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Prevalence of oral health-related shame and associated factors among Brazilian schoolchildren

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Abstract: The aim of the present study was to investigate the prevalence of oral health-related shame and the associated factors among 8-to-10-year-old Brazilian schoolchildren. A cross-sectional study was conducted with 388 children randomly selected from public and private schools of Diamantina, southeastern Brazil. In order to identify the feeling of shame, self-reports were collected through a single question, "In the last month, did you feel ashamed because of your teeth or mouth? Two calibrated examiners performed the clinical examination for dental caries (DMFT/dmft index), traumatic dental injuries (O' Brien), and malocclusion (Dental Aesthetic Index). Sociodemographic indicators were obtained through a questionnaire answered by the children's caregivers. Descriptive analysis, chi-square test, and hierarchical Poisson regression models were performed (95%CI; $p < 0.05$). The prevalence of shame was 38.1% (n = 148). The adjusted regression analysis demonstrated a significant association between shame and untreated dental caries (PR: 1.34; 95%CI: 1.04–1.74; p = 0.02), age of 10 years (PR: 1.36; 95%CI: 1.05–1.76; p = 0.01), and with parents with less than eight years of schooling (PR: 1.30; 95%CI: 1.00–1.68; p = 0.04). Older children with untreated dental caries and whose parents had lower education level presented a higher prevalence of oral health-related shame.

Keywords: Shame; Dental Caries; Oral Health; Child; Quality of Life.

Introduction

Shame can be described as the unpleasant feeling of taking to heart the negative words of an authority figure or peer, who exposes one's worthlessness, defects, and vulnerabilities.[1,2] It is a complex and self-focused social emotion that can lead to social exclusion, rejection, and attacks.[3,4] Shame causes uncertainties and impediments for self-confidence and trusting others.[1,5]

In the social context, several questions permeate schoolchildren's minds. They wonder whether they are likely to be accepted by their classmates and if they will have friends or be noticed and admired for who they are.[1] It is remarkable that, in this relationship process, children might be highly concerned about self-presentation and self-evaluation of attributes or characteristics that are socially valued, and being excluded, ridiculed or name-called becomes a common experience capable of causing

shame.[1-6] From the age of eight, children's social and cognitive skills are better established.[1] Interaction with schoolmates increases, as does the ability to make judgments about themselves and others.[7] Therefore, this is a critical period to assess feelings of shame related to oral health, which, once identified early, can be treated appropriately.

Having the appearance affected by oral problems can be an obstacle in social interactions.[8] The dissatisfaction with the teeth's appearance can make the person feel less attractive and avoid smiling; nevertheless, the necessity of treatment is intimately related with the esthetic perception and the others' vision of the smile.[9] Furthermore, dental caries can change the children's daily activities and cause shame, once they stop eating correctly, playing, sleeping, or talking.[10-13] Similarly, traumatic dental injury and malocclusion have functional, emotional, and psychosocial impacts.[14,15]

Children can deal with feelings of shame in a number of ways. Some tend to feel anger and contempt for themselves, others tend to walk away from the situation or deny the message that embarrassed them and, finally, there are children who try to make their classmates feel bad when facing criticisms.[16] Continued experiences of shame may reinforce negative views and feelings with time, increasing the risk of developing anxiety, depression, and other psychological disorders.[5,6,17] Although the feeling of shame and its symptoms have already been widely studied in childhood[1,16,17,18] the assessment of its association with oral health has not yet been reported in the literature. As oral problems may incite shame in children, strategies for prevention and effective treatment may contribute to a better quality of life. This study aimed to investigate the prevalence of shame related to oral health and the associated factors among Brazilian children between eight to ten years old.

Methodology

Ethical issues

The present study was carried out in compliance with international standards and national legislation on ethics in research involving human subjects. This study was approved by the ethics committee in research from the Federal University of Jequitinhonha and Mucuri Valleys (protocol number 370.291/2013). Parents and guardians authorized the children's participation by signing the free and informed consent form. The authorized children who wanted to participate also signed a consent form.

Study design and sample selection

The present cross-sectional population-based study was conducted with students from eight to ten years old from public and private schools of Diamantina, Minas Gerais, Brazil. From the 41 schools within the study age range, 38 were public and 3 were private.[19] The sample distribution respected the proportion of the population in that age range that attended public schools (75%) and private schools (25%) of the city. The draw was carried out in 2 stages. Four public schools and one private school were randomly selected in the first stage and the students were randomly selected in the classroom in the second stage. A 50% prevalence of oral health-related shame was considered, since the outcome was unknown in this population, a 95% confidence interval (CI), and standard error of 5% were adopted, which resulted in 384 participants. To compensate for losses, 20% was added resulting in a total of 461 children.

Literate children from eight to ten years old regularly enrolled in public and private schools in the city of Diamantina were considered eligible to be included in the study. Exclusion criteria were orthodontic devices, systemic diseases, cognitive difficulty that could preclude answering the questionnaire, and psychological treatment history (according to parents/guardians or teachers).

Calibration and pilot study

Prior to data collection, two examiners were trained and calibrated. Initially, examiners received theoretical training regarding the types of oral problems (dental caries, traumatic dental injuries, and malocclusion). Any divergences were discussed and resolved by consensus. Subsequently, a calibration between the examiners and a specialist was carried out with an oral examination of children who did not participate in

the main study. The calibration exercise was done in 15 days. Inter-examiner (0.77–1.00) and intra-examiner (0.71–0.79) kappa values were satisfactory for the diagnoses of all oral problems.

After the calibration, a pilot study was conducted with 52 children from a public school and their caregivers. The aim of the pilot study was to assess the methodology. The participants of the pilot study were select by convenience and not included in the main study. No methodological changes were necessary.

Non-clinical data collection

Non-clinical data collection directed to the children was performed at the school before the clinical oral examination. Information about oral health-related shame was self-reported with the question: "In the last month, did you feel ashamed because of your teeth or mouth?" The answer options were dichotomized into absent when 'never' was the response and present when once or twice, sometimes, often, everyday, or almost every day were the responses. This question was taken from the Brazilian version of the Child Perception Questionnaire 8-10.[20,21]

The structured questionnaire addressing demographic-socioeconomic data was sent to the parents/guardians. The child characteristics evaluated were age, dichotomized by the median into 8–9 years and 10 years, and sex, female and male. The socioeconomic status was evaluated from the household income, considered as the monthly number of minimum wages received by the economically active residents (207 US dollars). The dichotomization was defined by the median into ≤ 2 and > 2 minimum wages.

The educational level of the parents/guardians was evaluated considering the years of study and dichotomized to ≥ 8 and < 8 years, with eight years of school corresponding to a primary education in Brazil. The family structure was evaluated considering married/stable union and divorced/widower. The number of children in the family was dichotomized into one child and two or more children.

Clinical data collection

Clinical oral examinations were executed with the children sitting on a chair in a reserved room in each school. Gauze, dental mirrors (PRISMA. São Paulo, Brazil), artificial light (PETZL, Tikka XP, Crolles, France), and WHO periodontal probes (Golgran Ind. e Com. Ltda., São Paulo, Brazil) were used. The examiner was properly equipped for cross-infection prevention.

The dental caries experience was based in the DMFT/dmft index,[22] which registers the number of decayed, missing, and filled teeth. The variable was dichotomized into absent when the number of decayed teeth was 0 and present when the number of decayed teeth was 1 or more.

Traumatic dental injury (TDI) diagnosis was done following the classification proposed by O'brien.[23] This classification considers the presence of dental fractures, discoloration, and tooth loss caused by TDI, dichotomized as absent or present (enamel fracture only, enamel-dentin fracture, enamel-dentin fracture with pulp exposure, signs of pulp involvement without signs of fracture, missing tooth due to TDI, and other TDI [lateral luxation, intrusion, extrusion]).

For the diagnosis of malocclusion and the need of orthodontic treatment, the Dental Aesthetic Index (DAI) was used,[24] with a DAI score >25 used as the cutoff point for the need of dental treatment. The dichotomization was into malocclusion with and without orthodontic treatment need.[25]

Data analysis

The statistical analysis was done with the Statistical Package for the Social Sciences (SPSS) 21.0 program for Windows (IBM SPSS; IBM Corporation, Armonk, USA) and included frequency distribution, bivariate analysis, and hierarchical Poisson regression. All the associations between dependent and independent variables with $p < 0.20$ in bivariate analysis and theoretical importance were incorporated into the hierarchical Poisson regression model. The model was divided into three different levels to account for the influence of each level in the next one (Figure): 1st level – socioeconomic status; 2nd level – child characteristics; and 3rd level – oral conditions. The prevalence ratios (PR) and 95%confidence intervals (CI) were calculated and a $p < 0.05$ was considered statistically significant.

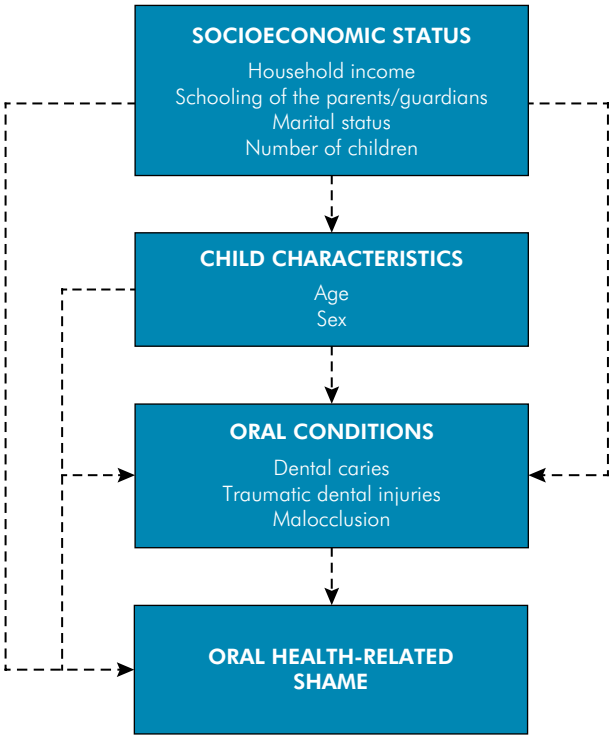

Figure. Hierarchical conceptual model for oral health-related shame.

Results

The response rate was 84%. There was a loss of 16% of the sample due to absence from school on the day of data collection and missing data in the questionnaires. Among the 388 children that participated in the study, 56.7% (n = 220) were female and 52.6% (n = 204) were eight and nine years old. A total of 53.9% (n = 209) of the parents/guardians had more than eight years of formal education and 84.0% (n = 326) were married or in stable union. The prevalence of oral health-related shame was 38.1% (n = 148) and the prevalence of untreated dental caries, TDI, and orthodontic treatment need was, respectively, 35.3% (n = 137), 23.7% (n = 92), and 39.9% (n = 155). The other frequencies are described in Table 1. In the bivariate analyses, untreated dental caries was significantly associated with shame (p = 0.033). The other results are described in Table 2.

The adjusted and non-adjusted hierarchical Poisson regression models are described in Table 3. In the final adjusted model, parent's schooling of less than eight years (PR: 1.300; 95%CI: 1.002–1.686; p = 0.048), age of 10 (PR: 1.363; 95%CI: 1.055–1.761; p = 0.018), and the presence of untreated caries (PR: 1.348; 95%CI: 1.042–1.744; p = 0.023) were factors significantly associated to shame, independently of orthodontic treatment need. The other variables were not associated with the outcome.

Table 1. Distribution of children aged 8 to 10 years (n = 388) according to the study variables. Data was collected in Diamantina, Brazil, in 2020.

Variables	Frequency n (%)
Oral health-related shame	
Absent	240 (61.9)
Present	148 (38.1)
Household income	
≥ 2 monthly minimum wage	201 (51.8)
< 2 monthly minimum wage	187 (48.2)
Parents/guardian's schooling	
≥ 8 years of study	179 (46.1)
< 8 years of study	209 (53.9)
Parents/guardian's marital status	
married/stable union	326 (84.0)
divorced/widower	62 (16.0)
Number of children	
One child	51 (13.1)
Two or more children	337 (86.9)
Sex	
Male	168 (43.3)
Female	220 (56.7)
Age	
8–9 years	204 (52.6)
10 years	184 (47.4)
Untreated dental caries	
Absent	251 (64.7)
Present	137 (35.3)
Traumatic dental injury	
Absent	296 (76.3)
Present	92 (23.7)
Malocclusion	
No orthodontic treatment need	233 (60.1)
Orthodontic treatment needed	155 (39.9)

Table 2. Association between oral health-related shame and the independent variables of the study (n = 388). Data was collected in Diamantina, Brazil, in 2020.

Independent variables	Oral health-related shame			p-value
	Absent	Present	Total	
	N (%)	N (%)	N (%)	
Household income				
≥ 2 monthly minimum wage	131 (65.2)	70 (34.8)	201 (100)	
< 2 monthly minimum wage	109 (58.3)	78 (41.7)	187 (100)	0.163
Parents/guardian's schooling				
≥ 8 years of study	121 (67.6)	58 (32.4)	179 (100)	
< 8 years of study	119 (56.9)	90 (43.1)	209 (100)	**0.031**
Parents/guardian's marital status				
married/stable union	203 (62.3)	123 (37.7)	326 (100)	
divorced/widower	37 (59.7)	25 (40.3)	62 (100)	0.700
Number of children				
One child	33 (64.7)	18 (35.3)	51 (100)	
Two children or more	207 (61.4)	130 (38.6)	337 (100)	0.653
Sex				
Male	108 (64.3)	60 (35.7)	168 (100)	
Female	132 (60.0)	88 (40.0)	220 (100)	0.389
Age				
8–9 years	135 (66.2)	69 (33.8)	204 (100)	
10 years	105 (57.1)	79 (42.9)	184 (100)	0.065
Untreated dental caries				
Absent	165 (65.7)	86 (34.3)	251 (100)	
Present	75 (54.7)	62 (45.3)	137 (100)	**0.033**
Traumatic dental injury				
Absent	182 (61.5)	114 (38.5)	296 (100)	
Present	58 (63.0)	34 (37.0)	92 (100)	0.788
Malocclusion				
No orthodontic treatment need	150 (64.4)	83 (35.6)	233 (100)	
Orthodontic treatment needed	90 (58.1)	65 (41.9)	155 (100)	0.210

*Pearson's Chi-Square Test ($p < 0.05$).

Discussion

The findings of the present study suggest that 10-year-old children with untreated dental caries and whose parents/guardians have less years of schooling have higher prevalence of oral health-related shame.

Although shame seems to be a very prototypical moral emotion when experienced in an extreme and persistent way, this feeling may bring negative health consequences.[26,27] People who self-report high levels of shame also report high levels of depressive symptoms and suicidal behavior.[5,28] Shame is deeply related to attitudes of submission and withdrawal, being associated with the wish of hiding, escaping or even disappearing.[27] In the present study, approximately one third of the schoolchildren reported oral health-related shame. To our knowledge, this is the first study addressing this topic among schoolchildren.

Table 3. Poisson's hierarchical regression model for the association between oral health-related shame and the independent variables of the study (n = 388). Data was collected in Diamantina, Brazil, in 2020.

Independent variables	Unadjusted PR (95%CI)	p-value	Adjusted PR (95%CI)	p-value*
Socioeconomic status – 1st level				
Household income				
≥ 2 monthly minimum wage	1			
< 2 monthly minimum wage	1.198 (0.929–1.544)	0.164		
Parents/guardian's schooling				
≥ 8 years of study	1		1	
< 8 years of study	1.329 (1.022–1.728)	0.034	1.300 (1.002–1.686)	0.048
Parents/guardian's marital status				
married/stable union	1			
divorced/widower	1.069 (0.766–1.492)	0.696		
Number of children				
One child	1			
Two children or more	1.093 (0.736–1.623)	0.659		
Child characteristics – 2nd level				
Sex				
Male	1			
Female	1.120 (0.864–1.452)	0.392		
Age				
8–9 years	1		1	
10 years	1.269 (0.984–1.637)	0.066	1.363 (1.055–1.761)	0.018
Oral conditions – 3rd level				
Untreated dental caries				
Absent	1		1	
Present	1.321 (1.027–1.699)	0.030	1.348 (1.042–1.744)	0.023
Traumatic dental injury				
Absent	1			
Present	0.960 (0.709–1.299)	0.790		
Malocclusion				
No orthodontic treatment need	1		1	
Orthodontic treatment needed	1.177 (0.914–1.516)	0.207	1.145 (0.888–1.477)	0.297

*Hierarchical Poisson Regression model adjusted for sex, age, and dental caries ($p < 0.05$).

The prevalence of untreated dental caries was similar to other studies with schoolchildren between eight and ten years old.[10,28,29] Untreated dental caries and its consequences are the main reasons that compel patients to seek treatment.[11] Toothache is a common symptom and can exert shame in children due to the negative consequences such as eating difficulties, school absenteeism, attention problems in the classroom, and difficulty doing homework or participating in recreational activities.[12].As a consequence of untreated dental caries, the child may also present halitosis and change in the structure and coloration of teeth,[30] which are probably associated with shame.

The presence of TDI and malocclusions that need orthodontic treatment were not associated with shame. Epidemiologic studies in schoolchildren showed that the most common TDI is enamel fracture.[13,31]

Therefore, the low aesthetic compromise of this type of fracture may not be enough to cause shame. On the other hand, despite orthodontic treatment need being the most prevalent oral condition found, the lack of association to shame can be explained by the mixed dentition stage that the children were in Barasuol et al.,[29] not feeling different to one another to the point of being ashamed of their looks.

The age of ten years was associated with oral health related shame. Adolescence is characterized by important psychosocial transformations that make the individual particularly sensitive to signals or messages that indicate what is socially unattractive and unacceptable.[1,2] Ten-year-old children are in early adolescence, when bullying is at its peak.[7,29] The preoccupation with esthetics increases significantly at this phase, which might explain the difference found in this group when compared to younger children.[32,33] On the other hand, shame was similar between sexes. Previous studies have shown that girls give more importance to esthetics than boys.[34] Nevertheless, self-perceived appearance and the necessity of social integration is similar in boys and girls.[35,36] Therefore, both can experience similar oral health shame.

Guardians education of less than eight years also remained associated with oral health related shame. Parents with lower schooling frequently have less knowledge concerning oral hygiene and caries prevention of their children.[37,38] In addition, less educated parents usually have a worse perception of their children's oral health and also do not have the habit of taking their children to dental appointments.[37,39] Negative oral health behaviors of parents can be transmitted to children and influence their oral health. Therefore, children of parents with low educational level have increased risk of developing oral problems such as dental caries,[34] which in turn can lead to oral heath-related shame.

An important clinical implication of this study is showing that dental caries, among all oral problems evaluated, had the highest impact on shame among schoolchildren. Thus, caries treatment and prevention strategies must be prioritized, aiming for the decrease of dental caries prevalence and consequently the feeling of shame due to oral problems in this age group, which in turn can contribute to a reduced risk of other problems, such as poor self-esteem, bullying, and depression.

As strengths, this is an original study with a representative sample of the population and a high response rate, conferring credibility and reliability to the findings. Some limitations should be considered. The cross-sectional design does not allow the settlement of causality between exposure and outcome. Although associations have been estimated, the sample size was calculated to estimate prevalence of oral health-related shame. In addition, the outcome was assessed using a single question. Most oral health-related quality of life questionnaires for children provide a total score based on the sum of subscales scores, which is more reliable that using a single domain or well-being issue. A specific validated questionnaire on the impact of oral problems on shame among children is lacking and can be considered a limitation of the study; our findings can serve as an incentive for the development of such a questionnaire. Finally, although the DAI tool was developed for permanent dentition only, this study as well as others, used the tool for assessment of occlusion and orthodontic treatment need in mixed dentition, therefore only few of the items were used.

Conclusion

The present study was the first to address the prevalence of shame from oral problems among 8-to-10-year old Brazilian schoolchildren. Our findings highlight the need for the establishment of preventive measures and treatment priorities for schoolchildren. In conclusion, 10-year-old children with untreated dental caries and whose parents/guardians had lower education level showed higher prevalence of oral health-related shame.

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