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Adaptation and validation of the early childhood oral health impact scale in Lithuania

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SUMMARY

Background. The Early Childhood Oral Health Impact Scale (ECOHIS) is a parent – assessed oral health related quality of life measure developed to assess the impact of oral health problems on preschool children.

Aim. The aim of this study was to develop a Lithuanian version of the ECOHIS and evaluate its validity and reliability among preschool children in Lithuania.

Design. A lithuanian version of ECOHIS (L-ECOHIS) was developed through a forward-backword translation. A cross-sectional study was performed to assess discriminant and convergent validity and internal consistency. Data was collected from 130 parents of 0-5 year-old children visiting the dental department. A subsample of parents filled the questionnaire again to assess the test-retest reliability.

Results. Cronbach's alpha for the instrument was 0.869. Item-total correlation coefficients ranged from 0.389 to 0.797. Scores of the child and family sections were significantly correlated ($P<0.001$). The scale scores indicating worse quality of life were significantly associated with poor parental ratings of their child's oral health and problem-based dental attendance. The intra-class correlation coefficient was 0.98.

Conclusion. The L-ECOHIS is a valid and reliable measure to assess OHRQoL of 0–5 year-old children with Lithuanian speaking parents.

Key words: children, oral health, quality of life, validity, reliability.

INTRODUCTION

Oral and dental health conditions are important factors affecting quality of life. Assessing the impact of oral health problems on quality of life is especially important in young children as oral health status can affect their growth, weight, socializing, self-esteem and learning abilities (1, 2).

In Lithuania, most studies have focused on the risk factors for early childhood caries and its behavioral, clinical and microbiological characteristics (3, 4). No studies have been reported in literature concerning the impact of dental caries on oral health related quality of life (OHRQoL) in preschool children, although a high prevalence of dental caries in childhood has been described in literature (3, 5). In order to evaluate the impact of oral health problems and treatments on OHRQOL of children, a standard instrument which evaluates children's OHRQOL is needed. No valid measure of children's OHRQOL exists in Lithuanian language.

There are few questionnaires which are specifically designed to assess OHRQoL in children (1, 6-8). One of them, the Early Childhood Oral Health Impact Scale (ECOHIS) has been specifically developed and validated for preschool children in English speaking populations (8). The ECOHIS is a parent–assessed OHRQoL measure developed to assess the impact of dental caries on preschool age children and their families. The questionnaire consists of 13 questions about the impacts of oral health on child's (9 questions) and family's (4 questions) daily activities. Child impact section consists of 4 domains: child symptoms, child function, child psychology and child self image and social interaction.

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Family impact section consists of 2 domains: parental distress and family function. Each question asks about frequency of an oral health-related problem in life and is scored from 1 (never) to 5 (very often) with a choice of "I don't know" (DK). Item scores are simply added to create a total scale score; higher scores indicate greater impacts and worse quality of life. The ECOHIS has been translated into French, Farsi, Turkish, Brazilian and Chinese languages and has shown high degrees of success in its validation studies in different countries (9-14).

The aim of this study was to develop a Lithuanian version of the ECOHIS (L-ECOHIS) and evaluate its validity and reliability among preschool age children in Lithuania.

MATERIAL AND METHODS

Stages of the study

The study consisted of a translation phase including a small pilot study to assess the content and face validity of the instrument, a main study to assess its discriminant and convergent validity and internal consistency and a follow up study to assess its test-retest reliability. Studies were conducted at the Department of Oral Health and Paediatric dentistry at the Lithuanian University of Health Sciences in Kaunas. Ethical approval was obtained from the Kaunas Regional Research Ethics Committee (No. BE -2-19, Date: 04/11/2009). SPSS statistical package and a confidence interval of 95% were used for data analysis.

Translation phase

The ECOHIS was translated into the Lithuanian language using the well-recognised forward-backward translation technique (15). The process consisted of the following stages. First of all a forward translation from English into Lithuanian was carried out by two Lithuanian native speakers, working independently. Then the two initial Lithuanian versions were compared and revised by the two translators and the principal investigator. Then the third Lithuanian version produced by this process was back translated by two English native speakers, again working independently from each other. Finally, the two back-translated English versions were compared with the original English version making final adjustments to the third Lithuanian version through consultation with all the translators and the principal investigator. This process resulted in a fourth Lithuanian version of the ECOHIS, which was tested in a small pilot test. 20 parents were interviewed after completing the questionnaire aiming to investigate the scale's comprehensibility. According to the results of this small study, the last changes were made and the final version of the L-ECOHIS was prepared. Different from the original study (8), a shorter referal period for questions was chosen (3 months), as the authors intended to use the instrument in a prospective study with repeated evaluations of patients' quality of life.

Validation of the L-ECOHIS

130 pairs of preschool children and their parents, who visited the Department of Oral Health and Paediatric Dentistry between December 2009 and June 2010, participated in the main study. The inclusion criteria were: age of the child (up to 72 months), lithuanian speaking parents or caregivers, being able to fill the questionnaire. Parents completed the L-ECOHIS questionnaire, which also included questions about child's age and sex, reason for their visit to the clinic, relation to the child (mother/father/other), parent education level and a global self-rating question about childs' oral health.

For the main statistical analysis, ECOHIS scores were calculated as a simple sum of the response codes for the whole scale and child and family sections separately. A DK response rate for each of 13 questions was calculated, in order to determine whether there were questions more difficult for parents to answer. Considering the management of the DK response option, a complete case analysis was chosen (excluding subjects with DK responses) as proposed by Chavance M. (16).

Convergent validity

To determine convergent validity of the questionnaire, the respondents were asked to answer the global oral health evaluation question (*Overall, how would you rate your child's oral health status?*). The response options were: excellent, very good, good, fair, poor, which scored from 1-5 points respectively. Convergent validity was evaluated through investigating the correlation between ECOHIS total scores and rating of the global evaluation question. Furthermore, a difference in mean ECOHIS scores by oral health status rating category was determined. The hypothesis that we aimed to check was that respondents with high levels of impacts should report poorer oral health.

Discriminant validity

Another hypothesis that we aimed to check was that the questionnaire should be able to discriminate between children with no immediate need for dental care and those who have an expressed need for den-

tal care. Therefore participants from group1 (who seek dental treatment) should have a higher ECOHIS score than participants in group 2 (whose reason for dental visit was a routine check-up). Student T-Test was used to check this hypothesis.

Internal consistency

Internal consistency was estimated through generation of Cronbach's alpha for the child and family impact sections separately and for the whole scale. Item-scale, inter-item and child-family scale correlations were evaluated through generation of Pearson correlation coefficients.

Test-retest reliability

Test-retest reliability was assessed using the intra-class correlation coefficient (ICC) calculated by two-way analysis of variance using data from respondents who reported no change in their child's oral health status during the 2-week interval between the initial and follow-up assessment.

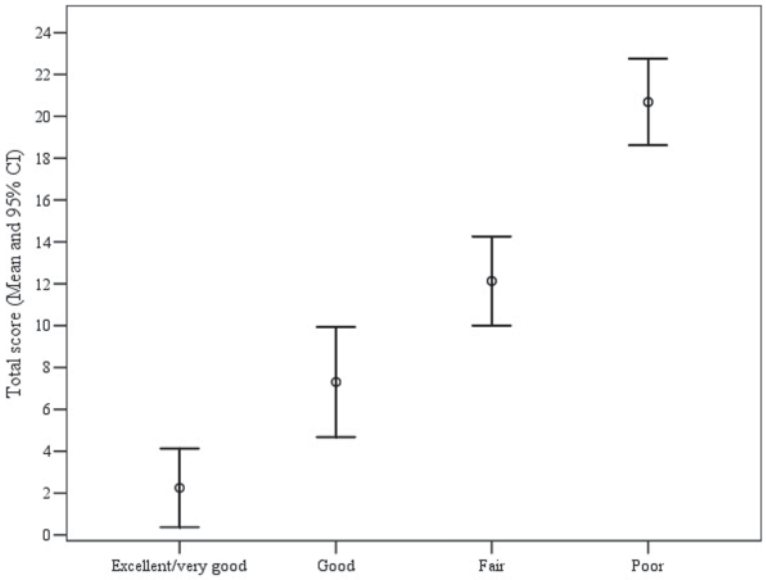

Figure. Relationship between oral health rating and total score

RESULTS

Some difficulty was encountered regarding the translation of the ECOHIS from English into Lithuanian due to colloquial differences between the two languages. To accomplish an accurate cross-cultural adaptation of the scale, some words had to be modified from the original version. The fifth item, *missed preschool, day-care or school* was adapted as *How often could your child not go to kindergarten, school or other educational institution?* to ensure conceptual equivalence of the item. In the seventh item, the phrase *been irritable or frustrated* was replaced by *irritable, disappointed or discouraged*, as the word *frustrated* has multiple meanings in the Lithuanian language. The thirteenth item, *financial impact on your family* was adapted as *How often has your*

Table 1. Item statistics and responses of parents to L-ECOHIS (N=130)

Impacts	Mean (SD)	"Never" or "hardly ever" N (%)	"Occasionally", "often" or "very often" N (%)	"Don't know" N (%)
1.Pain	1.6 (1.2)	57 (43.8)	72 (55.4)	0
2.Drinking	0.9 (1.1)	83 (63.8)	44 (33.8)	2 (1.5)
3.Eating	1.8 (1.4)	47 (36.2)	80 (61.5)	3 (2.3)
4.Pronuncing	0.8 (1.1)	84 (64.6)	26 (33.1)	2 (1.5)
5.Absence	0.6 (0.8)	101 (77.7)	26 (20)	1 (0.8)
6.Sleeping	1.0 (1.0)	81 (62.3)	48 (36.9)	0
7.Irritation	1.3 (1.1)	66 (50.8)	63 (48.5)	0
8.Smiling	0.4 (0.8)	107 (82.3)	17 (13.1)	5 (3.8)
9.Talking	0.3 (0.7)	111 (85.4)	14 (10.8)	4 (3.1)
10.Upset	2.0 (1.3)	42 (32.3)	86 (66.2)	0
11.Guilty	1.9 (1.3)	44 (33.8)	83 (63.8)	2 (1.5)
12.Work	0.6 (0.8)	106 (81.5)	22 (16.9)	0
13.Financial	0.5 (0.9)	106 (81.5)	20 (15.4)	3(2.3)
10.Upset	2.0 (1.3)	42 (32.3)	86 (66.2)	0
11.Guilty	1.9 (1.3)	44 (33.8)	83 (63.8)	2 (1.5)
12.Work	0.6 (0.8)	106 (81.5)	22 (16.9)	0
13.Financial	0.5 (0.9)	106 (81.5)	20 (15.4)	3 (2.3)

family had financial problems due to your child's dental problems or dental treatments?

130 pairs of children and parents participated in the main study. The mean age of the children was 50 months (SD=13.5). 51.5% of children (n=57) were boys. Questionnaires were filled out by mothers in 85.4% of the cases. 37.7% of respondents had a higher education. Reasons for attending the clinic included seeking dental treatment for a child (66.9%) and aroutine check-up for a child (33.1%). L-ECOHIS scores ranged between 0 and 35. The average score was 13.4 (SD=8.6). The average scores of child and family sections were 8.6 and 4.9 respectively. Parents reported more child impacts (94.6%) than family impacts (85.1%). 5.4% and 14.9% parents reported no impacts (floor effects i.e., the lowest possible score of 0) in child and family sections, respectively. No ceiling effects were observed (i.e., scores of 36 and 16 in child and family impact sections, respectively). The items related to difficulty in eating, pain, trouble sleeping and irritation/frustration were reported most frequently in the child impacts section. Items related to feeling upset and guilty were reported most frequently in the family impacts section of the L-ECOHIS. The maximum number of impacts reported was 26 in the child impact section and 12 in the family impact section. DK response rate for each of the 13 questions ranged between 0 to 3.8%. Item statistics and distribution of responses to L-ECOHIS are presented in Table 1.

Convergent validity

Four categories of response to the global oral health rating were created: those caregivers reporting their child's oral health as *excellent/very good* versus those reporting it to be *good* and *fair* and *poor*. Respondents with high levels of impacts reported poorer oral health. Figure 1 shows the mean total L-ECOHIS scores for these subjects. Furthermore, a Spearman correlation coefficient was determined in order to investigate the relationship between global rating and total ECOHIS scores, which was 0.719 (P<0.001).

Discriminant validity

In all domains the average scores were higher in the treatment group than in the check-up group (P<0.001) (Table 2).

Internal consistency

In order to evaluate internal consistency, Cronbach's alpha was calculated, its value for the instrument as a whole was 0.869. For the child and family sections it was 0.822 and 0.720 respectively. Item-total correlation coefficients ranged from 0.389 (difficulty pronouncing words) to 0.797 (trouble sleeping). Considering inter-item correlations, the weakest relationships were between difficulty pronouncing words and two items: oral/dental pain and financial impacts on family. The strongest correlation was between oral/dental pain and two items of difficulty in drinking and feeling irritated, also between parents being upset and feeling guilty (Table 3). Scores of the child and family sections were highly correlated (r=0.679, P<0.001).

Test-retest reliability

A subsample of parents who reported no change in health status of their child filled the questionnaire again 2 weeks after the first completion. Among these 30 subjects, intra-class correlation coefficient was 0.98 (P<0.001).

Table 2. Descriptive distributions of the L-ECOHIS for child and family domains

Impacts items)	Number of items	Possible range	Range			Mean (SD)		
			gr.1*	gr.2*	All*	gr.1*	gr.2*	All*
Child impact section	9	0-36	1-26	0-12	0-26	11.2 (0.7)	3.6 (0.5)	8.6 (0.6)
Child symptoms	1	0-4	0-4	0-3	0-4	2.2 (0.1)	0.5 (0.1)	1.6 (1.2)
Child function	4	0-16	0-11	0-9	0-11	5.2 (0.3)	2.4 (0.4)	1.0 (1.1)
Child psychology	2	0-8	0-7	0-4	0-7	3.2 (0.2)	0.8 (0.2)	1.2 (1.0)
Child self image and social interaction	2	0-8	0-7	0-5	0-7	1.0 (0.2)	0.2 (0.1)	0.3 (0.7)
Family impact section	4	0-16	0-12	0-9	0-12	6.2 (0.3)	2.2 (0.3)	4.9 (0.3)
Parental distress	2	0-8	0-8	0-6	0-8	4.9 (0.2)	2.0 (0.3)	2.0 (1.2)
Family function	2	0-8	0-5	0-3		1.4 (0.1)	0.4 (0.1)	0.5 (0.6)
Total score	13	0-52	1-35	0-18		17.5 (0.9)	5.7 (0.7)	13.4 (8.6)

*Groups of patients based on the reason of attendance: gr. 1 – treatment seeking patients (N=87), gr. 2 – routine check-up patients (N=43), all – whole sample (N=130).

DISCUSSION

The aim of this study was to develop and validate a Lithuanian version of the ECOHIS by evaluating its internal consistency, convergent validity, discriminant validity and test-retest reliability. The results of the validation process indicated a good internal consistency reliability (Cronbach's alpha of 0.822; 0.720; 0.869 for the child and family sections and the whole instrument respectively), the item-total correlation values were higher than the recommended 0.20 (17), the intra-class correlation coefficient was 0.98, showing a good agreement between test and retest results. Moreover, total ECOHIS scores correlated with a global evaluation of oral health and the L-ECOHIS was able to discriminate between children with no expressed need for dental care and those with an expressed need for dental care. This indicates that it is a valid instrument when used by Lithuanian speaking caregivers of 0-5 year old children to describe the oral health impacts experienced by their children.

There were, however, some limitations to the study. The study population did not include the community based sample. This study provided a preliminary support for psychometric properties of the L-ECOHIS in consecutive sample consisting of parents of 0-5 year-old patients in a university dental department. Therefore, our results provide evidence for its performance in this clinically based sample only. Future studies should be conducted on the L-ECOHIS to evaluate fully its psychometric properties in both community based and clinically based samples among parents of preschool children. Its sensitivity to change should also be established, so that it can be considered for use in clinical trials to assess the effect of dental disease and its treatment on quality of life.

With respect to the performance of the L-ECOHIS, it is worth noting the extremely low levels of problems in the financial impact item in the sample of this study.

The participants of the study were patients of the Department of Oral Health and Paediatric Dentistry at the Lithuanian University of Health Sciences in Kaunas, where routine dental examinations and treatment for children are paid by the government, so this item may be of limited relevance, when surveying this population. The two items of social interaction domain were very rarely pointed out by parents, moreover, the DK response rate for these two items was the highest among the other items. This could be interpreted as a limited parents' knowledge about their child's social life.

It is also interesting to compare our findings with those of the validation study of the original version of the ECOHIS (8). Comparing the results, three out of four of the most common impacts in child section were the same. In our sample the most common impacts were as follows: *difficulty eating, pain, trouble sleeping* and irritation, while in the original ECOHIS study they were *pain, irritation, difficulty eating* and *missing preschool*. In the family impact section, the most frequent items in our and

Table 3. Item-total, inter-item correlations

Item number*	1	2	3	4	5	6	7	8	9	10	11	12	13	Total score
1	1.00	.659	.348	.072	.351	.690	.731	.297	.288	.580	.480	.293	.229	.764
2	.659	1.000	.358	.149	.255	.626	.640	.242	.277	.370	.428	.274	.291	.702
3	.348	.358	1.00	.230	.115	.353	.461	.243	.300	.369	.434	.180	.200	.601
4	.072	.149	.230	1.00	.225	.214	.166	.245	.127	.209	.335	.130	.028	.389
5	.351	.255	.115	.225	1.00	.395	.380	.186	.210	.316	.233	.487	.333	.519
6	.690	.626	.353	.214	.395	1.00	.767	.290	.267	.567	.472	.348	.398	.797
7	.731	.640	.461	.166	.380	.767	1.00	.320	.392	.568	.459	.287	.320	.813
8	.297	.242	.243	.245	.186	.290	.320	1.00	.470	.266	.219	.034	.238	.474
9	.288	.277	.300	.127	.210	.267	.392	.470	1.00	.197	.185	.212	.249	.476
10	.580	.370	.369	.209	.316	.567	.568	.266	.197	1.00	.724	.445	.331	.761
11	.480	.428	.434	.335	.233	.472	.459	.219	.185	.724	1.00	.360	.337	.735
12	.293	.274	.180	.130	.487	.348	.287	.034	.212	.445	.360	1.00	.246	.506
13	.229	.291	.200	.028	.333	.398	.320	238	.249	.331	337	.246	1.00	.495

*Item numbers: 1– oral/dental pain, 2 – difficulty drinking, 3 – difficulty eating, 4 – difficulty pronouncing words, 5 – missing preschool, 6 – trouble sleeping, 7 – irritable or frustrated, 8 – avoided smiling, 9 – avoided talking, 10 – parents being upset, 11 – parents feeling guilty, 12 – parents taking time off work, 13 – financial problems.

the original ECOHIS study were *upset* and *guilty*. A difference between the results of the two studies that is worth mentioning is a low floor effect in our study comparing to the original ECOHIS study. This can be explained by the sample studied. In our case, a clinically based sample was studied, this is probably indicative of the subjects having higher levels of dental problems comparing with the community based sample of the original ECOHIS study. Neither the original ECOHIS nor the L-ECOHIS had any ceiling effects. What concerns the psychometric properties of the English and Lithuanian ECOHIS versions, both were very good.

Conclusion

The L-ECOHIS is a valid and reliable measure to assess OHRQoL of 0–5 year old children with Lithuanian speaking parents.

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