Original Article

Effect of personality on oral health–related quality of life in undergraduates

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ABSTRACT

Objectives: To evaluate the effects of personality traits and other variables on oral health–related quality of life (OHRQoL) of Chinese undergraduates aged 17 to 24 years with no history of orthodontic treatment.

Materials and Methods: A total of 443 undergraduate students aged 17 to 24 years were selected and completed a two-section questionnaire: the Eysenck Personality Questionnaire Short Scale Chinese version and the Oral Health Impact Profile–14 Chinese version (OHIP-14). Malocclusion severity was assessed via clinical examination using the dental health component (DHC) and esthetic component of the Index of Orthodontic Treatment Need (IOTN). Severe dentofacial deformities that required orthognathic surgery were excluded.

Results: The total and all dichotomized OHIP-14 dimensions correlated closely with the neuroticism personality traits ($P < .001$). The total and some subscales of OHIP-14 were related with psychoticism. Women had higher OHIP-14 scores than men, especially in the normal occlusion group. Nevertheless, men with more severe malocclusions had higher scores that were similar to those of women. OHRQoL was significantly different between the major of dentistry and other majors.

Conclusions: Personality affects comprehensive OHRQoL, and the most significant predictor is neuroticism. Female young adults have worse OHRQoL than male young adults, especially among those with mild malocclusion. (*Angle Orthod.* 2018;88:215–220.)

KEY WORDS: Personality; Health; Oral

INTRODUCTION

Malocclusion, a common tooth misalignment problem, not only influences patients' body image and oral function but also leads to severe psychological and mental disorders.[1,2] Students with better dental appearance have higher self-esteem and social acceptance than those with dental problems, indicating that an unattractive dental appearance has negative social impacts on individuals.[3] Moreover, malocclusion reduces oral health–related quality of life (OHRQoL), and the degree of reduction increases with the severity of misalignment.[4,5] However, some patients with mild malocclusion unexpectedly suffer psychosocially.[6] This phenomenon still has not been explained but may be attributable to psychological factors.

Measuring the impact of malocclusion is important, and one common technique is the Index of Orthodontic Treatment Need (IOTN). This index determines the needs for orthodontic treatment by considering the esthetic component (AC) and the dental health component (DHC). The IOTN has the advantages of reproducibility and accuracy and can be rapidly implemented.[7] However, the IOTN cannot be used to evaluate the impact of malocclusion on QoL.

The Oral Health Impact Profile (OHIP) estimates a person's perception about the social impact of oral disorders on well-being[8] and was abbreviated to a version of OHIP-14 in late 1997.[9] Both of these measures are of high quality and legitimacy and are approved as reliable ways to quantify OHRQoL. The OHIP is used to evaluate the influence of oral health on

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masticatory capacity and psychosocial function,[6,7] and a lower score on the OHIP indicates a higher satisfaction with dental care.[10]

The impacts of personality and psychological factors could be estimated by the Eysenck Personality Questionnaire (EPQ), which can be used to assess the psychosocial status and personality of adult patients with malocclusion.[11] The EPQ is simple and convenient, with high reliability and high validity compared with other personality questionnaires compiled by factor analysis. Therefore, it is widely applied and has been revised for use in many countries, including China.[12,13] In addition, the EPQ short scale for Chinese (EPQ-RSC) has also been revised and was demonstrated to be feasible for use in Chinese people.[14]

Research has shown modest relationships between malocclusion and QoL.[15,16] OHIP-14 scores decline greatly in individuals with no need for esthetic treatment or people receiving treatment compared with malocclusion patients.[17] Malocclusion patients are more inclined to be introverted and unstable than individuals with normal occlusion.[18] Meanwhile, self-esteem related to facial appearance tends to correlate closely with personality,[19] as dissatisfaction with dental appearance is a strong predictor for low self-esteem.[3] These findings indicate that the severity of malocclusion is associated with OHRQoL. Besides, even with the same degree of malocclusion, the impact of self-perceived oral conditions on well-being differs according to an individual's psychological status.

There is little research on the correlation between OHRQoL and psychological status. However, this information is critical to the design of better dental treatments. Thus, the purpose of this study was to investigate the relationship between OHRQoL and personality traits by assessing young Chinese adults with no history of orthodontic treatment using OHIP combined with EPQ and how this is influenced by other variables.

MATERIALS AND METHODS

Sample Selection

Adults aged 17 to 24 years from two universities in Wenzhou, China, were involved in this cross-sectional study. Students from different majors participated in the research, including medicine, stomatology, pharmacy, business administration, and law. A random selection program designed by Microsoft Visual Basic (Microsoft, Redmond, Wash) was conducted among dormitories to select and recruit participants. All of the dormitories were included and defined by an array of numbers, and then a random function was used to extract and output 100 of the dorms. A total of 555 students participated in the study, while data from 482 were used in the final analysis. The exclusion criteria were (1) craniofacial anomalies such as cleft lip or palate, (2) severe skeletal discrepancies requiring orthognathic surgery, (3) missing teeth or implants, (4) history or undergoing of orthodontic treatment, and (5) refusal to undergo dental examination. These exclusion criteria were set to make the samples homogeneous and to prevent possible confounding effects of such conditions. Ethical approval was obtained from the Health Research Ethics Board of Wenzhou Medical University, and informed consent was obtained from each student before participation. Dental students were also enrolled to investigate whether their oral perceptions were different from lay people.

The respondents were required to complete two self-administered questionnaires: OHIP-14 and EPQ-RSC. After completion, the interviewers examined the subjects' teeth using a modified DHC (IOTN-DHC[20]).

Questionnaire Design

Short form of OHIP-14. The impact of oral discomfort on OHRQoL in the past 6 months was measured by using the Chinese version of OHIP-14. This questionnaire was based on a subset of two questions for each of seven conceptual dimensions of OHRQoL. The 14 questions included how frequently the patient had experienced functional limitation, physical discomfort, psychological discomfort, physical disability, psychological disability, social disability, or handicap. Each question was scored on a five-point Likert-type scale of *very often* (4), *fairly often* (3), *occasional* (2), *hardly ever* (1), and *never* (0). The final score for each domain was computed by summing all the answers. Mean imputation was used if one item was unanswered in a questionnaire, while two or more deficient answers were regarded as "invalid." Since the question-weighted OHIP scores are similar to the unweighted OHIP scores in assessment of OHRQoL, the sum of OHIP values was used as the OHIP-14 score. The overall OHIP-14 ranges from 0 to 56, and the severity or total OHIP-14 score was calculated by adding the scores of all 14 items. A "0" represents no problems, while a higher score represents greater impact on OHRQoL.

IOTN. IOTN determines the treatment need based on two aspects: DHC and AC of the dentition.[20] In this study, both aspects were assessed by the clinician. DHC is a five-grade index that records the dental health need for orthodontic treatment. This index is determined by the following characteristics: the presence of retained teeth or lack of buds, the size of overjet, crossbite, crowding severity, and size of overbite. AC records the esthetic need for orthodontic

Table 1. Demographics of the Participants

Demographic	Number	Percentage
Age, y		
<20	129	29.12
≥20	314	70.88
Gender		
Male	171	38.60
Female	272	61.40
Major		
Dental	63	14.22
Not dental	380	85.78
Index of orthodontic treatment (IOTN-DHC)		
Mild/no (1–2)	170	38.37
Moderate (3)	159	35.89
Severe (4–5)	114	25.73
Objective AC		
Mild/no (1–4)	279	62.98
Moderate (5–7)	131	29.57
Severe (8–10)	33	7.45
Total	443	100

treatment on a scale of 10 photographs showing different levels of dental attractiveness. Clinical examination was undertaken to assess the DHC and AC of the IOTN of each participant. Specifically, (1) DHC grades 1–2 and AC grades 1–4, (2) DHC grades 3 and AC grades 5–7, and (3) DHC grades 4–5 and AC grades 8–10 represent (1) no or slight need, (2) moderate or borderline need, and (3) definite need for orthodontic treatment, respectively.

EPQ-RSC. Personality traits were evaluated using the Revised Eysenck Personality Questionnaire–Short Scale for Chinese (EPQ-RSC).[13,14] The EPQ is one of a series of personality inventories developed by Eysenck and colleagues. As a short scale of the Chinese version, EPQ-RSC includes 48 items and measures four scales (Extraversion, E; Neuroticism, N; Psychoticism, P; Lie, L). Each scale has 12 items with either "Yes" or "No" responses. The raw score of each dimension was transformed into a T-score according to the Chinese norm, where high scores suggested an outgoing, neurotic, or stubborn personality. The corresponding inclinations were defined as following: 43.3–56.7 = ambiversion, 38.5–43.3 and 56.7–61.5 = tendentious type, and <38.5 or >61.5 = typical type. The included 12 items each have an identical format with the EPQ-R Short Scale and were shown to have acceptable internal consistencies and test-retest reliability. Invalid personality questionnaires were determined for having missing items and were therefore excluded.

Statistical Analysis

Statistical analysis was performed using SPSS 18.0 (SPSS Inc, Chicago, Ill). The significance level was $P < .05$, and highly significant was considered as $P < .001$. Means and 95% confidence intervals were calculated via descriptive statistics. The differences in OHIP variables among the groups were examined by Mann-Whitney test. Correlations between OHIP scores and other variables were performed using Pearson and Spearman correlation tests. EPQ personality effects were analyzed by logistic regression analysis and predicted curves.

RESULTS

Among the 482 participants, 39 students were lost to follow-up because of an invalid questionnaire. Therefore, 443 students who completed the questionnaires were included, including 171 men and 272 women. The unbalanced sex distribution could be considered as a potential limitation of this study. The average age was 21.28 ± 1.36 years, with 70.88% of the total group in their 20s. The sample contained 63 dental students and 380 other students. The distribution of participants by IOTN-DHC grades is shown in Table 1. Neither total nor subscale OHIP-14 scores were significantly different between majors. Sex was significantly correlated with the total or subscale OHIP-14, such as physical pain, psychological disability, and psychological discomfort.

As shown in Table 2, the total and subscale OHIP-14 dimensions were all closely correlated with neuroticism personality traits ($P < .001$). Moreover, total and some domains of the OHIP-14 were correlated with psychoticism, including social disability, psychological disability, and handicap.

Women had significantly higher OHIP-14 scores than men across groups, indicating that women were

Table 2. Correlation Coefficients Between OHIP Scores and Other Variables

	OHIP-14 Total	Functional Limitation	Physical Pain	Psychological Discomfort	Physical Disability	Social Disability	Psychological Disability	Handicap
T score of P	.106*	.067	.006	.045	.098	.120*	.118*	.183**
T score of E	−.080	−.045	−.089	−.086	−.071	.007	−.063	−.064
T score of N	.297**	.169**	.207**	.306**	.235**	.200**	.308**	.206**
DHC	.041	.037	−.023	.058	.038	.036	.053	.003
Objective AC	.028	.031	−.032	.058	<.001	.045	.070	.007

* $P < .05$; ** $P < .001$.

Table 3. Comparison of OHIP-14 Between Genders in Each Group[a]

	OHIP-14		
Group	Male	Female	*P* Value
Mild	4.78 (3.12, 6.43)	7.00 (5.69, 8.32)	.016*
Moderate	5.18 (3.59, 6.77)	7.09 (5.73, 8.44)	.064
Severe	7.33 (4.86, 9.81)	7.27 (5.72, 8.82)	.360

[a] Values are presented as mean (95% confidence interval). Mild: DHC = 1 or 2; moderate: DHC = 3; severe: DHC = 4 or 5.
* $P < .05$.

more affected by oral health and had lower OHRQoL than men, especially for the subjects with mild malocclusion. Moreover, the impact of malocclusion on OHRQoL in terms of limited function and psychosocial well-being increased with the severity of malocclusion in men. However, this trend was not obvious in women (Table 3). In the mild malocclusion subjects, women also had significantly higher scores in some OHIP-14 dimensions, such as physical pain ($P = .004$), psychological discomfort ($P = .036$), and psychological disability ($P = .018$).

Logistic regression analysis showed that the risk of perceiving higher poor oral health was associated with neuroticism personality (odds ratio: 1.536; 95% confidence interval: 1.320–1.784; $P < .001$) and gender, as female respondents had higher OHIP scores (odds ratio: 1.567; 95% confidence interval: 1.092–2.246; $P = .015$). No significant association was found between OHRQoL and other factors (Table 4).

DISCUSSION

It is reportedly easier to analyze the self-perceived social impact of oral disorders in adults, as they already have some emotional stability and a more realistic view of dental-facial esthetics.[21] Thus, it was decided in this study to conduct an investigation in young adults (college students).

The OHIP has been proven as an important aid for determination of oral health needs and for development of strategies to control/reduce disease and promote oral health, with a positive impact on QoL.[22] As is well known, the responses to self-reported items are influenced by particular personality traits. In this study, a consistent association between negative emotionality and poor self-reported oral health was found, as expected. Neuroticism (N) was the most significant predictor of psychosocial impact of oral health, while extroversion (E), psychoticism (P), and lie (L) affected the relationship to a lesser extent. Dental students were always excluded from previous studies, because it was assumed that differences existed in perceptions of esthetics among dentists, dental students, and laypeople and that dental education may improve professional knowledge toward oral esthetic assessment.[23] However, the OHIP results showed no differences between dental students and other students, probably because many dental students in this

Table 4. Regression Models With the Oral Health Impact Profile as the Dependent Variable

			95% Confidence Interval for Odds Ratio		
Predictor	B (Regression Coefficient)	Odds Ratio	Lower	Upper	*P* Value
Age	.017	1.017	0.896	1.156	.788
Gender					
Male		1			
Female	.449*	1.567	1.092	2.246	.015
T score of P	.071	1.074	0.903	1.276	.423
T score of E	.009	1.009	0.875	1.162	.904
T score of N	.429**	1.536	1.320	1.784	<.001
DHC					
Mild/no (1–2)	−.279	0.757	0.377	1.519	.433
Moderate (3)	−.399	0.671	0.375	1.200	.178
Severe (4–5)		1			
Objective AC					
Mild/no (1–4)	.070	1.073	0.437	2.630	.879
Moderate (5–7)	.469	1.598	0.754	3.387	.221
Severe (8–10)		1			
Dental or not					
Dental student		1			
Not dental student	−.096	0.908	0.548	1.507	.709

* $P < .05$; ** $P < .001$.

study were at lower grades and had no access to professional knowledge of orthodontics.

With regard to sex, the findings from this study were consistent with many other investigations[24,25] showing that women perceived higher poor oral health compared with men, especially in terms of physical pain and psychological disability. Stratification analysis among three levels (mild, moderate, and severe) in terms of normative treatment need (DHC) showed that in subjects with no need (DHC1–2), women had significantly higher scores than men. This result implies that women were more affected by problems of the teeth and oral cavity than men, especially in the case of normal occlusion. In addition, for the mild treatment need group, areas in which women had higher scores were the domains of physical pain, psychological discomfort, and psychological disability. It is somewhat expected since women aspire to live more comfortably and place more emphasis on their esthetic appearance than men, but their confidence could be affected by only slight misalignment.

Women may also respond more sensitively to the various forms of discomfort that arise in the oral cavity during orthodontic treatment. Moreover, the impact of malocclusion on the patient's QoL in terms of limited function and psychosocial well-being is intensified with the severity of malocclusion in men. However, such trends were not obvious in women. This finding contradicts those of a previous study in which this trend was more pronounced in girls than in boys.[26] Studies have reported higher normative treatment needs and lower self-perceived need for men than for women.[27,28] Therefore, women sensitive to malocclusion are more likely to seek orthodontic treatment in their youth, and men may not be as greatly obsessed by dental problems.

It has been demonstrated that a patient's psychological profile can influence the social and emotional impacts of malocclusion.[29] Personality traits, which may shape the way an individual reacts to symptoms and thus construct an illness state, can be related to OHRQoL.[30] Psychosocial factors such as personality traits, especially neuroticism, are significantly associated with QoL ratings in patients with mucosal disease. Women have significantly more restrictions.[31] It was found that all subscales of OHIP were strongly positively correlated with neurotic personality, which partially supports the findings of Montero et al.[32] that neuroticism was inversely correlated with self-rated oral health and satisfaction with the smile. These results indicate that people with poorer self-reported oral health are more prone to anxiety, tension, and depression.

A significant association between psychoticism and the following OHRQoL domains were also observed: social disability, handicap, and psychological disability. High marks in two of the dimensions may be predictive of a negative effect, leading to an experience of negative feelings in the face of certain stressful situations and reaction to the environment with poor emotional control. This indicates that, under the same conditions, people with the personality traits of aggressiveness, coldness, anxiety, and tension are more influenced by malocclusion psychologically and socially. One surprising observation was that none of the OHIP-14 dimensions was found to have a significant correlation with extroversion. It may be possible that extraversion is a personality aspect that does not relate to people's perceptions of the impact of oral conditions on their well-being.

Overall, personality traits may affect self-reported oral health psychosocially, which suggests that dentists should take psychosocial status into account in treatment, in addition to normative clinical measurements. Because of the cross-sectional design of this study, causal conclusions about the associations between personality traits and OHRQoL cannot be drawn. Nevertheless, the results suggest that sex and some personality traits (especially neuroticism) can affect OHRQoL, and such effects will modestly change with normative treatment needs. Sex and personality traits may be independently related to OHRQoL, and this relationship helps orthodontists to understand a patient more psychologically, beyond the usual clinician parameters.

Orthodontic research has increasingly transformed from the traditional biomedical model toward a biopsychosocial and QoL perspective. As one of a series of personality inventories, the EPQ is widely used, but it is seldom used in orthodontic treatment. With psychological assessments, a more comprehensive understanding between laypeople and dentists can be established, and this allows better development of personalized orthodontic treatments according to the personality character of patients. In addition, compared with other studies, this article highlights not only the link between personality and the influence of oral health on masticatory capacity and psychosocial function in general but also the importance of neuroticism in terms of QoL.

Some limitations of this study must be considered. People who suffered from severe malocclusions or dentofacial deformities that required orthognathic surgery were excluded. This limits the usefulness of the findings from this study as the sample is not necessarily representative of all members of the general public. Another potential study limitation was the higher percentage of women respondents. This may bias the statistical analysis results between men and women.

CONCLUSIONS

- Personality may affect a person's OHRQoL comprehensively, and the neuroticism dimension is the most significant predictor.
- The OHRQoL is worse among female as compared with male young adults, especially in people with mild malocclusion.

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