

The Slovenian Version of the Oral Health Impact Profile Questionnaire (OHIP-SVN): Translation and Psychometric Properties

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ABSTRACT

The aim of the study was to develop and to test the psychometric properties of the Slovenian version (OHIP-SVN) in the new cultural context. Construct validity was tested on 430 subjects, test-retest reliability on 60 subjects, internal consistency on 460 subjects, and responsiveness on 30 patients with a treatment demand (toothache). The significant association between the OHIP summary scores and the self-reported oral health ($p < 0.001$) confirmed the construct validity. The test-retest reliability showed high intraclass correlation coefficients and no significant differences between the two administrations ($p > 0.05$). The internal consistency showed high Cronbach's alpha (0.97). The responsiveness was confirmed by the statistically significant difference between the mean OHIP score at baseline and follow-up ($p < 0.001$) and by a considerable effect size in the patients with a treatment demand (0.515). The OHIP-SVN, as one of the first translation into one of the Slavic family of the languages proves that this instrument is suitable for the assessment of the Oral Health Related Quality of Life in Slovenia.

Key words: oral health, quality of life, reliability, OHIP, psychometrics, reliability, validity, questionnaires, dentistry, Slovenia

Introduction

Oral health has always been considered as an important part of patient's general health¹. Both, objective physical indicators of oral morbidity and subjective patient's perception of oral condition contribute to the description of oral health status. The measurement of the patients' perceived oral health has been increasingly in demand for epidemiological, clinical, and longitudinal studies worldwide.

The various OHRQoL indicators are based on a conceptual framework derived from the International Classification of Impairments, Disabilities and Handicaps (ICIDH) developed by WHO in 1980². The ICIDH model consists of the following key concepts: impairments, functional limitations, pain, disability, and handicap. It provides a theoretical basis for the empirical exploration of the links between various dimensions of general and oral

health. Locker subsequently developed this theoretical framework for the oral health studies³.

The Oral Health Impact Profile (OHIP) is one of the most comprehensive subjective oral health status measure^{3,4} and it has become one of the most powerful tools in the oral health research for evaluating different treatment solutions and in multicentre studies where cross-cultural comparison is the priority. By the end of year 2008, there have already been 270 articles listed in the Medline® database that contain a keyword OHIP and a number of them is raising rapidly.

The original instrument consists of 49 items, representing seven domains (functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap) which

measure both the frequency and severity of oral problems⁴. For each question, the subjects are asked how frequently they had experienced the impact of the problem in the last month^{5,6}. Responses are rated using a Likert-type scale (0=never, 1=hardly ever, 2=occasionally, 3=fairly often, 4=very often). Zero indicates the absence of any problems. Higher scores indicate more impaired oral health⁴.

Besides the original questionnaire, some other specific versions of the OHIP instrument were developed: several short versions consisting of 14 questions (OHIP-14)^{7,8} or less⁹, the OHIP-Edentulous (OHIP-EDENT) for edentulous patients¹⁰, the OHIP for patients with temporomandibular disorders¹¹, and the OHIP-aesthetic questionnaire for measuring the oral aesthetic impact to the quality of life¹². Moreover, versions longer than OHIP-14 or OHIP-49 were also developed by adding some culture-specific items⁵.

To our best knowledge, the translation of the original OHIP questionnaire⁴ into any of the Slavic family of languages, (Russian, Ukrainian, Byelorussian, Rusyn, Lower and Upper Sorbian, Polish, Kashubian, Silesian, Czech, Slovak, Slovenian, Serbian, Croatian, Bosnian, Macedonian, Bulgarian), which are spoken by approximately 400 millions of people mostly in the Central, East and Southeast of Europe and the North of Asia, together with the psychometric evaluation has not been developed and/or published in an international journal (indexed in the ISI Journal Citation Reports®, Institute for Scientific Information, Thomson Reuters, New York, USA) yet. The aims of the study were to develop a Slovenian version of the Oral Health Impact Profile questionnaire (OHIP-SVN) and to evaluate the psychometric properties of the instrument in the new cultural context.

Subjects and Methods

Participants

A total of 490 Slovenian individuals (Table 1) were included to test the psychometric properties of the new OHIP-SVN instrument. The distribution of the samples

by age, gender, and research purpose is presented in the Table 1. The National Medical Ethics Committee approved the study. Consent was obtained from each subject prior the study.

The examination of the oral status of each individual was performed by one trained Slovenian dentist upon the WHO criteria prior to the administration of the questionnaire in the groups of prosthodontic patients and the groups of patients with a treatment demand¹³ (sample B and C, Table 1). The present prosthodontic appliances in the oral cavity were registered as well.

Derivations of the OHIP-SVN

The Slade's version of the OHIP⁴ consisting of 49 questions was translated from the original English into the Slovenian language, according to the accepted standards¹⁴. For each question, subjects were asked how frequently they had experienced the impact of the problem during the last month.

The self-administered questionnaires were collected during the year 2007. The response rate was 90%. 3% of the questionnaires were discarded due to missing data. Besides the OHIP questions the subjects also answered one question referring to the self-reported oral health and one question referring to the self-reported dental aesthetic.

Translation and back-translation of the original English version of the OHIP

The original English version of OHIP⁴ was translated into the Slovenian language according to the accepted techniques¹⁴. First, it was translated by a professional translator familiar with dental vocabulary and semantics together with a Slovenian dentist with an excellent knowledge of English, who had lived in USA for one year for the purpose of education. Two Slovenian dentists, with an excellent knowledge of English (Dental Division, Faculty of Medicine, University of Ljubljana, Slovenia), revised this translation. All the translators worked independently. The Slovenian translations were merged into one Slovenian version (OHIP-SVN). The final merged

TABLE 1
OVERVIEW OF THE SAMPLING STRATEGIES AND SAMPLES BY AGE, GENDER AND RESEARCH PURPOSE

Sample	Sample type	N	Age mean (SD)	Age range	% women	Type of investigation
(A) General population ^a	Random	400	41.38 (12.66)	19–80	72.7	Construct validity, Internal consistency
(B) Prosthodontic patients ^b	Consecutive	30	56.37 (12.72)	36–81	60.0	Internal consistency, Test-retest reliability
(C) Patients with a treatment demand (toothache) ^c	Consecutive	30	39.3 (14.69)	20–72	56.7	Responsiveness
(D) Students ^d	Convenience	30	22.6 (1.67)	21–26	63.3	Test-retest reliability

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version was then back-translated into English by another professional translator together with the Slovenian dentist with an excellent knowledge of English, who had been living in English spoken countries for several times as post-doctoral fellow. Two native English speakers who compared them with the original English version evaluated the Slovenian back-translation. Prior to back translation, a pilot study was performed within a group of 30 patients to test the clearness of the items.

The psychometric properties of the Slovenian version of OHIP-SVN were then tested. The assessment of reliability, validity, and responsiveness was performed.

Statistics

Statistical analysis was done using the SPSS 14.0 statistical software (Chicago, Illinois, USA) and the Microsoft Office Excel 2003 (Microsoft Office, Windows XP 2005, USA).

Reliability

The purpose of the reliability is to estimate the degree of test variance caused by error. In the present study, two types of reliability were assessed: the test-retest reliability and the internal consistency.

The test-retest reliability was assessed by calculating the intraclass correlation coefficients (ICC), based on a one-way repeated-measures analysis of variance (ANOVA), using summary scores of the OHIP from the repeated administration of the tests according to the method of Shrout's and Fleiss's ICC type 2.1¹⁵. The ICC demonstrates stability in the pattern of response. This was performed on 60 Slovenian subjects (groups B and D, Table 1). Thirty subjects (group B, Table 1) were patients referring to the Department of Prosthodontics, (Medical Faculty, Dental Division, University of Ljubljana) prior to the therapy. Another thirty subjects (group D, Table 1) were students. None of the subjects was treated for any of the oral and/or dental problems within a two-week interval, between the two completions of the OHIP-SVN questionnaire. It was predicted that the OHRQoL would not change during the two-week period without any oral treatment or problems. Intraclass correlation coefficients (ICC) were calculated for all OHIP-SVN item scores and the seven sub scores¹⁵. Limits of agreement were also calculated¹⁶.

The internal consistency measures whether several items that propose to measure the same general construct produce similar scores. The internal consistency was tested on 430 subjects (group A and B, Table 1), by calculating the Cronbach's alpha and the average inter-item correlation for all OHIP-SVN item scores and the seven sub scores. The Cronbach's alpha is a summary statistics, which captures the extent of agreement between all possible subsets of questions. The Cronbach's alpha values >0.80 indicate a reliable scale, although in the initial stages of the study, values >0.70 are also acceptable¹⁷.

Validity

The two sub-types of construct validity were tested, the convergent and the group's validity. For that purpose, 400 subjects were included. A group represented the employees (including all professions) from the following Slovenian educational and research institutions: one public kindergarten, one public primary school, University of Ljubljana and Slovenian research organization The Jozef Stefan Institute (group A, Table 1). The OHIP-SVN questionnaire was self-administered together with a detailed written instruction on how to complete it.

Convergent validity was tested by examining the association between the self-reported oral health on an analogue scale ranging from 1 to 4 (1=poor, 2=fair, 3=good, 4=excellent) and the OHIP (0–4) summary scores and the OHIP (2–4) summary scores using Spearman's rank correlation. Convergent validity was also tested by examining the association between the self-reported oral aesthetics ranging from 1 to 4 (1=poor, 2=fair, 3=good, 4=excellent) and the OHIP (0–4) summary scores and the OHIP (2–4) summary scores using the Spearman rank correlation.

Groups validity was tested between one self-reported oral condition (denture wearing) with predicted impact on OHRQoL and the OHIP scores in the group A using the point-biserial correlation coefficient. Possible responses regarding denture wearing were dichotomous (yes and no). A dental professional had predicted that subjects without dentures in the general population would have lower OHIP-SVN scores than persons having dentures (group A, Table 1). The two summary OHIP-SVN scores were calculated: the sum of the item responses resulting in the range 0–196, and the sum of impacts of questions mentioned occasionally, often and very often, resulting in the score 0–49 points.

Responsiveness

The responsiveness of the OHIP-SVN was tested on 30 patients with a treatment demand (group C, Table 1). The patients suffering from a toothache were selected. They were referred to the Oral surgery department for a tooth extraction (University Medical Center, Ljubljana), mainly after unsuccessful endodontic treatment. They completed the OHIP questionnaire twice, the first time before the tooth extraction and the second time one month after the treatment. It was assumed that the OHRQoL would improve substantially within one-month period after the treatment, compared with the status when having dental pain. The significance of the difference for the OHIP-SVN summary score between the baseline and the follow-up was tested using the paired t-test and by calculating two measures of responsiveness: the standardized effect size and the standardized response mean. The standardized effect size was calculated as:

$$\frac{(\text{Mean baseline OHIP score} - \text{follow up OHIP score})}{(\text{standard deviation of baseline OHIP score})}$$

and the standardized response mean as:

(Mean baseline OHIP score – follow up OHIP score)/
(standard deviation of baseline OHIP score – follow up
OHIP score) according to Allen et al.¹⁸.

Results

Reliability

The test-retest reliability was tested on 60 subjects (samples B and D, Table 1), by using a time-interval of two weeks between the administration of the same OHIP-SVN questionnaire. The intraclass correlation coefficients (ICC) were calculated for all OHIP-SVN item scores and the seven sub scores. The results of ICC varied between 0.52 and 0.98 (Table 2). The limits of agreement were computed around the mean of the differences (95% confidence intervals for the mean) (Table 2). The mean differences between the two scores were not significant ($p > 0.05$, Table 2).

The internal consistency of the OHIP-SVN was tested on 400 subjects (Group A, Table 1) by calculating the Cronbach's alpha¹⁷ and the average inter-item correlation for all OHIP-SVN item scores and the seven sub scores. The Cronbach's alpha was satisfactory and ranged between 0.78 and 0.97 (Table 3).

Validity

Construct validity was verified by a significant association of the two OHIP summary scores (sum of the values from 0 to 4 and sum of the values from 2 to 4) with

the self-reported oral health, the self-reported oral aesthetics, and with the presence or absence of a denture in the general population sample ($p < 0.001$, Table 4).

Responsiveness

The responsiveness is a test's characteristic that measures the response, which had occurred between the two administrations of the same test, by e.g. a change caused by a treatment procedure. In the group of patients with a toothache (group C, Table 1), there was a significant difference between the mean baseline score and the mean follow-up score (13.43 points) for the OHIP (0–4) summary score ($p < 0.001$, Table 5). The effect size was 0.515.

Discussion

The OHRQoL has been established as an important outcome for evaluating the impact of oral disease and for assessing the efficacy of different treatments and related factors. The development of different OHRQoL questionnaires has led to the construction of the OHIP instrument, »self-complete« questionnaire that investigates function, symptoms and the social and psychological impact of oral disorders and treatment procedures on general health. Almost 20 published translations of the original English version of the OHIP instrument confirm its general acceptance among dental researchers worldwide^{5,6,19–28}. However, only short OHIP versions (OHIP-14) are reported in some languages like Turkish²⁹, Hebrew³⁰, Finnish³¹, Sinhalese³², Croatian³³ and Slovenian³³. Russian

TABLE 2
TEST-RETEST RELIABILITY FOR A SLOVENIAN VERSION OF THE ORAL HEALTH IMPACT PROFILE WITH 49 ITEMS (OHIP-SVN)
AND SEVEN SUBSCALES

Scale [number of items]	ICC	Mean of the differences	Limits of agreement	P paired t-test
Students (n=30) sample D from Table 1				
OHIP-SVN [49]	0.96	0.77	-0.58 – +2.11	0.254
Functional limitation [9]	0.85	0.43	-0.26 – +1.12	0.210
Physical pain [9]	0.68	0.10	-0.65 – +0.85	0.789
Psychological discomfort [5]	0.98	0.10	-0.18 – +0.38	0.476
Physical disability [9]	0.81	0.13	-0.23 – +0.50	0.459
Psychological disability [6]	0.94	-0.23	-0.54 – +0.07	0.129
Social disability [5]	0.54	0.13	-0.08 – +0.35	0.211
Handicap [6]	0.98	0.10	-0.14 – +0.21	0.083
Prosthetic patients (n=30) sample B from Table 1				
OHIP-SVN [49]	0.92	2.40	-3.27 – +8.07	0.394
Functional limitation [9]	0.84	-0.03	-1.64 – +1.58	0.967
Physical pain [9]	0.86	-1.33	-2.70 – +0.04	0.056
Psychological discomfort [5]	0.85	0.60	-0.65 – +1.85	0.333
Physical disability [9]	0.76	1.60	-0.56 – +3.76	0.140
Psychological disability [6]	0.67	0.23	-1.47 – +1.94	0.781
Social disability [5]	0.52	0.67	-0.95 – +2.28	0.405
Handicap [6]	0.85	0.67	-0.61 – +1.94	0.294

TABLE 3
INTERNAL CONSISTENCY (CRONBACH'S ALPHA AND AVERAGE INTER-ITEM CORRELATION) FOR A SLOVENIAN VERSION OF THE ORAL HEALTH IMPACT PROFILE WITH 49 ITEMS (OHIP-SVN) AND SEVEN SUBSCALES

Scale [number of items]	General population (n=400)		Prosthetic patients (n=30)	
	Cronbach's alpha	Average inter-item correlation	Cronbach's alpha	Average inter-item correlation
OHIP-SVN [49]	0.97	0.39	0.96	0.35
Functional limitation [9]	0.83	0.36	0.78	0.30
Physical pain [9]	0.85	0.39	0.86	0.42
Psychological discomfort [5]	0.90	0.65	0.89	0.63
Physical disability [9]	0.88	0.44	0.88	0.45
Psychological disability [6]	0.91	0.64	0.87	0.54
Social disability [5]	0.92	0.69	0.95	0.79
Handicap [6]	0.88	0.54	0.92	0.67

translation has also been reported, but without results of psychometric evaluation³⁴.

The aims of this study were to develop a Slovenian version of the Oral Health Impact Profile (OHIP-SVN), to evaluate the psychometric properties (reliability, validity and responsiveness) in the Slovenian cultural environment and to compare them with the existing OHIP translations^{5,6,19–28}.

The administration modus of the German⁵ and the Hungarian⁶ versions was used as a strategy in the development of the Slovenian version of OHIP, since it certified a reliable procedure. Several sample-groups were formed in order to collect the data to test the psychometric properties (Table 1).

In the original English version⁴, the items had been weighted to reflect the relative importance of each question. The weights were not obtained in this study, since they not only increase the complexity of use and interpretation of health status measures, but also had not improved the measurement properties in the translated versions^{5,35}.

The Cronbach's alpha showed satisfactory results for OHIP-SVN (0.78–0.97, Table 3). The average inter-item correlation also confirmed good reliability of the Slovenian version of the OHIP questionnaire. The results of the reliability measures obtained in the Slovenian version of the OHIP-49 questionnaire (OHIP-SVN) are very similar to the original OHIP version⁴.

TABLE 4
CONSTRUCT VALIDITY: ASSOCIATION BETWEEN SELF-REPORTED ORAL HEALTH. SELF-REPORTED ORAL AESTHETICS. DENTURE WEARING AND SLOVENIAN VERSION OF THE ORAL HEALTH IMPACT PROFILE CONSISTING OF 49 ITEMS (OHIP-SVN) CALCULATED IN THE GENERAL POPULATION SAMPLE (N=400)

Variable	N	OHIP (0–4) (\bar{X})	OHIP (2–4) (\bar{X})	Correlation coefficient and level of significance
Self-reported oral health				0.63** OHIP (0–4) 0.60** OHIP (2–4)
Excellent	51	8.02	1.47	
Good	224	17.39	4.28	
Fair	94	40.03	12.22	
Poor	31	68.84	21.55	
Self-reported oral aesthetics				0.56** OHIP (0–4) 0.52** OHIP (2–4)
Excellent	52	10.52	2.60	
Good	213	17.53	4.34	
Fair	106	36.99	11.15	
Poor	29	69.00	21.03	
Denture				0.35** OHIP (0–4) 0.37** OHIP (2–4)
No	304	20.22	5.22	
Yes	96	42.24	13.17	

**p<0.001

TABLE 5

RESPONSIVENESS OF THE SLOVENIAN VERSION OF THE ORAL HEALTH IMPACT PROFILE QUESTIONNAIRE (OHIP-SVN) WITH 49 ITEMS BASED ON THE SAMPLE C (PATIENTS WITH A TREATMENT DEMAND-TOOTHACHE)

Measure	Value
Mean baseline OHIP score – Mean follow-up OHIP score	46.13–32.70**
95% confidence interval of the difference	9.60–17.27
Summary score range at baseline	10–94
Standardised effect size	0.515
Standardised response mean	1.31

** $p < 0.001$ (paired t-test)

The recall period for the OHIP-SVN test-retest evaluation was not longer than two weeks to provide that no deterioration of the oral health status had occurred within the two administration of the same questionnaire. Moreover, this time interval is long enough to assure that the subjects will not remember their previous answers.

The validity tests explain the degree to which the tests measure the items that they have been designed to measure. Therefore, the results of the OHIP-SVN were compared to the tests measuring similar clinical properties. The strong correlations of the self-rating of oral health and of the self-rating oral aesthetics with the OHIP-SVN scores confirmed the strong construct validity in the tested groups ($p < 0.001$, Table 4). The groups' validity was confirmed by the significant correlations of the OHIP-SVN scores and the presence or absence of dentures ($p < 0.001$, Table 4).

The responsiveness measures a response to the treatment, which had occurred between the two administrations of the same test. The one-month recall period was chosen, similar to the OHIP-G⁵, and the OHIP-H⁶, as it offered a more accurate memory, compared to a longer period. In the original OHIP version⁴ and some earlier OHIP-translations the recall period after the treatment was longer^{36,37}. However, over a long period of time an

impairment of oral health is also possible. The responsiveness of the OHIP-SVN was tested in the group of patients with a treatment demand. A group of patients having a toothache was selected. It was hypothesized that the dental pain would show a strong impact on the OHRQoL and that a successful treatment would relieve the patients from pain and significantly decreases the OHIP summary scores. After the treatment (tooth extraction), in 80% of the subjects pain disappeared within 7 days. Therefore, we supposed that the one-month period would be optimal for a total recovery of the symptoms in all of the patients. Great and statistically significant ($p < 0.001$) improvements in both, overall OHIP scores (OHIP 0–4) and OHIP 2–4 scores were obtained. The effect size also showed satisfactory changes of the post-treatment OHIP-score (Table 5). According to Cohen, the effect size of 0.20 is considered small, 0.50 moderate and 0.80 large³⁸.

The simple questionnaires for the measurement of patients' satisfaction with their removable dentures, offering responses on the five grades Likert scale have already been in use^{39–43}. Although the OHIP scores indicated 0–no problems and 4–the most severe problems, there was no problem for the Slovenian population to assess their oral health.

To our best knowledge, the OHIP questionnaire has not yet been translated into any language of the Slavic language family together with the reported examination of the psychometric properties in the new cultural environment. According to the results of this study, the OHIP-SVN revealed sufficient psychometric properties. This study will hopefully encourage other researchers that speak any language of the Slavic language family to translate and adopt this internationally accepted OHRQoL instrument.

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SLOVENSKA VERZIJA ORAL HEALTH IMPACT PROFILE UPITNIKA (OHIP-SVN): PRIJEVOD I PSIHOMETRIJSKA SVOJSTVA

S A Ž E T A K

Svrha ovog istraživanja bila je razviti i testirati psihometrijske karakteristike slovenske verzije »Oral Health Impact Profile« (OHIP) upitnika u slovenskom kulturnom okruženju (OHIP-SVN). Konstruktivna valjanost OHIP-SVN testirana je kod ukupno 430 ispitanika, »test-retest« pouzdanost uključila je 60 ispitanika, unutarnja konzistencija OHIP-SVN upitnika testirana je kod 460 ispitanika, a osjetljivost OHIP-SVN upitnika testirana je kod 30 ispitanika koji su imali potrebu za stomatološkim zahvatom (zbog kronične zubobolje). Značajna povezanost između OHIP zbroja bodova i pacijentove vlastite procjene oralnog zdravlja ($p < 0,001$) potvrdila je dobru konstruktivnu valjanost OHIP-SVN upitnika. Test-retest pouzdanost pokazala je visoke »intraclass« koeficijente korelacije, a također nije bilo statistički značajne razlike između zbroja bodova prvog i drugog upitnika, koji je ispunjen u razmaku od mjesec dana bez promjene oralnog statusa pacijenata ($p > 0,05$). Visoke vrijednosti Cronbach's alpha (0,97) potvrdile su dobru unutarnju konzistenciju upitnika (Internal consistency). Primjerenost upitnika potvrđena je utvrđenom statistički značajnom razlikom između aritmetičkih sredina OHIP bodova prije i nakon stomatološkog zahvata u grupi pacijenata sa kroničnom zuboboljom ($p < 0,001$), a također i primjerenom »veličinom efekta« (Effect size) (0,515). OHIP-SVN jedan je od prvih prijevoda OHIP upitnika na jedan od slavenskih jezika, a u ovom istraživanju potvrđena su njegova dobra psihometrijska svojstva, što pokazuje da je upitnik OHIP-SVN prikladan za procjenu kvalitete života ovisne o oralnom zdravlju u slovenskoj populaciji.