

Psychological impact and perceptions of orthodontic treatment of adult patients with different motivations

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Introduction: Motivations, perceptions, and psychosocial states of adult patients with orthodontic disorders in China have not been widely studied. The study assessed the psychosocial states and perceptions of adult patients undergoing orthodontic treatments with different motivations. **Methods:** Two hundred forty-three adult patients (mean age, 30.2 ± 7.4 years; women, 79.0%) undergoing orthodontic treatment were recruited from a tertiary stomatology hospital. The patients answered a patient-centered questionnaire regarding motivations and perceptions of orthodontic treatment and the Psychosocial Impact of Dental Aesthetics Questionnaire. Data were analyzed using the chi-square test on the basis of multiple responses. Multiple linear regression analyses were performed to determine the association between motivation factors and the Psychosocial Impact of Dental Aesthetics Questionnaire subscale scores ($P < 0.05$). **Results:** Patients with various motivations were as follows: occlusal function reason (70.4%), dental esthetic reason (54.7%), facial esthetic reason (24.3%), and following others' suggestions (18.5%). Patients with esthetic or occlusal motivations exhibited significantly greater need and interest for orthodontic treatment ($P < 0.001$). Multiple linear regression analyses revealed that the scores of social impact, psychological impact, and esthetic concern subscales were significantly associated with both dental and facial esthetic motivations ($P < 0.001$). **Conclusions:** The primary motivations of Chinese patients were observed to be improved esthetics and occlusal function. Patients with esthetic or occlusal motivations exhibited significantly greater need and interest in treatment. Patients with facial or dental esthetic motivations experienced greater impacts of psychosocial states. Therefore, the patient motivations and impacts of esthetic-related psychosocial states on them should be considered during treatment. (Am J Orthod Dentofacial Orthop 2023;164:e64-e71)

Malocclusion affects the dental health, psychological well-being, and social well-being of patients. The most common consequences of

malocclusion include unesthetic facial appearance; difficulty in speech, chewing, or cleaning; high prevalence of caries; low self-esteem; low self-confidence; and poor emotional and social health.^{1,2} The current medical model is gradually changing to a "bio-psycho-social" model that takes into account the subjective feelings and psychological conditions of patients.³ Furthermore, there is an emerging trend toward improving the psychosocial status and quality of life of patients.^{4,5} Thus, it is widely accepted that orthodontic treatments should not only aim to correct any deviation from the normal or ideal occlusion (malocclusions) but also offer positive psychosocial benefits, including increased self-esteem and emotional and social well-being.⁶⁻⁹

In recent years, the demand for orthodontic treatment has considerably increased. Moreover, the motivation of patients to seek orthodontic treatment is variable. The factors for motivation are divided into 2 categories: self-driven (functional or esthetic reasons) and externally influenced (influenced by families, friends, peers, or dentists) motivations.¹⁰ Patients with stronger self-driven

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motivations cooperate better during orthodontic treatments than those motivated by external factors.¹¹ Therefore, understanding the patient's motivation for seeking orthodontic treatment is important for a deeper understanding of their compliance, expectations, and satisfaction throughout the treatment. Several studies have reported that dental or facial esthetics are important motivations for patients to opt for orthodontic treatment.¹²⁻¹⁷ Furthermore, psychosocial factors positively affect patients' motivation.^{13,18-21} Improved psychological satisfaction and social image may be the major goals behind the motivation of adults to improve health and esthetics.^{15,22}

Several studies have assessed the perceptions of patients in terms of orthodontic treatment,^{10,16} reasons for seeking orthodontic treatment,^{10,14,16,17,23} and expectations or satisfaction about orthodontic treatment.^{10,23,24}

However, only a few studies have compared the differences in perceptions regarding orthodontic treatment between patients with different sources of motivation, and no study has explored the differences in the psychosocial impact of esthetics between patients with different motivations. Furthermore, studies have primarily focused on investigating the relationship between the psychosocial impact of dental esthetics and the desire for orthodontic treatment^{18,21,25} or psychosocial factors contributing to orthodontic treatment decisions.¹⁸⁻²⁰

Therefore, this study has the following objectives: (1) to compare the differences in perceptions of patients with different sources of motivation undergoing orthodontic treatment and (2) to compare the differences in esthetics-related psychosocial impact among patients with different sources of motivation.

MATERIAL AND METHODS

Ethical approval for this study was obtained from the Biomedical Institution Review Committee of the Peking University School of Stomatology (PKUSSIRB-202171208) before the commencement of the study. A minimum sample size of 129 was calculated using G*Power software (version 3.1.9.3; Franz Faul University, Kiel, Germany), a priori based on the linear multiple regression model, with an effect size of 0.15, α error of 0.05, power of 95%, and 4 predictors. Patients were recruited from a tertiary hospital of stomatology for this research. Each eligible patient was provided with study-related oral and written information and asked to sign an informed consent form voluntarily. The inclusion criteria were: (1) aged ≥ 18 years; (2) ability to read and understand; (3) patients with experience of standardized history, examination, and undergoing orthodontic treatment (not in the retainer phase); and (4) active treatment

duration ≥ 0.5 months (from the beginning of the orthodontic treatment until the survey date). The exclusion criteria were: (1) cognitively compromised patients, (2) patients with syndromes or congenital cleft lip, and (3) patients with palate craniofacial deformity.

The patients were surveyed using a patient-centered and structured questionnaire. Sociodemographic and general information, including age, sex, educational levels, household income, type of orthodontic treatment appliances, and active treatment duration (from the beginning of the orthodontic treatment until the survey date), was collected from all patients during their intake visit. All patients were requested to complete the questionnaires regarding the initial prime reasons for seeking orthodontic treatment, orthodontic perception questions, and the Chinese version of the Psychosocial Impact of Dental Aesthetics Questionnaire.^{26,27}

Previous studies have reported that dental esthetics and functional motivations were crucial in patients undergoing orthodontic treatment.^{13,14} Families, friends, and dentists have been reported to influence the perceptions of patients regarding treatment.^{10,14} Therefore, the question on reasons for seeking orthodontic treatment was designed with the following options (Supplementary Data): (1) to improve occlusal function, (2) to improve the dental appearance, (3) to improve the facial appearance, or (4) following others' suggestions (OS) (eg, family, friends, or dentists). During the first round of the questionnaire survey, a researcher specializing in orthodontics guided the patients in answering it and helped them understand the questions on orthodontic treatment motivation. For example, when the patient answered "bad bite," "cannot bite well," "to make it easier to eat/speak," or "to improve chewing ability," the patient was informed that these problems were related to occlusal function. When the patient answered "to close spaces between front teeth," "the upper/lower front teeth are irregular," or "the teeth looks ugly," the patient was informed that these problems were associated with dental esthetics.

Furthermore, when the patient answered "protruding upper/lower jaw" or "small chin," the patient was informed that these problems were associated with facial esthetics. According to the reasons for seeking orthodontic treatment, the patients were divided into 4 groups: (1) OS, (2) occlusal function reason (OR), (3) dental esthetic reason (DR), (4) facial esthetic reason (FR) group. The orthodontic perception questionnaire (Supplementary Table) consisted of questions on the need for orthodontic treatment, its impacts on social life, interest in orthodontic treatment, and related attitudes. The patients were required to rate how strongly they agreed with each statement, ranging from disagree

to strongly agree (disagree, slightly agree, relatively agree, strongly agree). Patients with relatively agree and strongly agree responses were considered motivated, whereas those who provided slightly agree and disagree were considered unmotivated. To ensure the repeatability and consistency of the 6 questions regarding motivations and perceptions of orthodontic treatment, 89 patients undergoing orthodontic treatment were randomly recalled after 2 weeks to refill these 6 questions.

To evaluate the psychological states of the patients, we used the Psychosocial Impact of Dental Aesthetics Questionnaire,²⁶ which was translated and validated for the Chinese population with good reliability and validity.²⁷ To be consistent with the direction of scoring in other parts of the questionnaire, a few studies used a reverse scoring of the items in dental self-confidence (DSC).^{18,28} This questionnaire specifically aims to evaluate the psychosocial impact of orthodontic treatment on patients. This questionnaire consisted of 23 questions and 4 subscales as follows: (1) social impact (SI) (8 items), (2) psychological impact (PI) (6 items), (3) esthetic concern (AC) (3 items), and (4) DSC (6 items). Each question was scored by patients on a 5-point Likert scale (0, not at all; 1, a little; 2, somewhat; 3, relatively strong; 4, very strong). All individual subscale question scores were added to obtain each subscale score. For the SI, PI, and AC domains, higher scores indicated greater psychological impact, whereas higher scores indicated higher self-confidence levels for the DSC domain.²⁶

Statistical analysis

Data management and statistical analyses were performed using SPSS software (version 24.0; IBM, Armonk, NY), and a *P* value of <0.05 was considered statistically significant for all analyses. Test-retest reliability was determined on the basis of the intraclass correlation coefficient (ICC) obtained on the basis of the data from 89 patients who answered the 6 questions after a 2-week interval. On the basis of the ICC scores, the patients were subsequently classified as having poor (<0.40), moderate (0.41-0.60), good (0.61-0.80), or excellent (>0.80) agreement.²⁹ The Shapiro-Wilk test indicated that the data did not follow a normal distribution; therefore, the nonparametric test was used for the study. Descriptive data were generated for all variables. Because the question regarding orthodontic motivation was multiple-choice, multiple-response analyses were first performed on the data regarding the 4 reasons for specific motivations. The chi-square and Fisher exact tests were conducted to analyze categorical variables

Table I. Results of test-retest reliability test for motivation question and perception questions on orthodontic treatment

Questions	Test-retest (ICC) (n = 89)	95% ICC (n = 89)
Motivation question	0.72	0.61-0.81
Q1 treatment need	0.67	0.63-0.77
Q2 care about what people say	0.37	0.17-0.53
Q3 social life effects	0.35	0.09-0.56
Q4 treatment interest	0.54	0.38-0.68
Q5 learning attitude	0.72	0.60-0.80
Q, question.		

on the basis of the results of multiple-response analyses. Moreover, multiple linear regression analysis was performed to determine the effect of 4 motivation factors on SI, PI, AC, and DSC domains.

RESULTS

Eighty-nine adult patients undergoing orthodontic treatment (aged 18-49 years; mean age, 32.0 ± 6.6 years) answered 6 questions regarding motivations and perceptions of orthodontic treatment after a 2-week interval. As shown in Table 1, the ICC for the question related to motivation was 0.72 (95% confidence interval [CI], 0.61-0.81), indicating good agreement. The ICCs for questions 1 (treatment need), 4 (treatment interest), and 5 (learning attitude) ranged from 0.54 (95% CI, 0.38-0.68) to 0.72 (95% CI, 0.60-0.80), indicating moderate to good agreement. However, the ICC for questions 2 (care about what people say) and 3 (social life effects) were 0.37 (95% CI, 0.17-0.53) and 0.35 (95% CI, 0.09-0.56), respectively, indicating poor agreement. Therefore, the motivation question and questions 1, 4, and 5 had moderate to good repeatability and agreement, whereas questions 2 and 3 had poor repeatability and agreement and should be deleted.

In total, 300 patients were screened for eligibility, of which 57 met the exclusion criteria or declined to be included in the study. Finally, the study comprised 243 adult patients with orthodontic problems (aged 18-65 years; mean age, 30.2 ± 7.4 years). These patients wore orthodontic appliances for an average of 18.9 ± 15.1 months (from 0.5 months to 5 years). Table 2 shows the motivations of the included patients based on multiple-response analyses. The response rate is the proportion of choices for a particular reason of orthodontic motivation to the total number of choices. The prevalence rate is the proportion of patients selecting a particular reason for orthodontic motivation to the total number of patients. The study indicated that the percentage of patients with occlusal function motivation

Table II. The distribution of motivations of the included patients

Motivation factors	n	Response rate (n = 408)	Prevalence rate (n = 243)
OS	45	11.0%	18.5%
OR	171	41.9%	70.4%
DR	133	32.6%	54.7%
FR	59	14.5%	24.3%
Total	408	100.0%	167.9%

Note. Results of multiple-response analysis.

OS, others' suggestions; OR, occlusal function reason; DR, dental esthetic reason; FR, facial esthetic reason.

(70.4%; 171 out of 243) was higher than that of patients with dental esthetic motivation (54.7%; 133 out of 243). In particular, the percentage of patients with facial esthetic motivation was 24.3% (59 out of 243); however, the OS group accounted for the lowest number of patients (18.5%; 45 out of 243).

Table III shows patients' sociodemographic characteristics. Most patients in the sample were women, accounting for 79.0% of the total number of patients, and significant differences were observed between men and women patients and different motivation groups ($FR > DR, OR, OS; P < 0.001$). Regarding age, 90.5% of the patients were aged 18–39 years, and only 9.5% were aged >40 years; however, no significant difference was noted in motivations for orthodontic treatment between different age groups ($P = 0.721$). In terms of educational levels/household incomes, the proportion of patients with a bachelor's or higher degree and that of those with middle- or high-income families were 93.0% and 83.1%, respectively; however, no significant differences were noted between different motivation groups and educational levels/household incomes. With regard to the active treatment duration, $>65\%$ of the patients in the sample wore dental appliances for <24 months; however, there was no statistically significant relationship between the active treatment duration and motivations for orthodontic treatment ($P = 0.863$). With regard to appliance types, most patients (70.4%) preferred wearing fixed appliances instead of removable appliances; however, no significant differences were noted between the type of appliances used and orthodontic treatment motivations.

Table IV illustrates the frequency distribution of the responses to the 3 questions on the perceptions of orthodontic treatments and the distribution of responses to the various motivation categories. Approximately 75% of patients motivated to seek orthodontic

treatment answered relatively agree or strongly agree, whereas 25.1% were unmotivated and answered slightly agree or disagree. Patients in the FR, DR, or OR groups were classified as significantly more motivated than those in the OS group ($FR, DR, OR > OS; P < 0.001$). Regarding question 4 (interest in orthodontic treatment), 57.2% of patients were motivated and answered relatively agree or strongly agree, whereas 42.8% were unmotivated and answered slightly agree or disagree. The response to the question on learning regarding orthodontic treatment exhibited a trend similar to that for question 4; 62.6% of patients were motivated and answered relatively agree or strongly agree, whereas 37.4% answered slightly agree or disagree. The same trend was observed in response to questions 4 and 5, with significant differences among patients with different motivations ($P < 0.001$); the ranking was as follows: $FR \geq DR \geq OR > OS$.

Results of multiple linear regression analyses for SI, PI, AC, and DSC scores are displayed in Tables V, VI, VII, and VIII, respectively. Based on the multiple linear regression analysis for predicting SI (Table V), facial esthetic and dental esthetic reasons were identified as significant factors. The FR group exhibited greater SI than the DR group, and the ranking was as follows: $FR > DR$, with $B = 6.42$ (95% CI, 4.81–8.04; $P < 0.001$) and 2.22 (95% CI, 0.72–3.72; $P < 0.001$), respectively. However, OR and OS were identified as insignificant factors ($P > 0.05$). Based on multiple linear regression analysis for predicting PI (Table VI), facial and dental esthetic reasons were significant factors that psychologically impacted patients. The FR group exhibited greater SI than the DR group, and the ranking was as follows: $FR > DR$, with $B = 6.10$ (95% CI, 4.94–7.27; $P < 0.001$) and 3.53 (95% CI, 2.45–4.60; $P < 0.001$), respectively. However, OS and occlusal function reasons did not significantly affect the PI score ($P > 0.05$). According to multiple linear regression analysis for predicting AC (Table VII), facial and DRs accounted for a high AC. The FR group also exhibited greater SI than the DR group; the ranking was as follows: $FR > DR$, with $B = 3.41$ (95% CI, 2.65–4.17; $P < 0.001$) and 1.28 (95% CI, 0.57–1.98; $P < 0.001$), respectively. However, occlusal function reasons and OS exhibited no significant effects on the AC score ($P > 0.05$). The multiple linear regression analysis of DSC scores and 4 motivation factors presented a different relationship from the above 3 dimensions (Table VIII). Only the DR significantly affected DSC, with $B = -2.39$ (95% CI, -3.78 to -1.00 ; $P < 0.001$). However, OS, occlusal function and facial esthetic reasons had no significant effects on the DSC score ($P > 0.05$).

Table III. Social-demographic characteristics and distributions of the various motivation categories of patients

Variables	Frequency (n = 243)	OS (n = 45)	OR (n = 171)	DR (n = 133)	FR (n = 59)	P value
Age (y)						
18-29	120 (49.4)	23 (51.1)	88 (51.5)	65 (48.9)	30 (50.8)	0.721
30-39	100 (41.2)	15 (33.3)	68 (39.8)	58 (43.6)	25 (42.4)	
≥40	23 (9.5)	7 (15.6)	15 (8.8)	10 (7.5)	4 (6.8)	
Sex						
Total	243 (100.0)	45 (18.5)	171 (70.4)	133 (54.7)	59 (24.3)	<0.001 [†]
Men	51 (21.0)	13 (28.9) ^a	37 (21.6) ^a	26 (19.5) ^a	8 (5.7) ^b	
Women	192 (79.0)	32 (71.1) ^a	134 (78.4) ^a	107 (80.5) ^a	133 (94.3) ^b	
Educational level						
High school or below	17 (7.0)	4 (8.9)	10 (5.8)	7 (5.3)	3 (5.1)	0.777
Bachelor's degree	133 (54.7)	22 (48.9)	97 (56.7)	74 (55.6)	38 (64.4)	
Master's degree or higher	93 (38.3)	19 (42.2)	64 (37.4)	52 (39.1)	18 (30.5)	
Household income (per mo, CNY)						
≤10,000	41 (16.9)	7 (15.6)	26 (15.2)	22 (16.5)	7 (11.9)	0.997
10,000-25,000	82 (33.7)	15 (33.3)	60 (35.1)	45 (33.8)	22 (37.3)	
25,000-45,000	53 (21.8)	9 (20.0)	38 (22.2)	28 (21.1)	15 (25.4)	
>45,000	67 (27.6)	14 (31.3)	47 (27.5)	38 (28.6)	15 (25.4)	
Active treatment duration (mo)						
<12	100 (41.2)	20 (44.4)	74 (43.3)	52 (39.1)	22 (37.3)	0.863
12-24	66 (27.2)	9 (20.0)	47 (27.5)	38 (28.6)	16 (27.1)	
24-36	44 (18.1)	7 (15.6)	27 (15.8)	24 (18.0)	14 (23.7)	
>36	33 (13.6)	9 (20.0)	23 (13.5)	19 (14.3)	7 (11.9)	
Type of appliance						
Fixed	171 (70.4)	35 (77.8)	120 (70.2)	87 (65.4)	39 (66.1)	0.431
Removable	72 (29.6)	10 (22.2)	51 (29.8)	46 (34.6)	20 (33.9)	

Note. Active treatment duration is from the beginning of the orthodontic treatment until the survey date. Values with the same superscripted letters indicate no statistically significant difference, whereas those with different letters indicate a statistically significant difference.

NA, not applicable; CNY, Chinese Yuan Renminbi; OS, others' suggestions; OR, occlusal function reason; DR, dental esthetic reason; FR, facial esthetic reason.

[†]Chi-square test ($P < 0.05$).

Table IV. Frequency of question responses and distribution of motivated responses for the various motivation categories (n = 243)

Variables	Frequency	OS (n = 45)	OR (n = 171)	DR (n = 133)	FR (n = 59)	P value
Q1 treatment need						
Unmotivated	61 (25.1)	24 (53.3) ^a	35 (20.5) ^b	16 (12.0) ^b	5 (8.5) ^b	<0.001*
Motivated	182 (74.9)	21 (46.7) ^a	136 (79.5) ^b	117 (88.0) ^b	54 (91.5) ^b	
Q4 treatment interest						
Unmotivated	104 (42.8)	32 (71.1) ^a	69 (40.4) ^b	36 (27.1) ^{b,c}	9 (15.3) ^c	<0.001*
Motivated	139 (57.2)	13 (28.9) ^a	102 (59.6) ^b	97 (72.9) ^{b,c}	50 (84.7) ^c	
Q5 learning attitude						
Unmotivated	91 (37.4)	26 (57.8) ^a	59 (34.5) ^b	35 (26.3) ^{b,c}	9 (15.3) ^c	<0.001*
Motivated	152 (62.6)	19 (42.2) ^a	112 (65.5) ^b	98 (73.7) ^{b,c}	50 (84.7) ^c	

Note. Values with the same superscripted letters indicate no statistically significant difference, whereas those with different letters indicate a statistically significant difference.

OS, others' suggestions; OR, occlusal function reason; DR, dental esthetic reason; FR, facial esthetic reason.

*Chi-square test with Bonferroni correction ($P < 0.05$).

The same trend was observed in the SI, PI, and AC scores between the DR and FR groups ($P < 0.001$), with a similar ranking as $FR > DR$. However, regarding the DSC score, only the dental esthetic reason was a significant factor.

DISCUSSION

The study compared the differences in the perceptions of patients' perceptions regarding orthodontic treatment for different motivations. Furthermore, the study demonstrated the psychosocial impacts of

Table V. Multiple linear regression analysis of SI scores and 4 motivation factors among patients (n = 243)

Parameter	B	SE	β	P value	B 95% CI
Constant	3.80	0.96		<0.001*	1.90-5.70
OS	-1.21	1.02	-0.08	0.237	-3.22 to 0.80
OR	-0.09	0.78	-0.01	0.906	-1.63 to 1.45
DR	2.22	0.76	0.18	0.004*	0.72-3.72
FR	6.43	0.82	0.45	<0.001*	4.81-8.04

SE, standard error; OS, others' suggestions; OR, occlusal function reason; DR, dental esthetic reason; FR, facial esthetic reason.

*Results of the multiple linear regression analysis ($P < 0.05$).

Table VI. Multiple linear regression analysis of PI scores and 4 motivation factors among patients (n = 243)

Parameter	B	SE	β	P value	95% CI
Constant	3.77	0.69		<0.001*	2.40-5.14
OS	0.42	0.73	0.03	0.572	-1.03 to 1.86
OR	1.07	0.56	0.10	0.057	-0.03 to 2.18
DR	3.53	0.55	0.35	<0.001*	2.45-4.60
FR	6.10	0.59	0.53	<0.001*	4.94-7.27

SE, standard error; OS, others' suggestions; OR, occlusal function reason; DR, dental esthetic reason; FR, facial esthetic reason.

*Results of the multiple linear regression analysis ($P < 0.05$).

esthetics on adult patients with different motivations. Understanding the patient's motivations for orthodontic treatment facilitates understanding their needs and mediates improved communication to meet their expectations and requirements. The study indicated that the percentage of patients with occlusal function motivation (70.4%) was similar to that of patients with esthetic motivation (79.0%). This result slightly differs from most previous studies that suggested that esthetic reasons were the primary factors for seeking orthodontic treatments.^{12,15,17,30,31} The variance in the frequency of esthetic and functional motivations might be attributable to differences in race, ethnicity, and national health care systems of various countries. The results of this study indicated that functional improvement was as important as an esthetic improvement for Chinese patients seeking orthodontic treatment.

Furthermore, in this study, most patients were women. The proportion of women patients with facial or dental esthetic motivations was significantly higher than that of men patients, which is consistent with the findings of previous studies reporting that women were more concerned with dental esthetics and smile satisfaction than men,^{21,32} and they are more likely to seek orthodontic treatment. Furthermore, this study concluded that patients with a bachelor's or higher

Table VII. Multiple linear regression analysis of AC scores and 4 motivation factors among patients (n = 243)

Parameter	B	SE	β	P value	95% CI
Constant	0.47	0.45		0.305	-0.43 to 1.36
OS	-0.03	0.48	0.00	0.949	-0.97 to 0.91
OR	0.71	0.37	0.11	0.053	-0.01 to 1.43
DR	1.28	0.36	0.22	<0.001*	0.57-1.98
FR	3.41	0.39	0.50	<0.001*	2.65-4.17

SE, standard error; OS, others' suggestions; OR, occlusal function reason; DR, dental esthetic reason; FR, facial esthetic reason.

*Results of the multiple linear regression analysis ($P < 0.05$).

Table VIII. Multiple linear regression analysis of DSC scores and 4 motivation factors among patients (n = 243)

Parameter	B	SE	β	P value	95% CI
Constant	6.66	0.90		<0.001*	4.90-8.43
OS	-1.46	0.95	-0.12	0.125	-3.33 to 0.41
OR	-0.59	0.73	-0.06	0.414	-2.02 to 0.84
DR	-2.39	0.71	-0.24	<0.001*	-3.78 to -1.00
FR	-1.10	0.76	-0.10	0.150	-2.60 to 0.40

SE, standard error; OS, others' suggestions; OR, occlusal function reason; DR, dental esthetic reason; FR, facial esthetic reason.

*Results of the multiple linear regression analysis ($P < 0.05$).

degree or middle- or high-household-income families mostly opted for orthodontic treatments. Patients from low-income families might not opt for treatment because of the high cost.¹⁶ Consistent with the findings of a few previous studies,^{18,19} no significant differences were observed with regard to motivations between patients with different educational levels and household incomes. However, previous studies have reported opposite results that educational levels and household incomes significantly influenced motivations.^{16,19} This discrepancy may be attributed to the fact that this study involved patients undergoing orthodontic treatment rather than those still hesitant. To date, there is no consensus on this issue. These varied findings may be attributed to the differences in sample size, patients, ethnicities, and national health care systems.

Notably, the research indicated that patients with esthetic or occlusal reasons were more driven to opt for orthodontic treatment than those who followed others' suggestions. Previously reported findings may explain this; the subjective need for orthodontic treatment increased with increasing malocclusion severity.²¹ Furthermore, patients with esthetic or occlusal motivations were significantly more interested in and motivated for orthodontic treatment, compared with those OS. This indicated that self-driven patients were more

interested and likely to show initiative in orthodontic treatments than exogenously driven patients. This finding is crucial because self-driven patients were more likely to cooperate during orthodontic treatment.

Studies have confirmed that dental esthetics are strongly influenced by psychosocial factors,^{21,25,33} and the more severe the malocclusion, the greater the negative psychosocial impact.^{18,21,25} However, these studies have limitedly compared esthetic psychosocial aspects between patients receiving orthodontic treatment and those refusing treatment.¹⁸⁻²⁰ Esthetic-related psychologies of patients with different motivations for orthodontic treatment have not been compared. In this study, multiple linear regression analyses indicated that patients with dental or facial esthetic motivations exhibited more significant SI, PI, and AC. However, only patients with dental esthetic motivation had low DSC. This may be because the 6 questions that comprise the DSC subscale only address whether patients have a positive attitude toward their teeth. The scale focuses only on confidence issues arising from dental esthetics and does not address facial esthetics; therefore, facial esthetic motivation is not a significant factor. Moreover, patients with occlusal motivation or those who followed others' suggestions did not exhibit high SI, PI, AC, or low DSC. The above findings are consistent with those of many previous surveys, indicating that dental esthetics significantly affect social interactions and mental health, especially regarding facial attractiveness and appearance-related satisfaction, which might result in embarrassment and shame regarding patients' dental or facial appearances in social interactions.^{34,35} In turn, this could result in low self-esteem and low self-confidence.^{7,36} However, patients following the suggestions of others were less concerned about their appearance and social life, consistent with previous research¹⁴; therefore, they might have higher DSC levels. Overall, the study proved that patients with dental or facial esthetic motivations were affected by greater psychosocial impacts, and patients with dental esthetic motivation exhibited lower DSC.

The limitations of this study include: (1) the study sample was limited to patients undergoing orthodontic treatment, and those who attended orthodontic consultation and refused to undergo orthodontic treatment were excluded; (2) the study results might have some recall and self-report biases because the survey was questionnaire-based; (3) this study included patients at various treatment timelines, and the different experiences of patients at different periods may have certain confounding effects on the study results; (4) this was a cross-sectional study, and although the findings indicated a strong

correlation between psychological factors and motivation for orthodontic treatment, the causal relationship between the 2 variables could not be ascertained. Therefore, future studies with larger sample sizes including more factors, such as cost, extraction or nonextraction treatment, and the same treatment period, along with randomized controlled trials, are required to better explore these relationships.

CONCLUSIONS

The results of this study are significant in 3 major aspects:

1. This study provided evidence that improved esthetics and occlusal function were the primary motivations of Chinese patients.
2. Compared with patients who followed others' suggestions, those with facial or dental esthetic motivations showed greater interest and motivation for orthodontic treatment, followed by occlusal motivation.
3. Patients with dental or facial esthetic motivations were affected by greater psychosocial impacts related to esthetics. Therefore, orthodontists should consider patients' motivations and esthetics-related psychosocial impacts while providing orthodontic treatment.

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AUTHOR CREDIT STATEMENT

Min-Juan Zhang contributed to conceptualization, methodology, investigation, data curation, validation, formal analysis, software, original draft preparation, manuscript review and editing, visualization, supervision, and project administration. Yan-Hui Sang contributed to conceptualization, methodology, investigation, resources, data curation, manuscript review and editing, supervision, and project administration; and Zhi-Hui Tang contributed to conceptualization, methodology, investigation, resources, data curation, manuscript review and editing, supervision, project administration, and funding acquisition.

SUPPLEMENTARY DATA

Supplementary data associated with this article can be found, in the online version, at <https://doi.org/10.1016/j.ajodo.2023.05.021>.

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