



# The Chinese version of Orthognathic Quality of Life Questionnaire (OQLQ-C): translation, reliability, and validity

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## Abstract

**Objectives** The aims of this study were to describe the development of a Chinese version of the Orthognathic Quality of Life Questionnaire (OQLQ) and examine its reliability and validity.

**Methods** The original English version of the OQLQ was translated into Chinese (OQLQ-C) by a forward-backward translation method. Psychometric evaluation of the OQLQ-C was carried out on a sample of 126 patients with dentofacial deformities. Reliability of the OQLQ-C was determined by means of internal consistency and test-retest methods, while validity was ascertained by content validity and construct validity.

**Results** Internal consistency for total OQLQ-C score was 0.932 (Cronbach's alpha), and the test-retest reliability was 0.913 (Spearman correlation coefficient). Content validity of OQLQ-C was supported by content validity index (CVI) with scale-level (S-CVI) of 0.99 and item-level (I-CVI) of 0.875 to 1. The OQLQ-C was distributed to 4 different factors, and the total variance explained was 67.049%.

**Conclusions** The Chinese version of the OQLQ demonstrated acceptable reliability and good validity in patients with dentofacial deformities.

**Clinical relevance** These findings enable assessments of oral health-related quality of life in Chinese literate patients with dentofacial disorders.

**Trial Registration** ChiCTR1900028206

**Keywords** Quality of life (QoL) · Oral health-related quality of life (OHRQoL) · Orthognathic Quality of Life Questionnaire (OQLQ) · Reliability · Validity

## Introduction

Dentofacial deformities not only affect the occlusal and functional aspects of the stomatognathic system but also impair the psychosocial and aesthetic well-being of patients, i.e., all the components of quality of life [1–3]. The World Health Organization (WHO) defines quality of life (QoL) as an individual's perception of his/her position in life in the context of

the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns [4]. Facial and dental aesthetics have a significant impact on personal and professional relations, especially among children and adolescents [5]. Therefore, the dentist must have a valid and reliable tool for measuring oral health-related quality of life (OHRQoL) that is focused on dentofacial disorders' influences on interpersonal relationships.

Many non-specific questionnaires are currently used for the purpose of oral and maxillofacial surgery. The most commonly applied for orthognathic surgery are the OHIP (Oral Health Impact Profile), the SF-36 (Short Form Health Survey), and the OHSQ (Oral Health Status Questionnaire) [6–8]. However, some generic health measure instruments, such as the SF-36, seem less sensitive to changes in oral health and exhibit limited construct validity [2, 9, 10].

In 2000, Cunningham et al. developed a specific self-assessment questionnaire, Orthognathic Quality of Life

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Questionnaire (OQLQ), in response to the inadequacy of existing instruments for measuring quality of life in patients with severe skeletal dentofacial deformities [10, 11]. This questionnaire consists of 22 items that are graded from 0, “does not bother you at all,” to 4, “bothers you a lot.” It assesses the impact of one’s dentofacial deformity on quality of life across 4 domains, including facial aesthetics (items 1, 7, 10, 11, and 14; range 0 to 20), oral function (items 2 to 6; range 0 to 20), awareness of dentofacial aesthetics (items 8, 9, 12, and 13; range 0 to 16), and social aspects of dentofacial deformity (items 15 to 22; range 0 to 32). Higher scores on the OQLQ are indicative of the poorer quality of life. It has been used to assess both the quality of life of patients with dentofacial deformities and the impact of surgical treatment, showing greater ability to discriminate between those with and without dentofacial deformities than the generic health or generic oral health approaches [2, 9, 12]. At present, it has been translated and validated into German, Serbian, Portuguese, Arabic, and Spanish [13–17]. Although a few studies have used the translated version of OQLQ to estimate the quality of life of patients in China [12, 18, 19], no validated Chinese version is currently available.

Therefore, the aims of this study were to develop a Chinese version of the Orthognathic Quality of Life Questionnaire and to assess the instrument’s reliability and validity in Chinese patients with dentofacial deformities.

## Material and methods

### Translation process

After obtaining the authorization from the original author, translation and cross-cultural adaption processes were conducted following accepted standards for the cultural equivalency of health-related quality of life questionnaires [20]. The English OQLQ was translated into Chinese by two independent bilingual translators (XZL and MXW) whose mother tongue was Chinese. This resulted in two independent Chinese translations. Discrepancies in word choices between the two translations were discussed and resolved by a consensus committee comprising the translators and principal investigator (LZL). A synthesized common Chinese translation was subsequently produced. This synthesized translation was then back-translated into English by a native English speaker that was blinded to the original version. All versions were consolidated and examined by the expert panel comprised of two orthognathic specialists (WX and another) and a methodologist. Modifications were made according to the feedback from the expert panel in order to establish the final Chinese version of OQLQ (OQLQ-C).

### Participants and data collection

Approval from the institutional review board of the Peking University School and Hospital of Stomatology (Beijing, China; PKUSSIRB-201944043) was obtained before starting the study. Participants for this study were recruited from the Department of Oral and Maxillofacial Surgery at the Peking University School and Hospital of Stomatology, Beijing, China. Participants would be included if they met the following criteria: (I) at least 18 years old; (II) patients with skeletal dentofacial deformities involving mandibular prognathism, mandibular retrognathism, anterior open bite, laterognathism, vertical maxillary excess, or a combination of these health problems; (III) primary school education and above; (IV) no diagnosis of cognitive impairment; (V) Chinese as a native language; and (VI) voluntarily participated in the study. Exclusion criteria were as follows: (I) patients with micrognathia or with sleep apnea hypopnea syndrome; (II) patients with craniofacial syndrome involving facial changes such as hemifacial microsomia; and (III) patients with secondary jaw deformities such as trauma, tumor, and cleft lip and/or palate. Informed consents were obtained from all participants.

Data collection was implemented by following procedures: (i) researchers identified the eligible participants by clinically examined; (ii) researchers introduced the purposes of the study and informed the consent of the study to the eligible patients; (iii) participants who agree to participate in the study therewith completed the questionnaires composed of demographic characteristic and OQLQ-C; and (iv) researchers checked the completed questionnaires for any missing questions.

One hundred thirty participants were recruited in the study. One hundred thirty questionnaires were collected, and 126 questionnaires which were filled in completely were considered valid questionnaires. The validity rate was 96.92% (126 of 130).

### Validation process

Firstly, the content validity index (CVI) was used to test the content validity of the OQLQ-C score. Eight experts were recruited to assess the content validity by marking each item from 4 (very important) to 1 (very unimportant). Seven of the experts were orthognathic surgeons, and the other one was a nurse specialist. The mean age of the experts was 47.0 ( $\pm 8.1$ ) years. They had 20.13 ( $\pm 10.2$ ) years of working experience in oral and maxillofacial surgery. The values of item-level content validity index (I-CVI) more than 0.78 were considered acceptable [21]. Scale-level content validity index (S-CVI) above 0.8 was considered adequate [22].

Secondly, transcultural adaptation and validation studies of OQLQ in Spanish [17] and Serbian [14] show that factor loadings of each item on the 4 components had some differences with the original version. In case of the domains of the

scale changed because of the cultural differences between China and England, exploratory factor analysis (EFA), with the extraction of factors by component principal analysis (CPA) and rotation by varimax, was conducted to identify the dimension and validate the construct validity of the OQLQ-C. Eigenvalues greater than 1 and scree plot were used to determine the number of factors to extract.

Thirdly, Cronbach’s alpha coefficient and split-half reliability coefficient were employed to examine the internal consistency of the scale. Moreover, in order to test the test-retest reliability, 2 weeks after the first investigation, 20 of the participants were contacted by telephone and asked to fill out the questionnaires again through emails.

### Statistical analysis

Demographic variables were analyzed by using descriptive statistics. Internal consistency was analyzed using Cronbach’s alpha coefficient, and a value above 0.70 was considered acceptable. The test-retest reliability was assessed by the Spearman correlation coefficient; a value above 0.70 was considered acceptable [23]. Construct validity was analyzed by exploratory factor analysis. All the statistical analyses were performed using SPSS software version 21.0 (SPSS Inc., Chicago, IL). *P* values of less than 0.05 (two-sided) were considered statistically significant.

## Results

### Patient characteristics

The mean age of the 126 participants was 25.77 ± 4.83 years. The demographic characteristics of the participants are shown in Table 1.

**Table 1** Participants’ demographic characteristics (*n* = 126)

	<i>n</i>	%
Sex		
Male	40	31.7
Female	86	68.3
Education levels		
Less than high school	2	1.6
High school diploma or equivalent	10	7.9
Junior college	19	15.1
Bachelor’s degree	72	57.1
Master’s degree or doctoral degree	23	18.3
Marital status		
Unmarried	112	88.9
Married	14	11.1

### Content validity

Scale-level content validity index (S-CVI) was 0.99. The values of item-level content validity index (I-CVI) ranged from 0.875 to 1. The S-CVI and the I-CVIs of all the items were acceptable [21, 22]. Therefore, the present study did not reduce any items during this process step.

### Construct validity

An exploratory factor analysis (EFA) was carried out to identify the dimensions and assess the construct validity of the scale. Before performing EFA, the Kaiser-Meyer-Olkin (KMO) test and Bartlett’s test of sphericity were conducted to evaluate the suitability for EFA. The results of KMO test (KMO = 0.892) and Bartlett’s test of sphericity (*p* < 0.001) demonstrated the justifiability of performing EFA on the OQLQ-C based on the dataset. Then, the 22 items of the OQLQ-C were distributed to 4 different factors with Eigenvalues > 1, and the total variance explained was 67.049%. Eight items loaded strongly (0.45 +) on the first factor, including totality of the original dimension named “social aspects of deformity” and one additional item (item 14: self-conscious about appearance). Four of the 5 items that belong to the original dimension “facial aesthetics” loaded strongly (0.45 +) on the second factor. The items loaded strongly (0.45 +) on the third and fourth factors replicating those in the original dimensions—“awareness of facial deformity” and “oral function” (Table 2).

### Reliability

For the total scale score, Cronbach’s alpha was 0.932, and the split-half reliability coefficient was 0.846, indicating excellent internal consistency. For the four dimension scores of the OQLQ-C, Cronbach’s alpha coefficients ranged from 0.783 to 0.943 (Table 3). Test-retest reliability measured by the Spearman correlation provided a global value of 0.913, CI 95% [0.685–0.993]. Spearman correlation coefficient varied from 0.896 to 0.953 for the four dimensions (Table 3).

## Discussion

This study adapted the original English language OQLQ-22 version to the Chinese language and investigated its reliability and validity in Chinese patients with dentofacial deformities. The Chinese version of OQLQ-22 was formed through strict multi-stepped translation processes and cross-cultural adaptations. Not only was the language translation fulfilled, but the translators also considered the cultural and environmental characteristics. The psychometric evaluation of the OQLQ-C indicated good construct validity, internal consistency, and test-retest reliability.

**Table 2** Exploratory factor analyses of the OQLQ-22: factor loading from the rotated component matrix

Original OQLQ item	Components			
	Factor 1: Social aspects of deformity	Factor 2: Facial aesthetics	Factor 3: Awareness of facial deformity	Factor 4: Oral function
Social aspects of deformity				
16	<i>0.834</i>	0.216	0.209	0.106
21	<i>0.828</i>	0.077	0.240	0.169
17	<i>0.794</i>	0.286	0.238	0.106
15	<i>0.763</i>	0.307	0.200	0.147
20	<i>0.758</i>	0.206	0.379	0.080
18	<i>0.679</i>	0.435	0.224	0.094
22	<i>0.628</i>	0.437	0.150	0.195
19	<i>0.576</i>	0.415	0.100	0.157
Facial aesthetics				
14	<i>0.591</i>	0.362	0.399	0.070
10	0.284	<i>0.786</i>	0.119	0.011
11	0.338	<i>0.782</i>	0.199	−0.015
1	0.300	<i>0.602</i>	0.209	0.192
7	0.342	<i>0.601</i>	0.389	0.032
Awareness of facial deformity				
13	0.327	0.069	<i>0.796</i>	−0.048
12	0.262	0.103	<i>0.757</i>	0.104
8	0.301	0.392	<i>0.697</i>	0.032
9	0.166	0.407	<i>0.661</i>	0.138
Oral function				
4	0.092	−0.140	−0.065	<i>0.825</i>
3	0.039	−0.038	0.126	<i>0.824</i>
2	0.027	0.167	−0.115	<i>0.756</i>
6	0.162	0.089	0.172	<i>0.589</i>
5	0.301	0.260	0.108	<i>0.558</i>
Eigenvalues	5.531	3.367	3.035	2.818
% of variance	25.139	15.305	13.794	12.811
Cumulative %	25.139	40.444	54.049	67.049

The italic values indicate the highest loadings for each factor

**Table 3** Internal consistency reliability and test-retest reliability

	Number of items	Cronbach's alpha ( $n = 126$ )	Split-half reliability coefficient ( $n = 126$ )	Spearman correlation coefficient ( $n = 20$ )	
				Correlation coefficient	95% CI
Total scale	22	0.932	0.846	0.913 <sup>*</sup>	0.685–0.993
Dimensions					
Social aspects	9	0.943	0.924	0.953 <sup>*</sup>	0.813–0.997
Aesthetic facial aspects	4	0.831	0.752	0.942 <sup>*</sup>	0.829–0.985
Concern about deformity	4	0.838	0.706	0.898 <sup>*</sup>	0.725–0.976
Oral function	5	0.783	0.666	0.896 <sup>*</sup>	0.737–0.983

\*Indicates statistically significant differences ( $p < 0.001$ )

The construct validity of the OQLQ-C was assessed by exploratory factor analysis (EFA). The results of our study were consistent with the original OQLQ-22 where four factors were extracted. The present study retained the original names of the four dimensions—“social aspects,” “facial aesthetics,” “awareness of facial deformity,” and “oral function.” However, there is a slight difference of the four clusters between the original scale and the Chinese version. The item 14 “self-conscious about appearance” which belonged to the “facial aesthetics” in the original scale is part of the “social aspects” in the Chinese version. This may be attributed to cultural differences. Literally, the purpose of the item “self-conscious about appearance” is not only to evaluate the appearance but also to emphasize the self-perception of patients. It implies potential problems in social interactions caused by a self-perceived unfavorable personal appearance in Chinese patients. Self-conscious emotions, such as shame and embarrassment, arise in response to events that have real or imagined implications for others’ judgments of the individual and could affect people’s social interactions and relationships [24]. Therefore, in the Chinese version of OQLQ-22, the item “self-conscious about appearance” is not included in the “facial aesthetics” dimension but in the “social aspects” dimension.

The reliability of the OQLQ-C was high with a Cronbach’s alpha value of 0.932 for the total scale score and a range between 0.783 and 0.943 for the four dimensions of the OQLQ-C, indicating good internal consistency of the scale. The original scale, the Brazilian version [15], the Spanish version [17], and the Serbian version [14] all have similar Cronbach’s alpha values of the four factors to the results of the Chinese version. Also, the high split-half reliability coefficient values of 0.846 for the total scale and ranged from 0.666 to 0.924 demonstrated an excellent internal consistency.

Test-retest reliability was assessed by 20 participants 2 weeks after the first investigation. The interval of 2 weeks was considered appropriate, because it avoids not only the interference of the memories of the last investigation but also the changes of participants’ status. Spearman correlation value of test-retest was 0.913 for the scale and varied from 0.896 to 0.953 of the four factors, which were sufficient to indicate an excellent temporal stability of the test results over time. The results were a little higher than what were reported in the original scale, the Brazilian [15], Spanish [17], and Serbian [14] versions.

Different systems of values and culture could explain slightly higher mean OQLQ value domains (poorer QoL) found in the Chinese sample when compared with Brazilian [25], Jordanian [9], and Spanish patients with dentofacial deformities [17].

## Conclusion

The English OQLQ was successfully translated into Chinese and culturally adapted for use in Chinese populations. The present study provided preliminary evidence on the acceptable reliability and good validity of the OQLQ-C. The OQLQ-C could be used as a self-reported, disease-specific instrument for those with dentofacial deformities in China and other Chinese literate populations.

**Author’s contribution** All authors contributed to the study conception and design. Material preparation, data collection, and analysis were performed by Zhulin Xue and Xiaowen Ma. The first draft of the manuscript was written by Zhulin Xue, and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

**Ethical approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This study was approved by the institutional review board of the Peking University School and Hospital of Stomatology (Beijing, China; PKUSSIRB-201944043).

This article does not contain any studies with animals performed by any of the authors.

**Informed consent** Informed consent was obtained from all individual participants included in the study.

## Appendix

**Table 4** The English and the Chinese version of the Orthognathic Quality of Life Questionnaire (OQLQ)

Final condition-specific measure

Please read the following statements carefully. In order to find out how important each of the statements is to you, please circle 1, 2, 3, 4, or N/A where:

请认真阅读下列条目, 项数字由小到大依次代表对您的困扰程度由轻到重, 根据每项条目对您的影响程度, 相应的数字选项上打“√”

1 means it *bothers you a little*

1 代表轻微程度地困扰您

1                      2    3    4

**Table 4** (continued)

Final condition-specific measure

Please read the following statements carefully. In order to find out how important each of the statements is to you, please circle 1, 2, 3, 4, or N/A where:

	Bothers you a little		Bothers you a lot		
4 means it <i>bothers you a lot</i> 4 代表很大程度地困扰您					
2 + 3 lie <i>between these statements</i> 2、3 介于以上描述之间	1	2	3	4	
N/A means the statement does not apply to you or does not bother you N/A 代表此项对您不适用或完全不对您造成困扰	轻微程度 困扰您			很大程度 困扰您	
1. I am self-conscious about the appearance of my teeth 我对自己牙齿的外观感到难为情	1	2	3	4	N/A
2. I have problems biting 我有咬合问题	1	2	3	4	N/A
3. I have problems chewing 我有咀嚼问题	1	2	3	4	N/A
4. There are some foods I avoid eating because the way my teeth meet makes it difficult 因为咬合的问题我会避免吃某些食物	1	2	3	4	N/A
5. I do not like eating in public places 我不喜欢在公共场合吃东西	1	2	3	4	N/A
6. I get pains in my face or jaw 我的脸或者颌骨感到疼痛	1	2	3	4	N/A
7. I do not like seeing a side view of my face (profile) 我不喜欢看我的侧貌	1	2	3	4	N/A
8. I spend a lot of time studying my face in the mirror 我会花很长时间对着镜子研究我的面容	1	2	3	4	N/A
9. I spend a lot of time studying my teeth in the mirror 我会花很长时间对着镜子研究我的牙齿	1	2	3	4	N/A
10. I dislike having my photograph taken 我不喜欢照相	1	2	3	4	N/A
11. I dislike being seen on video 我不喜欢被拍摄到视频中	1	2	3	4	N/A
12. I often stare at other people's teeth 我经常盯着别人的牙齿看	1	2	3	4	N/A
13. I often stare at other people's faces 我经常盯着别人的脸看	1	2	3	4	N/A
14. I am self-conscious about my facial appearance 我对自己面部的的外观感到难为情	1	2	3	4	N/A
15. I try to cover my mouth when I meet people for the first time 与人初次见面时我试图遮住我的嘴	1	2	3	4	N/A
16. I worry about meeting people for the first time 与人初次见面会使我担忧	1	2	3	4	N/A
17. I worry that people will make hurtful comments about my appearance 我担心人们会对我的外表做出伤人的评论	1	2	3	4	N/A
18. I lack confidence when I am out socially 外出社交时我缺乏自信	1	2	3	4	N/A
19. I do not like smiling when I meet people 与人见面时我不喜欢微笑	1	2	3	4	N/A
20. I sometimes get depressed about my appearance 我时常对我的外表感到沮丧	1	2	3	4	N/A
21. I sometimes think that people are staring at me 我时常会觉得人们在盯着我看	1	2	3	4	N/A

**Table 4** (continued)

Final condition-specific measure

Please read the following statements carefully. In order to find out how important each of the statements is to you, please circle 1, 2, 3, 4, or N/A where:

	1	2	3	4	N/A
22. Comments about my appearance really upset me, even when I know people are only joking					
评论我的外表真的使我不舒服, 管我知道人们只是在开玩笑					

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