

Relationship between Malocclusion, Bullying, and Quality of Life in Students from Low Social Development Area: A Cross-Sectional Study

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ABSTRACT

Objective: To analyze the relationship between malocclusion and bullying and its impact on the well-being and quality of life of students from low social development areas. **Material and Methods:** This cross-sectional study included 243 schoolchildren between 10 and 17 years. Malocclusion was analyzed using Dental Aesthetic Index. Bullying and self-perception of the impact of one's oral condition on quality of life and interpersonal relationships were assessed by questions from National Survey of Schoolchildren's Health and Child Perceptions Questionnaire 11-14 (CPQ11-14). Data were analyzed using the Spearman correlation coefficient and Mann-Whitney tests, considering groups: 10-11, 12-14 and 15-17 years. **Results:** No correlation was observed between malocclusion and bullying. However, in the 12-14 group, poor correlations were found between malocclusion and the CPQ11-14 (0.226) and between malocclusion and being shy/embarrassed due to oral aspects (0.298). Positive correlations were observed between bullying and the impact on the quality of life in the 10-11 (0.420) and 12-14 (0.425) groups. In the older group, a positive correlation (0.724) was observed between the concern about what others think of their oral health and the impact on their quality of life. **Conclusion:** There was no evidence of a relationship between malocclusion and bullying. However, the oral conditions negatively affected the interpersonal relationships and the student's quality of life.

Keywords: Malocclusion; Bullying; Quality of Life; Social Environment.

Introduction

Aggressive behavior among schoolchildren, known as bullying, is a recognized form of violence in society. It can be defined as a frequent phenomenon that involves repeated and intentional acts of oppression, humiliation, discrimination, cruelty, aggression, and domination of people or groups over other people or groups subdued by the force of the former [1]. In this sense, previous studies have reported the association between bullying and symptoms of depression, anxiety, and low self-esteem among schoolchildren [2,3].

Regarding bullying among adolescents, it is known that physical appearance plays a key role in social acceptance and in the development of self-esteem [2,4], while those identified as “different” are more prone to be bullied [5]. In this context, dental and facial aesthetics have an impact on facial attraction [6], and dental characteristics can be a target for nickname giving, teasing, harassment, and aggression among students [7]. In addition, dental trauma, untreated carious lesions and malocclusions have been reported to negatively influence self-esteem and quality of life [4,7,8-11].

It is worth mentioning that besides physical characteristics, socioeconomic inequality has also been associated with bullying since adolescents with poorer backgrounds were at higher risk of being bullied [12] and that the occurrence of bullying in the school context was disclosed in Brazil [13]. Thus, seeking to contribute to the evidence, the present cross-sectional study aims to analyze the relationship of malocclusion with the occurrence of bullying and the impact on the well-being and quality of life of adolescents from two public schools of low social development areas in Rio de Janeiro, Brazil.

Material and Methods

Study Design, Settings, and Participants

This observational cross-sectional study was conducted in full accordance with ethical principles, including the World Medical Association Declaration of Helsinki (version 2008) and was approved under protocols CAAE 46637315.4.0000.5257, n° 1.211.253 and CAAE 7453917.8.0000.5257, n° 2.354.835. Participation in the research was subject to the signing of the informed consent form by the students and their legal guardians of two public schools located in areas with low social development indicators in Rio de Janeiro, Brazil [14], which were part of a health promotion program for schoolchildren, aiming the prevention of violence and fostering a culture of peace [15].

The recruitment and data collection periods were, respectively, from March to April, 2017 and May to November, 2017. This study was reported according to the STROBE Statement [16].

The inclusion criteria were the absence of evident systemic clinical impairment or behavioral disorders that could hinder the evaluations and the presence of permanent dentition. The exclusion criteria were refusal to participate in the study; not signing the informed consent; the presence of dental prostheses or orthodontic appliances; the lack of relevant teeth for the analysis of malocclusion; and the presence of deciduous or mixed dentition or cleft lip and palate.

Variables of Interest, Data Sources and Measurements

The clinical oral examinations were undertaken by a single trained and calibrated examiner (SKPCT) to collect data regarding oral conditions and dental occlusion, using the Decayed Missing and Filled Teeth Index (DMFT) and the Dental Aesthetic Index (DAI). Intraexaminer reliability tests were performed with satisfactory results for the DMFT index (Kappa concordance coefficient, 0.716) and the DAI index (Intraclass Correlation

Coefficient – 0.846 and Pearson's correlation coefficient – 0.847). Training and calibration were based on the methodology used in the National Oral Health Survey – SB Brazil 2010 [17].

The exams were performed in a well-lit school room, using a flat oral mirror and the oral epidemiological methodology used in SB-Brazil 2010 [17]. The students were classified as presenting no/minor (DAI ≤ 25); definite (DAI 26 to 30); severe (DAI 31 to 35); and very severe malocclusion (DAI ≥ 36) [18]. For the evaluation of dental caries, the total DMFT index values were calculated and classified as: “absence of caries” (DMFT = 0) and “presence of caries” (DMFT ≥ 1). The occurrence of anterior tooth fracture was observed and scored 1 to “absence” and 2 to “presence.” To evaluate the possible correlation between malocclusion, bullying and quality of life, the students were divided by age into three groups: 10 to 11, 12 to 14, and 15 to 17 years old.

The epidemiological survey included questions about general information, home and school scenario and two oral health self-perception questions extracted from PeNSE 2012 [12]. The CPQ11-14 [19] was used for the assessment of oral health self-perception and its impact on quality of life.

In order to analyze the occurrence of bullying, a series of questions were formulated. A question from PeNSE 2012 [13] (“In the past month, how often have some of your schoolmates cursed, mocked, made fun or intimidated you in such a way that made you feel hurt, bothered, upset, offended, or humiliated?”) was considered. From the CPQ11-14 questionnaire, the “nickname-giving” assessment and four additional questions related to bullying were also selected. In addition, to complement the bullying/malocclusion relationship assessment, the following question was included: “Does anyone mock or make fun of you because of your teeth?” The control group consisted of students within the same sample who did not report the occurrence of bullying.

Data Analysis

Data were recorded and the software SPSS (Statistical Package for the Social Sciences, version 21.0, Chicago, USA) was used for statistical analysis. Percentage values were used in the descriptive analysis, whereas the Spearman correlation coefficient and the Mann-Whitney tests were used for the comparison of variables ($p < 0.05$).

Results

Of the 319 students sampled, aged 10 to 17 years, 76.2% response ($n=243$) was obtained. Students were excluded due to: absence on the day of the questionnaire and the clinical examination ($n=8$); the presence of an anterior deciduous tooth that affected aesthetics ($n=12$); use of orthodontic appliances ($n=14$); did not consent to participate ($n=8$); or did not bring the signed consent ($n=34$). The main socioeconomic characteristics of the participants are described in Table 1.

Table 1. Characteristics of the sample.

Variables	N	%
Sex		
Male	117	48.1
Female	126	51.9
Age groups (years)		
10 -11	87	35.8
12 to 14	137	56.4
15 to 17	19	7.8
Race/color		

White	91	37.4
Black	18	7.4
Yellow	8	3.3
Brown	116	47.7
Indigenous/ Not reported	10	4.1
Mother's schooling		
Without education	10	4.1
Elementary school uncompleted	45	18.5
Elementary school completed	40	16.5
High school	46	19.0
College	6	2.4
Did not know how to report	96	39.5
Internet access		
Yes	181	74.5
No	62	25.5

Analysis of the home and school scenario showed that 70.8% of the students answered that their parents “always know what they do in their free time,” and 77.8% never missed classes without permission. Regarding colleagues, 49.0% reported they have “always been well treated by their peers”, whereas 41.6% answered “sometimes or most of the time,” and 6.2% that they were “never or rarely well treated by their peers.”

Analysis of the question about bullying from PeNSE 2012 [4] showed that 37.9% answered they have “never suffered bullying,” 42.4% “rarely or sometimes,” and 19.8%, “most of the time or always.” Among the reasons mentioned, facial appearance was reported by 15.6% of the students; body appearance by 14%; whereas 25.5% provided other reasons: “I don't know/remember”, “They were joking”, “Because of my behavior”, and “I don't want to talk”. It is also worth mentioning that 53.9% reported that they had performed bullying with their schoolmates.

Upon observation of the student's oral health condition and self-perception about its impact on their quality of life, it was disclosed that 67.1% did not present dental caries and 9.5% showed anterior tooth fracture. Regarding malocclusion, 23% did not present with none, 19.8% with definite, 16% with severe and 41.2% with very severe malocclusion. For analysis of the results of the CPQ11-14, the median (ME = 11) was calculated as the cutoff point, and the classification as low impact on quality of life (CPQ11-14 <11) was obtained for 52.7% of the students.

The evaluation of self-perceived oral health and its impact on relationships with colleagues was performed by means of selected questions from the CPQ11-14 questionnaire (Table 2).

Table 3 shows the correlation between these questions, with malocclusion (DAI) and the impact on quality of life (CPQ11-14). Malocclusion was correlated to CPQ11-14 in the 12 to 14 years group. Positive and moderate correlations were observed between the question “nickname giving;” the self-perceived oral health and its impact on relationships with colleagues questions, and the CPQ11-14 results in the age groups from 10 to 11 and 12 to 14 years.

Similarly, a positive correlation between the question “concerned with what others think about their teeth, lips, jaws or mouth” with the impact on the quality of life of the older group. The results of the correlation between the bullying complementary question, malocclusion (DAI) and impact in the quality of life (CPQ11-14) are presented in Table 4. A significant difference was observed regarding bullying and the impact on the quality of life in the 12 to 14 years group.

Table 2. Self-perception about the impact of oral health on the relationship with colleagues using questions from CPQ11-14.

	Were you shy or embarrassed because of your teeth, mouth?	Were you upset about your teeth, mouth?	Were you concerned about what others think about your teeth, mouth?	Did you avoid smiling or laughing because of your teeth, mouth?	Did colleagues call you by nicknames because of your teeth, mouth?
Never	165	173	144	178	152
Once or twice	12	10	5	7	8
Sometimes	36	42	53	30	31
Often	13	10	19	10	16
Every day or almost every day	17	8	22	18	36
Total	243	243	243	243	243

Table 3. Spearman's Correlation Coefficient between Child Perceptions Questionnaire (CPQ11-14), Dental Aesthetic Index (DAI) and questions for registration of bullying distributed across age groups.

	CPQ	DAI	Were you shy or embarrassed because of your teeth, lips, jaws or mouth?	Were you upset about your teeth, lips, jaws or mouth?	Were you concerned about what other people think about your teeth, lips, jaws or mouth?	Did you avoid smiling or laughing when you are with you or other children because of your teeth, lips, jaws or mouth?	Did other children bother you or call you by nicknames because of your teeth, lips, jaws or mouth?
CPQ 10-11 years	CC	0.024	0.495**	0.658**	0.414**	0.481**	0.420**
	Sig.	0.825	<0.01	<0.01	<0.01	<0.01	<0.01
	N	87	87	87	87	87	87
DAI 10-11 years	CC	0.024	-0.052	-0.063	-0.045	0.077	0.115
	Sig.	0.825	0.630	0.562	0.682	0.476	0.290
	N	87	87	87	87	87	87
CPQ 12-14 years	CC	0.226**	0.627**	0.570**	0.688**	0.598**	0.425**
	Sig.	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	N	137	137	137	137	137	137
DAI 12-14 years	CC	0.226**	0.298**	0.132	0.209	0.225	-0.035
	Sig.	<0.01	<0.01	0.123	0.014	0.008	0.689
	N	137	137	137	137	137	137
CPQ 15-17 years	CC	0.136	0.429	0.575*	0.724**	0.043	0.378
	Sig.	0.579	0.067	0.010	<0.01	0.860	0.111
	N	19	19	19	19	19	19
DAI 15-17 years	CC	0.136	0.140	0.074	0.156	-0.022	-0.210
	Sig.	0.579	0.569	0.765	0.524	0.930	0.389
	N	19	19	19	19	19	19

CC: Coefficient Correlations; *The correlation is significant to the level of 0.05; **The correlation is significant to the level of 0.01.

Table 4. Descriptive statistics and non-parametric inferential (Mann Whitney), performed between groups, yes and no, of the complementary question of bullying, with CPQ and DAI, in the age groups.

Age Groups (Years)		"Does anyone mock or make fun of you because of your teeth?"						p-value
		Yes			No			
		Mean	SD	Median	Mean	SD	Median	
10-11	CPQ	20.7	11.8	21.0	12.0	6.7	11.0	0.010*
	DAI	33.8	8.9	34.2	35.0	10.4	32.5	0.965
12 to 14	CPQ	24.2	9.2	26.5	11.8	8.2	10.0	<0.01**
	DAI	35.2	9.9	33.2	33.7	10.2	32.0	0.523
15 to 17	CPQ	17.0	10.1	19.0	9.0	4.2	8.0	0.160
	DAI	34.0	8.6	38.5	29.3	8.2	29.5	0.340

SD: Standard Deviation; *The correlation is significant to the level of 0.05; **The correlation is significant to the level of 0.01.

Discussion

Globally, one in every three children reported suffering bullying at school at least once in the last month. While cyberbullying affects one in ten, psychological and physical bullying have been reported at higher rates [5]. In this research, it was observed that approximately 20% of students reported having "always or almost always" suffered bullying, characterized as psychological bullying. This percentage is considered high compared to 7.2% and 7.4% recorded in previous Brazilian surveys [13,20]. A possible explanation for this finding may be the socioeconomic profile of this sample, which considered only children from public schools of low social development regions, while the national surveys included those from both private and public schools. Nonetheless, this study showed a prevalence of bullying in accordance to the findings observed by the Program for International Student Assessment (PISA 2015) [21] for five countries in South America: 16.9% for Uruguay, 17.5% for Brazil, 18% for Chile, 18.4% for Peru and 22.1% for Colombia.

Facial appearance, which is significantly impacted by oral conditions and smile, was reported as a cause for bullying [7]. Although the reported findings regarding the relationship between malocclusion and bullying vary, which may be justified by the use of different methodologies [4,7-9,22-24], a systematic review concluded with low certainty of evidence that extreme and conspicuous malocclusion may be related to bullying in schoolchildren [25]. This conclusion reinforces the need for more observational studies, including a clinical examination perspective, as the current study, to contribute to the body of knowledge.

Children and adolescents' oral health-related quality of life can be better analyzed using instruments such as the CPQ11-14 [9,26]. Interestingly, no specific instrument for the assessment of the relationship between bullying and oral health was found in the literature at the time of conception of the research. Future studies should be performed to address this issue. However, the use of the CPQ11-14, the selected questions from the PeNSE survey and the complementary question allowed the identification of bullying in the sample.

The same examiner applied the questionnaires and collected clinical data, which may have constituted a study limitation, as the students have already identified her as a dentist. Regarding the malocclusion assessment instrument, DAI [17,19], a potential limitation refers to measurement since it is a complex index relying on millimetric dimensions. In this sense, minor errors can exaggerate the effect due to the weight attributed to the index components [27]. Although limitations have been observed in the use of the instruments, the analyses provided important information on the dynamics of the relationships between these students.

Socioeconomic factors play a fundamental role in physical, psychological and social development [5]. In this context, the following factors were considered relevant for the analysis of the study: gender, age, mother's educational level, ownership of goods and access to services. As to gender, the distribution was balanced, which coincides with data found in the national surveys and in low-and middle-income countries [3,13,20]. A correlation between bullying and gender is not always observed [7,8,9,20,24]; however, studies have reported

that bullying among boys was more prevalent than among girls [3,13,23]. Interestingly, boys are more likely to suffer physical bullying, while girls experience psychological bullying mostly based on their face or body appearance. Moreover, individuals that do not conform to the standardized genders are at higher risk for bullying [5].

Aiming the analysis of age factor, the students were classified according to age groups, which were formed based on the similarities in their development. The age criterion is considered relevant in the analysis of bullying events [3,23] since studies indicated that the occurrence of bullying tends to decline with age [3,7]. Regarding mothers' educational level, an important protective factor for the health of children and adolescents [13], the survey showed that the proportion of mothers with no or incomplete elementary education was lower than that recorded in national surveys, although the higher education level had a significantly lower frequency [13]. Association between the children's experience of bullying and the parent's low socioeconomic background [5,12], evidenced by low educational achievement [27], have already been reported. It was suggested that the low educational level of mothers could have contributed to the high frequency of bullying observed in this sample.

Regarding malocclusion, a high prevalence was observed among students, similar to that reported in other studies [28-30]. Curiously, a greater severity of malocclusion was identified compared to the results of SB-Brazil 2010, which could be justified by the limitation described for the DAI index [27]. Thus, even considering the limitations of this index, no correlation between bullying and malocclusion was observed, which coincides with findings from other studies [8,22,31,32]. However, in the group between 12- and 14-years old, malocclusion impacted negatively the quality of life, and the occurrence of embarrassment due to the teeth, lips, jaws and mouth appearance may point to a barrier in social acceptance [9] and in the construction of interpersonal relationships. Similarly, no association was disclosed between malocclusion and bullying in another Brazilian schoolchildren sample assessed by the DAI index. Nonetheless, previous orthodontic treatment has been identified as a protective factor regarding these schoolchildren's quality of life [32].

Among the CPQ11-14 questions selected, the one regarding nickname giving was considered the main signal for potential bullying. Upon analysis of the relation between this question and the CPQ11-14, a positive and moderate correlation was observed in the age groups from 10 to 11 and 12 to 14 years. The analysis of the complementary question only found a correlation in the group from 12 to 14 years. In contrast, the group from 15 to 17 years old showed no correlation for either of the two bullying questions, but a strong and positive correlation with the question regarding "concern about what others think of their oral health" was disclosed. These findings are in accordance with multinational studies that reported bullying as more frequent in younger groups, with a tendency to decrease with age [3,5]. However, the importance of the opinion of colleagues about their oral health condition remains evident in older students.

Some studies concluded that bullying was associated with oral conditions based on the analysis of the impact of oral health on quality of life and its psychosocial implications [1,4,8]. In addition to bullying, concern and dissatisfaction with the appearance of one's teeth [4,22], isolation and anguish [23], and the impact on self-esteem [7,9] were some of the findings that evidenced the impact on students' quality of life. The association between bullying, malocclusion and quality of life is complex, and combined factors may act synergistically, causing a negative effect on the psychosocial state of individuals [11]. Thus, the attention of people involved in the daily lives of students to situations that may affect their psychosocial development is the starting point for building a prevention and care network. Addressing bullying in schools contributes to achieving one of the sustainable development goals of the United Nations 2030 agenda, which seeks to promote a culture of peace and nonviolence. In Brazil, among the various strategies for addressing this topic, the Health at School Program

[15] and the National School Health Survey [13,20] stand out, in addition to the recent promulgation of Law 13,663/2018, which reinforces the importance of measures to raise awareness, prevent and fight all types of violence and to promote the culture of peace in schools.

Conclusion

There was no evidence of a relationship between malocclusion and bullying in this sample of students from low social development areas in Rio de Janeiro, Brazil. However, the oral conditions negatively affected the interpersonal relationships and the student's quality of life.

Authors' Contributions

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All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.

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Conflict of Interest

The authors declare no conflicts of interest.

Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

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