# **Original Article**

# Impacts on Daily Performances Attributed to Malocclusions Using the Condition-Specific Feature of the Oral Impacts on Daily Performances Index

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# ABSTRACT

**Objective:** To assess the prevalence, intensity, and extent of sociodental impacts attributed to malocclusions by sex, socioeconomic status, and normative orthodontic treatment need level. **Materials and Methods:** One thousand sixty 15- to 16-year-old adolescents without history of previous or current orthodontic treatment were randomly selected from all secondary schools in Bauru, Brazil. Interviews were done to collect information about sociodemographic variables and sociodental impacts on quality of life attributed to malocclusions using the Oral Impacts on Daily Performances Index. Adolescents were also clinically examined using the Index of Orthodontic Treatment Need. Statistical comparison by covariables was performed using  $\chi^2$  and Kruskal-Wallis tests.

**Results:** The prevalence of condition-specific impacts (CSIs) was 24.6%. Among adolescents with CSIs, 52.1% reported severe or very severe intensity and 77.4% reported impacts on only one daily performance, commonly, smiling. The prevalence, intensity, and extent of CSIs differed by level of normative orthodontic treatment need but not by sex or socioeconomic status. However, among adolescents with definite normative orthodontic treatment need, 24.5% reported CSIs of severe or very severe intensity, whereas among those with moderate or slight/no need, 13.0% and 7.9%, respectively, experienced CSIs of severe or very severe intensity.

**Conclusions:** Untreated malocclusions have physical, psychological, and social consequences on quality of life of Brazilian adolescents. However, because adolescents with a definite normative orthodontic need are considered by orthodontists as in need of care, these results raise the issue of whether all these adolescents should be considered for orthodontic attention since most had no perceived impacts on performing their daily life activities.

KEY WORDS: Oral impacts; Condition-specific impacts; Malocclusion; Orthodontic need; Adolescents

## INTRODUCTION

Although there is a general agreement among orthodontists that people are motivated to seek ortho-

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Accepted: April 2007. Submitted: March 2007. © 2008 by The EH Angle Education and Research Foundation, dontic care because of the adverse physical, psychological, and social effects of malocclusion,<sup>1,2</sup> there is conflicting evidence on the effects of malocclusion and orthodontic treatment on people's lives.<sup>3,4</sup> A recent review concluded that there is a need for a more comprehensive and rigorous evaluation of the sociodental impacts of untreated malocclusion on quality of life.<sup>5</sup> This evaluation should be on representative population-based epidemiological samples rather than patient-based studies. The studies should use specific, rather than generic, oral health–related quality-of-life (OHRQoL) measures.

Specific OHRQoL measures are designed for use in particular clinical situations. Their narrow focus makes them potentially more responsive to small but clinically important changes in health.<sup>4,6,7</sup> There are four types of specific OHRQoL measures: (1) condition-specific measures focusing on individuals with a particular disease or clinical condition; (2) domain-specific mea-

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sures focusing in detail on one dimension only, such as a psychological domain; (3) population-specific measures focusing on subgroups of people, such as elderly individuals or children; and (4) symptom-specific measures focusing on one type of symptom, such as pain.<sup>6,8</sup>

Condition-specific instruments, the first type of specific OHRQoL measure, are the most commonly used specific OHRQoL measures to assess quality of life.<sup>4</sup> Their advantage is that they emphasize the assessment of quality of life for a specific condition, such as malocclusion, rather than assessing quality of life in relation to overall oral health.<sup>7,8</sup> Therefore, a conditionspecific OHRQoL measure for malocclusion and/or conditions related to orthodontics has the potential of providing more insights into the consequences of untreated malocclusion and the benefits of orthodontic treatment.<sup>3,4,9</sup>

Although several OHRQoL measures have been developed and tested, the Oral Impacts on Daily Performances (OIDP) is the only OHRQoL specifically designed to link specific oral problems leading to the impacts on quality of life, thereby associating the impacts to the specific oral condition that may need attention.<sup>10</sup> When reporting such impacts, they may be referred to as condition-specific oral impacts on daily performances (CS-OIDP). This characteristic of linking the specific oral problems to the impact it causes has enabled CS-OIDP to be used in the assessment of dental health needs as well as in the prioritization of dental health care services.11-14 Another positive feature of the CS-OIDP is that it assesses the intensity or the extent (number of affected daily activities) of such impacts.

Some previous studies assessing the sociodental impacts of malocclusions on children or adolescents have reported only the prevalence of condition-specific impacts on quality of life related to malocclusion.<sup>15–17</sup> However, no study has reported on the intensity or the extent (number of affected daily activities) of such impacts. This information would be useful to prioritize children who should be treated first, especially when resources are limited. To overcome the gap in information on intensity or the extent of impacts, a study was planned with the objective of assessing the prevalence, intensity, and extent of the impacts attributed to malocclusions among Brazilian adolescents by sex, socioeconomic status (SES), and level of normative orthodontic treatment need.

# MATERIALS AND METHODS

#### **Study Population**

One thousand sixty adolescents were selected, using two-stage cluster sampling,<sup>18</sup> from the 2200 15- to

16-year-old students attending all secondary schools in the city of Bauru (Sao Paulo, Brazil). First, a random sample of secondary schools was selected from a list of the 11 public and 10 private schools in Bauru. The next stage was the random selection of 15- to 16-yearold adolescents within each previously chosen school. The sample size was calculated to allow for a design effect of 3, a prevalence of condition-specific impacts attributed to malocclusion of 50% (worst situation), and a maximum tolerable error of 5.0%. Therefore, the required sample size for simple random sampling was 328, but the required minimum sample size was increased to 984 adolescents aged 15 to 16 years to take into account the effect of clustering. Since the actual study sample was larger than recommended after effect design adjustment, weights were not used in the statistical analysis.

All adolescents agreed to participate voluntarily in the study. They had no previous history of orthodontic treatment or were not currently having such treatment. Ethical approval was obtained of the Ethics Committee of the Dental School at the University of Sao Paulo.

# **Data Collection**

Data were collected through face-to-face structured interviews and dental clinical examinations. During interviews, adolescents provided information about their sociodemographic characteristics and the impact of their oral conditions on daily life in the past 6 months. SES was assessed by recording the participation of the head of household in the production or distribution processes according to his or her occupational position, sector of activity, education, and training for work and ownership of the means of production.<sup>19</sup> 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 used with Brazilian adolescents.<sup>15,16</sup> The OIDP Index assesses the serious oral impacts on eight daily performances, namely, eating, speaking, cleaning mouth, relaxing, smiling, studying, emotion, and social contact (Table 1). If an adolescent reported an impact on any of the eight performances, the frequency of the impact (on a scale ranging from 1 to 3) and the severity of its effect on daily life (on a scale ranging from 1 to 3) were scored. If no impact was reported, then a zero score was assigned. Thereafter, adolescents were asked to identify oral problems that, in their opinion, caused the impact. Only those condition-specific oral impacts on daily performances related to "bad position of teeth," "space between teeth," and "deformity of mouth or face," hereafter referred as condition-specific impacts

 Table 1. The Eight Daily Performances Evaluated by the Oral Impacts on Daily Performances Index

Performance	Description
Eating	Eating your food (eg, meal, ice cream, hot bev- erages)
Speaking	Speaking and pronouncing clearly
Cleaning mouth	Cleaning mouth and teeth (eg, brushing teeth, rinsing mouth)
Relaxing	Sleeping and relaxing (eg, reading comic book, watching television)
Emotion	Maintaining your usual emotional state without being irritable
Smiling	Smiling, laughing, and showing teeth without embarrassment
Studying	Carrying out schoolwork (eg, going to school, participating in class, doing homework)
Social contact	Contact with people (eg, going out with friends, going to friend's house)

(CSI), were considered in the analysis as sociodental impacts attributed to malocclusion or conditions related to orthodontics.

The impact score per performance was estimated by multiplying the corresponding frequency and severity scores. The overall CSI score was the sum of the eight performance scores (ranging from 0 to 72) multiplied by 100 and divided by 72.10,20 Then, the prevalence of CSI on daily performances related to malocclusion was calculated as the percentage of adolescents with a CSI score greater than zero. Furthermore, among those adolescents reporting a CSI, the intensity of the impact on each performance (ranging from 1 to 9) was classified into five levels: very little (1), little (2), moderate (3-4), severe (6), and very severe (9). The overall intensity of CSI was then estimated as the most severe impact on any of the eight performances.<sup>20</sup> Finally, the extent of CSI was calculated as the number of performances affected (ranging from one to eight performances).20,21

Adolescents were then clinically examined to assess their orthodontic treatment need using the Dental Health Component of the Index of Orthodontic Treatment Need (DHC-IOTN). The examination was carried out by one of the authors (C.M.O.), who had undergone training and calibration on the IOTN in the Department of Orthodontics at University of Cardiff where the IOTN was developed. According to weighted Kappa, interexaminer and intraexaminer reliability was .77 and .91, respectively. For the DHC-IOTN, 10 traits of malocclusion were assessed: overjet, reverse overjet, overbite, openbite, crossbite, crowding, impeded eruption, defects of cleft lip and palate as well as any craniofacial anomaly, Class II and Class III buccal occlusions, and hypodontia. Only the highest scoring trait was used for assessing the treatment need.22 Each adolescent was then classified as presenting no/slight need (IOTN 1–2), moderate need (IOTN 3), or definite need (IOTN 4–5).<sup>22,23</sup>

# **Data Analysis**

The prevalence and intensity of CSI were compared according to sex, SES, and level of normative orthodontic treatment need using the  $\chi^2$  test, whereas the extent of CSI was compared according to sex and SES through the Mann-Whitney test and according to level of normative orthodontic treatment need by means of the Kruskal-Wallis test. If any difference among levels of need was found at this point, then the Mann-Whitney test was used to determine between what pairs of levels there were differences.

## RESULTS

One thousand sixty adolescents, 492 females (46.4%) and 568 males (53.6%), with a mean age of 15.35  $\pm$  0.48 years, who had no previous or current orthodontic treatment, participated in the study. A total of 625 (58.9%) were from low-SES backgrounds, and 435 (41.1%) adolescents were from high-SES backgrounds. Of the participants, 566 (53.4%) had no/slight need, 261 (24.6%) had a moderate need, and 233 (22.0%) had a definite need for orthodontic treatment based on the IOTN criteria.

The prevalence of CSI impacts on daily performances attributed to malocclusion was 24.6% (Table 2). Smiling and speaking were the daily performances with the highest prevalence of CSI from malocclusion (15.8% and 9.2%, respectively). The prevalence of CSI was very low for the other six daily performances, ranging between 0.2% and 2.3%. There was a statistically significant difference in the prevalence of CSI between sexes but not between SES groups (P < .001 and .240, respectively). Furthermore, the prevalence of CSI was higher in adolescents with a definite orthodontic treatment need than in those with no/slight or moderate need (P < .001). A total of 42.5% of participants with definite orthodontic treatment need according to IOTN reported a CSI, while only 20.7% of those with moderate and 19.1% with no/slight need reported a CSI. On the other hand, 57.5% of adolescents with a definite orthodontic treatment need experienced no impacts (Table 3).

Among the 261 adolescents with a CSI, 52.0% reported impacts of severe or very severe intensity (Table 2). Studying and emotion were the most severely impacted daily performances (100.0% and 64.8% of adolescents with a CSI reported impacts of severe or very severe intensity, respectively), whereas speaking and cleaning were the least severely impacted daily performances (43.3% and 45.0% of adolescents with

	Daily Performances Impacted										
Indicator	Eating	Speaking	Cleaning Mouth	Relaxing	Smiling	Emotion	Studying	Social Contact	Overall Impact		
Prevalence of imp	acts (n = 10	60 adolescents	s)								
n	24	97	20	2	167	17	3	7	261		
%	2.3	9.2	1.9	0.2	15.8	1.6	0.3	0.7	24.6		
Intensity of impact	s in 261 ado	lescents with in	npacts								
Very little	8.3	7.2	5.0	0.0	9.0	0.0	0.0	0.0	7.7		
Little	12.5	19.6	10.0	0.0	12.6	17.6	0.0	0.0	14.6		
Moderate	25.0	29.9	40.0	50.0	25.1	17.6	0.0	42.9	25.7		
Severe	33.4	23.7	35.0	50.0	22.2	5.9	33.3	42.9	25.3		
Very severe	20.8	19.6	10.0	0.0	31.1	58.9	66.7	14.2	26.7		

Table 2. Prevalence and Intensity of Impacts Attributed to Malocclusions in 15- to 16-Year-Old Brazilian Schoolchildren

CSI reported severe or very severe intensity, respectively).

There was no statistically significant difference in the intensity of CSI by sex and SES (P = .334 and .240, respectively; Table 4). However, the percentage of adolescents with CSI of very severe intensity increased significantly with increases in the level of normative orthodontic treatment need (P = .005), ranging from 15.7% among adolescents with no/slight need to 36.3% among those with definite need for orthodontic treatment.

In relation to the extent of CSI, the mean number of daily performances affected by malocclusion was 1.29  $\pm$  0.61. Of the children with CSI impacts, 77.4% reported 1 affected performance, 17.6% reported 2 affected performances, 3.5% reported 3 affected performances. There was no statistically significant difference in the extent of CSI by sex or SES (P = .317 and .159, respectively). However, there was a statistically significant difference when the extent of CSI was compared by orthodontic treatment need (P = .011). Adolescents with definite orthodontic treatment need had more daily performances affected than those with no/slight need (Table 5).

#### DISCUSSION

This is the first study assessing not only the prevalence but also the intensity and extent of the oral impacts attributed to malocclusions or conditions related to orthodontics. Among the Brazilian adolescents, 24.6% reported CSI for malocclusions on at least one daily performance during the past 6 months. A figure similar to that was reported in Thai 11- to 12-year-old children<sup>13</sup> and Brazilian 10- to 14-year-olds<sup>17</sup> (20.3% and 27.0%, respectively).

Among adolescents with a CSI attributed to malocclusion, 52.0% reported impacts of severe or very severe intensity, and 77.4% reported impacts on only one performance. The most commonly affected performance was smiling, laughing, and showing teeth without embarrassment. On the other hand, the performances not usually affected by malocclusions were relaxing, studying, and social contact. Since this study was designed to focus exclusively on the sociodental impacts of malocclusions, it is interesting to note that the reported pattern of affected daily performances was different from previous studies. Whereas effects on eating were the most common performance impacted in other studies,<sup>21,24,25</sup> it was not the most af-

Table 3.	Prevalence of Impacts	Attributed to Malocclusions i	n 15- to	16-Year-Old Brazilian	Schoolchildren, by Covariables <sup>a</sup>
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	With I	With Impacts Without Impacts			
Covariable	n	%	n	%	P Value
Sex					<.001
Male	96	19.5	396	80.5	
Female	165	29.1	403	70.9	
Socioeconomic status					.240
Low	162	25.9	463	74.1	
High	99	22.8	336	77.2	
Orthodontic treatment need					<.001
No/slight need	108	19.1	458	80.9	
Moderate need	54	20.7	207	79.3	
Definite need	99	42.5	134	57.5	

<sup>a</sup>  $\chi^2$  test.

245	
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	Intensity of Impacts										
	Ver	y Little	L	ittle	Мо	derate	Se	evere	Very	Severe	_
Covariable	n	%	n	%	n	%	n	%	n	%	P Value
Sex											.334
Male	9	9.4	16	16.7	28	29.2	24	25.0	19	19.8	
Female	11	6.7	22	13.3	39	23.6	42	25.5	51	30.9	
Socioeconomic status											.240
Low	9	5.6	22	13.6	48	29.6	36	22.2	47	29.0	
High	11	11.1	16	16.2	19	19.2	30	30.3	23	23.2	
Orthodontic treatment need											.005
No/slight need	10	9.3	21	19.4	32	29.7	28	25.9	17	15.7	
Moderate need	1	1.9	10	18.4	9	16.7	17	31.5	17	31.5	
Definite need	9	9.1	7	7.1	26	26.3	21	21.2	36	36.3	

fected performance affected by malocclusions among the Brazilian adolescents. The Brazilian adolescents reported that smiling and speaking were most commonly affected by their malocclusion.

The prevalence, but not the intensity or extent, of the impacts attributed to malocclusions differed between sexes. Females had more CSI than males did. Some studies consider that females are more concerned about dental appearance than males are.15-17 We have shown that despite the difference in prevalence, there was no difference between sexes in relation to the number of items affected or the intensity of those impacts. While some studies report that the overall pattern of oral impacts<sup>21,25,26</sup> and impacts attributed to malocclusions are related to SES,15-17 no such difference was found in the present study. It is likely that the dissimilar methodologies used to collect socioeconomic information may explain, at least in part, the differences among studies. Therefore, more studies are required to broaden the knowledge in relation to the presence of a social gradient in OHRQoL.

As this study explored the CSI for malocclusions, it was considered appropriate to assess whether there was a relationship between level of normative orthodontic treatment need and perceptions of impacts on the quality of life attributed to malocclusion. Although the Aesthetic Component of the IOTN (AC-IOTN) was developed to collect information on the patient's perspective, this component was not assessed in this study for three main reasons. First, the reliability of the AC-IOTN has been questioned.<sup>15,16,27,28</sup> Second, this study aimed to explore whether a commonly used orthodontic need system in Britain, the IOTN Index, captured the perceived needs of the subjects. At present, in Britain, provision of orthodontic treatment is almost exclusively based on the DHC-IOTN since the AC-IOTN is used only in borderline cases.<sup>29</sup> And third, the individual's perspective was obtained through the condition-specific characteristic of the OIDP. Therefore, the inclusion of AC-IOTN was considered redundant.

Our results showed that the prevalence, intensity, and extent of CSI differed by orthodontic treatment need level. They were higher among adolescents with definite normative need than in those with moderate or no/slight need for orthodontic treatment. Although these results reinforce the idea that untreated severe malocclusions have physical, psychological, and social consequences on quality of life, it should be noted that not all adolescents perceived negative impacts of their malocclusions. Although the prevalence of im-

Table 5.	Extent of Impacts	Attributed to	Malocclusions in	15- to	16-Year-Old Brazilian	Schoolchildren by	<b>Covariables</b> <sup>a</sup>
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Covariable	n	x	SD	Range	P Value
Sex					.317
Male	96	1.26	0.6	1–4	
Female	165	1.31	0.61	1–4	
Socioeconomic status					.159
Low	162	1.34	0.67	1–4	
High	99	1.21	0.48	1–3	
Orthodontic treatment need					.011
No/slight need	108	1.19*	0.52	1–4	
Moderate need	54	1.24	0.51	1–3	
Definite need	99	1.42*	0.72	1–4	

<sup>a</sup> Kruskal-Wallis test was used instead of Mann-Whitney test.

\* Statistically significant difference between pairs (Mann-Whitney test, P < .05).

pacts attributed to malocclusions increased with increasing levels of normative orthodontic treatment need, even among adolescents with definite need for orthodontic treatment, less than 50% reported impacts on quality of life caused by their current occlusal status (Table 3). On the other hand, 20.7% of those with moderate need for orthodontic treatment reported a CSI. Because adolescents with a definite normative orthodontic need are considered by orthodontists as in need of orthodontic care, our results raise the issue of whether all these adolescents should be considered for orthodontic attention since most of them have no perceived difficulties performing their everyday physical, psychological, or social activities.

This issue was further highlighted when information about intensity and extent of the CSI was analyzed (Tables 4 and 5). On one hand, within the group with definite normative orthodontic need, 42.5% reported impacts attributed to malocclusions; 57.5% of them reported impacts of severe or very severe intensity, that is, 24.5% of all those with definite normative need. On the other hand, 13.0% of adolescents with moderate need, for whom it is not clear whether there will be a benefit from orthodontic treatment, experienced CSIs of severe or very severe intensity. Moreover, the extent of CSI was similar among adolescents with moderate and definite normative orthodontic treatment need. These findings raise doubts about current methods of assessing orthodontic treatment and how to prioritize who should be treated first.

These inconsistencies in findings on normative needs and impacts underline the shortcomings of the normative approach to assessing need, using only clinical indexes to estimate orthodontic treatment needs.<sup>13,30</sup> The normative approach gives relatively high estimates of need.<sup>11–14</sup> As people's feelings and perceptions in relation to their dental appearance or oral function should be central to assessing need and outcome of orthodontic reetment needs has recently been recommended.<sup>13</sup>

Since information about the intensity and extent of the impacts represents an alternative method of describing or comparing the impacts in relation to the oral conditions causing them,<sup>21,24</sup> the present approach, using an OHRQoL as a way of attributing sociodental impacts to specific oral conditions, could be useful in planning orthodontic services and assist decision making about who should be treated first. However, studies are needed to corroborate the present results. Such studies should not only be based on normative need but also use subjective measures, such as an OHRQoL index and assessment of perceived need.

#### CONCLUSIONS

- Almost a quarter of the Brazilian adolescents reported at least one impact on their daily life during the past 6 months attributed to malocclusions or conditions related to orthodontics.
- Among those with CSIs related to malocclusion, slightly more than half reported impacts of severe or very severe intensity, whereas slightly more than three-quarters reported impacts on only one performance, usually smiling.
- The prevalence, intensity, and extent of CSIs did not differ by sex or SES of the adolescents.
- Although prevalence, intensity, and extent of CSIs differed by level of orthodontic treatment need, considerable proportions of adolescents with normative definite orthodontic treatment need experienced no impacts.

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