


## Translation and validation of the English-language instrument Orthognathic Quality of Life Questionair into Swedish

Magnus Ahl<sup>a,b</sup> , Agneta Marcusson<sup>b</sup>, Martin Ulander<sup>c,d</sup>, Anders Magnusson<sup>e,f</sup>, Carina Cardemil<sup>g,h</sup> and Pernilla Larsson<sup>i,j</sup>

<sup>a</sup>Department of Oral and Maxillofacial Surgery, The Institute for Postgraduate Dental Education, Jönköping, Sweden; <sup>b</sup>Maxillofacial Unit, and Department of Clinical and Experimental Medicine, Linköping University, Linköping, Sweden; <sup>c</sup>Department of Clinical Neurophysiology, Linköping University Hospital, Linköping, Sweden; <sup>d</sup>Division of Neurosciences and Inflammation, Department of Clinical and Experimental Medicine, Faculty of Medicine, Linköping University, Linköping, Sweden; <sup>e</sup>Department of Orthodontics, The Institute for Postgraduate Dental Education, Jönköping, Sweden; <sup>f</sup>Centre for Oral Health, School of Health and Welfare, Jönköping University, Jönköping, Sweden; <sup>g</sup>Department of Oral and Maxillofacial Surgery, Karolinska University Hospital, Stockholm, Sweden; <sup>h</sup>Department of Biomaterials, Institute of Clinical Sciences, Sahlgrenska Academy at University of Gothenburg, Göteborg, Sweden; <sup>i</sup>Department of Prosthodontics, Faculty of Odontology, Malmö University, Malmö, Sweden; <sup>j</sup>Centre of Oral Rehabilitation, Folk tandvården Östergötland, Norrköping, Sweden

### ABSTRACT

**Introduction:** In orthognathic surgery, understanding the patient's motives for treatment is a key factor for postoperative patient satisfaction and treatment success. In countries/systems where orthognathic surgery is funded by public means, patients are referred mainly due to functional problems, although studies of quality of life related changes after treatment indicate that psychosocial and aesthetic reasons might be equal or more important for the patient. There is no available validated condition specific instruments in the Swedish language for quality of life evaluation of patients with dentofacial deformities.

**Aims/objectives:** Cross cultural translation and adaptation of the English-language instrument 'Orthognathic Quality of Life Questionnaire' (OQLQ) into Swedish.

**Methods:** OQLQ was translated into Swedish. A total of 121 patients in four groups were recruited and the Swedish version of the OQLQ (OQLQ-S) was tested by psychometric methods. Reliability was assessed by internal consistency and test-retest reliability. Validity was evaluated by face, convergent and discriminant validity.

**Results/findings and conclusions:** OQLQ-S is reliable and showed good construct validity and internal consistency and can be used in a Swedish speaking population as a complement to clinical variables to evaluate patients with dentofacial deformity.

### ARTICLE HISTORY

Received 27 October 2019

Revised 12 March 2020

Accepted 2 May 2020

### KEYWORDS

Surveys and Questionnaires; Quality of Life; dentofacial deformities; orthognathic surgery

### Introduction

Combined orthodontic and surgical treatment for correction of skeletal dentofacial deformities and malocclusion, orthognathic surgery, is a large investment for the individual patient in terms of time, pain and risk of complications, and for society in terms of costs and resources utilised. Proffit et al. claim that about 5% of the population have such a severe malocclusion that the condition can be considered a handicap and that the number of persons in the United States 1990 who would benefit from orthognathic surgery was about 1.2 million [1]. However, all patients with malocclusion do not desire treatment. In a Swedish study, 52.2% of children referred to an orthodontic department declined treatment, many of those with a strong or very strong objective indication for treatment [2]. Therefore, evaluation of indications for treatment and treatment outcomes from a patient perspective, is of great importance.

Treatment objectives in orthognathic surgery include harmonising the occlusion, jaw function, aesthetic improvement and long-term stability. However, the psychosocial impact of dentofacial deformities and malocclusion may not be determined by measuring deviation in cephalometric values or clinical indicators such as facial appearance or dental crowding, vertical-, sagittal- and transversal discrepancy in the occlusion. From the patient's perspective, it might be more relevant to ask: How does the treatment impact my life?

The ideal outcome of treatment is described as a return to the normal or usual quality of life for a given age and medical condition [3].

Quality of life (QoL) is a multidimensional construct in which personal values, life conditions and personal satisfaction interact. It is defined as an overall general well-being that comprises objective descriptors and subjective evaluations of physical, material, social, productive, emotional and civic well-being, all weighted by a personal set of values [4]. The World Health Organisation Quality of Life Group defines

QoL as: 'The individual's perception of their 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' [5].

In clinical research, health-related QoL is used to evaluate aspects of QoL related to the individual's health. Generic instruments, such as the widely used Short-Form 36-item Health Survey SF-36 [6], are sensitive to differences across populations and can be used for economic evaluation. However, they are limited in capturing the effects of specific interventions in the individual aspect [7].

A condition specific QoL instrument, the Orthognathic Quality of Life Questionnaire (OQLQ) was developed in the United Kingdom by Cunningham et al. in 2000 [7,8]. This instrument consists of 22 items in the four dimensions: social aspect of deformity, facial aesthetics, function and awareness of facial deformity. The OQLQ is used all over the world and has been translated into several languages [9–19]. Psychometric evaluations have been published for some of them in Spanish, Portuguese and Serbian [11,14,15]. To our knowledge, there is no available psychometrically developed Swedish version of the OQLQ.

## Aim

The aim of this study was to translate and adapt the OQLQ into Swedish and to evaluate the reliability and validity of the Swedish version, the OQLQ-S.

## Ethical considerations

The study protocol was approved by the ethics review committee of Linköping, Sweden, dnr 2017/341-32. Prior to the study, all participants signed an informed consent form.

## Methods

The translation, adaptation and validation were undertaken based on the guidelines for establishing cultural equivalents

of instruments by Ohrbach et al. [20]. The process comprised multiple steps (Figure 1). The instrument OQLQ was forward translated from the source, English, into the target language, Swedish, by three independent translators who were all bilingual native speakers of Swedish. One of the translators had prior knowledge of the concept (i.e. dental nurse) and two were laypersons naive to the concept. In order to resolve discrepancies, the three individual translations were evaluated and combined into one by a panel comprised of two oral and maxillofacial surgeons, one orthodontist, one specialist in oral prosthodontics and one specialist in clinical neurophysiology. The OQLQ was back-translated by two bilingual native speakers of English, who were both laypersons naive to the concept. The same panel as above discussed the discrepancies and combined the two versions into one. This forward- and back-translated version of the OQLQ was sent to the author of the original instrument for evaluation. After this evaluation, the panel met again and compiled a final translated version of the instrument taking into consideration the opinions of the author of the original instrument.

To conduct a pre-test, a focus group comprised of three orthodontic patients, one orthodontist, three dental nurses from the department of oral and maxillofacial surgery and department of orthodontics, and one oral and maxillofacial surgeon (moderator) discussed the final translated version of the instrument. First, the participants individually completed the questionnaire. Then, a discussion followed where each question was discussed until consensus was reached. The layout of the instrument were discussed and adjusted until agreement in the group was achieved.

One hundred and twenty-one consecutive patients in the following four groups were recruited for a field test.

- Orthognathic: Patients scheduled for orthognathic surgery, 2–4 weeks prior to surgery ( $n = 26$ ). Exclusion criteria: congenital syndrome including cleft lip and palate.
- Wisdom teeth: Patients referred for operative extraction of wisdom teeth ( $n = 31$ ). Exclusion criteria: ongoing orthodontic treatment.

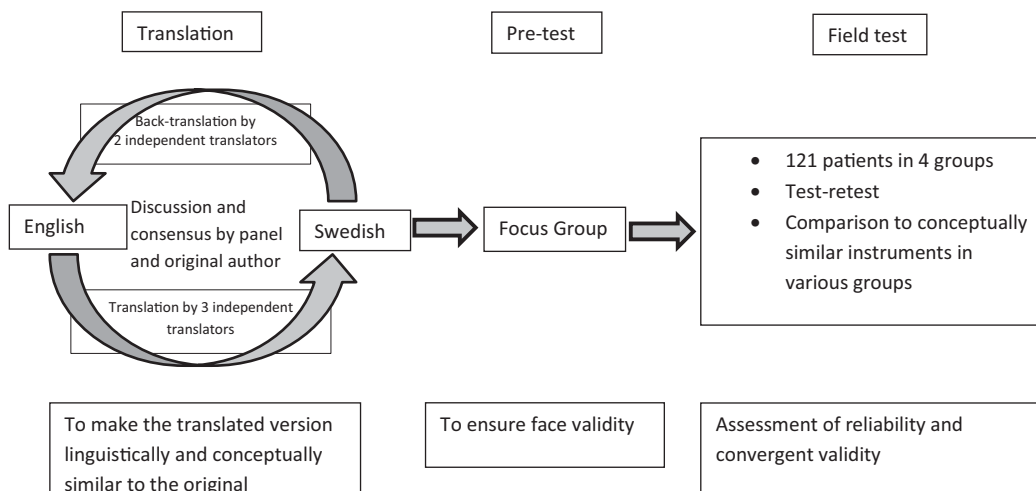


Figure 1. Translation and validation process according to guidelines from Ohrbach et al.<sup>20</sup>

- General dentistry: Healthy recall patients in general dentistry ( $n=31$ ). Exclusion criteria: ongoing orthodontic treatment.
- Orthodontics: Patients treated with conventional orthodontics at the time for retention control ( $n = 33$ ).

The OQLQ-S questionnaire and three reference instruments, previously validated in Swedish; the Oral Health Impact Profile 14 (OHIP14) [21], Jaw Function Limitation Scale (JFLS) [22] and Oral Aesthetic Scale (OES) [23–25], were distributed at a planned appointment. A dental surgery assistant was available to help if any item was unclear.

Twenty-eight patients completed the questionnaire on two occasions with a two week interval to evaluate the test–retest reliability.

## Variables

### Orthognathic quality of life questionnaire

The OQLQ was designed to measure change in QoL in patients with dentofacial deformity undergoing orthognathic surgery. The instrument comprises 22 items and is divided in four dimensions: social aspect of dentofacial deformity (eight items); facial aesthetics (five items); oral function (five items); and awareness of dentofacial aesthetics (four items). The items are rated on a four-point Likert scale, and the total score ranges from 0 to 88. A higher score indicates lower quality of life [7,8].

### Oral health impact profile 14

OHIP14 is a short form of the OHIP49 that was designed to measure the oral health effects on psychosocial well-being. The OHIP14 is a 14-item questionnaire divided in four domains: oral function; orofacial pain; orofacial appearance; and psychological impact. Responses are given on a four-point Likert scale. The total score ranges from 0 to 56. A higher score indicates lower QoL [21,26].

### Jaw function limitation scale

The JFLS is an eight-item questionnaire tailored to reflect daily activity related to normal jaw function. The degree of pain and discomfort is scored on a 0–10-point scale, with the endpoints being no limitation and extreme limitation. Higher scores indicate more limitations [22].

### Orofacial aesthetic scale

The OES is an eight-item questionnaire designed to provide an overview of patients' aesthetic concerns. The scale was originally developed for prosthodontic patients but has successfully been tested and used in the general population. The degree of aesthetic concerns about the face, mouth, teeth and gums is scored on a 0–10-point scale. Higher scores indicate more concerns [23,24,27].

### Statistical analysis

The internal consistency and reliability of the OQLQ-S was calculated with Cronbach's alpha and test–retest reliability with the intraclass coefficient (ICC). Face validity was evaluated in the pre-test. Convergent validity of the OQLQ-S, including its subscales, was measured with the OHIP14-S, the JFLS and the OES using Spearman's correlation coefficient. Discriminant validity was determined by comparisons between groups with analysis of variance.

SPSS 24.0 software (SPSS Inc.; Chicago, IL, USA) was used for statistical data evaluation.

## Results

One hundred and twenty-one consecutive patients were included in the study. Table 1 illustrates the distribution of the subjects according to number, gender and age in each group.

The internal consistency reliability of the subscales of the OQLQ-S, calculated by Cronbach's alpha ( $\alpha$ ), was between 0.80 and 0.90. Twenty-eight patients completed their questionnaire on two occasions with an interval of two weeks. The test–retest reliability, calculated with the ICC varied between 0.81 and 0.93 (Table 2).

Convergent validity of the subscales in the OQLQ-S and the corresponding subscales in the reference instruments was calculated with the Spearman correlation coefficient. Overall correlations were moderate to high except for the subscale awareness, which did not correlate with the most likely scale, OHIP14 psychosocial (Table 3).

Mean values and standard deviations for the groups are presented for total score and for each subscale in Table 4. In the analysis of discriminant validity, the orthognathic group had significantly higher ( $p < .05$ ) scores in total and in the OQLQ-S subscales, facial aesthetics and oral function, compared with the reference groups from general dentistry and the wisdom teeth group. The orthognathic group also scored significantly higher than the wisdom teeth group in the OQLQ-S subscales, social aspect of deformity and oral

**Table 1.** Distribution of participants according to gender and age in the four groups.

	Orthognathic	Wisdom teeth	General dentistry	Orthodontics	Total
No. of individuals	26	31	31	33	121
Gender					
Male	15	18	12	18	63
Female	11	13	19	15	58
Age					
Mean	25.5	20.9	19.2	22.4	21.9
SD	9.25	1.75	0.93	8.39	6.53

function, compared with the orthodontic group. The reference instruments OHIP14, JFLS and OES did not show any difference between the groups in total score.

## Discussion

To our knowledge, this is the first validation of a translation of the OQLQ into a Scandinavian language. In the translation of a questionnaire, the goal is not just to translate the words but also to verify semantic and conceptual agreement between the original and the translated version. To ensure that, the translation of the OQLQ from English to Swedish followed the guidelines developed by Ohrbach et al. [20]. The participants in the study were consecutive patients from dental specialist clinics in oral and maxillofacial surgery, orthodontics and from a general dentistry clinic. The four groups were selected to represent varying orofacial function. The majority of patients planned for orthognathic surgery and orthodontics are young adults and the patients in the reference groups were selected to match age and gender. The mean age and standard deviation in the orthognathic and orthodontic group were slightly higher due to a few older patients, > 40 years of age, within these groups.

The correlation between the items in the subscales, internal consistency, can be calculated from the pairwise correlation between the items,  $\alpha$ . The range is from negative

infinity and one. If  $\alpha$  is negative, the variability is greater within subjects than between subjects. When  $\alpha > 0.95$ , this indicates that an item does not contribute any unique information and may be redundant [28]. In our study,  $\alpha$  for the subscales in the translated version of the OQLQ were all between 0.80 and 0.90, which indicate good internal consistency and are comparable with  $\alpha$  in the test of the original instrument and the previous translated Serbian, Spanish and Portuguese versions [8,11,14,15].

Repeatability can be measured by administration of the questionnaire to the same subject twice without any intervention. By using the ICC, the correlation between the measurements can be calculated. ICC values less than 0.5 indicate poor reliability, values between 0.5 and 0.75 indicate moderate reliability, values between 0.75 and 0.9 indicate good reliability and values greater than 0.9 indicate excellent reliability [29]. In our study, the ICC for the different items varied between 0.81 and 0.93; thus, indicating good to excellent reliability.

To assess convergent validity, a comparison with three earlier validated instruments was performed. OHIP14 is a short form of the OHIP49 and a widely used instrument designed to measure oral health effects on psychosocial well-being [26,30]. The JFLS is an instrument for assessing functional status of the masticatory system [22], while the OES was developed and tested for reliability and validity in prosthodontic patients [23,24]. The correlation was strong ( $\rho > 0.50$ ) in the aesthetics and function domains. A moderate correlation ( $\rho = 0.35-0.50$ ) was found in the total score and a weak correlation ( $\rho = 0.20-0.35$ ) was found in the domain, social aspect of the deformity. The domain, awareness of deformity, did not correlate with any domain in the reference instruments ( $\rho < 0.20$ ).

In the analysis of discriminant validity, the target group, patients planned for orthognathic surgery, scored significantly higher than the healthy reference group and the wisdom teeth group in total score, aesthetic and functional aspects. They also scored higher than the wisdom teeth group in the social aspect. This is in agreement with earlier studies [10,31]. Compared with the orthodontic patient group, only the functional aspect differed significantly, this may be due to a high standard deviation in the orthodontic group indicating a large variation in satisfaction with treatment outcome in that group. The reference instruments OHIP14, JFLS and OES failed to differentiate between the groups. These instruments were developed primarily for an older population, measuring individuals' perception of the

**Table 2.** Internal consistency reliability and test-retest reliability for each of the four domains in the OQLQ-S.

	Internal consistency reliability (Cronbach's alpha)	Test-retest (ICC)
Social aspect of deformity	0.90	0.93
Facial aesthetics	0.86	0.87
Oral function	0.86	0.81
Awareness of dentofacial deformity	0.80	0.90

**Table 3.** Convergent validity of the subscales in the OQLQ-S and subscales in the reference instruments.

OQLQ subscale	Reference scale	Spearman correlation coefficient
OQLQ-S tot.	OHIP14 tot.	0.46*
OQLQ-S soc.	OHIP14 psycholog.impact	0.34*
OQLQ-S aesthetic	OES-S	0.56*
OQLQ-S function	JFLS	0.71*
OQLQ-S function	OHIP14 function	0.57*
OQLQ-S awareness	OHIP14 psycholog.impact	0.17*

\* $p < .01$

**Table 4.** Mean and standard deviation for each group, total score and the four subscales of the OQLQ-S and the reference instruments.

Subscale	Orthognathic	Wisdom teeth	General dentistry	Orthodontics
OQLQ-S total score	27.2 ± 16.6	10.7* ± 13.1	13.1* ± 12.6	19.9 ± 21.0
OQLQ-S social aspect of deformity	7.2 ± 7.0	2.3* ± 4.6	4.2 ± 6.2	5.5 ± 8.2
OQLQ-S facial aesthetics	8.2 ± 5.3	2.8* ± 4.1	4.3* ± 4.3	5.8 ± 5.7
OQLQ-S oral function	7.8 ± 4.7	3.2* ± 5.0	1.4* ± 2.2	3.8* ± 5.3
OQLQ-S awareness of dentofacial deformity	4.1 ± 4.0	2.4 ± 3.2	3.1 ± 3.3	4.8 ± 4.0
OHIP14 total score	10.8 ± 7.6	10.9 ± 10.7	7.0 ± 7.0	10.0 ± 6.0
JFLS	23.5 ± 26.4	18.3 ± 33.8	18.9 ± 46.4	27.4 ± 36.7
OES	30.2 ± 17.5	25.4 ± 17.7	23.7 ± 17.0	22.5 ± 20.1

ANOVA post hoc Tukey's-b: \* $p < .05$ .

social impact of oral disorders related to function, pain and discomfort as well as aesthetics [7], they might not be fully applicable to orthognathic patients who in general are younger and whose conditions are more asymptomatic and relate more to aesthetics and psychosocial issues. Zamboni et al. concluded that generic instruments for QoL, such as the SF36, have poor sensitivity to detect changes in oral health and that condition specific instruments such as the OHIP14 and OQLQ exhibit higher sensitivity for detecting the impact of orthognathic surgery on the QoL of patients [32]. Our findings suggest that the OQLQ-S has better discriminant validity for patients with dentofacial deformities than the other condition specific instruments, the OHIP14, JFLS and OES, used as reference in our study.

In earlier studies, using the OQLQ, there is evidence of improvement in QoL after orthognathic surgery [14,16,19,32]. However, these studies are limited by patient numbers,  $n = 22-85$  and short follow up, 6–12 months. There is a need for further studies with larger numbers of patients and longer follow up. Our goal is to implement the OQLQ-S in the newly started Swedish National Register for Orthognathic Surgery (NROK), which today includes 750 patients/year.

The FDI World Dental Federation addresses the importance of incorporating oral health-related QoL measures into assessments of oral healthcare needs and cost-effectiveness [33]. QoL is underrepresented as an outcome measure in orthodontic research even though there is a trend of gradual increase [34]. Taking into consideration that malocclusion and dentofacial deformity is not a disease, but a condition that implies a variation from accepted societal norms, it is important to continue this positive trend and to devise standardised, valid instruments in different languages, for evaluation of the impact of these conditions on the quality of life.

## Conclusion

OQLQ-S is valid, reliable and comparable with the original English version.

The OQLQ-S seems to be more sensitive for measuring QoL in patients planned for orthognathic surgery than the OHIP14, JFLS and OES.

Our results suggest that the OQLQ-S is a valid tool for evaluation of the important aspect, QoL in Swedish speaking patients with dentofacial deformities when considering indications for treatment and measuring treatment outcomes.

## Acknowledgements

We thank Loka Holm Kvist, Public Dental Health Service Nässjö, for her help with the control group.

## Funding

The study was supported by the research council FUTURUM, Region Jönköpings County, Sweden.

## ORCID

Magnus Ahl  <http://orcid.org/0000-0003-2102-0919>

## References

- [1] Proffit WR, White RP. Jr. Who needs surgical-orthodontic treatment? *Int J Adult Orthod Orthognathic Surg.* 1990;5:81–89.
- [2] Myrberg N, Thilander B. Orthodontic need of treatment of Swedish schoolchildren from objective and subjective aspects. *Scand J Dent Res.* 1973;81(2):81–84.
- [3] Ware JE. Measuring patients' views: the optimum outcome measure. *BMJ.* 1993;306(6890):1429–1430.
- [4] Felce D. Defining and applying the concept of quality of life. *J Intellect Disabil Res JIDR.* 1997;41(2):126–135.
- [5] The World Health Organization Quality of Life assessment (WHOQOL): position paper from the World Health Organization. *Soc Sci Med (1982).* 1995;41:1403–1409.
- [6] Ware JE, Jr., Sherbourne CD. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Med Care.* 1992;30(6):473–483.
- [7] Cunningham SJ, Garratt AM, Hunt NP. Development of a condition-specific quality of life measure for patients with dentofacial deformity: I. Reliability of the instrument. *Community Dent Oral Epidemiol.* 2000;28(3):195–201.
- [8] Cunningham SJ, Garratt AM, Hunt NP. Development of a condition-specific quality of life measure for patients with dentofacial deformity: II. Validity and responsiveness testing. *Community Dent Oral Epidemiol.* 2002;30(2):81–90.
- [9] Bortoluzzi MC, Manfro R, Soares IC, et al. Cross-cultural adaptation of the orthognathic quality of life questionnaire (OQLQ) in a Brazilian sample of patients with dentofacial deformities. *Med Oral Patol Oral Cir Bucal.* 2011;16(5):e694–e699.
- [10] Bock JJ, Odemar F, Fuhrmann RA. Assessment of quality of life in patients undergoing orthognathic surgery. *J Orofac Orthop.* 2009;70(5):407–419.
- [11] Vucic L, Glisic B, Kistic-Tepavcevic D, et al. Cross-cultural adaptation and validation of the disease specific questionnaire OQLQ in Serbian patients with malocclusions. *Zdravstveno Varstvo.* 2016;55(3):166–173.
- [12] Al-Ahmad HT, Al-Sa'di WS, Al-Omari IK, et al. Condition-specific quality of life in Jordanian patients with dentofacial deformities: a comparison of generic and disease-specific measures. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2009;107(1):49–55.
- [13] Alanko O, Tuomisto MT, Peltomaki T, et al. A longitudinal study of changes in psychosocial well-being during orthognathic treatment. *Int J Oral Maxillofac Surg.* 2017;46(11):1380–1386.
- [14] Sanchez-Burgos R, Martinez-Gimeno C, Arribas-Garcia I, et al. Transcultural adaptation and validation of the Spanish language version of the questionnaire OQLQ for the assessment of quality of life in orthognathic patients. *J Clin Exp Dent.* 2018;10:e1184–e1191.
- [15] Gava EC, Miguel JA, de Araujo AM, et al. Psychometric properties of the Brazilian version of the Orthognathic Quality of Life Questionnaire. *J Oral Maxillofac Surg.* 2013;71:1762.e1–1762.e8.
- [16] Silva I, Cardemil C, Kashani H, et al. Quality of life in patients undergoing orthognathic surgery - a two-centered Swedish study. *J Craniomaxillofac Surg.* 2016;44(8):973–978.
- [17] Tajima M, Kohzuki M, Azuma S, et al. Difference in quality of life according to the severity of malocclusion in Japanese orthodontic patients. *Tohoku J Exp Med.* 2007;212(1):71–80.
- [18] Pelo S, Gasparini G, Garagiola U, et al. Surgery-first orthognathic approach vs traditional orthognathic approach: Oral health-related quality of life assessed with 2 questionnaires. *Am J Orthod Dentofacial Orthop.* 2017;152(2):250–254.
- [19] Sun H, Shang HT, He LS, et al. Assessing the quality of life in patients with dentofacial deformities before and after orthognathic surgery. *J Oral Maxillofac Surg.* 2018;76(10):2192–2201.

- [20] Ohrbach RB, Jezewski J, John M, et al. Guidelines for translation and cultural equivalency of instruments. <https://ubwp.buffalo.edu/rdc-tmdinternational/other-resources/translation-guidelines/>
- [21] Larsson P, John MT, Hakeberg M, et al. General population norms of the Swedish short forms of oral health impact profile. *J Oral Rehabil.* 2014;41(4):275–281.
- [22] Ohrbach R, Larsson P, List T. The jaw functional limitation scale: development, reliability, and validity of 8-item and 20-item versions. *J Orofac Pain.* 2008;22(3):219–230.
- [23] Larsson P, John MT, Nilner K, et al. Development of an Orofacial Esthetic Scale in prosthodontic patients. *Int J Prosthodont.* 2010;23(3):249–256.
- [24] Larsson P, John MT, Nilner K, et al. Reliability and validity of the Orofacial Esthetic Scale in prosthodontic patients. *Int J Prosthodont.* 2010;23:257–262.
- [25] John MT, Larsson P, Nilner K, et al. Validation of the orofacial esthetic scale in the general population. *Health Qual Life Outcomes.* 2012;10:135.
- [26] Slade GD. Derivation and validation of a short-form oral health impact profile. *Commun Dent Oral Epidemiol.* 1997;25(4):284–290.
- [27] Larsson P, John MT, Nilner K, et al. Normative values for the Orofacial Esthetic Scale in Sweden. *J Oral Rehabil.* 2014;41(2):148–154.
- [28] Goforth C. Using and Interpreting Cronbach’s Alpha. Web page. 2019. <https://data.library.virginia.edu/using-and-interpreting-cronbachs-alpha/>.
- [29] Koo TK, Li MY. A guideline of selecting and reporting intraclass correlation coefficients for reliability research. *J Chiropr Med.* 2016;15(2):155–163.
- [30] Larsson P, List T, Lundstrom I, et al. Reliability and validity of a Swedish version of the Oral Health Impact Profile (OHIP-S). *Acta Odontol Scand.* 2004;62(3):147–152.
- [31] Lee S, McGrath C, Samman N. Quality of life in patients with dentofacial deformity: a comparison of measurement approaches. *Int J Oral Maxillofac Surg.* 2007;36(6):488–492.
- [32] Zamboni R, de Moura FRR, Brew MC, et al. Impacts of orthognathic surgery on patient satisfaction, overall quality of life, and oral health-related quality of life: a systematic literature review. *Int J Dent.* 2019;2019:2864216.
- [33] Hescot P. The new definition of oral health and relationship between oral health and quality of life. *Chin J Dent Res.* 2017;20:189–192.
- [34] Tsihlaki A, O’Brien K. Do orthodontic research outcomes reflect patient values? A systematic review of randomized controlled trials involving children. *Am J Orthod Dentofacial Orthop.* 2014;146(3):279–285.