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## Eysenck personality and psychosocial status of adult patients with malocclusion

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### ABSTRACT

**Objective:** To evaluate the personality and psychosocial status of adult malocclusion patients through the Eysenck Personality Questionnaire (EPQ) and the Symptom Checklist 90 (SCL-90). **Methods:** The EPQ and the SCL-90 were administered to 348 adult respondents with Angle's Class I, II, III malocclusion and normal occlusion. Personality and psychosocial traits were analyzed and compared among the groups. **Results:** Patients in Angle's Class I, II and III groups scored lower on the EPQ-E and higher on the EPQ-N than those in the normal occlusion group, whereas patients in the Class II group scored higher on the EPQ-P. The mean scores of Class I, II and III groups were significantly higher than those of the normal group on somatization, obsessive-compulsiveness, interpersonal sensitivity, depression, anxiety, and paranoid ideation. All SCL-90 scores were significantly positively correlated with EPQ-N. Psychoticism and neuroticism scores of female respondents were higher than those of male respondents. The impact of education was greatest on the EPQ-P and the EPQ-E of adult personality, whereas the impact of deformity was greatest on the EPQ-N of adult personality. **Conclusions:** Personality and psychosocial status show differences in adult patients with Class I, II, III malocclusion and normal occlusion and can be influenced by gender, deformity, age and education.

## 1. Introduction

Malocclusion is a common oral health condition that can be characterized by a significant degree of misalignment of teeth with or without an incorrect relationship between the upper and lower dental arches. Malocclusion affects not only oral function, but also facial esthetics, which may have an adverse impact on the psychological well-being of patients[1]. In recent years, many researches have witnessed an increase in the demand for orthodontic treatment among the adult population[2]. In some countries, particularly those with large percentages of retirees, adults may constitute

more than half of all orthodontic patients[3]. Evidence suggests that people who express dissatisfaction with their teeth may have some psychological problems that impact their social behavior to varying degrees[4]. Additionally, Demand for orthodontic treatment was mainly motivated by personal concerns about facial esthetics and other psychosocial factors[5]. An early study found that many adult malocclusion patients presented problems of social adaptation, mental health, and personality deficit, which interfered with normal doctor-patient relationships, despite successful outcomes of orthodontic treatments[6]. It has been demonstrated that certain personality traits, either negative or positive, might be attributed to a person's dental appearance[7].

According to research conducted using psychological surveys, adult malocclusion patients have a significantly different perception from normal individuals in that the former group scores significantly higher on neuroticism

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than the latter group<sup>[8]</sup>. It has also been shown that adult malocclusion patients exhibit more psychological patterns than people with normal occlusion, which include paranoid ideation, anxiety, shyness, self-abasement and introversion<sup>[9]</sup>. Furthermore, Kim *et al* found orthognathic patients had more psychological problems than control patients, and the improvement in facial deformities might have a positive influence on psychosocial aspects<sup>[10]</sup>. Nevertheless, very limited research has been conducted on differences in personality and psychosocial status that might exist in patients with different types of malocclusion. In a study involving college student, it was found that students with severe Angle's Class II and Class III malocclusion were more likely to show signs of introversion and astatic emotion than those with normal occlusion<sup>[11]</sup>. However, data from one specific narrow demographic group may not be applicable to adult malocclusion patients.

The purpose of the present study was to evaluate the personality and psychosocial status of adult malocclusion patients aged between 18 and 39 years before orthodontic treatment, using the Eysenck Personality Questionnaire (EPQ) and the Symptom Checklist 90 (SCL-90). It is hoped that findings from this study would help understand and manage adult malocclusion patients better in orthodontic treatment.

## 2. Materials and methods

### 2.1. Patient selection

This study was performed at the Department of Orthodontics, School of Stomatology, Hainan Medical University. The research protocol was approved by the Ethics Committee of the university. A written informed consent was obtained from all the participating patients before the study began. The study groups consisted of 348 patients with ages ranging from 18–39 years ( $25.5 \pm 3.5$ ), of whom, 173 were male (49.7%) and 175 female (50.3%). The patients were assigned into one of four groups (Class I, II, III and normal control) based on Angle's classification. Of all the patients, 85 (24.4%) had Class I malocclusion, 87 (25.0%) had Class II malocclusion, 88 (25.3%) had Class III malocclusion, and 88 (25.3%) had normal occlusion. Each of the three malocclusion groups was divided into three subgroups, *i.e.*, mild, moderate and severe, as determined by the Index of Orthodontic Treatment Need. Before commencement of treatment, each patient was assessed using two standard tests: the EPQ and the SCL-90. Five orthodontists examined the subjects' occlusal status and facial profiles. In order to minimize potential inter-examiner discrepancy, the measurement methods and grouping rules were explained, and a calibration procedure was performed for the examiners. Patients were recruited into the study on a rolling basis when the following inclusion criteria were

met: (1) for canines and premolars, the buccal segment was fully erupted; (2) there were no existing craniofacial deformities, including cleft lip or palate; (3) none of first molar was missing and there were no detectable proximal lesions or restorations; (4) no teeth mesial to the first molar were missing or impacted; (5) the patient had promised full cooperation; (6) the patient had completed the questionnaire satisfactorily. Exclusion criteria included: (1) there was a craniofacial deformity of either primary or secondary nature; (2) the patient was deemed unlikely to cooperate; (3) the patient had not signed the informed consent.

### 2.2. Patient selection

#### 2.2.1. EPQ

EPQ was one of a series of personality inventories developed by Eysenck and colleagues<sup>[12]</sup>. The Chinese version of EPQ, which consisted of 88 items, was used to assess the personality of the respondent<sup>[13]</sup>. It presented to the respondent yes/no questions for each item, and it included 4 factors such as extroversion/introversion (E), neuroticism (N), psychoticism (P) and lie (L). Extraversion represented sociability, liveliness, and surgency; neuroticism represented emotional instability and anxiousness; psychoticism represented tough-mindedness, aggressiveness, coldness, and egocentricity; and lie represented unsophisticated dissimulation and social naivety or conformity<sup>[12]</sup>. This study received two invalid questionnaires, which were excluded.

#### 2.2.2. SCL-90

The SCL-90 was constructed by Derogatis in 1973<sup>[14]</sup> and is widely used in clinical studies. It serves to check and classify possible illness or distress in certain individuals. The Chinese version of SCL-90, with 90 items rated from 1 to 5 on the basis of the degree of illness or distress caused over the past week, was administered in this study<sup>[15]</sup>. Each item was scored as: 1, not at all; 2, a little bit; 3, moderately; 4, quite a bit; 5, extremely. It consisted of 10 subscales for assessing somatization, obsessive-compulsiveness, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, psychoticism and appendix symptoms. It provided a global score as the best single indicator for the global symptom. The SCL-90, as an instrument for measuring symptom severity, has been shown to be a reliable and valid psychiatric self-rating scale in a variety of populations in China and other countries. Approximately 20 minutes were required to obtain the scores.

### 2.3. Statistical analysis

The test results were processed at the Department of Psychiatry, Hainan Medical University, using the SPSS 16.0 software (SPSS Inc, Chicago, USA). Data from the EPQ and

SCL-90 tests were expressed as mean  $\pm$  standard deviation.

Socio-demographic characteristics of the groups were compared using the Chi-square test. Analysis of variance of factorial design tests were used for group comparisons. The Pearson correlation analysis was used between each subscale of EPQ and SCL-90. Multiple regression stepwise analysis was conducted to analyze EPQ scores. Differences were considered significant if  $P < 0.05$  and highly significant if  $P < 0.01$ .

### 3. Results

#### 3.1. Socio-demographic characteristics of the study groups

The socio-demographic characteristics of subjects with Angle's Class I, II and III malocclusion as well as normal occlusion are shown in Table 1. No statistically significant differences were detected among the four groups in terms of gender, age, or education background ( $P=0.991$ ,  $0.870$ ,  $0.846$ , respectively). A statistically significant difference existed among the three malocclusion groups in deformity ( $P < 0.001$ ).

#### 3.2. Comparison of EPQ scores among Angle's Class I, II, III malocclusion and normal occlusion groups

The mean EPQ scores of the four groups are presented in Table 2. The mean score of psychoticism (EPQ) for the Class II group was significantly higher than those for the other three groups ( $F=14.51$ ,  $P < 0.001$ ). No significant difference was found among the other three groups in psychoticism scores. However, the mean scores of

extroversion/introversion (EPQ) for the Class I, II and III groups were significantly lower than that for the normal group ( $F=5.48$ ,  $P=0.001$ ). The mean scores of neuroticism (EPQ) for the Class I, II and III groups were significantly higher than that for the normal group ( $F=17.22$ ,  $P < 0.001$ ). Meanwhile, there was no significant difference among the other three groups in extroversion/introversion and neuroticism scores.

#### 3.3. Comparison of SCL-90 scores among Angle's Class I, II and III malocclusion and normal occlusion groups

The mean SCL-90 scores of the four groups are presented in Table 3. The mean scores on somatization, obsessive-compulsiveness, interpersonal sensitivity, depression, anxiety and paranoid ideation ( $F=12.78$ ,  $18.27$ ,  $22.35$ ,  $19.41$ ,  $13.25$ ,  $11.73$ , respectively) for the Class I, II and III groups were significantly higher than that for the normal group ( $P < 0.001$ ). However, no significant difference was found among the Class I, II and III groups. Nor did any significant difference exist in hostility, phobic anxiety and psychoticism scores among the four groups ( $P=0.465$ ,  $0.217$ ,  $0.886$ , respectively).

#### 3.4. Correlations between SCL-90 and EPQ scores

There was a significant positive correlation between the scores of all SCL-90 subscales and scores of EPQ-N (all  $P < 0.01$ ) (Table 4).

#### 3.5. Multiple regression analysis of EPQ scores

The mean T score for each EPQ subscale was considered

**Table 1**

Socio-demographic characteristics of adults with normal occlusion, Angle's Class I, II, III malocclusion.

Covariable		Normal	Class I [n (%)]	Class II [n (%)]	Class III [n (%)]	$\chi^2$	P value
Gender	Male	44 (50.0%)	41 (48.2%)	44 (50.6%)	44 (50.0%)	0.106	0.991
	Female	44 (50.0%)	44 (51.8%)	43 (49.4%)	44 (50.0%)		
Age	18–25	33 (37.5%)	31 (36.5%)	28 (32.1%)	35 (39.8%)	2.483	0.870
	26–32	31 (35.2%)	25 (29.4%)	26 (29.8%)	30 (34.1%)		
	33–39	24 (27.3%)	29 (34.1%)	28 (38.1%)	23 (26.1%)		
Deformity	Mild	–	28 (32.9%)	28 (32.2%)	28 (31.8%)	2.680	<0.001
	Moderate	–	28 (32.9%)	29 (33.3%)	30 (34.1%)		
	Severe	–	29 (34.2%)	30 (34.5%)	30 (34.1%)		
Education	Lower	18 (20.5%)	22 (25.9%)	19 (21.8%)	25 (28.4%)	2.692	0.846
	Middle	29 (33.0%)	30 (35.3%)	32 (36.8%)	30 (34.1%)		
	Higher	41 (46.5%)	33 (38.8%)	36 (41.4%)	33 (37.5%)		

**Table 2**

Mean EPQ scores for normal occlusion, Angle's Class I, II, III malocclusion groups.

Dimensions	Normal(n=87)	Class I(n=84)	Class II (n=87)	Class III (n=88)	$F_{\text{group}}$	P
Psychoticism	46.78 $\pm$ 5.45	46.44 $\pm$ 10.37	55.33 $\pm$ 7.65	48.83 $\pm$ 12.89	14.51	<0.001
Extrovision & introvision	51.56 $\pm$ 9.39	48.39 $\pm$ 8.17	47.83 $\pm$ 9.80	45.29 $\pm$ 9.45	5.48	0.001
Neuroticism	42.17 $\pm$ 8.11	47.89 $\pm$ 10.71	52.39 $\pm$ 10.34	52.00 $\pm$ 13.57	17.22	<0.001

a dependent variable, and gender (male=1, female=2), deformity (normal=0, mild=1, moderate=2, severe=3), age (18–25=0, 26–32=1, 33–39=2), and education (lower=0, middle=1, higher=2) were considered independent variables in the multiple regression analysis. Deformity and age were significantly positively correlated with psychoticism scores. In contrast, educational background was negatively correlated with psychoticism scores. Psychoticism scores for the female respondents were higher than those for the male respondents (Table 5). Extroversion/introversion scores

were positively correlated with educational background but negatively correlated with deformity. The male respondents tended toward extroversion while the females respondents tended toward introversion (Table 6). As shown in the table 7, there were significant positive correlations between neuroticism scores and deformity, age and education background respectively. The neuroticism scores for the female respondents were higher than those for the male respondents (Table 7).

**Table 3**

Mean SCL-90 scores for normal occlusion, Angle's Class I, II, III malocclusion groups.

Factor	Normal(n=87)	Class I(n=84)	Class II (n=87)	Class III (n=88)	$F_{\text{group}}$	$P$
Somatization	1.35±0.41	1.54±0.39	1.56±0.54	1.58±0.61	12.78	<0.001
Obsessive-compulsiveness	1.60±0.58	1.75±0.44	1.78±0.51	1.81±0.55	18.27	<0.001
Interpersona sensitivity	1.63±0.64	1.89±0.77	1.98±0.69	2.03±0.57	22.35	<0.001
Depression	1.49±0.47	1.75±0.59	1.79±0.67	1.81±0.72	19.41	<0.001
Anxiety	1.37±0.46	1.53±0.51	1.58±0.59	1.61±0.63	13.25	<0.001
Hostility	1.47±0.51	1.45±0.49	1.46±0.57	1.48±0.69	1.31	0.465
Phobic anxiety	1.22±0.45	1.20±0.39	1.23±0.51	1.24±0.63	1.57	0.217
Paranoid ideation	1.42±0.55	1.51±0.60	1.60±0.73	1.65±0.69	11.73	<0.001
Psychoticism	1.37±0.49	1.35±0.32	1.34±0.29	1.36±0.56	0.57	0.886

**Table 4**

Correlation between SCL-90 and EPQ scores in malocclusion groups.

Factor	Neuroticism	Extraversion	Psychoticism
Somatization	0.349 <sup>b</sup>	-0.047	0.226 <sup>b</sup>
Obsessive-compulsiveness	0.475 <sup>b</sup>	-0.128 <sup>b</sup>	0.224 <sup>b</sup>
Interpersona sensitivity	0.429 <sup>b</sup>	-0.159 <sup>b</sup>	0.245 <sup>b</sup>
Depression	0.481 <sup>b</sup>	-0.178 <sup>b</sup>	0.258 <sup>b</sup>
Anxiety	0.496 <sup>b</sup>	-0.104 <sup>b</sup>	0.396 <sup>b</sup>
Hostility	0.467 <sup>b</sup>	-0.030	0.027
Phobic anxiety	0.440 <sup>b</sup>	-0.136 <sup>b</sup>	0.015
Paranoid ideation	0.487 <sup>b</sup>	-0.041	0.227 <sup>b</sup>
Psychoticism	0.388 <sup>b</sup>	-0.087 <sup>a</sup>	0.058

<sup>a</sup>:  $P < 0.05$ ; <sup>b</sup>:  $P < 0.01$ .

**Table 5**

Multiple regression analysis of psychoticism in EPQ.

Factor	$\beta$	$SE$	$Beta$	$t$	$P$
Constant	40.152	1.405	-	28.578	<0.001
Gender	2.417	0.552	0.241	4.377	0.003
Deformity	1.395	0.681	0.131	2.048	0.040
Education	-0.617	0.385	-0.328	-1.602	0.048
Age	3.429	0.182	0.193	19.841	<0.001

**Table 6**

Multiple regression analysis of extroversion/introversion in EPQ.

Factor	$\beta$	$SE$	$Beta$	$t$	$P$
Constant	61.893	2.239	-	27.643	< 0.001
Deformity	-3.789	0.798	-0.332	-4.748	0.003
Gender	-3.135	1.126	-0.187	-2.784	0.004
Education	3.644	0.615	0.370	5.925	0.002

**Table 7**

Multiple regression analysis of neuroticism in EPQ.

Factor	$\beta$	SE	Beta	t	P
Constant	28.525	2.164	–	13.181	< 0.001
Deformity	9.134	0.726	0.657	12.581	< 0.001
Gender	2.234	0.719	0.154	3.107	0.002
Education	4.965	0.614	0.320	8.086	< 0.001
Age	2.803	0.578	0.170	4.849	0.001

#### 4. Discussion

In this study, we intended to achieve a certain level of understanding that would be of value in treatment planning of adult patients with malocclusion. Our findings concerning the personality and psychosocial aspects indicate that adult patients with Angle's Class I, II and III malocclusion display lower scores on the extroversion/introversion scale and higher scores on the neuroticism scale than individuals with normal occlusion, suggesting that adult malocclusion patients tend to be introverted, pessimistic, and likely associated with anxiety, tension, and depression. These findings are consistent with those from a study by Sergl's *et al*, in which adult malocclusion patients showed a broad spectrum of psychological characteristics that were less evident in normal controls<sup>[9]</sup>.

The present study also demonstrates that adult patients with Class II malocclusion score higher on psychoticism, meaning that patients in this group tend to be more hostile and show a lack of compassion. It is possible that these traits are related to differences in perceptions of attractiveness and societal expectations. Wilmont *et al* found that patients with Class II malocclusion are more likely to seek orthodontic treatment than those with Class I or Class III malocclusion<sup>[16]</sup>. Interestingly, in a study conducted on adult respondents, patients with Class II malocclusion were rated as less attractive than those with Class III malocclusion, with a similar degree of skeletal discrepancy<sup>[17]</sup>. Moreover, the study also found that those who had a severe Class II skeletal profile received more negative feedback, and this might explain why the skeletal II patients show higher scores on psychoticism<sup>[17]</sup>. It has been known that teasing and social stereotyping can have a major impact on psychosocial status<sup>[18]</sup>.

Another finding from our study, which is consistent with those by Phillips *et al*<sup>[18]</sup>, is that adults with Angle's Class I, II or III malocclusion all scored significantly higher than those with normal occlusion on somatization, obsessive-compulsiveness, interpersonal sensitivity, depression, anxiety, and paranoid ideation. In addition, all subscales of symptoms of adult patients with malocclusion were strongly positively correlated with their neurotic personality. Adult patients with malocclusion can easily become nervous,

anxious, irritable and depressed; this may lead them to react to the environment with poor emotional control and experience negative feelings in the face of certain stressful situations. This finding lends support to those by Zammit *et al*, who found that adult malocclusion patients presented difficulties in environment adaptation and became nervous, anxious and depressed<sup>[19]</sup>.

The results of multiple regression analysis in EPQ provide evidence that female malocclusion patients score higher than their male counterparts on psychoticism and neuroticism, implying that they tend to be more hostile, nervous, anxious and depressed, and that they are also more likely to be introverted. Hamdam<sup>[20]</sup> and Birkeland *et al*<sup>[21]</sup> presented similar findings in which females were more critical of and concerned with their dental esthetics, more dissatisfied with the appearance of their dentition and more sensitive to the esthetic effects of malocclusion than males. This might be a result of the commonly reported greater concern about health in women than in men<sup>[22]</sup>. It should be noted that conflicting results have been reported on gender personality differences in adult orthognathic patients<sup>[23]</sup>. As presented by Macías Gago *et al*, severe malocclusion leads to a low opinion of physical attractiveness<sup>[24]</sup>, and this finding corresponds to the positive correlation between deformity and psychoticism from the current study. Our data also show that neuroticism is influenced by age and educational background.

In conclusion, our study supports the notion that differences in personality and psychosocial status of adult patients are reflected in different types of malocclusion and these traits are also affected by factors such as gender, deformity, age and education. More and more orthodontic research moves away from the traditional biomedical model toward a biopsychosocial perspective and oral–health–related quality of life<sup>[25]</sup>. Recently, there has been growing acceptance of the importance of considering inherent psychological parameters in orthodontic psychosocial research<sup>[26]</sup>. Psychological tests are capable of identifying both quantitative and qualitative changes that may be used in aiding diagnosis and treatment in clinical situations, adding another dimension through which better treatment planning and execution can be achieved due to a more comprehensive understanding of patients' concerns and expectations.



## Conflict of interest statement

We declare that we have no conflict of interest.

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