Comparison of the Generic and Condition-Specific Forms of the Oral Impacts on Daily Performances (OIDP) Index

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Abstract

Objective: *This study aimed to compare generic and condition-specific forms of the Oral Impacts on Daily Performances (OIDP) in terms of their ability to discriminate between adolescents with and without normative need for orthodontic treatment.* ***Methods:*** *A total of 1,060 15- to 16-year-old adolescents without history of previous or current orthodontic treatment were randomly selected from all secondary schools in Bauru, Brazil. Adolescents were clinically examined by using the Dental Aesthetic Index (DAI). Normative need for orthodontic treatment was defined by using three different suggested cutoff values on DAI score; 28, 31, and 36 points. Two different estimates (overall score and prevalence of oral impacts) were calculated by using the generic and the condition-specific OIDP (CS-OIDP) attributed to malocclusion. Discriminative ability was assessed, comparing both estimates between groups. Effect size and adjusted odds ratios were used to interpret the magnitude and meaning of differences.* ***Results:*** *The overall score and prevalence of oral impacts on quality of life in the last 6 months were significantly lower for the CS-OIDP attributed to malocclusion than for the generic OIDP (*$P < 0.001$ *in both cases). However, effect sizes and adjusted odds ratios were always larger for the CS-OIDP attributed to malocclusion than for the generic OIDP.* ***Conclusions:*** *Although generic and condition-specific OIDP forms were able to discriminate adolescents with normative need for orthodontic treatment from those without such a need, CS-OIDP attributed to malocclusion had better ability to distinguish between groups. Further studies are needed to compare discriminative ability of both OIDP forms between groups with different levels of other oral conditions.*

Key Words: oral health-related quality of life, generic oral impacts, condition-specific oral impacts, malocclusion, orthodontic need

Introduction

Oral health-related quality of life (OHRQoL) measures are being used in oral health surveys, oral health needs assessment, clinical trials, and studies evaluating the outcomes of dental care interventions (1-3). OHRQoL may be assessed by using two different groups of instruments: generic and specific OHRQoL measures (4,5). Generic OHRQoL measures take into account numerous oral conditions and thus measure wider effects of oral health on quality of life. In surveys assessing oral health, they provide a summary of overall oral health, which allows comparisons among different groups of patients and general or disease-free populations. On the other hand, specific OHRQoL measures focus on a particular disease, population, function, condition, or symptom and, thus, are used when any of these particular attributes needs to be assessed. Their narrower focus makes them potentially more sensitive to small but clinically important changes in oral health (5-7).

Condition-specific OHRQoL measures reduce patient burden and increase acceptability by including only relevant dimensions. This may in turn increase responsiveness (7,8).Their rationale lies in the potential for providing more insights into the consequences of a specific untreated oral condition or disease and the corresponding benefits of its treatment, rather than assessing quality of life in relation to overall oral health (5,7,8). This is particularly important when assessing oral health needs. Knowing whether there is an impact of the mouth on quality of life does not necessarily provide information on what specific dental condition was related to the impact. Condition-specific OHRQoL measures attempt to provide such information by attributing oral impacts to specific oral conditions, therefore indicating conditions that may require dental attention (3).

There are only a few studies comparing generic and condition-specific OHRQoL measures (9-11). This is because there are not many condition-specific OHRQoL measures. Although several OHRQoL measures have been developed and tested, the Oral Impacts on Daily Performances (OIDP) is the only OHRQoL measure designed to link specific oral problems leading to the impacts on quality of life, thereby associating such impacts to the specific oral condition that may need attention (12). This characteristic has enabled the condition-specific OIDP

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(CS-OIDP) to be used in the assessment of oral health needs and in the prioritization of dental health care services (3,13-15).

The OIDP index can be used either as a generic or condition-specific OHRQoL measure. Nevertheless, no study has compared the ability of both OIDP forms to differentiate between groups with different levels of oral health. Such information would be useful to suggest whether the use of the CS-OIDP provides more reliable information than the generic OIDP. Therefore, this study set out to compare the generic OIDP and CS-OIDP in terms of their ability to discriminate between adolescents with and without normative need for orthodontic treatment. It was hypothesized that CS-OIDP would be better able than the generic OIDP to distinguish between both groups of individuals.

Materials and Methods

Study Population. From the 2,200 15- to 16-year-old students attending all secondary schools in the city of Bauru (Sao Paulo, Brazil), 1,060 adolescents were selected by using a two-stage cluster sampling (16). First, a random sample of 15 schools was selected from a list of the 11 public and 10 private secondary schools in Bauru. The second stage was the random selection of an equal proportion of 15- to 16-year-old adolescents within each previously chosen school. That is, the proportion of adolescents sampled from each school was the same regardless of its size. Thus, the probability that a participant was included in the sample was the same for all 15- to 16-year-old adolescents in the population, a self-weighting sample (17,18). The design effect was 1.14 according to the pilot study. Therefore, the required number of participants to estimate a 20 percent prevalence of CS-OIDP attributed to malocclusion with a width of 95 percent confidence interval (CI) of 5 percent for simple random sampling was 757, but it was increased to 863 15- to 16-year-olds to take account of the design effect. Final sample size was far larger than the required minimum number of participants.

Parents signed a consent letter agreeing for their children to participate in the study. In addition, each student was asked for verbal consent before starting activities. No student had completed or undergone orthodontic treatment at the time of the survey. Ethical approval was obtained from the Ethics Review Board of the Dental School at the University of Sao Paulo.

Data Collection. Data were collected through face-to-face structured interviews and dental examinations. During interviews, adolescents provided information about sociodemographic characteristics and the impact of oral conditions on daily life in the last 6 months. Socioeconomic status (SES) was assessed by recording the participation of the head of household in the production or distribution processes, according to his/her occupational position, sector of activity, education and training for work, and ownership of the means of production (19). The classification system distinguishes six social classes, which were subsequently dichotomized for analysis as low or high SES.

The OIDP index was used to collect information on sociodental impacts. It has been previously validated on Brazilian adolescents (20,21). The OIDP index assesses the serious oral impacts on eight daily performances, namely, eating, speaking, cleaning mouth, relaxing, smiling, studying, emotion, and social contact. If an adolescent reported an impact on any of the eight performances, the frequency of the impact (scale from 1 to 3) and the severity of its effect on daily life (scale from 1 to 3) were scored. If no impact was reported, then a 0 score was assigned. Two different estimates (scores and prevalence of impacts) were calculated by using the generic OIDP and CS-OIDP attributed to malocclusion. For both OIDP forms, each performance score was estimated by multiplying the corresponding frequency and severity scores. However, for the CS-OIDP attributed to malocclusion, only those condition-specific oral impacts related to "bad position of teeth," "space between teeth," and "deformity of mouth or face" were considered in the analysis as impacts attributed to malocclusion (15,22). For both the generic OIDP and the CS-OIDP attributed to malocclusion, the overall score was the sum of the eight performance scores (ranging from 0 to 72) multiplied by 100 and divided by 72 (12,23). Then, the prevalence of impacts was calculated as the percentage of adolescents with a respective overall score higher than 0.

Adolescents were then clinically examined to assess their professionally defined normative need for orthodontic treatment using the Dental Aesthetic Index (DAI). Examinations were carried out by one of the authors (CMO), who had been previously trained and calibrated in the Department of Orthodontics at University of Cardiff. At the end of the calibration process, interexaminer (against a senior orthodontist) and intra-examiner reliability were evaluated. According to weighted Kappa (using quadratic weights), inter- and intra-examiner reliability were 0.77 and 0.91, respectively. DAI consists of 10 occlusal traits related to dentofacial anomalies, according to the three components of dentition, spacing/crowding, and occlusion. The final DAI score was obtained by using the following regression equation (24-26): (missing visible teeth × 6) + (crowding) + (spacing) + (diastema × 3) + (largest anterior maxillary irregularity) + (largest anterior mandibular irregularity) + (anterior maxillary overjet × 2) + (anterior mandibular overjet × 4) + (vertical anterior openbite × 4) + (anteroposterior molar relation × 3) + 13. Thereafter, each adolescent was classified as having "no need" or "need" for orthodontic treatment according to three different cutoff values. Because a DAI scores of 28, 31, and 36 points have been previously suggested as cutoff values to define normative need for orthodontic treatment (27-29), these

three values were alternatively used to dichotomize the sample.

Data Analysis. Discriminative ability was examined in terms of construct validity, where the distributions of generic OIDP and CS-OIDP scores are compared between groups with expected oral health differences (30). Mann–Whitney tests were used to compare generic OIDP and CS-OIDP scores between adolescents with and without normative need for orthodontic treatment. To aid comparison and interpretation, the magnitude of differences was also expressed as an effect size (31,32), calculated as the mean difference between groups divided by the pooled standard deviation. The generally accepted thresholds of 0.2, 0.5, and 0.8 were used to define "small," "moderate," and "large" effect sizes (31).

Because distribution of OIDP and CS-OIDP scores was positively skewed (floor effect), comparisons between groups were also performed by using the prevalence of generic OIDP and CS-OIDP attributed to malocclusion. Both prevalences were compared between adolescents with and without normative need for orthodontic treatment using multiple binary logistic regression. This method allowed adjusting for some sociodemographic characteristics (sex, age, and SES of adolescents). Odds ratios (ORs) were calculated as a measure of the strength of the association between variables.

Results

A total of 1,060 adolescents, 492 females (46.4 percent) and 568 males (53.6 percent), with a mean age of 15.35 ± 0.48 years, participated in the study. A total of 625 (58.9 percent) were from low SES, and 435 (41.1 percent) adolescents were from high SES. The percentage of individuals with a mandatory need for orthodontic treatment was 16.0 percent (170), 11.1 percent (118), and 4.2 percent (45), respectively, when 28, 31, and 36 points on DAI score were used as cutoff values to dichotomize the sample.

Sample distribution according to the generic OIDP and CS-OIDP attributed to malocclusion is shown in Table 1. As expected, the overall score and the prevalence of oral impacts were significantly lower for the CS-OIDP attributed to malocclusion than for the generic OIDP. The mean score for the generic OIDP was 3.19 ± 6.38 percent, whereas the mean score for the CS-OIDP was 2.27 ± 5.51 percent (Wilcoxon signed-rank test, $P < 0.001$). Similarly, the prevalence of generic OIDP was 34.2 percent, while the prevalence of CS-OIDP attributed to malocclusion was 24.6 percent (McNemar's chi-squared test, $P < 0.001$).

Table 1
Sample Distribution by Generic OIDP and CS-OIDP Attributed to Malocclusion in 15- to 16-Year-Old Brazilian Schoolchildren

Indicator	Generic OIDP	CS-OIDP	*P* value
OIDP score (0-100%)			<0.001*
Mean	3.19	2.27	
Standard deviation	6.38	5.51	
Quartiles (25; 50; 75)	(0; 0; 4.17)	(0; 0; 0)	
Minimum value	0	0	
Maximum value	50.00	45.83	
Prevalence of impacts (OIDP score >0)			<0.001†
Number of cases	362	261	
Percent of cases	34.2	24.6	

* Wilcoxon signed-rank test was used.
† McNemar's chi-squared test was used.
OIDP, Oral Impacts on Daily Performances; CS-OIDP, condition-specific Oral Impacts on Daily Performances.

Using the generic OIDP, there were statistically significant differences between adolescents with and without normative need for orthodontic treatment (Table 2). That was irrespective of the cutoff value used to dichotomize the sample ($P < 0.001$ in all three cases). Hence, the mean differences in overall scores between both groups were 4.34 percent [$CI_{95\ percent}$(3.33; 5.36)], 4.81 percent [$CI_{95\ percent}$(3.62; 5.99)], and 6.63 percent [$CI_{95\ percent}$(4.76; 8.49)] when 28, 31, and 36 points on DAI score were used respectively as cutoff values to dichotomize the sample. The corresponding size effects for such mean differences in scores were 0.68 [$CI_{95\ percent}$(0.53; 0.87)], 0.75 [$CI_{95\ percent}$(0.58; 0.97)], and 1.04 [$CI_{95\ percent}$(0.76; 1.36)], respectively. In addition, there were statistically significant differences between groups for the prevalence of generic OIDP ($P < 0.001$ in all three cases). Adjusted ORs for the association between normative need for orthodontic treatment and prevalence of generic OIDP were 2.68 [$CI_{95\ percent}$(1.91; 3.76)], 2.65 [$CI_{95\ percent}$(1.78; 3.93)], and 3.61 [$CI_{95\ percent}$(1.91; 6.82)], respectively, when 28, 31, and 36 points on DAI score were used as cutoff values to dichotomize the sample.

For the CS-OIDP attributed to malocclusion, there were statistically significant differences between adolescents with and without normative need for orthodontic treatment (Table 3), independently of the cutoff value used to dichotomize the sample ($P < 0.001$ in all three cases). The mean differences between adolescents with and without normative need for orthodontic treatment were 3.91 percent [$CI_{95\ percent}$(3.04; 4.78)], 4.57 percent [$CI_{95\ percent}$(3.55; 5.59)], and 6.59 percent [$CI_{95\ percent}$(4.99; 8.19)] when 28, 31, and 36 points, respectively, were used as cutoff values to define normative need. The corresponding size effects for such mean differences in scores were 0.71 [$CI_{95\ percent}$(0.57; 0.90)], 0.83 [$CI_{95\ percent}$(0.66; 1.05)], and 1.20 [$CI_{95\ percent}$(0.93; 1.53)], respectively. Furthermore, there were statisti-

Table 2
Overall Score and Prevalence of Oral Impacts, Calculated Using the Generic OIDP, in 15- to 16-Year-Old Brazilian Schoolchildren With and Without Normative Need for Orthodontic Treatment

Normative need	*n*	Mean	SD	*P* value*	Effect size	95% CI for effect size	% of impacts	Adjusted OR†	95% CI for OR
Using DAI of 28 points as cutoff value				<0.001	0.68	(0.53; 0.87)			
No need	890	2.50	5.07				30.3	1.00	
Need	170	6.84	10.20				54.1	2.68	(1.91; 3.76)
Using DAI of 31 points as cutoff value				<0.001	0.75	(0.58; 0.97)			
No need	942	2.66	5.34				31.5	1.00	
Need	118	7.46	10.87				55.1	2.65	(1.78; 3.93)
Using DAI of 36 points as cutoff value				<0.001	1.04	(0.76; 1.36)			
No need	1015	2.91	5.79				32.8	1.00	
Need	45	9.54	12.82				64.4	3.61	(1.91; 6.82)

* Mann-Whitney test was used for comparison between groups.
† Multiple binary logistic regression was used to adjust for sex, age, and SES ($P < 0.001$ in all cases).
OIDP, Oral Impacts on Daily Performances; SD, standard deviation; CI, confidence interval; OR, odds ratio; DAI, Dental Aesthetic Index; SES, socioeconomic status.

Table 3
Overall Score and Prevalence of Oral Impacts, Calculated Using the CS-OIDP Attributed to Malocclusion, in 15- to 16-Year-Old Brazilian Schoolchildren With and Without Normative Need for Orthodontic Treatment

Normative need	*n*	Mean	SD	*P* value*	Effect size	95% CI for effect size	% of impacts	Adjusted OR†	95% CI for OR
Using DAI of 28 points as cutoff value				<0.001	0.71	(0.57; 0.90)			
No need	890	1.64	4.17				20.5	1.00	
Need	170	5.56	9.24				46.5	3.38	(2.39; 4.79)
Using DAI of 31 points as cutoff value				<0.001	0.83	(0.66; 1.05)			
No need	942	1.76	4.38				21.4	1.00	
Need	118	6.33	10.05				50.0	3.69	(2.48; 5.50)
Using DAI of 36 points as cutoff value				<0.001	1.20	(0.93; 1.53)			
No need	1015	1.99	4.83				23.1	1.00	
Need	45	8.58	12.25				60.0	4.95	(2.66; 9.22)

* Mann–Whitney test was used for comparison between groups.
† Multiple binary logistic regression was used to adjust for sex, age, and SES ($P < 0.001$ in all cases).
CS-OIDP, condition-specific Oral Impacts on Daily Performances; SD, standard deviation; CI, confidence interval; OR, odds ratio; DAI, Dental Aesthetic Index; SES, socioeconomic status.

cally significant differences between groups for the prevalence of CS-OIDP attributed to malocclusion ($P < 0.001$ in all three cases). Adjusted ORs for the association between mandatory need for orthodontic treatment and prevalence of CS-OIDP attributed to malocclusion were 3.38 [$CI_{95\ percent}$(2.39; 4.79)], 3.69 [$CI_{95\ percent}$(2.48; 5.50)], and 4.95 [$CI_{95\ percent}$(2.66; 9.22)] when 28, 31, and 36 points, respectively, on DAI score were used as cutoff values to dichotomize the sample.

Discussion

This study assessed the construct validity of the generic and the condition-specific forms of the OIDP index, specifically in relation to their ability to differentiate adolescents with normative need for orthodontic treatment from those without such a need. To our knowledge, this was the first attempt to compare the discriminative ability of both OIDP forms. Overall, findings were very similar for the two different estimates used: the overall score and the prevalence of impacts.

Mean differences in overall scores between adolescents with and without normative need for orthodontic treatment were always higher when generic OIDP than when CS-OIDP attributed to maloc-

clusion was used. Because mean difference does not take into account data variability, effect sizes were used to interpret the magnitude and meaning of such differences (31,32). Hence, effect size for the CS-OIDP attributed to malocclusion was moderate when 28 points on DAI score was used as a cutoff value to define normative need for orthodontic treatment, and large when either 31 or 36 points on DAI score was used as cutoff values to dichotomize the sample. In contrast, effect size for the generic OIDP was moderate when either 28 or 31 points on DAI score was used as cutoff values to define normative need for orthodontic treatment, and large when 36 points on DAI score was used to dichotomize the sample. Furthermore, effect size for both OIDP forms increased according to the level of DAI score used as cutoff value to define normative need for orthodontic treatment. However, the increase was larger for the CS-OIDP attributed to malocclusion. Effect sizes for the CS-OIDP attributed to malocclusion were 4.4, 10.7, and 15.7 percent larger than the corresponding figures for the generic OIDP when 28, 31, and 36 points, respectively, on DAI score were used to dichotomize the sample.

Similar to the mean differences in scores, the prevalence of oral impacts was always higher using the generic OIDP in comparison with the CS-OIDP attributed to malocclusion. However, when the strength of the association between normative need for orthodontic treatment and prevalence of oral impacts was assessed, ORs were always larger using the CS-OIDP attributed to malocclusion than the generic OIDP, even after controlling for sex, age, and SES of the adolescents (Tables 2 and 3). This was an advantage over using effect sizes because there is no way to control for covariates with non-parametric tests such as the Mann–Whitney test. The comparison of prevalences between groups with different health status has been previously reported for other OHRQoL measures (9,11,33). As for effect sizes, adjusted ORs for both OIDP forms increased depending on the level of DAI score used as a cutoff value to define normative need for orthodontic treatment. However, such increases were larger for the CS-OIDP attributed to malocclusion. Adjusted ORs for the CS-OIDP attributed to malocclusion were 26.1, 39.2, and 37.1 percent larger than for the generic OIDP when 28, 31, and 36 points, respectively, on DAI score were used to define normative need for orthodontic treatment.

Therefore, the generic OIDP as well as the CS-OIDP attributed to malocclusion was able to differentiate between adolescents with and without normative need for orthodontic treatment. However, because the CS-OIDP attributed to malocclusion always showed larger effect sizes and ORs than the generic OIDP, the former appeared to be better able than the latter to distinguish between groups of adolescents. Such discriminative ability was independent of the estimator used (i.e., overall score or prevalence of oral impacts) and increased when stricter cutoff values on DAI score were used so as to define normative need for orthodontic treatment (i.e., 28, 31, or 36 points, respectively).

These results confirmed our hypothesis that the CS-OIDP attributed to malocclusion was better able to discriminate between sub-groups with different health statuses than the generic OIDP. This agrees with previous findings using other OHRQoL measures (9-11), in which different OHRQoL measures (a generic and a condition-specific) had different values for determining the impact on quality of life of nasopharyngeal carcinoma (9), third molar removal (10), and dentofacial deformity (11). Such studies have also suggested that generic and condition-specific OHRQoL measures are complementary, rather than alternative sources of information. In this regard, because the real difference between both OIDP forms involves adding an extra final question about the self-perceived causes of oral impacts, we strongly recommend collecting this kind of information. This would allow researchers to have the overall profile of oral impacts as well as the condition-specific oral impacts on quality of life for most oral conditions and diseases.

A final point relates to some minor limitations of the present study. First, although this study was based in a large sample with a response rate of 100 percent, participants are not representative of the overall population of 15- to 16-year-old adolescents in Brazil. Therefore, findings cannot be generalized beyond the actual study population. Further studies are encouraged in different settings and populations to corroborate the present results. Second and finally, because our comparisons were based on discriminating between adolescents with and without normative need for orthodontic treatment, our findings need further confirmation for other oral conditions.

Conclusions

For this population of Brazilian adolescents, both the generic and the condition-specific forms of the OIDP index were able to discriminate between different levels of normative need for orthodontic treatment. However, the CS-OIDP attributed to malocclusion had greater ability to distinguish between adolescents with normative need from those without such a need. More studies are needed to assess the discriminative ability of both OIDP forms between groups of people with different levels of other oral conditions.

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