10	0.67
SI	6.43±3.64	7.18±3.44	0.04*
PI	6.26±3.36	7.13±3.76	0.02*
AC	3.18±1.52	3.50±1.67	0.06
IOTN-DHC, n			0.893
Grades 1–2	94	90	
Grade 3	63	56	
Grades 4–5	36	35	
Desire, n			0.035*
0	56	40	
1	39	34	
2	60	55	
3	21	29	
4	17	23	
Total	193	181	

Notes: Student's *t*-test was performed to observe sex differences in relation to PIDAQ scores. A Mann–Whitney *U* test was performed to observe sex differences in relation to IOTN-DHC grades or desire for orthodontic treatment. * $P<0.05$. Data are presented as mean ± standard deviation.

Abbreviations: PIDAQ, Psychosocial Impact of Dental Aesthetics Questionnaire; IOTN-DHC, dental health component of the index of orthodontic treatment need; DSC, dental self-confidence; SI, social impact; PI, psychological impact; AC, aesthetic concern.

Table 3 Comparison of total and subscale PIDAQ scores in each grade of desire

Variable	Desire for orthodontic treatment					ANOVA F
	0	1	2	3	4	
PIDAQ total	14.54±3.57	20.85±3.96	29.37±4.02	40.26±4.45	46.82±6.52	582.88**
DSC	6.49±1.98	8.26±1.98	11.11±2.53	14.08±2.78	16.49±2.81	180.23**
SI	2.99±1.40	5.29±1.58	7.48±1.87	10.48±2.24	12.15±2.84	238.49**
PI	3.04±1.38	4.67±1.65	7.42±1.79	10.66±2.43	11.95±2.32	263.87**
AC	2.02±1.26	2.63±1.59	3.29±1.62	5.04±1.61	6.23±2.34	64.80**

Notes: One-way analysis of variance (ANOVA) with least significant difference post hoc test was used to assess PIDAQ scores intergroup. ** $P<0.01$. Data are presented as mean ± standard deviation. Grades are measured with grade 4 representing the highest desire for treatment and grade 1 representing the least desire.

Abbreviations: PIDAQ, Psychosocial Impact of Dental Aesthetics Questionnaire; DSC, dental self-confidence; SI, social impact; PI, psychological impact; AC, aesthetic concern.

Table 4 Comparison of IOTN-DHC grade in each grade of desire

IOTN-DHC	Desire for orthodontic treatment					Kruskal–Wallis F
	0	1	2	3	4	
Grade 1–2	94 (97.92%)	48 (65.75%)	30 (26.09%)	10 (20.00%)	2 (5.00%)	
Grade 3	2 (2.08%)	23 (31.51%)	70 (60.87%)	17 (34.00%)	7 (17.50%)	
Grade 4–5	0 (0.00%)	2 (2.74%)	15 (13.04%)	23 (46.00%)	31 (97.92%)	
Total	96 (100%)	73 (100%)	115 (100%)	50 (100%)	40 (77.5%)	190.44**

Notes: Kruskal–Wallis test was used to assess IOTN-DHC grades intergroup. ** $P < 0.01$. Grades are measured with grade 4 representing the highest desire for treatment and grade 1 representing the least desire. **Abbreviation:** IOTN-DHC, dental health component of the index of orthodontic treatment need.

Table 5 Comparison of total and subscale PIDAQ scores in each grade of IOTN-DHC

Variable	IOTN-DHC			ANOVA F
	Grades 1–2	Grade 3	Grades 4–5	
PIDAQ total	19.81±7.60	29.39±7.37	42.80±8.14	239.30**
DSC	8.17±3.02	10.75±2.92	15.40±3.21	147.68**
SI	4.59±2.41	7.67±2.61	11.04±2.92	170.74**
PI	4.49±2.46	7.67±2.82	10.67±2.92	140.09**
AC	2.54±1.55	3.40±1.81	5.55±2.67	72.68**

Notes: One-way analysis of variance (ANOVA) with least significant difference post hoc test was used to assess PIDAQ scores intergroup. ** $P < 0.01$. Data are presented as mean ± standard deviation.

Abbreviations: PIDAQ, Psychosocial Impact of Dental Aesthetics Questionnaire; IOTN-DHC, dental health component of the index of orthodontic treatment need; DSC, dental self-confidence; SI, social impact; PI, psychological impact; AC, aesthetic concern.

subscale PIDAQ scores differed significantly among five groups ($P < 0.01$). A significant positive correlation was found between desire and total or subscale PIDAQ ($r = 0.93$, $P < 0.01$), meaning that the desire for improving dental appearance increased with the increasing of self-perceived psychosocial impacts of malocclusion. Kruskal–Wallis test found that the IOTN-DHC grade was significantly different among the five groups (Table 4). The correlation coefficient between desire and IOTN-DHC grade was 0.72 ($P < 0.01$); the desire for improving dental appearance increased with the increasing level of malocclusion severity. Comparison of total and subscale PIDAQ scores in each grade of IOTN-DHC is shown in Table 5. The total and subscale PIDAQ scores differed significantly among groups ($P < 0.01$). A significant positive correlation was found between IOTN-DHC grade and total or subscale PIDAQ scores ($r = 0.72$, $P < 0.01$) and the psychosocial impacts of malocclusion increased with the increase of malocclusion severity. Correlation coefficient among PIDAQ scores, IOTN-DHC, and desire for orthodontic treatment is shown in Table 6.

Discussion

A motive is what prompts the person to act in a certain way or at least develop an inclination for specific behavior.

Table 6 Spearman’s correlation coefficient among PIDAQ scores, IOTN-DHC, and desire

	IOTN	DSC	SI	PI	AC	PIDAQ
Desire	0.72**	0.81**	0.86**	0.87**	0.60**	0.93**
IOTN	–	0.62**	0.68**	0.67**	0.46**	0.72**

Notes: ** $P < 0.01$. Grades are measured with grade 4 representing the highest desire for treatment and grade 1 representing the least desire.

Abbreviations: PIDAQ, Psychosocial Impact of Dental Aesthetics Questionnaire; IOTN-DHC, dental health component of the index of orthodontic treatment need; DSC, dental self-confidence; SI, social impact; PI, psychological impact; AC, aesthetic concern.

The motives for seeking orthodontic treatment are numerous and varied. A person's own desire for improving dental appearance is the main determinant factor, and the most commonly perceived impacts of dental aesthetics included appearance, self-consciousness about their smile, self-confidence, self-esteem, and so on.^{6,8,16} PIDAQ is a specialized tool for the evaluation of the psychosocial impacts of dental aesthetics in young adults, and it has been widely proved with high validity across samples,¹⁷ including Chinese young adults.^{18,19} Several research papers have studied the factors associated with the desire for orthodontic treatment among adolescents,^{12–15,20} and only one research was performed on adults.²¹ The present research is the first to study the association between psychosocial impact of dental aesthetics and the desire for orthodontic treatment among young adults in the People's Republic of China, and it was more advisable to analyze the psychosocial factors in adults, who have a more stable self-concept compared with adolescents.^{22,23}

Table 2 shows no significant sex difference in relation to malocclusion severity. However, female subjects had a higher PIDAQ score than males without significant differences and had a higher desire for orthodontic treatment. This finding is supported by a number of studies carried out on other populations, suggesting that females are more concerned with their dental–facial appearance and have higher self-perceived needs or desire for orthodontic treatment.^{12,20} However, some studies found no sex difference.^{2,14,15,21} There is no consensus in the literature and it should be discussed in future research. The present result revealed that females feel significantly higher social impact and psychological impact than males. Psychosocial factors are the main reason for why females have greater desires for seeking orthodontic treatment.^{16–19}

The desire for orthodontic treatment increased with the increased self-perceived psychosocial impacts of malocclusion and malocclusion severity according to IOTN-DHC. IOTN-DHC has been widely used to objectify orthodontic treatment needs and outcomes.^{10,11} However, it cannot account for the influence of malocclusion on the patient's social and mental status, which has been proved as a determinant factor for seeking orthodontic treatment.¹⁶ PIDAQ can evaluate the self-perception of dental aesthetics in adults and assess the psychosocial impact of dental aesthetics in treatment seeking; it covered the shortage of the IOTN. There is much higher correlation between desire and PIDAQ than between desire and IOTN-DHC, the reason could be that self-perceived oral health-related quality of life is not always a reflection of malocclusion severity.²³ Many studies have questioned the reliability of the IOTN-AC and have shown that the treatment

needs to be differed considerably according to the objective result of IOTN-DHC or subjective result of IOTN-AC,^{24,25} so the present study only chose IOTN-DHC and showed a significant positive correlation between the total and subscale PIDAQ scores and the grades of IOTN-DHC. It meant that the psychosocial impact of dental aesthetics increased with the severity of malocclusion and malocclusion could considerably influence adult's self-confidence, psychology, and social life; this finding agreed with other research.^{1,17,22} The results showed that the more severe the malocclusion and psychosocial impact, the more the desire for orthodontic treatment. However, many negative factors influenced people seeking orthodontic treatment, such as functional restrictions, discomfort and pain during orthodontics treatment, low self-perception of appearance, costs, time, dental fear, and so on.^{12,13}

Some studies have clearly shown PIDAQ is a reliable and effective method for measuring the psychosocial impact of malocclusion.^{18,19} The internal consistency of the PIDAQ in this study was good (Cronbach's coefficient, 0.83); Spearman's rank correlation coefficient (0.72) showed a satisfactory association among desire for orthodontic treatment, PIDAQ, and IOTN-DHC. However, the present study has some limitations that may curtail the generalization of results. The study participants are chosen from two universities in Wenzhou; this may limit the study's representativeness and prevent the generalization of these findings to the general population, but it will reduce other interference factors to the research. This study does not use AC of IOTN to compare with PIDAQ and only studied the influence of PIDAQ and IOTN-DHC. Various other factors might affect people's desire for orthodontic treatment, further study is needed.

Conclusion

The desire for orthodontic treatment is higher among female young adults, who have the same normative orthodontic treatment needs, compared to males. The desire for orthodontic treatment has positive correction with PIDAQ scores and IOTN-DHC and increased with the increasing of self-perceived psychosocial impacts of malocclusion and normative orthodontic treatment need. Meantime, the psychosocial impacts of malocclusion increase with the increase in malocclusion severity.

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Disclosure

The authors report no conflicts of interest in this work.

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