Journal of Clinical Pediatric Dentistry

ORIGINAL RESEARCH

Cross-cultural adaptation and validation of a self-administered Urdu version of the child oral impacts on daily performances index among 11–12-year-old children in Lahore, Pakistan

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Abstract

The Child Oral Impacts on Daily Performances (Child-OIDP) index was developed to assess children's oral health-related quality of life. This study aimed to culturally adapt the self-administered Child-OIDP index into Urdu, evaluate its psychometric properties, and provide an initial estimate of oral impacts among 11–12-year-old children in Lahore, Pakistan. The translation of the Child-OIDP index from English to Urdu was performed, and the content and face validity of the initial Urdu version were evaluated by experts and 11–12-year-old children, respectively. The psychometric properties of the Urdu Child-OIDP were assessed by administering the index to 264 children aged 11–12 from five schools in the Lahore district. Psychometric properties were evaluated using criterion and construct validity, internal consistency, test-retest reliability, and global self-rated oral items, followed by an oral examination. The standardized Cronbach's alpha was 0.77, and the weighted Kappa was 0.94 (intraclass correlation coefficient = 0.98). The index exhibited significant associations with subjective outcome measures, dental problem history, and dental caries status ($p = 0.001$). Children reporting poor oral health, lower satisfaction with oral health, and experiencing oral impacts demonstrated higher Child-OIDP scores. Additionally, children with dental caries and perceived treatment needs exhibited higher Child-OIDP scores, indicating poorer Oral Health-Related Quality of Life (OHRQoL). The prevalence of oral impacts was 88.3% (mean score = 17.8, standard deviation (SD) =14.7). Eating performance was the most affected while speaking was the performance least affected, while toothache and sensitive teeth were identified as the two most common causes of oral impacts. Toothache was the primary cause of condition-specific impacts, responsible for the majority of oral impacts. This study demonstrates that the self-administered Urdu Child-OIDP index is a valid and reliable tool for assessing OHRQoL among 11–12-year-old children in Lahore, Pakistan.

Keywords

Child-OIDP; Children; Oral health-related quality of life; Oral impact; Psychometric; Urdu; Validation

1. Introduction

The Ottawa Charter declaration has transformed the concept of health [1]. Oral health is now recognized as comprising functional, social and psychological dimensions essential for overall well-being, with quality of life being profoundly influenced by individuals' health perceptions, expectations, personal encounters, satisfaction with care and capacity to lead a pain-free, comfortable life [1].

Oral health-related quality of life (OHRQoL) represents a multidimensional framework that reflects an individual's comfort during daily activities, thereby revealing the impacts of oral diseases and conditions on subjective perceptions, well-being and quality of life [2, 3]. This framework has significant

implications for oral health research and clinical practice as it reshapes the understanding of the impact of oral health on individuals' lives [3, 4]. Traditionally, clinical measures were used mainly to diagnose oral diseases and conditions. Although valid and reliable, such measures are considered inadequate for assessing the broader attributes of oral health [3]. For example, a person experiencing mild dental fluorosis may not require dental treatment based only on clinical indices. However, such a condition may affect the individual's ability to smile and socialize without embarrassment, thereby impacting their emotional and psychological health and, ultimately, their quality of life. Thus, the recognition that clinical measures alone were insufficient for assessing people's perceived needs

and the impact of oral conditions on their quality of life has led to the development of OHRQoL measures to evaluate oral impacts that cannot be adequately captured using clinical measures alone [3–5].

In children, oral diseases can have significant impacts on their daily life. Poor oral health not only affects their ability to eat, speak and socialize without embarrassment but also diminishes their overall quality of life, disrupts school performance, and disrupts the lives of their families. Oral diseases affect more than half of the child population globally, making oral impacts on children a pressing global public health concern [6–8]. Previous studies have shown that the OHRQoL of children with dental caries is significantly lower than that of their healthy counterparts [9]. Furthermore, recent research has indicated that school-going children and adolescents experience considerable negative impacts on their OHRQoL due to conditions such as toothache, gingival diseases, dental trauma and malocclusion [10–13].

According to the Federation Dentaire Internationale (FDI) report, oral health problems have affected approximately 90% of the global population at some point in their lives, with children being the most affected [14]. Therefore, numerous instruments have been developed to assess OHRQoL in children. For instance, the Child Oral Impacts on Daily Performances (Child-OIDP) index was designed specifically for evaluating OHRQoL in 11–12-year-old children [5]. Its theoretical framework was derived from the World Health Organization's International Classification of Impairment, Disabilities and Handicap [15], as well as Locker's conceptual model of oral health [16].

According to the World Health Organization's (WHO) international classification, the consequences of diseases can be categorized into three levels: impairment, intermediate level (pain, discomfort, functional limitations), and ultimate impacts (disability and handicap). In 1988, Locker *et al.* [16] proposed a conceptual framework to explain the effects of oral diseases on OHRQoL and posited that untreated oral diseases can result in pain and discomfort, thereby impairing daily activities. Treatment of oral diseases at the intermediate level can alleviate symptoms. However, if left untreated, oral diseases can progress to disability and handicap, ultimately diminishing OHRQoL. For instance, a patient with a tooth cavity experiences difficulty in eating, indicating impairment. If the cavity is not treated, it may advance to irreversible pulpitis, causing severe pain. At this intermediate stage, a root canal treatment will save the tooth. Nevertheless, if left unaddressed, the tooth may require extraction, resulting in ultimate impacts such as social embarrassment and difficulty eating in public settings.

The Child-OIDP index targets the third level, assessing the repercussions of inadequate oral health on the capacity to perform daily activities, such as eating, speaking, teeth cleaning, sleeping, smiling, studying, maintaining emotional well-being and socializing. Essentially, the index encompasses functional, psychological and social dimensions of oral health that are not evaluated by clinical measures [5]. Since its inception, the index has been effectively translated and validated in numerous languages, establishing itself as a straightforward, succinct and pertinent tool for evaluating OHRQoL in children [17–25].

In Pakistan, among the total population of 220 million in 2020, 34% were children [26], with this proportion steadily rising over the years [27]. In regard to oral health, children in Pakistan experienced a moderate to high prevalence of various conditions, including dental caries [28, 29], severe toothache [30, 31], poor oral hygiene [28], gingivitis [32], fluorosis [33], malocclusion [34] and oral cancer [35], with a substantial portion requiring treatment [36]. These oral diseases and conditions significantly impact their daily activities [30, 33]. Despite considerable research conducted in Pakistan in recent years, there has been limited investigation into assessing the oral impact on children [37]. Thus, insufficient data are available in this regard, leaving children in Pakistan vulnerable to poor OHRQoL without effective interventions to address the issue. This underscores the necessity for a suitable instrument to evaluate oral impacts on children in Pakistan, which would facilitate the development of effective interventions to address these challenges at the population level.

A recent development in this field includes the creation of an interview-based Urdu Child-OIDP index, which was conducted among a limited sample of school children in Islamabad, Pakistan [37]. While this represents a positive step forward, this method may present challenges due to its time-consuming nature, higher administrative costs, and limited suitability for large-scale epidemiological surveys [38].

Therefore, the study aimed to cross-culturally adapt and validate an Urdu-translated version of the self-administered Child-OIDP index, evaluate its psychometric properties, and offer an initial assessment of oral impacts among 11–12-year-old children in Lahore, Pakistan. The Child-OIDP index was selected due to its user-friendly nature, cultural relevance, and inclusion of condition-specific (CS) items. It is considered suitable for application in population surveys and clinical settings alike, facilitating the prioritization of treatment allocation.

2. Materials and methods

The development of the Urdu Child-OIDP index adhered to established guidelines outlined by Herdman *et al.* [39] and Beaton *et al.* [40]. The adaptation and validation process comprised two phases: linguistic validation followed by the psychometric evaluation of the index.

2.1 Linguistic validation of the Urdu Child-OIDP

In Phase 1, the English Child-OIDP underwent forward translation into Urdu by three independent local translators: a pediatric dentist, an Urdu language school teacher, and a layman, all proficient in both languages. They were instructed to translate the questionnaire using simple, concise and clear language understandable to 11–12-year-old children, avoiding literal translations when possible to ensure meaningful and relevant sentences. Then, the forward translators (FTs) and researchers convened to review the translations, focusing on conceptual and item equivalence between the English and Urdu versions. After discussion, a consensus was reached on

a single draft of the Urdu Child-OIDP. This draft was then back-translated into English by three independent bilingual translators: a community dentist, an English language school teacher, and a layman, proficient in both languages. A meeting between the back translators (BTs) and researchers was held to select a single back translation. Finally, an expert committee meeting involving the FTs, BTs and researchers compared the back translation with the original English Child-OIDP in terms of item and conceptual equivalence, content clarity, item arrangement and instructions. Minor modifications were made to the back translation based on the discussion, and relevant adjustments were applied to the draft Urdu Child-OIDP before finalization.

A pre-test of the draft Urdu Child-OIDP was performed using a convenient sample of 40 children aged 11–12 from two schools (one private and one public) in the Lahore district to evaluate its face validity. The children completed the questionnaire independently in a classroom setting, followed by a discussion with the researcher (KT) regarding their comprehension of the purpose, instructions, content, wording, response options, and general layout of the index. Additionally, the time taken to complete the questionnaire was recorded. After the discussion with the children, minor adjustments were made to the index. Then, a second pre-test was conducted with another group of 40 children, followed by a discussion. It was determined that no further modifications to the index were necessary, and the draft Urdu Child-OIDP was finalized. The flowchart depicting the process of linguistic validation is presented in Fig. 1.

2.2 Psychometric assessment of the Urdu Child-OIDP

In Phase 2, a cross-sectional study was conducted comprising 11–12-year-old children in the Lahore district. The inclusion criteria were children aged 11–12 years from all socioeconomic backgrounds who could read, write and understand the Urdu language, with parental consent obtained. Uncooperative children were excluded.

The sample size was determined in accordance with guidelines provided by Clark and Watson [41], recommending a sample of 100–200 participants for a validation study involving an index with fewer than 20 items, and Terwee's rule of thumb, suggesting 10 participants per index item [42]. Hence, a minimum sample of 200 participants was required. To accommodate potential non-respondents and incomplete data, this sample size was increased by 30% to n = 260.

Regarding sample selection, children were non-randomly recruited from three private and two public schools situated in urban and suburban areas of the Lahore district. Lahore, being the largest district in Punjab province, encompasses a population representing diverse socioeconomic backgrounds and cultures. All eligible children from the five schools were invited to participate in the study. Permission to conduct the study was obtained from the Education sector, Ministry of Education, Punjab [43].

The study utilized two main tools: a self-administered questionnaire and an oral examination sheet using the Decayed, Missing, and Filled Teeth (DMFT) index for permanent teeth

and the decayed, extracted due to caries, and filled teeth (deft) index for primary teeth. The self-administered questionnaire comprised three sections: sociodemographic background information, the Urdu Child-OIDP index, and global oral health assessment items.

2.2.1 Sociodemographic background

The consent form for parents/guardians contained questions on the sociodemographic profile of both the children and their families, which included inquiries regarding the child's gender (1 = female, 2 = male), household income level (1 = low income, 2 = average income, 3 = high income), and the parents' level of education (0 = no formal education, 1 = primary school, 2 = secondary school, 3 = intermediate/college, 4 = university).

2.2.2 Urdu Child-OIDP index

The index comprises eight items, each measuring the impact of oral health on eight daily activities: eating, speaking, teeth cleaning, sleeping, smiling, studying, emotional stability and socializing. The questionnaire begins by prompting children to indicate whether they have experienced any oral diseases and/or conditions in the past three months by selecting from a provided list. Then, they were asked to specify if any of these oral diseases and/or conditions have affected their daily performances (0 = no, 1 = yes). If an oral impact was present, they were then prompted to specify the frequency (1 = once/twice a month, 2 = once/twice a week, 3 = three/more times a week) and severity (1 = little, 2 = moderate, 3 = a lot) of impact. For each performance, an additional question on CS impact was included.

2.2.3 Global oral health assessment items

Additional questions on global oral health assessment items were incorporated, including children's perceived need for dental treatment (0 = no, 1 = yes), perceived oral health status (1 = excellent, 2 = very good, 3 = good, 4 = moderate, 5 = poor), perceived satisfaction with oral health (1 = very satisfied, 2 = satisfied, 3 = moderately satisfied, 4 = less satisfied, 5 = not satisfied), perceived impact of mouth/teeth problems (0 = no impact, 1 = mild impact, 2 = moderate impact, 3 = high impact), and presence of mouth/teeth problems in past three months (0 = no, 1 = yes).

Oral examination was conducted by an examiner (K.Z.) who was trained in decayed, missing and filled teeth (DMFT/deft) indices at the Faculty of Dentistry, Universiti Malaya, Kuala Lumpur, Malaysia. The intra-examiner reliability, as measured by the Kappa score, was 0.96.

The parental consent form was distributed to 300 children across the five schools, with the intention for them to be given to their parents. Children with parental consent then completed the questionnaire in a school hall, followed by an oral examination. After one week, the questionnaire was redistributed to 20% of the sample for reassessment.

The oral examination aimed to evaluate dental caries utilizing the DMFT/deft indices in accordance with the WHO criteria for basic methods in epidemiological surveys [44]. Children were examined by the researcher (K.Z.) in the classroom, utilizing natural sunlight while seated on a chair. Dental
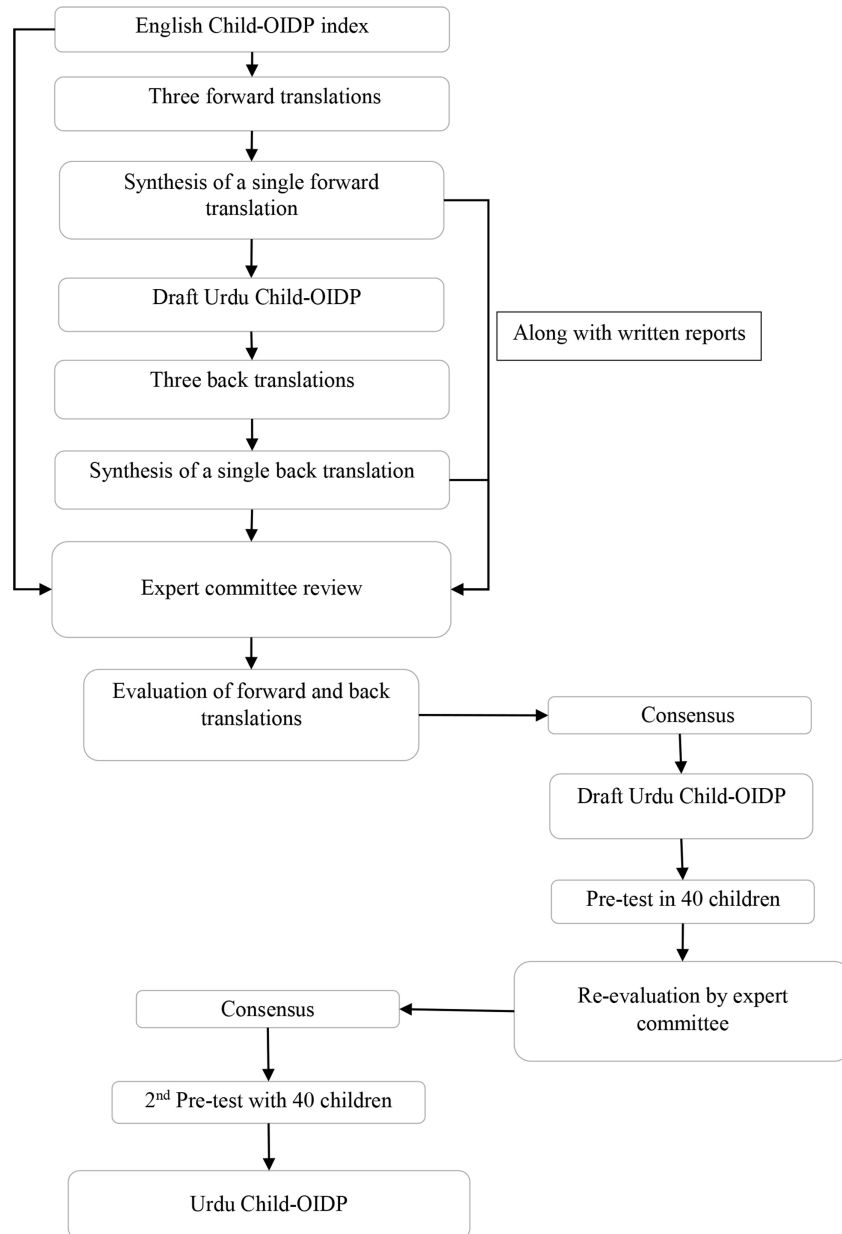
F I G U R E 1. Flow chart of the linguistic validation in Phase 1. This step-by-step illustration outlines the translation process involving 11–12-year-old children and the expert committee to assess the content and face validity of the Urdu Child-OIDP index, adhering to guidelines by Beaton *et al.* [40] and Herdman *et al.* [39]. Child-OIDP: Child Oral Impacts on Daily Performances.

caries assessment encompassed all erupted primary and permanent teeth, employing disposable intraoral mouth mirrors, blunt/ball-ended probes, and tweezers. The coding for DMFT was as follows: 0 = sound, 1 = decayed, 2 = filled with decay, 3 = filled without decay, 4 = missing due to caries. For the deft index, the coding was: A = sound, B = decayed, C = filled with decay, D = filled without decay, and E = missing due to caries.

Data were analyzed and checked for errors using IBM SPSS Statistics 24.0 (IBM Corp, Armonk, NY, USA). For the Child-OIDP index, an impact score was computed for each performance affected (1 = yes) by multiplying the frequency of impact (score 1–3) with the severity of impact (score 1–3). For the performance with no impact (0 = no), the impact was scored as 0. The sum of the eight performances yielded a total score ranging from 0 to 72. To obtain a percentage score (range = 0–100), the total score was divided by 72 and multiplied by 100.

A higher score indicated a greater impact and lower OHRQoL.

The mean score for each performance and the mean total score were calculated. The overall prevalence of impact was calculated as the percentage of children experiencing at least one daily performance with impact. Similarly, the prevalence of impact for each performance was calculated as the percentage of children experiencing impact for that specific performance. Oral impact was further evaluated based on the extent of the impact, measured by the number of performances with impact (PWI) affecting the children's quality of life, ranging from 0 to 8. Impact intensity for each performance was calculated by categorizing the score of each performance as follows: score 1 = very little, 2 = little, 3–4 = moderate, 6 = severe, 9 = very severe), where higher scores indicate higher impact intensity for the performance [45].

Psychometric analysis of the index was measured by assess-

ing its reliability and validity. The internal consistency reliability was measured using the inter-item correlation, corrected item-total correlation, and the standardized Cronbach alpha coefficient [42]. The test-retest reliability was assessed using a weighted Kappa coefficient for categories of Child-OIDP score and intraclass correlation coefficient (ICC) using a two-way random effect model [42].

Content validity was assessed by experts during the linguistic validation phase. Face validity was assessed during pre-tests conducted with the group of children [39].

Criterion validity was assessed based on the index's ability to measure oral impacts, which reflected treatment needs [42]. Thus, a global oral health assessment item, *i.e.*, the perceived need for dental treatment, was used: "Did you need dental treatment in the last three months?" [21]. The hypothesis was that children with a perceived need for treatment would have higher OIDP scores.

Construct validity was assessed using convergent and discriminant validity. Convergent validity was measured by assessing the association of Urdu Child-OIDP with a set of global oral health assessment items, including perceived oral health status, perceived satisfaction with oral health, and perceived impact of mouth/teeth problems. These items included questions such as "How do you rate your oral health?", "How satisfied are you with your oral health?" and "How much have your mouth/teeth problems affected your daily activities?". The underlying hypotheses proposed that children reporting poorer oral health, dissatisfaction with their oral health, or greater impact of mouth/teeth problems on their daily lives would exhibit higher Child-OIDP scores [21].

Discriminant validity was evaluated by determining the ability of the index to differentiate between children with and without oral disease [42], performed by comparing Child-OIDP scores with children's dental history and caries scores [5]. The items included were: "Have you experienced any mouth/teeth problems in the past three months?" and the DMFT/deft scores. The hypotheses suggested that children with dental issues and dental caries would demonstrate higher Child-OIDP scores.

The floor and ceiling effects were assessed by determining the percentage of children achieving the lowest (score = 0) or highest (score = 100) possible scores. Ideally, the percentage for each should not exceed 15% [42].

For the DMFT/deft scores, the teeth were recorded as follows: code 0/A denoted no caries, code 1/B and 2/C were grouped as caries (denoted as "D/d"), code 3/D indicated filled teeth ("F/f"), and code 4/E indicated missing teeth due to caries or for extraction. Dental caries were evaluated separately for primary and permanent dentitions. The D, M and F components were summed to determine the DMFT score for permanent teeth, while the d, e and f components were summed to calculate the deft score for primary teeth.

Due to skewness in the Child-OIDP data, hypothesis testing for criterion and construct validity was conducted using Kruskal-Wallis and Mann-Whitney U tests. Since the data were non-parametric, manual pairwise group comparisons were performed with corrections to identify significant differences in mean Child-OIDP scores between pairs of groups. The significance level was set at $p < 0.05$. Parents were assured that all collected data would be kept strictly confidential and protected against disclosure. Research data were stored on an encrypted hard drive.

3. Results

Of the 300 eligible children, parental consent was obtained from 267, and 264 children agreed to participate in the study, resulting in a response rate of 98.9%. The gender distribution was nearly equal, with 51.1% female and 48.9% male participants. The children represented diverse socioeconomic backgrounds, with 29.5% from low-income, 42.4% from middle-income, and 24.2% from high-income groups. A larger proportion of children attended public schools (n = 139, 52.7%) compared to private schools (n = 125, 47.3%).

3.1 Linguistic validation of Urdu Child-OIDP

Content validity was confirmed by experts with some modifications. For instance, the phrases "a new tooth pushing through" and "missing tooth" were rephrased to "a new tooth pushing through the gums" and "tooth not present", respectively. The English term homework was retained in the Urdu version as it was widely used and well-understood by children. Moreover, the phrase "Have you felt different?" (Item 5) was rephrased to "Have you felt any change in yourself?" to ensure semantic equivalence. Furthermore, certain items (names of oral diseases) had to be replaced due to difficulties in literal translation to Urdu or lack of clarity. The replacements maintained the original meaning. Additionally, certain words were omitted to enhance sentence clarity, such as the exclusion of the word "BUT" from instructions, which did not align with Urdu language norms. Therefore, it was omitted, which improved the children's understanding of the instructions. Moreover, some items were replaced with synonyms to ensure clarity and equivalence of meaning, as they could lead to confusion when translated into Urdu. After four expert committee meetings, conceptual and item equivalence between the English and Urdu versions was confirmed. Recordings of changes made in the back translation were documented, and corresponding adjustments were applied to the Urdu version. After a thorough discussion, the final draft of the Urdu Child-OIDP was approved by all committee members.

During the face validity assessment, some children encountered difficulty understanding terms like cleft lip and palate and dental plaque/tartar. To address this, it was decided to incorporate images depicting these conditions into the Urdu version. Moreover, confusion arose between the terms "broken tooth" and "missing tooth" as the latter is commonly used locally to describe a broken tooth in the local context. Thus, the term "partially" was added to "broken tooth" to align with the conceptual meaning of the English word. Additionally, simplified synonyms were substituted for certain Urdu translations of words such as relevant, whether, specify, enjoy, speak clearly, including and affect. After these adjustments, no further issues were reported by children during the second pre-test. The questionnaire took approximately 15–20 minutes to complete.

T A B L E 1. Reliability analysis: inter-item correlation coefficients of the Urdu Child-OIDP index (N = 264).

Variables	Eating	Speaking	Cleaning teeth	Relaxing	Emotional stability	Smiling	Studying	Socializing
Eating	1.00							
Speaking	0.19	1.00						
Cleaning teeth	0.37	0.45	1.00					
Relaxing	0.37	0.36	0.40	1.00				
Emotional stability	0.28	0.32	0.26	0.31	1.00			
Smiling	0.20	0.26	0.32	0.19	0.19	1.00		
Studying	0.18	0.23	0.23	0.47	0.32	0.11	1.00	
Socializing	0.27	0.27	0.37	0.35	0.27	0.51	0.29	1.00

3.2 Psychometric assessment of the Urdu Child-OIDP index

Regarding internal consistency, the inter-item correlation co-efficients of the eight items ranged from 0.11 to 0.51, all showing positive correlations (Table 1). Corrected item-total correlations of the Urdu Child-OIDP index, as presented in Table 2, were all positive and exceeded 0.30. The standardized Cronbach's alpha coefficient was 0.77, and no increase in value was observed upon deletion of any item. For test-retest reliability, weighted kappa and ICC values ranged from 0.76 to 1.00 and 0.91 to 0.99, respectively, across the eight daily performances. The overall weighted kappa and ICC values were 0.94 and 0.98, respectively.

Table 3 shows the criterion and construct validity tests of the Urdu Child-OIDP. Children indicating a perceived needs for dental treatment had a higher mean OIDP score compared to those without such a perceived need ($p < 0.001$). Similarly, children who perceived their oral health status as poor or moderate demonstrated significantly higher mean OIDP scores than those reporting good, very good, or excellent oral health status ($p < 0.001$). The Bonferroni manual pairwise corrections of Child-OIDP scores confirmed significant differences in mean OIDP scores between the different categories ($p < 0.001$). Children who were very satisfied with their oral health had a significantly lower mean OIDP score than those who were satisfied, moderately satisfied, less satisfied or not satisfied with their oral health ($p < 0.001$). The Bonferroni manual pairwise correction of Child-OIDP scores showed significant differences in mean OIDP scores between the different categories except for the less satisfied-not satisfied group pair. In addition, children who perceived the impact of mouth/teeth problems to be severe had a significantly higher mean OIDP score than those who perceived the impact to be moderate, mild or no impact at all ($p < 0.001$). The Bonferroni manual pairwise corrections of Child-OIDP scores showed significant differences in mean OIDP scores between all the different categories. Moreover, children who experienced mouth/teeth problems in the past three months had a higher mean OIDP score than those who had not experienced mouth/teeth problems ($p < 0.001$), and children with dental caries experience (DMFT/deft > 0) had a significantly higher mean OIDP score than those without caries (DMFT/deft = 0; $p < 0.001$). Notably, the index showed no floor or ceiling effect, as only

11.7% of children scored 0, and none scored 100.

3.3 Prevalence of impacts

Table 4 shows the prevalence and impact score of the Child-OIDP index. The overall prevalence of oral impact was 88.3% (mean score = 17.8, SD =14.7). The performance most frequently associated with oral impact was eating (n = 173, 65.5%), followed by cleaning teeth (n = 158, 59.8%) and smiling (n = 133, 50.4%). Conversely, studying (n = 71, 26.9%) and speaking (n = 64, 24.2%) had the least oral impact. Among those with oral impacts, 14.6% had one, 18.9% had two, and 16.3% had three PWI.

Regarding impact intensity, there was an inverse relationship between impact prevalence and intensity for several performances. A "very severe" level of impact intensity was reported by less than one-fifth (15.8%) of children for smiling (mean score = 21.9, SD = 15.5), followed by studying (12.7%) (mean score = 27.7, SD = 15.1). Conversely, a "very severe" level of impact intensity was reported for emotional stability and eating by only 4.6% and 5.2% of children, respectively (Table 5).

3.4 Prevalence of self-perceived causes of oral impacts

Of the 233 children who suffered from oral impact, toothache (61.8%) and sensitive teeth (61.8%) were frequently cited as the primary causes, followed by bleeding gums (52.8%). Conversely, cleft lip and palate (CLAP) (0.4%) and missing permanent tooth (9.0%) were the least commonly reported causes of oral impact (Table 6).

3.5 Condition-specific impacts

Apart from the general causes of oral impacts, the children also identified specific types of oral diseases/conditions that impacted each daily performance (Table 7). Toothache was reported to be the most common cause of CS impact on six of the eight daily performances while bleeding gums were the cause of CS impact for the remaining two performances. CLAP was reported to be the least common cause of CS impact in all eight performances. The CS impact for the most affected performances, *i.e.*, eating and cleaning teeth, were related to toothache, sensitive teeth and bleeding gums. For smiling

TABLE 2. Reliability analysis: corrected item-total correlation, Cronbach's alpha if item deleted, and Cronbach's coefficient of the Urdu Child-OIDP index (N = 264).

Variables	Corrected item-total correlation	Cronbach's alpha if item deleted
Eating	0.41	0.75
Speaking	0.47	0.74
Cleaning teeth	0.55	0.73
Relaxing	0.55	0.73
Emotional stability	0.43	0.75
Smiling	0.40	0.76
Studying	0.40	0.75
Socializing	0.55	0.73
Alpha value		0.76
Standardized items alpha		0.77

TABLE 3. Criterion and construct validity tests of the Urdu Child-OIDP index: OIDP scores (0–100) by subjective outcome measures and dental caries status among 11–12-year-old children in Pakistan (N = 264).

Variables	N	Mean	SD	Median	IQR	Quartiles	p value*
Perceived need for dental treatment							
Yes	172	20.6	15.2	16.6	20.8	(8.3, 16.6, 29.1)	<0.001**
No	92	6.5	8.9	2.7	8.3	(0.0, 2.7, 8.3)	
Perceived oral health status							
Excellent	17	4.5	9.6	0.0	2.7	(0.0, 0.0, 2.7)	
Very Good	61	6.9	7.2	4.2	5.9	(1.3, 4.2, 7.2)	
Good	75	10.9	10.1	8.3	11.2	(4.1, 8.3, 15.3)	<0.001
Moderate	96	23.4	15.1	19.4	23.6	(11.1, 19.4, 34.7)	
Poor	15	37.8	15.8	36.1	30.6	(23.6, 36.1, 54.2)	
Perceived satisfaction with oral health							
Very satisfied	48	3.5	6.1	1.4	4.2	(0.0, 1.4, 4.2)	
Satisfied	96	9.7	9.1	6.9	11.0	(2.8, 6.9, 13.8)	
Moderately satisfied	66	20.6	13.5	18.1	18.7	(9.4, 18.1, 28.1)	<0.001
Less satisfied	45	29.4	15.3	25.0	22.3	(16.6, 25.0, 38.9)	
Not satisfied	9	39.0	15.2	33.3	27.8	(26.4, 33.3, 54.2)	
Perceived impact of mouth/teeth problems							
Severe	36	34.3	15.1	34.7	24.7	(20.8, 34.7, 45.5)	
Moderate	74	22.6	14.2	18.7	20.0	(12.2, 18.7, 32.3)	<0.001
Mild	95	11.4	8.8	8.3	9.6	(4.2, 8.3, 13.8)	
No impact	59	2.5	4.1	0.0	2.7	(0.0, 0.0, 2.7)	
Experienced mouth/teeth problems in the past three months							
Yes	202	19.2	15.0	15.3	19.9	(7.9, 15.3, 27.8)	<0.001**
No	62	4.2	6.9	0.7	5.6	(0.0, 0.7, 5.6)	
Caries status							
DMFT/deft > 0	150	20.0	15.8	16.7	25.0	(6.9, 16.7, 31.9)	<0.001**
DMFT/deft = 0	114	10.1	11.6	6.9	12.5	(1.4, 6.9, 13.9)	

*Kruskal-Wallis test; **Mann-Whitney U test; IQR: Interquartile range; SD: Standard deviation; DMFT: Decayed, Missing, and Filled Teeth; Level of significance = $p < 0.05$.*

T A B L E 4. Prevalence and score of oral impacts on daily performances of 11–12-year-old children in Pakistan (N = 264).

Daily performance	N (%)	Mean	SD	Median	IQR	OIDP quartiles
Overall	233 (88.3)	17.8	14.7	13.8	18.1	(6.9, 13.8, 25.0)
Eating	173 (65.5)	20.5	15.3	16.7	21.8	(8.8, 16.7, 30.6)
Speaking	64 (24.2)	27.9	16.9	25.7	28.1	(11.8, 25.7, 39.9)
Cleaning teeth	158 (59.8)	21.6	15.6	16.7	23.9	(9.4, 16.7, 33.3)
Relaxing	99 (37.5)	27.5	15.3	25.0	22.2	(16.7, 25.0, 38.9)
Emotional stability	108 (40.9)	25.2	14.4	22.2	20.9	(13.8, 22.2, 34.7)
Smiling	133 (50.4)	21.9	15.5	18.1	23.6	(9.7, 18.1, 33.3)
Studying	71 (26.9)	27.7	15.1	25.0	25.0	(13.8, 25.0, 38.8)
Socializing	106 (40.2)	25.3	15.2	20.8	22.3	(13.8, 20.8, 36.1)

SD: Standard deviation; IQR: Interquartile rang; OIDP: Oral Impacts on Daily Performances.

T A B L E 5. Impact intensity of the daily performances among 11–12-year-old children in Pakistan (N = 233).

Level of impact intensity (score)	Eating (N = 173) n (%)	Speaking (N = 64) n (%)	Cleaning teeth (N = 158) n (%)	Relaxing (N = 99) n (%)	Emotional stability (N = 108) n (%)	Smiling (N = 133) n (%)	Studying (N = 71) n (%)	Socializing (N = 106) n (%)
Very little (1)	40 (23.2)	18 (28.1)	35 (22.2)	21 (21.2)	20 (18.5)	26 (19.6)	20 (28.2)	29 (27.4)
Little (2)	53 (30.6)	13 (20.3)	37 (23.4)	25 (25.2)	35 (32.4)	39 (29.3)	19 (26.8)	31 (29.2)
Moderate (3–4)	54 (31.2)	20 (31.3)	57 (36.1)	35 (35.4)	35 (32.4)	31 (23.3)	16 (22.5)	28 (26.4)
Severe (6)	17 (9.8)	7 (10.9)	19 (12.0)	9 (9.1)	13 (12.1)	16 (12.0)	7 (9.8)	8 (7.6)
Very severe (9)	9 (5.2)	6 (9.4)	10 (6.3)	9 (9.1)	5 (4.6)	21 (15.8)	9 (12.7)	10 (9.4)

T A B L E 6. Prevalence of self-perceived oral health problems (N = 233).

Self-perceived oral health problem	No. of children, n	Percentage of children, %
Toothache	144	61.8
Sensitive teeth	144	61.8
Tooth decay	66	28.3
Loose milk teeth	81	34.8
Large space between teeth	44	18.8
Fractured teeth	73	31.3
Colour of teeth	78	33.5
Shape/size of teeth	40	17.2
Position of teeth	76	32.6
Bleeding gums	123	52.8
Swollen gums	46	19.7
Dental plaque/tartar	47	20.2
Mouth ulcers	61	26.2
Bad breath	74	31.7
Cleft lip and palate	1	0.4
Erupting permanent tooth	47	20.2
Missing permanent tooth	21	9.0

T A B L E 7. Condition-specific impacts on daily performances of 11–12-year-old children in Pakistan (N = 233).

Performance	Eating (N = 173) n (%)	Speaking (N = 64) n (%)	Cleaning teeth (N = 158) n (%)	Relaxing (N = 99) n (%)	Emotional stability (N = 108) n (%)	Smiling (N = 133) n (%)	Studying (N = 71) n (%)	Socializing (N = 106) n (%)
Toothache	112 (64.7)	20 (31.2)	96 (60.6)	80 (80.8)	83 (76.8)	25 (18.8)	62 (87.3)	61 (57.5)
Sensitive teeth	102 (58.9)	12 (18.8)	61 (38.6)	42 (42.4)	52 (48.1)	26 (19.5)	33 (46.5)	47 (44.3)
Tooth decay	41 (23.7)	2 (3.1)	24 (15.2)	20 (20.2)	27 (25.0)	17 (12.8)	12 (16.9)	18 (17.0)
Loose milk teeth	46 (26.6)	19 (29.6)	46 (29.1)	27 (27.2)	32 (29.6)	29 (21.8)	14 (19.7)	29 (27.4)
Large space between teeth	25 (14.5)	11 (17.2)	23 (14.6)	15 (15.2)	17 (15.7)	20 (15.0)	4 (5.6)	13 (12.3)
Fractured teeth	36 (20.8)	25 (34.4)	41 (25.9)	27 (27.2)	36 (33.3)	40 (30.1)	10 (14.1)	35 (33.0)
Color of teeth	11 (6.4)	0	28 (17.7)	19 (19.2)	25 (23.1)	49 (36.8)	2 (2.8)	31 (29.2)
Shape/size of teeth	8 (4.6)	0	4 (2.5)	9 (9.1)	16 (14.8)	20 (15.0)	1 (1.4)	15 (14.2)
Position of teeth	33 (19.1)	16 (25.0)	33 (20.9)	20 (20.2)	32 (29.6)	54 (40.6)	5 (7.0)	32 (30.2)
Bleeding gums	80 (46.2)	31 (48.4)	92 (58.2)	53 (53.2)	53 (49.1)	59 (44.4)	34 (47.8)	50 (47.2)
Swollen gums	29 (16.8)	10 (15.6)	28 (17.7)	22 (22.2)	21 (19.4)	16 (12.0)	12 (16.9)	19 (17.9)
Dental plaque/tartar	32 (18.5)	3 (4.6)	28 (17.7)	18 (18.2)	24 (22.2)	27 (20.3)	7 (9.8)	21 (19.8)
Mouth ulcers	34 (19.6)	14 (21.8)	27 (17.1)	19 (19.2)	27 (25.0)	17 (12.8)	12 (16.9)	14 (13.2)
Bad breath	21 (12.1)	0 (0.0)	29 (18.3)	23 (23.2)	31 (28.7)	45 (33.8)	4 (5.6)	30 (28.3)
Cleft lip and palate	0	0	0	0	0	1 (0.7)	1 (1.4)	1 (0.9)
Erupting permanent tooth	20 (11.6)	6 (9.3)	20 (12.6)	12 (12.1)	12 (11.1)	6 (4.5)	5 (7.0)	10 (9.4)
Missing permanent tooth	11 (6.3)	1 (1.6)	3 (1.9)	6 (6.1)	10 (9.3)	8 (6.0)	0 (0.0)	3 (2.8)
Other reasons	4 (2.3)	1 (1.6)	4 (2.5)	4 (4.1)	3 (2.8)	3 (2.3)	1 (1.4)	3 (2.8)

and socializing, CS impacts were attributed to bleeding gums, position and color of teeth and bad breath.

4. Discussion

This paper presents the cross-cultural adaptation and validation of the self-administered Urdu Child-OIDP index among 11–12-year-old children in Lahore, Pakistan. Taken together, the results suggest that the index is both valid and reliable for assessing OHRQoL in this demographic. A validated self-administered Urdu Child-OIDP index offers a practical and cost-effective means of data collection, applicable in both clinical and population-based epidemiological settings.

In this study, we followed established guidelines [39, 40] for the linguistic validation of the Urdu-Child OIDP. A pediatric dentist was included as one of the translators due to the attributed extensive experience with children, providing valuable insights into appropriate word choices and terminology. During the translation process, we found that the Urdu translation of the word "homework" had several meanings, each of which was conceptually different from the item concept in the English language. Therefore, to maintain the conceptual and item equivalence between the two versions, the experts decided to include the word "homework" in the Urdu version to refer to schoolwork given by teachers. This decision was well-received by the children involved in the study.

During the first pre-test, some children encountered difficulties understanding the Urdu translations of specific oral diseases/conditions. To address this issue, we decided to incorporate pictures depicting these conditions into the Urdu Child-OIDP index. Subsequently, during the second pre-test, the children unanimously expressed that the Urdu version was easy to comprehend, relevant, and practical. Following this feedback, the expert committee convened for a final meeting, affirming that the layout of the final Urdu Child-OIDP mirrored that of the original index and maintained contextual similarity.

In the analysis of internal consistency, all inter-item correlation coefficients were positive, suggesting a positive association among the eight items. However, a relatively weak correlation was noted between studying and smiling (0.11). This finding was consistent with studies conducted in Chile (0.15), Morocco (0.11), and India (0.10) [22–24] but higher than that reported in a Brazilian study (0.01) [19]. One possible explanation is that children in this age group may not perceive school-related activities as significantly impacted by oral

health issues. Additionally, none of the inter-item coefficients suggested redundancy among the items [42]. Moreover, all corrected item-total correlation values exceeded 0.2, indicating their relevance to the overall index score. The standardized Cronbach's alpha coefficient exceeded 0.70, signifying strong internal consistency in assessing oral impacts among Pakistani children within the local context [42]. This value is consistent with findings from studies conducted in Chile (0.71), Sudan (0.73) and Malaysia (0.80) [20–22]. Furthermore, the Cronbach's alpha did not increase upon deletion of any items, highlighting the importance of retaining all items within the index [42]. Regarding test-retest reliability, both the overall weighted Kappa and the ICC surpassed 0.8, indicating excellent agreement and temporal stability of the index [42].

The criterion and construct validity assessments of the index revealed significant associations with all global oral health assessment items, history of mouth/teeth problems, and caries levels, aligning with the study's hypotheses. Furthermore, the absence of floor or ceiling effects indicates the suitability and appropriateness of using the index within this population [42].

In this study, we observed that eating was the most commonly affected performance reported by the children, consistent with findings from studies conducted in Sudan, India and Egypt [20, 24, 25]. Toothache, sensitive teeth and bleeding gums were identified as the most common oral conditions contributing to this impact. This outcome is unsurprising given the significant importance children at this age typically place on eating and enjoying their meals. Experiencing toothache or tooth sensitivity can severely diminish their ability to savor their food, while bleeding gums may affect the taste of food and drinks, consequently impacting their overall enjoyment. As a result, these oral conditions can significantly impede their daily activities and overall well-being.

The second most prevalent impact was observed in cleaning teeth, a trend consistent with findings from studies conducted in Sudan, India and Egypt [20, 24, 25]. Toothache and bleeding gums emerged as the commonly reported causes. Children experiencing toothache and bleeding gums may be inclined to avoid brushing their teeth, consequently compromising their oral hygiene and diminishing their self-confidence in social interactions, both within their local communities and at school.

In this study, we observed that the ability to speak was the least affected performance due to oral diseases/conditions. This could suggest that children at this age may not prioritize verbal communication as adults do, or they may not fully grasp its importance. Interestingly, although studying ranked as the second least prevalent oral impact reported by the children, a higher proportion of children reported experiencing a "very severe" level of impact intensity on studying. Conversely, despite eating being the most prevalent oral impact, more children reported experiencing "very little" impact intensity in this regard. These findings suggest an inverse relationship between the prevalence of oral impact and its intensity, consistent with observations from related studies [21, 25]. It appears that while eating is considered a basic life necessity, children may prioritize certain performances over others. The severe impact intensity reported for studying could be attributed to fear of not being able to perform well at school, being criticized by teachers, and being mocked by friends for having low grades.

Moreover, it was found that 58.6% of children suffered from dental caries. As a result, it was not surprising that toothache, sensitive teeth and bleeding gums were the three oral conditions mostly reported to have caused oral impacts by the children. These findings are consistent with those of similar studies conducted elsewhere [24, 25].

Our study has several limitations. Firstly, our sample was not randomly selected, potentially limiting the representativeness of 11–12-year-old children in Lahore. However, for validation studies, the use of a non-random sample was justified as long as the index was relevant to the sample population [41]. Secondly, our study focused on children from urban and suburban areas of Lahore, excluding those from rural areas. Nonetheless, our sample encompassed children from various socioeconomic backgrounds, somewhat reflecting the demographics of rural areas. The assessment of dental caries using the DMFT/deft indices did not offer additional information on caries severities, possibly leading to an underestimation of caries progression and severity. Nevertheless, the use of this index is recommended by WHO for epidemiological surveys [44]. Future studies could incorporate samples of children from rural areas. Furthermore, assessing the sensitivity and responsiveness to change in the index is recommended to validate its utility in measuring changes in OHRQoL following dental treatment.

5. Conclusions

The study findings indicate that the self-administered Urdu Child-OIDP index is a valid and reliable tool for assessing oral impacts among 11–12-year-old children in Pakistan, as well as in other Urdu-speaking child populations. This index can effectively evaluate oral impacts in large-scale epidemiological surveys involving children of this age group in Pakistan.

AVAILABILITY OF DATA AND MATERIALS

The datasets used and analyzed during the current study are available from the corresponding author upon reasonable request.

AUTHOR CONTRIBUTIONS

KZ—contributed towards data collection, analysis, and writing the manuscript. ZYMY and JM—contributed towards data analysis, interpretation, critical analysis and appraisal of the manuscript. All authors read and approved the final manuscript. All authors conceived the idea and contributed to the concept, design and development of the study.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethics approval for the study was granted by the Medical Ethics Committee, Faculty of Dentistry, Universiti Malaya (No: DFCO1806/0033(P)) and the Punjab Education Department, Pakistan (No: 7034). The research was conducted in accordance with the World Medical Association Declaration

of Helsinki 1975 (with 2013 revision). Permissions to conduct the study were obtained from the schools. A signed consent form was obtained from parents/guardians of the children and verbal consent was obtained from the children before data collection.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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