

Impact of Oral Health Education on Children's Self-perceived Oral Health and Quality of Life: A School-Based Study



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Abstract:

Introduction: Oral health is an important indicator of child well-being. Childhood caries is frequent, may cause sequelae, and compromise the ability to eat, smile, and speak, as well as the child's mental and social health. The Child Perceptions Questionnaire (CPQ8-10) assesses the impact of oral diseases on quality of life across four domains: 1) Oral symptoms; 2) Functional limitations; 3) Emotional well-being; and 4) Social well-being. This study evaluated children's perceptions of oral health before and after an oral hygiene educational activity.

Materials and Methods: Eighty-five 8-year-old children from a public municipal school in São Paulo, Brazil were included. They underwent clinical examinations using the dmft/DMFT indices and completed the CPQ8-10. The children participated in an interactive lecture on oral health with audiovisual resources, received an illustrated booklet, and were provided with a kit containing a toothbrush and fluoride toothpaste. After 3 months, both the CPQ8-10 and clinical examinations for dmft/DMFT indices were repeated.

Results: When comparing baseline and 3-month follow-up, no statistical difference was observed in clinical indices: the mean dmft was 1.38 and the mean DMFT was 0.06. However, the CPQ8-10 mean score showed a statistically significant reduction in the functional limitation domain, decreasing from 15.08 before the lecture to 12.09 after the lecture. Significant differences were also observed in items related to children's self-perception of their oral condition.

Discussion: Few studies have conducted long-term follow-ups, and evidence from other reviews suggests that short-term oral health behavioural change interventions are not sustained in the long term unless changes in the social environment support the new behaviours; however, the clinical significance of these changes for public health remains uncertain. Further longitudinal studies are needed to investigate the long-term impact of untreated carious lesions and their consequences on children's oral health-related quality of life, as well as to assess the effectiveness of school-based educational programmes, emphasising the need to implement new programmes in public schools to improve children's oral health.

Conclusion: The present study demonstrated that a school-based oral health educational intervention was capable of positively influencing children's self-perceived oral health and oral health-related quality of life, even in the absence of measurable short-term changes in clinical caries indices.

Keywords: Child, Quality of life, Oral health, Tooth, Mouth, Perception.

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1. INTRODUCTION

Oral health has a significant impact on public health and the quality of life of individuals and their families; therefore, school-based oral health promotion activities are effective in preventing disease and promoting oral health in children, contributing to changes in behaviour and attitudes regarding oral health [1]. The World Health Organization (WHO) defines oral health as “a state in which a person is free from chronic and acute diseases in the mouth, teeth, face, and throat, limiting the ability to eat, smile, speak, as well as mental or social health” [2].

Oral diseases are global public health problems, and there is particular concern regarding the increase in their prevalence in many low- and middle-income countries related to behavioural and socioeconomic changes. A strong and consistent social gradient exists between socioeconomic status and the prevalence and severity of oral diseases; therefore, they are considered sensitive clinical markers of social disadvantage [3]. Oral health is an important indicator of a child's well-being, and dental caries and other oral disorders in childhood are among the most serious and expensive health conditions that negatively impact children's health-related quality of life [4]. Deciduous teeth are susceptible to caries from the time of eruption, with peak prevalence around 6 years of age [2].

The consequences of untreated oral diseases are various, including physical symptoms, functional limitations, and detrimental impacts on emotional, mental, and social well-being. They may cause sequelae and compromise the ability to eat, smile, and speak, as well as negatively affect children's mental and social well-being. Education and changes in individuals' behaviour contribute to reducing problems and improving oral health. Health education activities have a positive effect on individuals' behavioural characteristics, such as oral health knowledge, changes in attitude, oral hygiene practices, healthy eating habits, reduced carious lesions, and periodontal health [5].

The condition of children's oral health has improved in recent decades, making it essential to evaluate oral health-related quality of life (OHRQoL) using validated instruments [6]. Studies indicate that children from 8 years of age have the cognitive maturity to report health problems, while adapted questionnaires show that even those aged 5 years can provide reliable answers about the

impact of oral conditions on their well-being [7]. The World Health Organization (WHO) has developed questionnaires to measure OHRQoL, focusing on conditions such as caries, malocclusion, and craniofacial anomalies [8]. One of the most widely used instruments is the Child Perceptions Questionnaire (CPQ), which evaluates four domains: oral symptoms, functional limitations, emotional and social well-being, and is applicable to different age groups (6-7, 8-10, and 11-14 years) [9].

Educational interventions in oral health have been shown to be effective in promoting healthy habits among schoolchildren, with significant improvements in hygiene and knowledge [10]. Evidence indicates that targeted public policies, such as those implemented in Bauru, drastically reduced the DMFT index in 12-year-old children between 1976 and 2001, raising the proportion of sound permanent teeth from 0.40% to 45.50% [11]. Health Promoting Schools (HPS), especially in deprived areas like Curitiba, showed better oral outcomes compared with institutions without specific programmes [12]. Children aged 8-10 years, typically in the mixed dentition stage, are considered an ideal target group for educational interventions, as early strategies positively influence behaviours in adult life [13]. Thus, the integration of OHRQoL assessment, public policies, and health education emerges as fundamental for the sustainability of advances.

This study addressed oral health education by evaluating children's perception of their oral health condition through the application of the CPQ8-10 questionnaire before and after (3 months) an interactive lecture on oral health and hygiene lasting 1 hour, with audiovisual resources and the use of macromodels, along with the distribution of illustrative booklets and an oral hygiene kit. Clinical evaluation was also carried out for the dmft/DMFT indices (pre/post) in the mixed dentition of 8-year-old children from a public school on the outskirts of São Paulo.

2. MATERIALS AND METHODS

The study included 85 eight-year-old children, 3rd-grade students from the Municipal School Deputado José Blota Junior (São Paulo), selected from a total of 150 students. Parents signed the Free and Informed Consent Form, approved by the Santo Amaro University Ethics Committee (CAAE: 59474122.5.0000.0081). The study was conducted in accordance with the Declaration of Helsinki.

After the parents read and signed the consent form, the children underwent clinical examinations performed by two calibrated examiners, who assessed the DMFT index (permanent dentition) and dmft index (deciduous dentition), following the protocols of the World Health Organization (2003) [8] and Frias *et al.* (2004) [14]. The diagnoses were validated by consensus among the examiners, establishing a gold standard. The authors declare that they did not use any AI tools in the preparation of the study and manuscript.

A convenience sample was used, based on the number of students who were in the third grade of elementary school at the same school in São Paulo. The assessments (application of the questionnaire and oral clinical evaluation) were carried out between November 2022 and March 2023. The eligibility criteria adopted were the inclusion of children aged 8 years and children whose parents read and signed the consent form. Exclusion criteria included children who did not answer all the questions on the questionnaire, children who did not allow the oral examination, and children who were older or younger than 8 years.

Simultaneously, the CPQ8-10 questionnaire, adapted into Portuguese, was applied. It evaluates oral symptoms, functional limitations, emotional and social well-being, in addition to recording gender and age. The CPQ8-10 was administered by a researcher (a dental student and school teacher) through individual interviews. Clinical assessments of the DMFT (Decayed, Missing, and Filled Teeth – permanent dentition) and dmft (deciduous dentition) indices were performed by two calibrated examiners. Calibration was conducted both inter- and intra-examiner for the presence of caries, involving the examination of five children. The examiners underwent prior training (40 hours), which included discussions, slide-based study sessions, and clinical oral examinations. The children involved in the calibration process were not included in the final study sample. During calibration, inter- and intra-examiner agreement rates for caries experience (dmft/DMFT) and caries activity ranged from 78% to 83% (Kappa = 0.78 to 0.83) [15]. The baseline assessments were conducted within the school premises, during class hours, in a private setting. Children were seated at desks, and oral examinations were performed

using a dental mirror and explorer; a portable light source was used as the light source.

Following the initial assessment, the children participated in a one-hour interactive lecture on oral hygiene. A total of 30 slides were presented, covering topics such as oral hygiene and its systemic, social, and aesthetic importance; diet and its relationship to caries; and oral hygiene instructions. Large dental models were used to demonstrate toothbrushing techniques. Each child received a kit containing a toothbrush, fluoride toothpaste, and an illustrated booklet. The booklet, specifically designed for this intervention, included five pages, each featuring drawings of familiar children's characters associated with toothbrushes, toothpaste, and oral hygiene. The students were encouraged to begin colouring the drawings throughout the evaluation and questionnaire administration process. Ninety days later, the questionnaire and clinical examinations were repeated to compare the post-intervention results.

The CPQ8-10 data and the clinical indices were statistically analysed using SPSS V26, Minitab 21.2, and Excel software. The Chi-Square Test for independence, Mann-Whitney Test (pre/post comparison) adjusted for multiple comparisons using the Benjamini-Hochberg (FDR) procedure, Z-Test for proportions, and *p*-value (5% significance, 95% CI) were used. The approach sought to evaluate the effectiveness of the educational intervention on oral health and children's perceptions, integrating quantitative and clinical methodologies to validate the observed impacts.

3. RESULTS

The study included 85 eight-year-old children; 4 did not return the signed form and were removed from the study, but they had access to the interactive oral health and hygiene education lecture. The 81 children included had a mean age of 8 years (± 0.19) (pre) and 8.42 years (± 0.50) (post), with 45 girls and 36 boys. The clinical data, evaluated before and 3 months after the lecture, showed no statistical difference. The Mann-Whitney test was used to compare the pre- and post-moment values for the quantitative factors, with *p*-values adjusted for multiple comparisons using the Benjamini-Hochberg (FDR) procedure (Table 1).

Table 1. Age and dmft/DMFT index before and after interactive activities.

		Mean	Standard Deviation	IC	<i>p</i> -valor
Age	Pré	8,00	0,19	0,04	<0,001
	Pós	8,42	0,50	0,11	
Decayed	Pré	1,12	1,81	0,39	0,464
	Pós	1,20	1,69	0,37	
Missing	Pré	0,12	0,48	0,11	1,000
	Pós	0,12	0,48	0,11	
Filled	Pré	0,16	0,51	0,11	1,000
	Pós	0,16	0,51	0,11	
Absent teeth	Pré	0,51	0,90	0,20	0,085
	Pós	0,64	0,78	0,17	

When comparing the pre- and post-moments for the clinical results, separated by deciduous (d) and permanent (D) teeth, we found no statistically significant difference between the pre (year 2022) and post (year 2023) moments (Table 2). The questionnaire was applied individually through an interview. Thus, we compared the pre and post moments for the distribution of relative

frequencies in each of the 27 questions of the CPQ questionnaire. For this statistical comparison, the Chi-Square test was used (Table 3).

Table 4 shows the mean scores ($\pm$ SD) at T0 and T1 (with median, CI, and p-value) of the Overall CPQ, oral symptoms, functional limitations, emotional well-being, and social well-being.

Table 2. Dmft and DMFT index.

		Mean	Standard deviation	IC	p-value
decayed-d	Pre	1,19	1,80	0,39	0,380
	Post	1,14	1,51	0,33	
missing-d	Pre	0,12	0,48	0,11	0,317
	Post	0,09	0,36	0,08	
filled-d	Pre	0,16	0,51	0,11	1,000
	Post	0,16	0,51	0,11	
dmft-d	Pre	1,41	1,81	0,39	0,739
	Post	1,38	1,72	0,37	
DECAYED-P	Pre	0,06	0,29	0,06	1,000
	Post	0,06	0,29	0,06	
FILLED-P	Pre	0,00	0,00	- x -	1,000
	Post	0,00	0,00	- x -	
MISSING-P	Pre	0,00	0,00	- x -	1,000
	Post	0,00	0,00	- x -	
DMFT-P	Pre	0,06	0,29	0,06	1,000
	Post	0,06	0,29	0,06	
dmft + DMFT	Pre	1,47	1,98	0,43	0,738
	Post	1,44	1,88	0,41	

Table 3. CPQ₈₋₁₀ questionnaire pre and post interactive activities.

		Pre		Post		p-value
		N	%	N	%	
Overall perception of oral health and general well-being						
Do you think your teeth and mouth are:						
Q01	Excellent	6	7,4%	13	16,0%	0,09
	Good	57	70,4%	59	72,8%	0,73
	Fair	18	22,2%	9	11,1%	0,06
	How much do your teeth or mouth bother you?					
Q02	Not at all	59	72,8%	63	77,8%	0,47
	Hardly	8	9,9%	5	6,2%	0,39
	A little	11	13,6%	12	14,8%	0,82
	A lot	3	3,7%	1	1,2%	0,31
Oral Symptoms						
In the past month, how many times have you had toothache or mouth pain?						
Q03	Never	67	82,7%	67	82,7%	1,00
	Once or twice	8	9,9%	7	8,6%	0,78
	Sometimes	4	4,9%	5	6,2%	0,73
	Often	2	2,5%	2	2,5%	1,00
In the past month, how many times have you had sores in your mouth?						
Q04	Never	74	91,4%	72	88,9%	0,59
	Once or twice	5	6,2%	9	11,1%	0,26
	Sometimes	2	2,5%	0	0,0%	0,15

(Table 3) contd....

		Pre		Post		p-value
		N	%	N	%	
In the past month, how many times have your teeth hurt when you ate or drank something cold?						
Q05	Never	57	70,4%	64	79,0%	0,21
	Once or twice	9	11,1%	8	9,9%	0,80
	Sometimes	9	11,1%	7	8,6%	0,60
	Often	2	2,5%	1	1,2%	0,56
	Every day	3	3,7%	1	1,2%	0,31
In the past month, how many times has food gotten stuck in your teeth?						
Q06	Never	10	12,3%	18	22,2%	0,10
	Once or twice	57	70,4%	48	59,3%	0,14
	Sometimes	11	13,6%	14	17,3%	0,51
	Every day	3	3,7%	1	1,2%	0,31
In the past month, how many times have you had bad breath?						
Q07	Never	72	88,9%	63	77,8%	0,06
	Once or twice	2	2,5%	2	2,5%	1,00
	Sometimes	6	7,4%	16	19,8%	0,02
	A lot	1	1,2%	0	0,0%	0,32

Functional Limitations

In the past month, how many times have you taken longer to eat your food because of your teeth or mouth?						
Q08	A lot	1	1,2%	0	0,0%	0,32
	Never	69	85,2%	73	90,1%	0,34
	Once or twice	6	7,4%	5	6,2%	0,76
	Sometimes	2	2,5%	3	3,7%	0,65
In the past month, how many times have you had difficulty biting or chewing harder foods?						
Q09	Never	16	19,8%	29	35,8%	0,02
	Once or twice	60	74,1%	37	45,7%	<0,01
	Sometimes	5	6,2%	15	18,5%	0,02
In the past month, how many times has it been difficult for you to eat what you wanted because of your teeth or mouth?						
Q10	Never	72	88,9%	74	91,4%	0,60
	Once or twice	7	8,6%	4	4,9%	0,35
	Sometimes	2	2,5%	3	3,7%	0,65
In the past month, how many times have you had difficulty speaking because of your teeth or mouth?						
Q11	Never	77	95,1%	80	98,8%	0,17
	Once or twice	1	1,2%	1	1,2%	1,00
	Sometimes	2	2,5%	0	0,0%	0,16
In the past month, how many times have you had difficulty sleeping because of your teeth or mouth?						
Q12	Never	80	98,8%	80	98,8%	1,00
	Once or twice	1	1,2%	1	1,2%	1,00

Emotional Well-being

In the past month, how many times have you felt upset because of your teeth or mouth?						
Q13	Never	77	95,1%	79	97,5%	0,41
	Once or twice	3	3,7%	1	1,2%	0,31
	Sometimes	1	1,2%	1	1,2%	1,00
In the past month, how many times have you felt sad because of your teeth or mouth?						
Q14	Never	76	93,8%	79	97,5%	0,25
	Once or twice	4	4,9%	1	1,2%	0,17
	Sometimes	1	1,2%	1	1,2%	1,00

(Table 3) contd....

In the past month, how many times have you felt embarrassed because of your teeth or mouth?						
Q15	Never	75	92,6%	76	93,8%	0,76
	Once or twice	2	2,5%	3	3,7%	0,65
	Sometimes	3	3,7%	2	2,5%	0,65
In the past month, how many times have you worried about what people think about your teeth or mouth?						
Q16	Never	77	95,1%	77	95,1%	1,00
	Once or twice	2	2,5%	2	2,5%	1,00
	Sometimes	2	2,5%	2	2,5%	1,00
In the past month, how many times have you thought that you were not as good-looking as other people because of your teeth or mouth?						
Q17	Never	26	32,1%	64	79,0%	<0,01
	Once or twice	54	66,7%	16	19,8%	<0,01
	Sometimes	1	1,2%	1	1,2%	1,000

Social Well-being

In the past month, how many times have you missed school because of your teeth or mouth?						
Q18	Never	80	98,8%	81	100,0%	0,32
	Once or twice	1	1,2%	0	0,0%	0,32
In the past month, how many times have you not done your homework because of your teeth or mouth?						
Q19	Never	80	98,8%	80	98,8%	1,00
	Once or twice	1	1,2%	1	1,2%	1,00
In the past month, how many times have you had difficulty paying attention in class because of your teeth or mouth?						
Q20	Never	81	100,0%	81	100,0%	- x -
In the past month, how many times have you not wanted to speak or read out loud in class because of your teeth or mouth?						
Q21	Never	80	98,8%	80	98,8%	1,00
	Once or twice	1	1,2%	1	1,2%	1,00
In the past month, how many times have you not wanted to smile or laugh when with other children because of your teeth or mouth?						
Q22	Never	80	98,8%	80	98,8%	1,00
	As vezes	1	1,2%	1	1,2%	1,00
In the past month, how many times have you not wanted to talk with other children because of your teeth or mouth?						
Q23	Never	79	97,5%	80	98,8%	0,56
	Once or twice	1	1,2%	1	1,2%	1,00
In the past month, how many times have you not wanted to be near other children because of your teeth or mouth?						
Q24	Never	81	100,0%	81	100,0%	- x -
In the past month, how many times have you been left out of games or play because of your teeth or mouth?						
Q25	Never	81	100,0%	80	98,8%	0,32
	Sometimes	0	0,0%	1	1,2%	0,32
In the past month, how many times have other children made unpleasant jokes about you because of your teeth or mouth?						
Q26	Never	78	96,3%	79	97,5%	0,65
	Once or twice	2	2,5%	1	1,2%	0,56
	Sometimes	1	1,2%	1	1,2%	1,00
In the past month, how many times have other children asked you questions because of your teeth or mouth?						
Q27	Never	80	98,8%	81	100,0%	0,32
	Once or twice	1	1,2%	0	0,0%	0,32

Table 4. Scores of the four domains of the CPQ₈₋₁₀.

	T0 Mean (±SD)	T1 Mean (±SD)	Median	95% IC	Range	p-value
CPQ ₈₋₁₀ Overall	15,08 (24,17)	12,48 (20,6)	6 / 3	1,16-6,36	0-91 / 0-80	0,16
Oral Syntoms	7,36 (6,62)	7 (5,36)	22 / 29	14,03-17,63	9-91 / 9-80	0,76
Functional limitation	4 (5,67)	3,6 (5,56)*	11 / 10	0,037-3,96	1-70 / 1-67	0,04
Emotional well-being	3,28 (4,43)	1,48 (1,23)	6 / 6	11,19-29,19	6-56 / 3-18	0,28
Social well-being	0,44 (0,47)	0,4 (0,21)	1 / 1	0,52-0,72	0-4 / 0-3	0,72

Note: T0 - initial evaluation; SD - standard deviation; T1 - 90 days after; IC- confidence interval.

There were few statistically significant differences between the pre- and post-lecture indices. In Question 9, significant differences were observed in the distribution of responses between baseline and follow-up, showing a change in perception. The last question with a statistically significant difference was Question 17, where we noted that the “Never” index rose from 32.1% to 79.0% and the “Once or twice” index dropped from 66.7% to 19.8%, both with a p -value <0.001 . The “Sometimes” index remained at 1.2% in both moments (p -value = 1.000).

4. DISCUSSION

This study used the CPQ8-10 adapted by Barbosa *et al.* (2011) [16] for children aged 8 to 10 years, with 27 questions in the 4 health domains: oral symptoms (questions 3 to 7), functional limitations (questions 8 to 12), emotional well-being (questions 13 to 17), social well-being (questions 18 to 27), and 2 additional questions on global perception of oral health and general well-being (questions 1 and 2). The CPQ8-10 analysed experiences related to oral disease and how these conditions compromised the quality of life of the evaluated children, combining information about oral health status with the frequency (responses such as, for example, never, sometimes, many times) associated with that status.

This work is in agreement with the study by Rebok *et al.* (2001) [17], which showed that children aged 8 to 11 years are sufficiently able to understand the nature of the task and the terms presented to them, being able to explain their answers clearly and showing that they understood the questions about their oral health. This research corroborates Group I of the study by Hebbal *et al.* (2011) [18], in which a questionnaire with questions about oral health was applied for children to answer before and after the oral health education programme with audiovisual resources. Both studies showed that there was a change in the perception of oral health.

More than half of the children in this study reported that the intensity level of the impact was “a little” and “once or twice” in all 4 health domains (Oral Symptoms, Functional Limitations, Emotional Well-being, and Social Well-being). These results were close to those of similar studies with school-aged children in Malaysia [19] and Thailand [20], which reported “very little” and “little” intensity levels of impact. In the present study, the highest frequencies (many times/every day/very much) in the impacts of Oral Symptoms were discomfort regarding teeth (question no. 2 of the CPQ8-10: “How much do your teeth or mouth bother you?”), presence of pain (question no. 3 of the CPQ8-10: “In the last month, how many times have you had toothache or pain in your mouth?”), and dental sensitivity to cold (question no. 5 of the CPQ8-10: “In the last month, how many times have you felt pain in your teeth when you ate or drank something cold?”). The most frequent causes of impact were food impaction and difficulty chewing harder foods (questions no. 6 and 9 of the CPQ8-10: “In the last month, how many times did food get stuck in your teeth?” and “In the last month, how many times did you have difficulty biting or chewing

harder foods?”, respectively). Compared with the study in Malaysia by Yusof & Jaapar (2013) [19], the most frequent causes of impact were toothache, fractured tooth, and dental sensitivity.

Despite this study not comparing with a control group (study limitation), it is in agreement with the studies by Jaime *et al.* (2015) [21] in Monte Sião (MG) and Nguyen *et al.* (2021) [22] in Vietnam, which were not sufficiently effective in reducing the incidence of dental caries. However, the present study changed the perception of oral health among the evaluated children after the oral health education programme. The CPQ8-10 questionnaire was individually administered through interviews conducted by a school teacher who was also a final-year dental student. This format facilitated the understanding, interaction, and freedom of the children when answering the questionnaire. A similar interview-based approach was used by Mendonça *et al.* (2021) [23]. Thus, as with the study [24] involving Brazilian students in the 8- to 10-year-old age group regarding CPQ8-10 responses, the results showed that there was an increase in the perception of oral symptoms and functional limitations of the CPQ8-10.

The oral health problems of the participants in this study did not affect school tasks, which corroborates the study by Bhadila *et al.* (2023) [25] in Saudi Arabia. However, in the study by Santos *et al.* (2019) [26] in Florianópolis (SC), oral problems affected attention in classes, and there was school absenteeism. The overall mean CPQ score varied among the studies analysed: 20.79 in the study by Mendonça *et al.* (2021) [23], in children aged 6 to 8 years with cavitated carious lesions in dentin in the pre-treatment phase (Brazil); 15.6 in the study by Pauli *et al.* (2020) [27], in children aged 8 to 10 years (Canada). In the present study, although the overall CPQ score decreased from 15.08 at T0 to 12.48 at T1, statistical significance was observed only in the functional limitation domain. The domain with the greatest impact was “oral symptoms” at T0 and T1, in agreement with the study by Pauli *et al.* (2020) [27].

The study by Sadana *et al.* (2017) [28] demonstrated that oral health education can be carried out through lectures, illustrative booklets, audiovisual resources, or a combination of these methods, with the combined approach being the most effective in enhancing knowledge on the topic. In the present study, a lecture with audiovisual resources and macromodels was given for oral hygiene instruction, in addition to the distribution of educational booklets, toothbrushes, and toothpaste. This approach is in agreement with the review by Silva *et al.* (2016) [29], which indicated that combined interventions, such as oral health education associated with preventive care and distribution of materials, tend to have a greater impact on reducing dental caries, while education alone was shown to be less effective.

According to the World Health Organization (WHO), the most common chronic childhood disease is dental caries. In the present study, the prevalence of caries in 8-year-old children was 51.85%, higher than the estimated global average of 43% (WHO, 2022) [2], but lower than

that reported in other studies, such as SB Brazil 2010 (80.2% in 5-year-old children and 54.1% at 12 years), Mota-Veloso *et al.* (64.6% in Diamantina) [24], Pichot *et al.* (59.9% in New Caledonia) [30], and Veiga *et al.* (72.1% in Portugal) [31]. The mean dmft index was 1.41 before the intervention and 1.38 after three months; both values were lower than those reported in previous studies, which ranged from 3.07 to 3.86 [32]. The dmft=0 value among the children was 41.97%, close to the national average of 46.6% [33]. In the permanent dentition, dental caries was classified as very low (WHO, 2013) [34], with a mean of 0.06 in the children evaluated. The study results do not contradict the existing evidence [35] that oral health measures related to quality of life are significantly associated with subjective perceptions but are not associated with the clinical evaluation of dental malocclusion. The study by Barbosa *et al.* (2009) [9] did not observe clear gradients in the mean CPQ8-10 score in the categories of severity of dental malocclusion. In the study by Kallunki *et al.* (2018) [36], there was no statistically significant difference between the presence of unilateral posterior crossbite and normal occlusion in relation to OHRQoL, similar to the present study, in which 12.3% of the evaluated children had posterior crossbite, but no impact on OHRQoL was observed. In contrast, the study by Do & Spencer (2008) [37] indicated that Australian children with less acceptable occlusal characteristics reported worse OHRQoL.

Limitations of the study include the absence of a control group, the relatively small sample size, and the short follow-up period. The time between clinical evaluations (90 days) is too short for changes to be observed; a longer interval between evaluations could reveal clinical changes. Changes in children's perception of oral health can lead to positive long-term clinical outcomes for oral health. Parental participation in the lecture could also help incorporate hygiene habits at home, not limiting them only to the school environment.

The improvement in oral health indicators, such as the decrease in dental caries, may be associated with the fluoridation of the public water supply, greater access to dental services, the use of fluoridated toothpaste, and the impact of educational and preventive programmes for schoolchildren in the city of Bauru in the State of São Paulo [38], which may also partly explain the low DMFT values observed in the present study. The systematic review by Watt & Marinho (2005) [39] showed that all studies evaluated with oral health intervention and education were effective in the short term. Oral health is a domain where the integration of clinical and self-reported outcomes is particularly important [40].

Few studies have been conducted with long-term follow-ups, and there is evidence from other reviews showing that short-term oral health behavioural change interventions are not sustained in the long term unless there are changes in the social environment to maintain the new behaviours; however, the clinical significance of these oral health changes for public health is questionable. New studies are needed to evaluate the

long-term impacts caused by untreated carious lesions and their clinical consequences on the quality of life of children, to evaluate the efficiency of these school activities in promoting oral health-related quality of life, emphasising the need to implement new programmes in public schools to improve children's oral health and achieve the WHO goals.

5. STUDY LIMITATION

This study has some limitations that should be considered when interpreting the findings. First, the absence of a control group limits the ability to establish a direct causal relationship between the educational intervention and the observed changes in children's self-perception of oral health. In addition, the use of a convenience sample from a single public school restricts the generalisability of the results to other populations and socioeconomic contexts. The relatively small sample size and the short follow-up period of 90 days may also have limited the detection of clinically measurable changes in dmft/DMFT indices, since dental caries progression and behavioural modifications generally require longer observation periods to become evident. Furthermore, the reliance on self-reported outcomes through the CPQ8-10 questionnaire may introduce response bias related to children's understanding, memory, or social desirability. Another limitation is that external factors potentially influencing oral health behaviours, such as parental participation, dietary habits, access to dental services, and home oral hygiene practices, were not controlled during the study period. Despite these limitations, the study provides relevant evidence regarding the potential impact of school-based oral health education on children's oral health-related quality of life and self-perception.

CONCLUSION

The present study demonstrated that a school-based oral health educational intervention was capable of positively influencing children's self-perceived oral health and oral health-related quality of life, even in the absence of measurable short-term changes in clinical caries indices. After the intervention, significant improvements were observed mainly in the functional limitation and emotional well-being domains of the CPQ8-10, indicating that educational strategies may increase children's awareness and perception of oral conditions, oral symptoms, and daily functional impacts. These findings support the relevance of incorporating oral health education into public school environments as part of broader health-promotion policies aimed at improving children's well-being and encouraging healthier behaviours from an early age.

AUTHORS' CONTRIBUTIONS

The authors confirm contribution to the paper as follows: A.C.J.P.: Methodology; A.G.S.S.: Investigation; J.O.: Writing the Paper; M.H.T.: Validation; H.B.: Writing - Original Draft Preparation; C.V.G.R.T.: Study Concept or Design. All authors reviewed the results and approved the final version of the manuscript.

LIST OF ABBREVIATIONS

CPQ8-10	= Child Perceptions Questionnaire
WHO	= World Health Organization
HPS	= Health Promoting Schools
DMFTDMFT	= Decayed, Missing, and Filled Teeth

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study was approved by the Santo Amaro University Ethics Committee, Brazil (CAAE: 59474122.5.0000.0081).

HUMAN AND ANIMAL RIGHTS

All human research procedures followed were in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013.

CONSENT FOR PUBLICATION

Parents signed the Free and Informed Consent for this study.

STANDARDS OF REPORTING

STROBE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

The data and supporting information are available in the article.

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None.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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