



Cross-Cultural Adaptation and Validation of the COHIP-SF19 to be used in Brazil

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Abstract

Objective: To carry out a cross-cultural adaptation and validation of the Child Oral Health Impact Profile - COHIP-SF 19 to be used in Brazil. **Material and Methods:** The adaptation process followed five stages: translation into Portuguese, synthesis of different translations, back-translation, expert panel analysis, and pre-final version testing. The final version was administered at two different moments to a sample of 100 schoolchildren aged 8-15 years in Criciúma, Brazil. The Brazilian version of the Child Perceptions Questionnaire (CPQ₁₁₋₁₄) was administered as a comparison parameter. In both administrations of the questionnaire, factor analysis, principal component extraction, and factor rotation were performed. The internal validation was performed by using the α -Cronbach coefficient and the congruence coefficient between the rotated factors in the two administrations of the questionnaire. In order to analyze the external validity, the factors of the first administration of COHIP-SF 19 and CPQ₁₁₋₁₄ factors were compared by using simple linear regression analysis and congruence coefficient. **Results:** A Brazilian version of the questionnaire was obtained. The results of the internal validity analysis indicated adequate internal consistency and statistically significant internal congruence in the two factors identified in the factorial analysis. The linear regression analysis between the COHIP-SF 19 and CPQ₁₁₋₁₄ showed weak correlations, and the congruence indices were not statistically significant. **Conclusion:** The Brazilian version of COHIP-SF 19 showed good internal consistency, but lacked external validity when compared to CPQ₁₁₋₁₄.

Keywords: Validation Studies; Quality of Life; Child; Adolescent.

Introduction

Health impact assessment of people's quality of life has been gradually incorporated into the practices of the health sector. The use of questionnaires for the impact assessment has increased considerably and focused on the perception of the physical, mental, and functional health conditions of the individual [1,2].

Oral health is part of general health and is indispensable for the good perception of quality of life. An oral health condition that enables to speak, chew, taste, smile, live free of pain and discomfort, and relate to others without embarrassment is fundamental. There are various ways to understand the importance of oral health-related quality of life. They are expressed in the form of dimensions, such as physical, social, and psychological [3]. The ability to eat properly, for example, is considered a positive factor for quality of life, whereas as the occurrence of pain and discomfort is considered a negative aspect for quality of life [3]. Petersen argues that quality of life of individuals is strongly influenced by their oral health condition. Physical and psychological restrictions may directly influence aspects of eating, speech, locomotion, social interaction, and self-esteem [4].

Different tools can be used to study the impact of oral health on quality of life in children, such as the Early Childhood Oral Health Impact Scale (ECOHIS) [5], the Child-Oral Impacts on Daily Performances (CHILD-OIDP) [6], the Child Perception Questionnaire (CPQ) [7], and the Child Oral Health Impact Profile (COHIP) questionnaire [8]. This instrument is composed of 34 questions divided into five dimensions, and was designed to evaluate oral-facial well-being in children aged 8-15 years [8]. The authors believed that in that age group, children were able to respond adequately to the questions of the questionnaire. According to them, the questionnaire would be easily understood and self-administered, being useful for research and clinical practice [8]. This instrument was originally written in English, Spanish and French, and has already been validated in the Persian [9], Korean [10] and Dutch [11] languages.

In 2012, some authors proposed a shorten version of the assessment tool termed the Child Oral Health Impact Profile – Short Version 19 (COHIP-SF 19), with 19 questions sorted into three dimensions: self-perception of oral health, functional well-being, and social/emotional well-being [12]. The aim of the present study was to carry out a cross-cultural adaptation, propose a Brazilian version, and examine its internal and external validity.

Material and Methods

Transcultural Adaptation

The guidelines proposed previously [13,14] were followed to provide a cross-cultural adaptation of COHIP-SF 19 [15].

Initial Translation into Brazilian Portuguese

The translation of the original version of the COHIP-SF 19 questionnaire was translated from English into Brazilian Portuguese by a certified translator, who was not familiar with the

terminology of the health area, and did not know the purpose of the study. An additional translation was done by a PhD in linguistics, with academic links, and who knew the purpose of the study.

Synthesis of Translations

The two translations were compared and synthesized in a single Brazilian Portuguese version by the research authors.

Back-Translation

The back-translation was done by two native English-speaking teachers. Both had no knowledge of health issues and the original questionnaire.

Expert Panel

An expert panel was composed of five researchers, namely four dentists, of whom one held a PhD, one was a pediatric dentist specialist, and two were specialists in orthodontics; and a PhD in Nursing. This panel evaluated semantic, idiomatic, experimental, and conceptual equivalences of the translations. After discrepancy identification, analysis and discussion, a pre-final version of the questionnaire was prepared.

Pre-Final Version Testing

The pre-final questionnaire was applied to 10 schoolchildren [16] aged 8-15 years old in two public schools in Criciúma, Brazil in order to check the comprehension of the questions, questionnaire's layout and the time taken to answer it. The results indicated sufficient comprehension by the students, adequate layout, and an average time of 10 minutes (SD = 2) to respond. The researchers made minor modifications to some of the questions and approved the final Brazilian version of the questionnaire.

Administration of the Proposed Brazilian Version of the Questionnaire for Validity

Study Design and Sample

A cross-sectional study was carried out on a randomly selected sample of 100 schoolchildren aged 8-15 years enrolled in two public schools in the city of Criciúma, Brazil.

Data Collection

Initially, data collection was performed through the application of two questionnaires: the proposed Brazilian version of COHIP-SF 19 (termed COHIP 1) and the Brazilian version of the Child Perception Questionnaire (CPQ₁₁₋₁₄) [7], an instrument used for external validity analysis. The CPQ₁₁₋₁₄ was used as a parameter for being a well-known tool to assess oral health-related quality of life of children and also because the number of questions and the approximate age range were similar to those of the COHIP-SF 19. After seven days, the Brazilian version of COHIP-SF 19

(termed COHIP 2) was applied again. The questionnaires were self-completed by the students under the supervision of two dentists. The questionnaires were always administered after the break between classes, taking approximately 15 minutes for the first questionnaire, and 10 minutes for the second. There was a quick explanation on how to fill in the questionnaire before starting its administration.

Ethical Implications

The school managers sent the schoolchildren's parents the free and informed consent forms to be signed, explaining the objectives and importance of the research. Only the schoolchildren who brought the consent forms signed by their parents or guardians could participate in the study. The students were also asked to sign the consent form as a condition to participate in the study.

The research project, including all its stages, was submitted to and approved by the Research Ethics Committee involving Human Subjects of the University of Southern Santa Catarina (Protocol CAAE 51240915.0.0000.5369).

Data Analysis

The statistical analyses were carried out using SPSS 18 (IBM Corp., Armonk, USA).

Exploratory Factorial Analysis (EFA)

Prior Analysis of the Method Overall Suitability

In order to examine the EFA adequacy to the data of the present study, the following previous analyses were made: relationship between the number of questions in the questionnaire and the number of subjects interviewed; correlation matrix between each pair of questions by using Pearson's linear correlation; overall suitability of factor analysis for the data by using the Kaiser-Meyer-Olkin (KMO) and Bartlett's sphericity tests.

Definition of Factors by Principal Components and Factor Rotation

Two analyses were made to define the number of factors: 1) latent dimensions or Kaiser's criterion [17], which takes into account only the factors corresponding to eigenvalues greater than one ($\lambda \geq 1$) or very close to one. For this procedure, the principal component extraction method was used, in which, in addition to minimizing the correlation between factors, the first one was formed by the highest percentage of the variance shared by the original questions, that is, the best summary of the correlations observed in the variables or items. Lastly, the Varimax type factor rotation was applied. Thus, when rotating the factor matrix, we sought to redistribute the variance of the first factors to the last ones in order to reach a simpler and significant factor pattern that would allow us to easily visualize which items made up each factor to be extracted. Thus, the number of questions that presented high loads in a given factor was minimized by redistributing the loads, and the shared variance was maximized in factors corresponding to smaller eigenvalues. The use of this method

allowed us to obtain a structural reduction of the data, define rankings of observations by means of the principal components, and verify the validity of the previously established constructs. 2) A priori criterion was used to confirm how many factors best fit the translated instrument. This type of criterion is used when the researchers already know how many factors must be extracted before starting, and when they are testing a theory or hypothesis regarding the number of factors [18].

Factor Loads and Commonalities

Factor loads are represented by the Pearson's correlation coefficient between the original variables and each of the factors. Based on Kaiser's criterion [17], it was understood that the factorial loads between the factors corresponding to eigenvalues smaller than one and the original variables should be low, since they would have presented higher correlations with previously extracted factors, from higher eigenvalues.

Commonality, which represents the total shared variance of each question in all factors from the eigenvalues greater than one, allowed us to verify if any question did not share a significant percentage of variance with the defined factors.

Internal Validity

Internal Reliability Analysis

In order to analyze the degree of internal consistency, the general standardized α -Cronbach coefficient of COHIP-SF 19 was used in both administrations of the questionnaire. This coefficient measures the correlation between answers in a questionnaire by analyzing the answers given by the respondents and presenting a mean correlation between the questions. The α -Cronbach coefficient is calculated from the variance of the individual items and the variance of the sum of the items of each administration of all the items of a questionnaire. In other studies, it is traditionally estimated that the coefficient value should be between 0.6 and 0.7 to be considered satisfactory [19], in this study it was considered above 0.7.

Comparison of COHIP-SF 19 Factor Structures Administered at two Different Moments by Means of the Congruence Coefficient

The objective was to examine if the administration of the Brazilian version of COHIP-SF [2] at different times (seven days apart) indicated statistically similar factor structures. For that purpose, the congruence coefficient [20] was adopted, in which the factorial load of each variable was used, that is, each question of the Brazilian version of COHIP-SF 19. Tools containing 20 questions, with a 5% significance, should have a congruence coefficient greater than 0.48 [21].

External Validity

Correlation Analysis Between the Rotated Factor Scores of the Proposed Version of COHIP-SF 19 and the Brazilian Version of CPQ₁₁₋₁₄

The correlation was performed by using simple linear regression analysis to measure the R^2 coefficient of determination.

Comparison of the Factor Structures of the Proposed Version of COHIP-SF 19 and the Brazilian Version of CPQ₁₁₋₁₄ Using the Congruence Coefficient

The objective was to compare factor structures obtained by using different instruments, that is, the Brazilian version of the proposed COHIP-SF 19 and CPQ₁₁₋₁₄ to the same sample. The aim was to examine if these instruments were measuring the same phenomenon. For that purpose, the congruence coefficient was used [20]. Likewise, the value of the proposed congruence coefficient should be greater than 0.48 [21].

Results

After going through all the methodological stages proposed for cross-cultural adaptation of the COHIP-SF 19 questionnaire, a Brazilian version was reached and applied to a sample of 100 students with a mean age of 10.15 years ($SD = 1.75$), of whom 42 (42%) were male.

Overall Suitability Analysis

The relationship between the number of subjects interviewed and the number of questions in the questionnaire was 5, which represents a favorable relation for the factor analysis, since the sample size must be at least 4 to 5 times the number of variables in the study [22].

The correlation matrix of the variables presented mainly values above 0.2, which represents the limit value under which the correlations would be very weak and the factor analysis method could not be applied properly.

The overall suitability of the factor analysis for the present dataset indicated a value of 0.58 for COHIP 1 and 0.72 for COHIP 2 for the KMO statistic, which indicated suitability, since the index was greater than 0.5 in both cases. The Bartlett's sphericity test resulted in a significance level ($p < 0.001$) in both questionnaire administrations, which also allowed us to consider good suitability of the method for the study sample.

Definition of Factors

The Kaiser criterion (with $\lambda \geq 1$) resulted in seven factors for both COHIP-SF 19 administrations, but factorization resulted in unclear and very mixed dimensions, which allowed us to explain approximately 62% and 64% of the variance variability in both administrations. Diagram analysis of the declivity components/eigenvalues (scree plot) revealed that, although the Kaiser criterion was indicating seven factors, the graph slope indicated three factors for COHIP 1 and two for COHIP 2, as shown in Figure 1.

The second analysis, using the a priori criterion, considering two factors in both administrations of the COHIP-SF 19, allowed us to explain approximately 28% of the variability for COHIP 1 and 38% for COHIP 2.

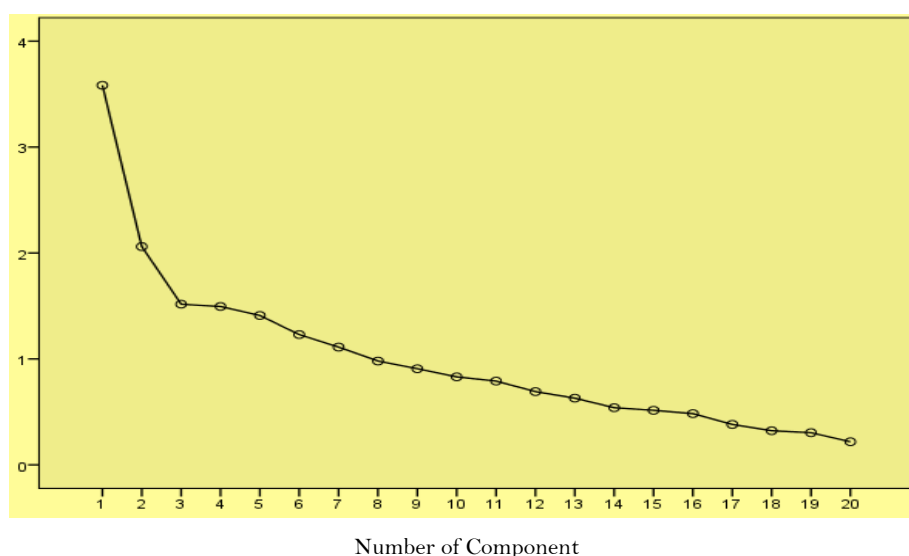


Figure 1. Graph with the relation between number of factors and Eigen values.

Subsequently, the factor load of each variable was analyzed in relation to the components extracted after the Varimax rotation (Table 1). Factor 1 corresponded to a possible dimension of the instrument composed of ten questions (No 3, 6, 7, 10, 11, 12, 14, 15, 16, and 19). Such questions denoted mainly social or psychological impact. Factor 2 corresponded to another possible dimension, mainly related to physical impact, and was composed of nine questions (No 1, 2, 4, 5, 8, 9, 13, 17, and 18).

Table 1. Matrix of the components rotated by the Principal Component Extraction method in the first and second administrations of the Brazilian version of COHIP-SF 19.

Number in Original Instrument and Question	COHIP 1		COHIP 2	
	Factor 1	Factor 2	Factor 1	Factor 2
3. Had discolored teeth or spots on your teeth	0.73		0.45	
6. Been unhappy or sad because of your teeth, mouth, or face.	0.67		0.65	
7. Missed school for any reason because of your teeth, mouth, or face	-0.50		0.61	
10. Felt worried or anxious because of your teeth, mouth, or face	0.48		0.50	
11. Not wanted to speak/read out loud in class	0.44		0.49	
12. Avoided smiling or laughing with other children because of your teeth, mouth or face	0.44		0.49	
14. Been teased, bullied or called names by other children because of your teeth, mouth or face	0.42		0.48	
15. Felt that you were attractive (good looking) because of your teeth, mouth, or face	0.35		0.46	
16. Felt that you look different because of your mouth, teeth, or face	0.35		-0.50	
19. Been worried about what other people think about your teeth, mouth or face	0.32		0.34	
1. Had pain in your teeth/toothache		0.58		0.48
2. Had crooked teeth or spaces between your teeth		0.58		0.61
4. Had bad breath		0.57		0.57
5. Had bleeding gums		0.56		0.46
8. Been confident because of your teeth, mouth, or face		0.48		0.61
9. Had difficulty eating foods you would like to because of your teeth, mouth, or face		0.48		0.40
13. Had trouble sleeping because of your teeth, mouth, or face		0.48		0.52
17. Had difficulty saying certain words		0.37		0.69
18. Had difficulty keeping your teeth clean		0.32		0.57

Extraction method: Principal component analysis; Rotation method: Varimax with Kaiser normalization.

Internal Validity

The rotated factor scores were quite similar in both administrations (Table 1). The results of the internal validity analysis showed statistically significant values of internal congruence in both Factor 1 ($p = 0.010$) and Factor 2 ($p = 0.025$), as shown in Table 2. The α -Cronbach were 0.68 for COHIP 1 and 0.72 for COHIP 2, and was never lower than 0.60 if any question was excluded from the analysis.

Table 2. Results of the congruence analysis.

		Coefficient	p-value
		Internal Congruence	
Factor 1 COHIP 1 X Factor 1 COHIP 2		0.65	0.010
Factor 2 COHIP 1 X Factor 2 COHIP 2		0.60	0.025
		External Congruence	
Factor 1	COHIP 1 X CPQ ₁₁₋₁₄	0.48	>0.05
	COHIP 2 X CPQ ₁₁₋₁₄	0.36	>0.05
Factor 2	COHIP 1 X CPQ ₁₁₋₁₄	0.38	>0.05
	COHIP 2 X CPQ ₁₁₋₁₄	0.42	>0.05

External Validity

In order to make it possible for the analysis of the external validity it was necessary to perform the same procedures of factor analysis and extraction of principal components referring to the administration of the Brazilian version of CPQ₁₁₋₁₄ (Table 3). The linear regression analysis between the scores of the rotated factors showed weak correlations and, consequently, low coefficients of determination (Figure 2). Similarly, congruence indices were all statistically non-significant (Table 2).

Table 3. Matrix of components rotated by Principal Component Extraction method of the Brazilian version of the *Child Perception Questionnaire* (CPQ₁₁₋₁₄).

Question Number in Original Instrument and Question	CPQ ₁₁₋₁₄	
	Factor 1	Factor 2
10. Felt shy?	0.74	
11. Been upset?	0.49	
12. Been concerned what other people think about your teeth, lips, mouth or jaws?	0.67	
13. Avoid smiling or laughing when around other children?	0.57	
14. Argued with other children or your family?	0.56	
15. Other children teased or called names because of your teeth, lips, jaws or mouth?	0.69	
16. Other children asked you questions about your teeth, lips, jaws or moth?	0.64	
1. Pain in your teeth, lips, jaws or mouth?		0.51
2. Sores in your mouth?		0.63
3. Bad breath?		0.52
4. Food stuck in or between your teeth?		0.63
5. Taken longer than others to eat a meal?		0.38
6. Difficult to bite or chew food like apples, corn on the cob or steak?		0.36
7. Difficult to say any words?		0.34
8. Difficult to drink or eat hot or cold foods?		0.52
9. Felt irritable or frustrade?		0.59

Extraction method: Principal component analysis; Rotation method: Varimax with Kaiser normalization.

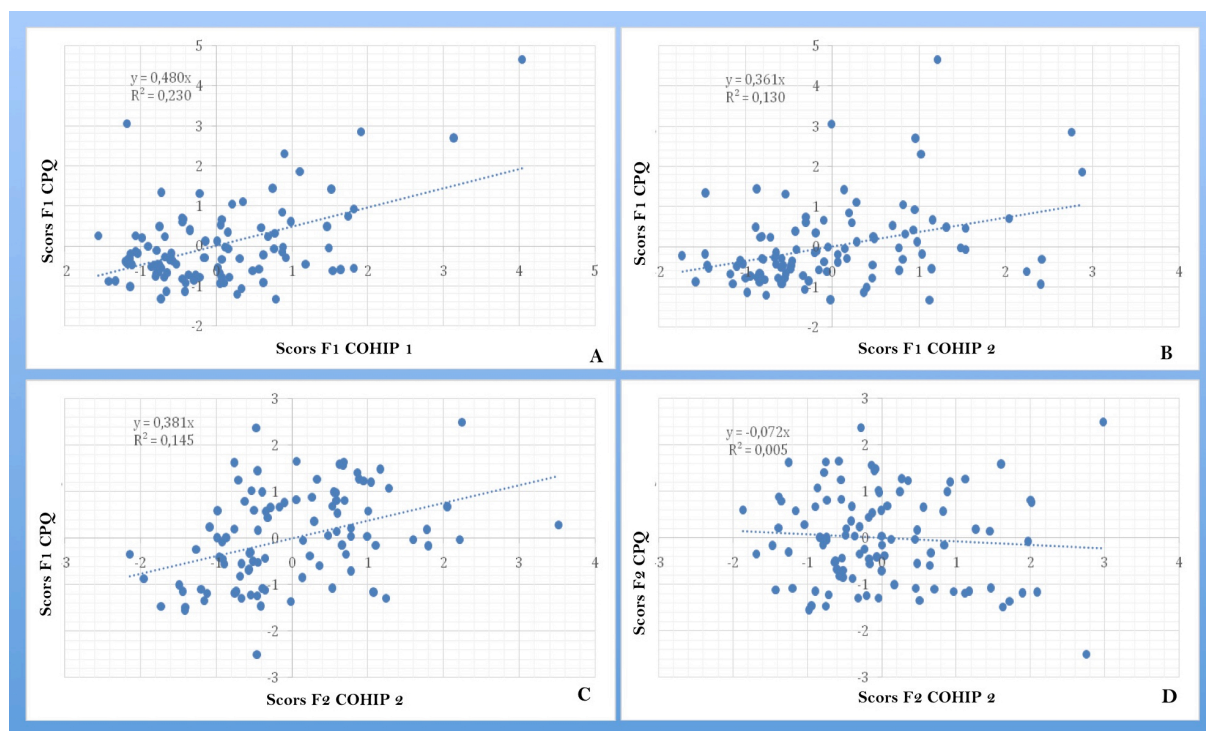


Figure 2. Results of linear regression analysis between: A- COHIP1 Factor 1 scores and Factor 1 scores of the CPQ; B- COHIP2 Factor 1 scores and CPQ Factor 1 scores; C- COHIP2 Factor 2 scores and CPQ Factor 1 scores; Scores of Factor 2 of COHIP2 and Factor 2 scores of CPQ.

Discussion

Adaptation of a research instrument is necessary when it has been prepared for one population and will now be applied to another population that has a different culture, which requires modifications of questionnaire items because of their peculiarities. Some authors have stated that following a high methodological rigor in the process of questionnaires adaptation is important for the validity of results comparability and epidemiological profiles obtained from different versions of the same instrument, used in different settings and cultures [23]. Therefore, the traditional approach, which usually consists of translation, back-translation, comparison between the original and translated versions, review by an expert panel, and testing of psychometric properties of the translated questionnaire, if not carried out with methodological rigor, may lead to a new version that is not sufficient to achieve equivalence between the original and translated versions of the questionnaire [24].

The cross-cultural adaptation process of COHIP-SF 19 generated a Brazilian version that was considered easy and quick to apply, given the average administration time was 10 minutes and only required supervision at the time of administration. Two factors or dimensions were identified in both administrations of the questionnaire. Interestingly, the factors were coincident in both administrations of the instrument: the first was composed of 10 questions that demonstrated impact upon the social and psychological environment. Factor two, composed of nine questions, indicated impact oral health may have upon physical conditions.

In 2007, it was proposed the full version of COHIP with 34 questions, suggesting five dimensions, which included assessment of oral health, functional well-being, social-emotional well-being, school environment, and self-image [24]. However, the original short version of COHIP-SF 19, proposed in 2012, presented three dimensions: oral health assessment with five questions, functional well-being with four questions, and social-emotional well-being with ten questions [15], which was different from that proposed in this study. The difference between the number of dimensions between the original instrument and the proposed Brazilian version could be attributed, hypothetically, to the different cultural context in which the original instrument was created in the United States. On the other hand, it is important to note that obtaining two factors enabled the study of external validation, because in this same population, factorial analysis also pointed out two factors for CPQ. Although higher values of variability could be expected, the use of two factors with 28% and 38% of variability in COHIP 1 and COHIP 2 could be considered acceptable. A meta-analysis about studies that used factor analysis in the health area [25], of the 803 cases evaluated, the mean of the total variance explained was 57%, only 10% explained more than 76% and another 10% had explained variances lower than 34%. According to the author, such results provide a certain guideline in the evaluation of what could be a good level of explained variance, without indicating, nevertheless, cutoff points [25].

However, it should be noted that the administration of the Brazilian version of COHIP-SF 19 at different times, seven days apart between the first and second administrations for the same sample, indicated statistically similar factor structures. Since the administration of the Brazilian version at different times allowed to reach similar structures, the instrument has the potential to provide the same response at different times, keeping the construct constant. This allows us to conclude the internal validity was adequate. In addition, the results of the congruence analysis indicated adequate and statistically significant values in relation to the instrument administrations, both in factor or dimension 1 and in factor or dimension 2, reinforcing the internal reliability of the Brazilian short version of COHIP-SF 19.

The study also showed adequate results for the standardized Cronbach's alpha, indicating good internal consistency, both in the first and second administrations of the proposed Brazilian version. Such indicator allowed us to conclude the reliability of the instrument in its proposed version was good.

Regarding the external validity, the Brazilian version COHIP-SF 19 did not obtain statistically significant indicators as compared to CPQ₁₁₋₁₄, both in the analysis of the coefficients of determination and in the congruence analysis. A factorial analysis of the CPQ₁₁₋₁₄, which also generated two factors or dimensions in the studied sample, revealed that each instrument obtained different results, and were measuring different phenomena.

In the field of ideas, one of the possibilities of not having significant congruence could be due to the fact that, unlike COHIP-SF 19, which had more questions related to the social-emotional factor, the CPQ₁₁₋₁₄ had more questions related to the physical factor than the psychological factor.

Furthermore, the fact that the CPQ₁₁₋₁₄ might have a better result if three factors were used instead of two, may also have impaired the congruence between the instruments, since two factors were a priori established to be extracted from the CPQ₁₁₋₁₄ to allow comparison with the Brazilian version of the COHIP-SF 19, in which two factors or dimensions were clearly defined. It should be noted that the CPQ₁₁₋₁₄ was first selected for comparison due to the similarity of the construct, but it was clear that the questionnaires could be used in different situations, that is, they can measure hypothetically different constructs. Furthermore, the COHIP-SF 19 was designed for the 8–15 age group and the CPQ₁₁₋₁₄, for the 11–14 age group, which may have influenced the results. Nevertheless, in proposing the Chinese version of the COHIP-SF 19, the authors have obtained satisfactory external validity results, when comparing it with a general instrument of oral health self-perception [26].

Among the limitations of this study, we should mention the relatively small sample and the selection for convenience, which may have influenced the results. However, a previous adequacy analysis of the factor analysis for the present dataset revealed that the relationship between the number of subjects interviewed and the number of questions in the questionnaire was 5, which represents a favorable relation. Furthermore, the KMO statistic values and the Bartlett's sphericity test also revealed overall suitability of the factor analysis for the present data set. However, there are indications that different results can be obtained in the factor analysis if there was higher heterogeneity in the sample, which would represent more appropriately the target population [27] for which the instrument would serve. As this study was carried out in only two schools in a single city, it is suggested to conduct other studies in other places of the country, with different realities and with a larger sample, before endorsing the use of the questionnaire for clinical practice and research purposes.

Conclusion

The results of this study show that a Brazilian version of the COHIP-SF 19 questionnaire was obtained from cross-cultural adaptation according to internationally recommended guidelines. The Brazilian version of the questionnaire is practical, easy to apply, and has satisfactory internal consistency and reliability. The results also suggest that the instrument can be used to evaluate oral health-related quality of life in children, and may provide additional contribution to other instruments with the same purpose.

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