Validation of a Greek version of the oral health impact profile (OHIP-14) in adolescents

T. Roumani, C.J.Oulis*, V. Papagiannopoulou**, J. Yfantopoulos**,*
*Depts. of *Paediatric Dentistry, School of Dentistry, **School of Law, Economic and Political Sciences; University of Athens, Greece.*

Abstract

AIM: To evaluate the validity and reliability of the Greek version of the Oral Health Impact Profile (OHIP-14) (short form) in adolescents. **METHODS:** A total of 112 healthy adolescents (15-18 years) from various socioeconomic backgrounds were randomly selected and participated in a clinical oral examination conducted by a calibrated dentist and on the same day a face to face interview was held for assessing the psychometric properties of the OHIP-14 in Greek adolescents. **RESULTS:** Cronbach's coefficient, was used to evaluate the internal consistency of the instrument and a value of a=0.8 was found indicating exceptional internal consistency. Discriminant validity and convergent validity was assessed and the inter-item correlation coefficients ranged from -0.01 to 0.8 and the item-total correlation coefficients varied from 0.17 to 0.6. Important statistical correlations were also observed between the OHIP-14 and all the clinical measures, confirming that the questionnaire can distinguish between individuals with and without impacts on their oral health. The OHIP-14 total score proved to have high associations with both self-perceived oral health status (rs=0.36; p=0.01) and self-assessment of oral satisfaction (rs=0.4; p=0.01). Examination of the relationship between these parameters and the score of each domain also lead to similar results. **CONCLUSIONS:** The Greek version of OHIP-14 instrument was found to be a valid and reliable instrument for assessing oral health-related quality of life in Greek adolescents.

Introduction

Oral Health (OH) is an integral component of a population's general health and allows individuals to function in everyday life (eat, speak and socialize) without any problems caused by illness, discomfort or disability. Furthermore, OH contributes to the overall individual's well-being. Over the last 20 years several researchers have developed specific instruments aimed at the measurement of OH [Garratt et al., 2002] and its impact on the individual's quality of life [Slade and Spenser, 1994]. Among these the Oral Health Impact Profile (OHIP) is one of the most widely used with demonstrable psychometric properties. The original version of the OHIP-49 included 49 items but was too long and Slade [1977] developed a shorter version of 14-item version called as OHIP-14. The shorter version has indicated consistency, responsiveness to changes [Allen et al., 2001; Locker et al., 2004] and sufficient cross-cultural reliability [Allison et al., 1999]. Both instruments, the longer and shorter versions, have been used with great success in several cross-sectional and longitudinal studies in adults [Locker and Slade, 1993] as well as adolescent populations. [Broder et al., 2000; Soe et al., 2004; Lopez and Baelum 2006]. Translation and cultural adaptation of both versions of OHIP-49 and OHIP-14 were successfully transformed into Chinese [Wong et al., 2002], German [John et al., 2002], Singhalese [Ekanayake and Perera, 2003], Brazilian [De Oliveira and Nadanovsky, 2005] and Spanish [Montero-Martin et al., 2009].

Although quite a few Health Related Quality of Life (HRQoL) instruments have been translated, validated and implemented in populations based quality of life studies in Greece [Yfantopoulos 2001; Tsakos et al., 2001; Papagiannopoulou et al., 2007], to the best of our knowledge there is no study so far for a Greek validated version of the OHIP-14 instrument

The aim of this study was to culturally and linguistically adapt the OHIP-14 instrument for a Greek population and demonstrate psychometric properties in a randomly selected sample of Greek adolescents from various socioeconomic backgrounds.

Materials and Methods

Validation process. The validation process of the OHIP-14 instrument into Greek was carried out in three phases: i) translation and cultural adaptation ii) testing the comprehensiveness of the instrument in a pilot study and finally iii) launching the main survey to investigate the psychometric properties (reliability and validity) of the instrument in a Greek environment. More specifically the actions undertaken in each phase are discussed below.

Translation. The process of translation followed the guidelines proposed by Guillemin et al. [1993]. As a first step two bilingual individuals, whose first language was Greek, translated the original OHIP-14 from English into Greek. Then, two other bilingual individuals, whose first language was English, undertook the reverse translation. After discussion between the members of the above groups a preliminary version of the Greek OHIP-14 was obtained.

Pilot study. The comprehensiveness of the OHIP-14 questionnaire was tested in a pilot study of 30 adolescents at the

Key words: Adolescents, validation, Oral health impact profile

Postal address: Assoc. Prof. Constantine Oulis, Department of Paediatric Dentistry, Dental School, University of Athens, 2 Thivon str., 15647, Athens, Greece.

Email: cjoulis@techlink.gr

University of Athens Paediatric Dentistry Clinic. In the pilot phase conceptual aspects of the OHIP-14 questionnaire were discussed with adolescents and finally a group of specialists of clinical dentists and language experts took into account the findings and comments received from the adolescents panel and produced a Greek Version of OHIP-14.

Main Study. A random sample of 112 healthy adolescents aged 15-18 years was selected by a stratified cluster sampling. Using the sampling frames of the National Statistical Service of Greece [Population Census of Greece, 2001], 3 schools were selected representing low, medium and high levels of socio-economic backgrounds. In total 55 boys (49.1%) and 57 girls (50.9%) were randomly selected and participated in a clinical examination and face-to-face interview.

Participants answered and provided information on demographic, dental utilization; socio-economic status and self reported oral health as well as satisfaction with dental services. OH was evaluated in an ordinal scale on the base of the question: 'How would you rate your oral health?' and three possible responses ranging from 'good', 'fair' to 'poor' were investigated. Satisfaction was also evaluated with the question: 'Are you satisfied with your oral health status?' and two possible responses 'satisfied, dissatisfied' were analysed [Dolan et al., 1998].

The same individuals underwent clinical examinations by a calibrated dentist for DMFT and plaque index DI-s [Green and Vermillion, 1964]. Recording of dental caries was carried out according to the BASCD criteria using artificial light, mouth mirror and a WHO CPITN probe [Pitts et al., 1997]. Within the framework of the main study an additive scoring process was adopted to obtain the values for each item of OHIP-14. On the estimated values reliability and construct validity was tested.

Scoring Method. Using the additive method, the total score of the OHIP-14 was calculated by summing up the responses for the 14 items. The values of OHIP score ranged from 0 to 56, with higher scores indicating lower Oral Health Related Quality of Life (OHRQoL). This method was selected because of its operational simplicity and its effectiveness in measuring Oral Health Related Quality of Life between groups with different socioeconomic background. [Robinson et al., 2003].

Statistical analysis. This was conducted by means of the Statistical Package for Social Sciences (SPSS) v.17. The psychometric properties of OHIP-14 were further tested via reliability and validity tests.

Reliability. The reliability of the OHIP-14 (i.e. the internal consistency and homogeneity) was assessed by the use of Cronbach's coefficient. By removing one item at a time, a lower value than the original for the OHIP-14 instrument should be obtained, supporting in this way the hypothesis that all 14 items should be included. According to the literature, Cronbach's coefficients above 0.7 are considered as acceptable. For a good internal consistency the values of should be above 0.8, while for an excellent internal consistency the corresponding estimates of a should be above 0.9 [Ekanayake and Pereira, 2003].

Construct Validity. Discriminant and convergent validity were used to evaluate a construct validity of the instrument. A relationship between the OHIP-14 total score and participants' OH status was assessed by correlation matrix. The main assumption was that adolescents with low OH status (more decayed or missing teeth) would correspond to lower levels of OHRQoL and higher OHIP-14 scores. The statistical significance between the differences in OH and OHIP-14 scores were assessed using the Mann-Whitney or Kruskal-Wallis test. Spearman's correlation coefficient (rs) was further used to examine convergent validity of OHIP-14 by examining the association of OHIP-14 total score and each domain score with the self-perceived OH status and the self-assessment of oral satisfaction.

Results

Table 1 presents the distribution and frequency of DMFT and the subjects according to age and gender. The sample consisted of 112 adolescents, 55 boys (49.1%), aged 15-18 years old. The age distribution of the sample was rather skewed towards the younger ages i.e. 40.2% for the 15 years old, 36.6% for the 16 years, 15.2% for the 17 years and finally 8% for the 18 years old. As for the distribution of the DMFT index, it ranged from 0 to 14 (mean = 3.0 ± 3.3), with 35.1 % of the sample having a DMFT=0, 35.8 % a DMFT= 1-5 and 28.8 % a DMFT ≥ 5.

The subjective evaluation (Table 2) of the OH status was rather high as 57.1% of the adolescents stated a 'good' oral health, followed by 37.5% reporting 'fair' and another 5.7% describing their OH as 'poor'. As far as OH satisfaction was concerned, 68.8% of the interviewees reported that they were satisfied with their OH and the remaining 31.2% as not satisfied.

Reliability. The overall value of Cronbach's alpha (a) coefficient of the OHIP-14 was estimated to be around 0.8, indicating very good internal consistency (Table 3). The exclusion of one of the 14 items from the list resulted in a lower alpha value supporting the hypothesis that all 14 items should be included. The degree of homogeneity within the seven subscales varied from poor to satisfactory and the alpha values for the different sub-scales were ranged from 0.1 (Psychological Discomfort) to 0.7 (Physical and Psychological Disability). The homogeneity of the scale was evaluated on the basis of the corrected item-total correlation coefficients. These analyses compute the correlation between each individual item in the scale and the rest of the scale with the item of interest eliminated. The corrected item-total correlation coefficients ranged from 0.25 to 0.71 (Table 3). All these values were above 0.2 that has been recommended for including an item in a scale [Streiner and Norman 1995].

Table 1. Distribution of subjects according to DMFT index, gender and age in a Greek study on adolescents OHIP-14.

By DMFT index	Distribution (# of subjects)	Distribution (%)	Cumulative distribution (%)
0	39	35.1	35.1
1	12	10.7	45.9
2	5	4.5	50.5
3	13	11.6	62.2
4	10	9.0	71.2
5	4	3.6	74.8
6	8	7.2	82.2
7	5	4.5	86.5
≥8 (8-14)	15	13.5	99.1
Mean DMFT=3 (SD=3.3)	**Total subjects=111**	**Plus one (1) missing (0.9 %)**	**Total=112 100 %**
By Gender			
Female	57	50.9	50.9
Male	55	49.1	49.1
Total	**112**	**100.0**	**100.0**
By Age			
15	45	40.2	40.2
16	41	36.6	36.6
17	17	15.2	15.2
18	9	8.0	8.0
Total	**112**	**100.0**	**100.0**

Table 4 illustrates the pattern of inter-item correlations between all items. More particularly, the inter-item correlation coefficients ranged from -0.01 (between item 10 and item 4) to 0.8 (between item 14 and item 8).

Construct Validity. The results of the discriminant validity are described in Table 4. As hypothesised, participants' with a high OHIP-14 score presented a higher number of decayed, missing teeth and a lower number of natural and filled teeth. All differences were statistically significant, while the most notable impact observed for the DMFT≥ 5 outcome, with a mean OHIP-14 score equal to 12.3 (SD±8.1), $p<0.05$. The same gradient was found with the DI-s: showing that participants with poor OH demonstrated a OHIP-14 scores of 11.0 (SD±6.9), for 'fair' OH was 9.04 (SD±9.6) and finally for 'good' OH was 9.33 (SD±6.5).

The convergent validity of the OHIP-14 was found to show that as the participants' perceived OH status was improved from poor to good, both the mean OHIP total score and the subscales scores were improved too, with the most and the least affected sub-scales being the Physical Pain 2.25 (SD±1.5) and Psychological and Social Disability, with mean values of 0.66 (SD±1.3) and 0.41 (SD±1.1) respectively,

Table 2. Self evaluation and satisfaction of Greek adolescent's Oral Health

How do you evaluate the condition of your oral health?				
	Frequency (%)	**Percent (%)**	**Valid %**	**Cumulative %**
Good	64	64	57.1	57.1
Fair	42	42	37.5	94.6
Poor	6	6	5.4	100.0
Total	**112**	**112**	**100.0**	
Are you satisfied with the condition of your oral health?				
Yes	77	68.8	68.8	68.8
No		31.2	31.2	100.0
Total	**112**	**100.0**	**100.0**	

Table 3. Reliability analysis: corrected item-total correlation and alpha if item deleted.

Impact Item		Corrected Item Total Correlation	Cronbach's Alpha if Item Deleted
1.	Difficult to pronounce words	0.55	0.80
2.	Worsened taste	0.53	0.80
3.	Pain	0.60	0.79
4.	Uncomfortable to eat	0.71	0.83
5.	Self-conscious	0.56	0.80
6.	Feel tensed	0.36	0.81
7.	Diet unsatisfactory	0.54	0.80
8.	Interrupted meals	0.38	0.81
9.	Difficult to relax	0.47	0.80
10.	Embarrassed	0.56	0.80
11.	Irritable	0.25	0.82
12.	Difficult to do jobs	0.39	0.81
13.	Life less satisfying	0.57	0.80
14.	Totally unable to function	0.29	0.81
	Mean	**0.44**	

(Table 6). All the Spearman's rank correlation coefficients were positive and statistically significant, whereas the highest association was detected within the physical disability subscale (rs= 0.41), and the lowest within the physical pain subscale (rs= 0.15) (table 6).

The correlation of the total score of OHIP-14 and the score of each domain with self-assessment of the adolescent's oral satisfaction was very high as well, confirming the good convergent validity of the OHIP-14 (Table 7). More specifically, participants dissatisfied with their OH status, had higher OHIP-14 or subscale scores (statistically significant), compared with those who were satisfied. In particular, the correlation coefficient regarding the association between the

Table 4. Reliability analysis: OHIP-14 inter-item correlationin a group of Greek adolescents.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1													
2	0.35**	1												
3	0.57**	030**	1											
4	0.05	0.02	0.17	1										
5	0.32**	0.48**	0.39**	0.05	1									
6	0.21*	0.25**	0.09	0.21*	0.22*	1								
7	0.41**	0.39**	0.66**	0.19*	0.44*	0.10	1							
8	0.10	0.13	0.14	0.23*	0.20**	0.50**	0.05	1						
9	0.26**	0.42**	0.32**	0.11	0.26**	0.04	0.22*	0.20*	1					
10	0.46**	0.52**	0.34**	-0.01	0.35**	0.10	0.30**	0.27**	0.60**	1				
11	0.16	0.19	0.18	-0.15	0.24*	0.04	0.14	-0.10	0.22*	0.15	1			
12	0.32**	0.21**	0.36**	-0.04	0.24*	0.06	0.26**	0.02	0.25**	0.35**	0.63**	1		
13	0.36**	0.32**	0.42**	0.06	0.41**	0.20*	0.44**	0.22*	0.40**	0.40**	0.29**	0.29**	1	
14	0.12	0.04	0.07	0.20*	0.20*	0.49**	0.00	0.82**	0.08	0.15	-0.08	-0.01	0.11	1

*Correlation significant at the 0.01 level (2-tailed). **Correlation significant at the 0.05 level (2-tailed).

Table 5. Discriminant validity of the OHIP-14 in a group of Greek adolescents.

Variable (number of cases)	OHIP-14 Mean (SD)/N	Test
Number of decayed, missing and filled teeth:		Mann-Whitney P<0.05
DMFT<5	8.37 (6.1)/79	
DMFT≥5	12.3 (8.1)/32	
DI-s distribution		Kruskal-Wallis P>0.823
DI-s=0.0-0.6 (good oral hygiene)	9.33 (6.5)/18	
DI-s=1.7-1.8 (fair oral hygiene)	9.04 (9.6)/66	
DI-s=1.9-3.0 (poor oral hygiene)	11.0 (6.9)/27	

total OHIP-14 score and self- assessment of oral satisfaction was 0.4, whereas the coefficients for the association between the latter and the different sub-scales varied from 0.06 for 'social disability' to 0.38 for 'physical disability'.

Discussion

The aim of this study was the cultural and linguistic adaptation of the Oral Health Impact Profile (OHIP-14) instrument into Greek and its validation, in order to use it in a second stage in the general population. Results highlighted the sensitivity of the OHIP-14 to detect the impact of OH problems on adolescents' quality of life. This has been the first study that used OHIP-14 in a Greek setting and the first that focused on the correlation of OH and the quality of life in Greek adolescents. The process of reliability and validity took place in a representative sample of three different high schools in Athens from various socio-economic backgrounds. The clinical findings of our study were very comparable with those of the national OH survey conducted by the Hellenic Dental Association [Oulis et al., 2009], in terms of the DMFT's prevalence, as well as the cultural and socioeconomic backgrounds. In particular, one third (35.1 %) of this sample was found with a DMFT=0 versus 28.9 % and a DMFT=3.0 versus 3.19 found in the general population respectively. All the above figures lead us to classify our sample as a medium carious risk group and similar to the general population. In other studies, the samples were either of low carious risk (DMFT=0.6) [Soe et al., 2004], medium carious risk (DMFT=5.4) [Biazevic et al., 2008] or high risk (DMFT=8.8) [Broder et al., 2000] while in the most recent study by Lopez and Baelum [2006] the carious index was not reported.

Intercultural process of adaptation of OHIP-14 from English into Greek was simple and the comparison between the original OHIP-14 and translated English version did not create differences in meaning or context. Several studies have shown the reliability and validity of the tested questionnaire in adult population. However, it should be noted that this instrument has not been extensively used either in adolescents nor in children populations [Jocovic et al., 2002; Foster et al., 2005]. Only three studies have been conducted worldwide [Broder et al., 2000; Soe et al., 2004; Lopez and Baelum, 2006] and only two have performed translation and cultural adaptation of the instrument [Von Rueden et al., 2006; Biazevic et al., 2008].

Mean total score of the OHIP-14 in our study coincides with the results of Broder et al. [2000] and Lopez and Baelum [2006], where samples had minor dental problems, but higher than that of Soe et al. [2004] whose sample had no problems or particular needs for dental treatment.

Table 6. Convergent validity of the OHIP-14: Mean scores and Spearman's rank correlation coefficients among the OHIP-14 and subscale scores and self-perceived oral health status.

	Self-perceived oral health status				
Subscales	**All subjects n=112 Mean (S.D.)**	**Good n=64 Mean (S.D.)**	**Fair n=42 Mean (S.D.)**	**Poor n=6 Mean (S.D.)**	**rs**
Functional limitation	1.50 (1.5)	1.06 (1.2)	1.82 (1.5)	4.00 (2.1)	**0.33**
Physical pain	2.25 (1.5)	2.09 (1.4)	2.30 (1.4)	3.50 (1.5)	0.15
Psychological discomfort	2.14 (1,6)	1.76 (1.4)	2.54 (1.6)	3.33 (2.5)	**0.26**
Physical disability	1.21 (1.9)	0.79 (1.1)	1.61 (1.3)	2.83 (1.4)	**0.41**
Psychological disability	0.66 (1.3)	0.43 (0.9)	1.73 (1.4)	2.66 (2.4)	**0.19**
Social disability	0.41 (1.1)	0.25 (0.7)	1.61 (1.4)	0.66 (1.6)	0.16
Handicap	1.27 (1.3)	0.96 (1.3)	1.59 (1.6)	2.33 (1.2)	**0.25**
OHIP-14	9.55 (6.9)	7.38 (5.5)	11.2 (6.9)	19.3 (8.8)	**0.36**

Bold: Correlation is statistically significant at 0.05 or 0.01 (2-tailed).

Table 7. Convergent validity of the OHIP-14: Mean scores and Spearman's rank correlation Coefficients among the OHIP-14 and subscale scores and self-assessment of oral health's satisfaction.

	Self-assessment of oral health's satisfaction			
Subscales	**All subjects n=112 Mean (SD)**	**Satisfied n=77 Mean (SD)**	**Dissatisfied n=35 Mean (SD)**	**rs**
Functional limitation	1.50.(1.5)	1.13 (1.3)	2.31 (1.7)	**0.33**
Physical pain	2.25 (1.5)	2.07 (1.4)	2.62 (1.4)	0.17
Psychological discomfort	2.14 (1.6)	1.76 (1.2)	3.00 (2.0)	**0.29**
Physical disability	1.21 (1.3)	0.86 (1.1)	1.97 (1.4)	**0.38**
Psychological disability	0.66 (1.3)	0.44 (1.0)	1.17 (1.7)	**0.24**
Social disability	0.41 (1.3)	0.30 (0.7)	0.65 (1.6)	0.06
Handicap	0.27 (1.3)	0.98 (1.0)	1.91 (1.6)	**0.27**
OHIP-14	9.55 (6.9)	7.57 (5.6)	13.8 (4.4)	**0.40**

Bold: Correlation is statistically significant at 0.05 or 0.01 (2-tailed).

The period of time, in which adolescents were asked to describe how a problem in their oral state had an impact in their everyday life, was not defined in this study. This was based upon the short duration of their lifetime until interview (lifetime recall), a fact that all researchers agreed on [Broder et al., 2000; Soe et al., 2004; Lopez and Baelum, 2006]. On the contrary, from studies on adults, it is important to define the period of time in which the problem occurred due to the longer duration of their lifetime [John et al., 2002]. All researchers have agreed with the approach that physical disability, functional limitations and psychological discomfort have the highest correlation with OH and an important impact in adolescent quality of life [Broder et al., 2000; Soe et al., 2004; Lopez and Baelum, 2006], confirmed in this study.

The estimated Cronbach's α value of 0.8 found in our study is similar to that of Soe et al. [2004] and Lopez and Baelum [2006], (with α = 0.9 and =0.7 respectively), from adolescents with minor problems. But it is lower than that of Broder et al. [2000] on adolescents of high risk. The internal consistency of the present version of the OHIP-14 is verified also by the fact that by omitting any of the 14 items, lower alpha values were observed. However, the finding that the alpha values for the subscales, excluding those for Physical Disability (α=0.7) and Social Disability (α=0.8), were quite poor was an indication of a low level of subscales' homogeneity of the instrument. The development of a new OHIP-14 instrument, based on a subset of 14 questions from the original OHIP-49, according to their frequency in the Greek population, might have had solved the problem. However, such an undertaking was far beyond the purpose of this study, although similar trials have already been reported in the literature [Wong et al., 2002; Locker and Allen, 2002].

Inter-item and item-total correlations were also good enough to support the internal consistency of the instrument. In particular, although inter-item correlations varied from -0.01 to 0.8, none were high enough for any item to be redundant, while the item-total correlations coefficients were above a recommended threshold for including an item in a scale [Streiner

and Norman, 1995]. Similar results have been observed in studies evaluating the reliability of the instrument among adolescents [Soe et al., 2004, Lopez and Baelum, 2006].

Statistically significant associations were found between questions aiming to subjectively evaluate individuals' OH status (such as self-perceived OH status and self-assessment of oral satisfaction) and OHIP scores. The finding that the higher the OHIP-14 total and the subscale scores, the more diminished OHRQoL, and thus the poorer the perceived OH status and satisfaction, provided further evidence of the instrument's construct validity. The capability of the index to detect people with problems out of a small sample makes it a very sensitive instrument. Also, the fact that it is a questionnaire created for elderly people and does not predict the natural mental development and acquirement of experiences that accompany an adolescent's life, makes it an even more significant instrument and this is confirmed by the studies so far [Slade and Spenser 1994; Garratt et al., 2002].

Conclusion

The Greek version of the OHIP-14 instrument presented psychometric characteristics similar with the originals in English and it is considered appropriate for assessing the impacts of oral health to quality of life of the adolescents in the Greek population.

Acknowledgements

The ethical approval for this study was given from the Ethics Research Committee at the Athens Dental School. Furthermore a consent form was completed and signed by all adolescents who participated in the study and reconfirmed by their parents. This study was made in partial fulfilment of a Master's Degree in Paediatric Dentistry and it was part of a program carried out under the auspices of the Hellenic Dental Association and in collaboration with the Dental School of Athens and supported by a Colgate Palmolive Co.

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