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The impact of cyberbullying on schoolchildren's dental anxiety in Brazil: A cross-sectional multi-level study

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Abstract

Objectives: This cross-sectional study assessed the correlation between individual and school-related social environment variables with dental anxiety in Brazilian schoolchildren aged 8-12 years.

Methods: A sample of children from 20 private and public schools (n = 1211) from Pelotas, Brazil, were selected. Socioeconomic data were collected from parents, and data regarding children characteristics were collected using a questionnaire. Dental anxiety (the outcome) was assessed by the following question: 'Are you afraid of going to the dentist?' Dental examinations were performed to assess caries experience (DMFT ≥ 1). The social school environment was assessed by a questionnaire administered to schools' coordinators and considered: type of school, verbal violence between students, presence of gangs at school and cyberbullying episodes. Multilevel Poisson regression was used to investigate the association between school social environment and dental anxiety.

Results: The prevalence of dental anxiety was 9.1% (95%CI 7.5-10.8). For the individual variables, anxiety was more prevalent in girls [1.85 (1.21-2.81)], in children with less-educated mothers [1.50 (1.00-2.27)] and in children who never attended to the dentist [2.48 (1.65-3.72)]. For contextual variables, episodes of cyberbullying in school increased the prevalence of dental anxiety by almost 80% [1.78 (1.14-2.78)].

Conclusions: The school social environment influences dental anxiety. The results suggest that it is important to establish strategies focused on promoting healthier environments and preventing cyberbullying in order to reduce the occurrence of dental anxiety.

KEYWORDS

children, cyberbullying, dental anxiety, epidemiology, school

1 | INTRODUCTION

Dental fear/anxiety is a common problem in children/adolescents worldwide, with a prevalence varying from 10% to 29.3%, depending on the instrument used.[1] It has been considered one of the most common reasons to avoid seeking dental treatment, which leads to a worsening of dental health, throughout the vicious cycle of fear.[2] Although the concepts of dental fear and dental anxiety are often used interchangeably within the dental literature, dental fear is a normal emotional reaction to one or more specific threatening stimuli in the dental situation, while dental anxiety denotes a state of apprehension that something dreadful is going to happen in relation to dental treatment, and it is coupled with a sense of losing control.[3] Dental anxiety has been demonstrated to be higher in girls, in poorer children, in those not attending the dentist or in children presenting decayed teeth or dental pain.[4,5]

The school social environment has been considered an important contextual factor when considering children and adolescents health, since they spend a large part of their time in school and most children are required to attend school until a certain age. A recent report by the United Nations Educational, Scientific and Cultural Organization (UNESCO) showed that there is violence occurring in schools in several countries, in forms of different types of violence: bullying (physical bullying, psychological bullying, sexual bullying and cyberbullying), physical fights, physical attacks, sexual violence, physical violence perpetrated by teachers and corporal punishment perpetrated by teachers.[6] With the widespread use of the Internet, there is increased concern over the incidence of cyberbullying among children. Worldwide, cyberbullying has been reported to affect 1 in 10 children, while in Brazil, among those children and adolescents who were Internet users, 20% reported having been subjected to cyberbullying, and 12% had behaved offensively online.[7] School bullying, cyberbullying or both can increase the rate of suicidality in teenagers[8] and, when combined with physical threat, can also lead to increased depression and suicidality.[9] The school social environment has been shown to influence dental caries occurrence in children,[10] and the oral health-related quality of life[11]; however, no study has investigated the contextual effect of schools on dental anxiety.

The present study aimed to investigate the influence of school contextual factors on the occurrence of dental anxiety in children enrolled in public and private schools in a Brazilian southern city.

2 | METHODS

2.1 | Study design and population

This cross-sectional study was part of a comprehensive oral health survey conducted between September and December 2010 in Pelotas, a city in southern Brazil with 320 000 inhabitants. This study was performed in 8- to 12-year-old children attending public and private schools. For sample selection, a two-stage stratified sample design was adopted. In the first stage, the primary units (schools) were selected. To ensure proportionality, five private and 15 public schools were randomly selected using a probability selection method. In the second stage, five 2nd to 6th grade classes were randomly selected in each school, and all the students enrolled in these classes were initially eligible for the study. Physically and/or intellectually disabled children were excluded from the study. A previous study was published with detailed methodological aspects.[12]

The minimum sample size needed was estimated using the Epi Info 6.0 software (Centers for Disease Control and Prevention, Atlanta, USA). Considering an estimated dental anxiety prevalence rate of 14.5%,[13] a 3% margin of error, and a confidence level of 95%, it was determined that at least 519 children would need to be included in the sample. Because a cluster sample selection was adopted, the design effect was estimated to be 2. The sample was increased by 20% to account for losses or refusals. The minimum sample size of this study was large because it also assessed other outcomes (n = 1202).

2.2 | Outcome

Children's dental anxiety was assessed using an instrument with a single question (DAQ: Dental Anxiety Question)[14] with the following question for the children 'Are you afraid of going to the dentist?'. The possible answers were 'no', 'a little', 'yes, quite' and 'yes, very'. For analysis, dental anxiety was dichotomized into low dental anxiety ('no' and 'a little') and high dental anxiety ('yes, quite' and 'yes, very').[4]

2.3 | Individual co-variables

Self-administered questionnaire was sent to parents to collect maternal schooling in completed years of education, categorized in 'less than 8 years' (which correspond to the fundamental education level in Brazil) and '8 years or more'. Parents were also questioned if their children had ever visited the dentist during their lifetime and the answers were 'yes' or 'no'. After the questionnaire was returned from parents, children were interviewed to collect data about sex, age (8-10 years, 11-12 years) and dental pain in the past 6 months. The answers related to dental pain were 'yes' or 'no'. The experience of dental caries in mixed dentition was assessed through clinical examination using the number of decayed/missing/filled teeth (dmft/DMFT index)[15] for permanent and primary teeth. The examinations were performed in regular school chairs by six trained dentists and calibrated. Agreement was measured against the standards of an associate professor with a PhD in Paediatric Dentistry and experience in epidemiological investigations (inter-examiner weighted kappa was 0.74 (0.62-0.79). dmft and DMFT indices were added, and experience of dental caries was considered when dmft + DMFT ≥ 1. The clinical examination was conducted using a mirror and CPI periodontal probe, following biosecurity WHO precepts.

2.4 | School-level variables

Variables related to the social environment of schools were collected using a questionnaire based on the National School Health Survey (PeNSE, acronym in Portuguese). These variables have been used to investigate the occurrence of bullying in the Brazilian school system.[16] This questionnaire was applied to school coordinators. The occurrence of episodes of verbal violence between students was assessed through the question, 'Have there been episodes of verbal violence between students in the last academic year?'. The presence of gangs in school was assessed using the question 'Have there been episodes of gang violence in the school in the last academic year?'. In addition, the occurrence of cyberbullying episodes was investigated by the question 'Have there been episodes of cyberbullying involving students in the last academic year?'. All questions were collected in dichotomous form (yes/no).

2.5 | Data analysis

The collected data were double-entered using EpiData 3.1. All analyses were performed using Stata 12.0. Descriptive analysis was performed to characterize samples according to dental anxiety and interest variables. Multilevel Poisson regression models with robust variance using the scheme of mixed effects were used to assess the association between the presence of high dental anxiety and school social environment using two levels of data organization, with individual-level variables (first level) nested at school-level variables (second level). Goodness of fit of models was assessed using deviance values (−2 log-likelihood). Three models were fitted as follows: (a) crude analysis, (b) adjustment only by contextual-level variables and (c) fully adjusted model, including individual—and contextual-level variables. Prevalence ratios and 95% confidence intervals (CIs) were obtained.

2.6 | Ethical considerations

The Human Research Ethics Committee from Federal University of Pelotas (UFPel) (#160/2010) and the City Education Department of Pelotas gave the approval for the study. Parents of all children signed an informed consent form. Children who needed dental treatment were referred to the Dental School of UFPel to receive treatment.

3 | RESULTS

A total of 1744 children were eligible for the study, of which 418 (24%) did not present the informed consent form signed by parents. Of the children with parental consent to participate in the study, 105 (7.9%) were lost because they were absent from school during data collection. The final response rate of the main study was 69.4%, giving a total sample of 1211 children. From this total, nine children did not answer the question about dental anxiety. Thus, the final sample of this study was 1202 children (response rate of 68.9%).

High dental anxiety was reported in 109 children (9.1%; 95% CI 7.5-10.8). Table 1 displays the descriptive analysis of the sample. Most of the children reported used dental services at least once in their life. More than one-third of participants reported dental pain in the last 6 months prior to the interview. Regarding school-level variables, almost 80% of the participants were from public schools.

TABLE 1 Prevalence of high dental anxiety(%) with 95% confidence interval (CI) according to demographic, socioeconomic, clinical, behavioural and contextual variables in schoolchildren

Variable	N (%)	High dental anxiety % (95% CI)
Individual level		
Sex		*
Boys	574 (47.4)	6.0 (4.7, 7.5)
Girls	637 (52.6)	11.9 (10.1, 13.9)
Age		
8-10 y	789 (65.2)	9.3 (7.7, 11.1)
11-12 y	422 (34.9)	8.6 (7.0, 10.3)
Maternal schooling (Y)		*
≥8	750 (63.8)	6.7 (5.4, 8.3)
<8	426 (36.2)	13.0 (11.1, 15.0)
Dental pain		*
No	771 (64.3)	8.0 (6.5, 9.7)
Yes	428 (35.7)	11.3 (9.6, 13.2)
Use of dental service		*
Yes	905 (75.7)	6.2 (4.9, 7.8)
No	291 (24.3)	18.3 (16.2, 20.6)
Dental caries		
Absent (dmft/DMFT = 0)	495 (41.3)	9.3 (7.7, 11.1)
Present (dmft/DMFT ≥ 1)	704 (58.7)	8.6 (7.0, 10.3)
Contextual Level		
Type of school		*
Private	253 (20.9)	5.2 (4.1, 6.7)
Public	958 (79.1)	10.1 (8.4, 11.9)
Episodes of verbal violence		
No	130 (10.7)	4.7 (3.5, 6.0)
Yes	1,081 (89.3)	9.6 (8.0, 11.4)
Episodes of gang violence		*
No	1,036 (85.5)	8.4 (6.9, 10.1)
Yes	175 (14.5)	13.1 (11.2, 15.1)
Episodes of cyberbullying		*
No	819 (67.6)	7.3 (5.9, 8.9)
Yes	392 (32.4)	12.8 (11.0, 14.8)

*$P < .05$—Chi-square test.

One-third of children studied at schools where the occurrence of cyber bullying was reported by school coordinators.

The results of the multilevel analysis are presented in Table 2. After adjustments, some individual variables were associated with dental anxiety. Girls presented a prevalence rate 80% higher than that of boys. Children from mothers with lower educational level were more likely to present with dental anxiety (50%), while those children who never attended the dentist had a 2.5 times higher chance of presenting with high dental anxiety. Crude analysis revealed that, considering school-level variables, students from public schools presented almost twice as high prevalence of high dental anxiety compared with those from private schools. In addition, the prevalence of high dental anxiety was higher in children from schools where coordinators reported the presence of gangs in the school environment. In addition, the occurrence of cyberbullying episodes between students was associated with a higher prevalence of high dental anxiety. In the final model, after adjustments by individual-level variables and contextual variables, the occurrence of

TABLE 2 Results of the multilevel Poisson regression analysis for the association between high dental anxiety and school-level variables in schoolchildren (n = 1202)

Variable	Model 1* PR (95% C)	Model 2* PR (95% CI)	Model 3* PR (95% CI)
Individual level			
Sex			
Boys	1	-	1
Girls	1.99 (1.33-2.99)		1.85 (1.21-2.81)
Age			
8-10 y	1	-	1
11-12 y	0.91 (0.61-1.36)		0.96 (0.63-1.45)
Maternal schooling (Y)			
≥8	1	-	1
<8	1.92 (1.30-2.82)		1.50 (1.00-2.27)
Use of dental service			
Yes	1	-	1
No	2.97 (2.04-4.34)		2.48 (1.65-3.72)
Dental caries		-	
Absent (dmft/DMFT = 0)	1		1
Present (dmft/DMFT ≥ 1)	0.91 (1.61-1.34)		0.92 (0.61-1.39)
Dental pain		-	
No	1		1
Yes	1.41 (0.96-2.05)		1.29 (0.86-1.93)
Contextual level			
Type of school			
Private	1	1	1
Public	1.92 (1.08-3.43)	1.67 (0.91-3.08)	0.99 (0.51-1.93)
Episodes of verbal violence			
No	1	1	1
Yes	2.04 (0.88-4.73)	1.34 (0.56-3.20)	1.15 (0.48-2.71)
Episodes of gang violence			
No	1	1	1
Yes	1.57 (0.98-2.52)	1.08 (0.65-1.81)	0.96 (0.56-1.64)
Episodes of cyberbullying			
No	1	1	1
Yes	1.76 (1.21-2.56)	1.60 (1.05-2.43)	1.78 (1.14-2.78)
−2 log-likelihood	** 740.76	727.86	646.06

*Model 1—Crude analysis; Model 2—Adjusted by contextual-level variables; Model 3—Adjusted by school-level variables and individual-level variables.

**Empty model.

cyberbullying remained associated with the presence of high dental anxiety. Children from schools where episodes of cyberbullying were related by schools' coordinators presented an increase of almost 80% in prevalence of dental anxiety, compared with children from schools where cyberbullying was not reported.

4 | DISCUSSION

This study showed that the presence of high dental anxiety in schoolchildren was influenced by the school context, even considering individual factors. The existence of cyberbullying incidents in the school social environment was associated with a higher prevalence of dental anxiety, being the only school variable associated with the outcome.

Traditional bullying has long been considered a school problem and becoming a victim of bullying at school can affect mental health and behaviour, leading to consequences such as depression, anxiety and psychosomatic symptoms.[8,9] The impact of cyberbullying must be recognized, even though aggression might not occur on the physical grounds of the school.[17] According to the UNESCO report, cyberbullying includes being bullied by messages, that is, someone sending mean instant messages, postings, emails and text messages or creating a website that makes fun of a student or by pictures, that is, someone taking and posting online unflattering or inappropriate pictures of a student without permission; it also refers to being treated in a hurtful or nasty way by mobile phones (texts, calls, video clips) or online (email, instant messaging, social networking, chat rooms) and online hurtful behaviour.[6] While the worldwide prevalence of cyberbullying is low (10%) compared with bullying (30%), it has been reported that the exposure to the first kind of violence has a broader amplitude and it could persist online for a longer period of time.[6] In the present study, one-third of the children studied at schools where cyberbullying has occurred, as reported by school coordinators.

Research studies have indicated that cyberbullying is becoming a major issue in schools and has various negative effects.[18] Victimization and aggression in cyberbullying relate to a series of individual (eg gender) and contextual factors, such as school climate,[19] classroom contextual influences,[20] social relationships among peers and adjustment to coexistence[21] and adolescents' school-belongingness.[22] Cyberbullying victims experience repeatedly, and over time, negative actions communicated by their bullies through the Internet or digital devices. These actions lead to behaviours such as exclusion, teasing, taunting, name calling, spreading rumours, threats or other communications that are meant to harass, bother, annoy or torment the victim.[23] Cyberstalking victims have a greater overall number of self-protective behaviours, including changing/quitting school.[23] Children affected by cyberbullying are more prone to developing depression.[8] A longitudinal study showed the potential of cybervictimization as a risk factor for future depressive symptoms, social anxiety symptoms and below average well-being among adolescents.[24] The ICT Kids Online Brazil survey estimated that approximately eight out of ten children (82%) aged 9-17 years are Internet users.[7] Also, it was detected that 41% of Internet users reported to have witnessed someone being discriminated on the Internet, with the main discrimination reason being: skin colour or race (24%); physical appearance (16%); and same-sex attraction (13%). Finally, 7% of children mentioned having suffered some type of discrimination on the Internet.[7] Those students who were bullied were more likely to report fear and avoidance.[25]

Another consequence of cyberbullying is social anxiety, which involves a fear of negative evaluation, and general and specific social avoidance of new situations or individuals.[26] Students with high levels of social anxiety have limited social skills in face-to-face interactions. Therefore, it is possible to expect that these psychological states could be associated with dental anxiety. In an environment where cyberbullying occurs, it is possible that children are more likely to experience a series of psychological consequences, including dental fear/anxiety. The investigation of factors related to dental anxiety is extremely important because dental anxiety leads directly to avoidance of dental visits. Our study reports that nearly ¼ of all students had never had a dental visit and, among other reasons, this may be due to dental anxiety. Avoidance attitudes may result in deterioration of oral health and in turn to problem-oriented visiting, which serves to maintain or exacerbate the person's level of dental fear.[27]

Another reason for dentists to understand the bullying process in school is that teeth are frequently targeted for bullying, followed by strength and weight. Spacing between the teeth or missing teeth, shape or colour of the teeth and prominent maxillary anterior teeth are commonly reported dentofacial features targeted by bullies.[28] In the present study, the causes of bullying were not available; however, other studies showed that adolescents who were bullied due to the presence of dental problems had a negative impact on both their self-esteem and oral health-related quality of life (OHRQoL).[29]

Considering that more individuals are using the Internet, especially younger individuals who spend an increased number of hours, cyberbullying in school has the potential to be a major topic of concern.[6] Therefore, cyberbullying prevention policies should be included in school and health centres, so that teachers, school counsellors and health professionals have opportunities to be well informed and trained to help. Cyberbullying disrupts the rights of students to be secure in an educational environment, affecting their quality of life and health, so every professional working with students has the responsibility to make all efforts to prevent it.[30]

In relation to the individual variables, the presence of dental anxiety was associated with girls, lower maternal schooling and non-use of dental services, as previously reported.[5] Maternal schooling is a proxy for socioeconomic position, and it is known that dental fear in children is influenced by socioeconomic position, affecting those individuals who are more economically deprived.[4] In addition, children who avoid dental treatment are more prone to exhibit dental fear and the avoidance to look for treatment usually result in a worsening of dental conditions and, consequently lead to more dental fear in a vicious circle.[2,27] Girls exhibited higher levels of dental anxiety

than boys, similar to previous studies,[31] a possible explanation being due to cultural issues because girls feel more comfortable expressing feelings and fears.[5]

There are some limitations to this study that should be highlighted. Information about school contextual factors was reported by the school coordinators, and the occurrence of cyberbullying episodes was assessed using a yes/no response scale. Answers depended on the perception and involvement of the coordinator with the school, and this may not represent the students' reality. In addition, a single-item measure was used to assess dental anxiety. Different scales have been developed to measure dental anxiety and fear, which could be considered more theoretically advanced.[32] However, the DAQ has been widely used and has shown good validity. The contextual factors assessed in this study were restricted to the school environment; other contexts, such as familiarity and neighbourhood, can also be related to the outcome. Another limitation inherent in cross-sectional studies is the impossibility of establishing a true cause-and-effect relationship.

However, the present study presents several strengths, such as using a multilevel analysis that has an important role in understanding the significance of specific contexts for different individual health outcomes. In addition, the sample size was large enough to provide power, and the data collection was carried out by a trained team using proper instruments. This is one of the first studies to address the influence of contextual variables in the development of dental anxiety in schoolchildren. It is noteworthy that the present study was carried out in 2010. Considering the increased use of the Internet by children and adolescents in Brazil, and taking into account the increasing trend for occurrences of cyberbullying, the current situation of the school environment leading to dental anxiety could be worse.

Despite these limitations, the results suggest that it is important to establish strategies focused on promoting healthier environments and preventing cyberbullying in order to reduce the occurrence of dental anxiety. Given the devastating consequences of cyberbullying, the findings reinforce the importance of developing policies and programmes to combat this behaviour.[18] Addressing cyberbullying should be a collective effort on the part of schools, families, students and society.[18] A multidisciplinary approach, by encouraging doctors, dentists and psychologists to participate in school activities, alerting the school community to the risks of school bullying and cyberbullying for the maintenance of health should also be considered. In addition, it has been suggested that cyberbullying and its impact on health be inserted in the medical forms of dentists.[33]

In conclusion, our study demonstrated that contextual factors, in this case cyberbullying episodes, could influence the occurrence of a higher prevalence of dental anxiety in schoolchildren.

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AUTHOR CONTRIBUTIONS

ERS,VPPC, MSA, MBC and MLG participated in the study design, data collection and data analysis; drafted the manuscript. TMA and FFD participated in the conception and design of the study, and manuscript revision. All authors approved the final version of the article to be published.

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REFERENCES

1. Cianetti S, Lombardo G, Lupatelli E, et al, Dental fear/anxiety among children and adolescents. A systematic review. *Eur J Paediatr Dent*. 2017;18:121-130.
2. Armfield JM, Stewart JF, Spencer AJ. The vicious cycle of dental fear: exploring the interplay between oral health, service utilization and dental fear. *BMC Oral Health*. 2007;14(7):1.
3. Klingberg G, Broberg AG. Dental fear/anxiety and dental behaviour management problems in children and adolescents: a review of prevalence and concomitant psychological factors. *Int J Paediatr Dent*. 2007;17:391-406.
4. Torriani D, Ferro R, Bonow M, et al, Dental caries is associated with dental fear in childhood: findings from a birth cohort study. *Caries Res*. 2014;48:263-270.
5. Silveira ERD, Goettems ML, Demarco FF, Azevedo MS. Clinical and individual variables in children's dental fear: a school-based investigation. *Braz Dent J*. 2017;28:398-404.
6. UNESCO. *School Violence and Bullying: Global Status Report*. Brasília: Brasília: United Nations Educational, Scientific and Cultural Organization; 2019.
7. CETIC. *TIC KIDS ONLINE BRASIL Survey on Internet Use*. Basília: Centro Regional de Estudos para o Desenvolvimento da Sociedade da Informação; 2016.
8. Messias E, Kindrick K, Castro J. School bullying, cyberbullying, or both: correlates of teen suicidality in the 2011 CDC youth risk behavior survey. *Compr Psychiatry*. 2014;55:1063-1068.
9. Pham TB, Adesman A. Increased risk of sadness and suicidality among victims of bullying experiencing additional threats to physical safety. *Int J Adolesc Med Health*. 2017;32(2). https://doi.org/10.1515/ijamh-2017-0109
10. Fernández MR, Goettems ML, Ardenghi TM, Demarco FF, Correa MB. The role of school social environment on dental caries experience in 8- to 12-year-old Brazilian children: a multilevel analysis. *Caries Res*. 2015;49:548-556.
11. Machry RV, Knorst JK, Tomazoni F, Ardenghi TM. School environment and individual factors influence oral health related quality of life in Brazilian children. *Braz Oral Res*. 2018;32:63.
12. Goettems ML, Correa MB, Vargas-Ferreira F, et al, Methods and logistics of a multidisciplinary survey of schoolchildren from Pelotas, in the Southern Region of Brazil. *Cad Saúde Pública*. 2013;29:867-878.

13. Akbay Oba A, Dülgergil ÇT, Şaroğlu SI. Prevalence of dental anxiety in 7-to 11-year-old children and its relationship to dental caries. *Medical Princ Pract*. 2009;18(6):453-457.
14. Neverlien PO. Assessment of a single-item dental anxiety question. *Acta Odontol Scand*. 1990;48:365-369.
15. WHO. *Oral Health Surveys: Basic Methods*. 4th ed. Geneva, Switzerland: World Health Organization; 1999.
16. Malta DC, Mello FCM, Prado RRD, et al, Prevalence of bullying and associated factors among Brazilian schoolchildren in 2015. *Cien Saude Colet*. 2019;24:1359-1368.
17. Hinduja S, Patchin JW. Social influences on cyberbullying behaviors among middle and high school students. *J Youth Adolesc*. 2012;42(5):711-722.
18. Li Q. Cyberbullying in high schools: a study of students' behaviors and beliefs about this new phenomenon. *Child Adolesc Aggr Maltreat*. 2010;19(4):372-392.
19. Yang C, Sharkey JD, Reed LA, Dowdy E. Cyberbullying victimization and student engagement among adolescents: does school climate matter? *Sch Psychol*. 2020;35(2):158-169.
20. Elledge LC, Williford A, Boulton AJ, DePaolis KJ, Little TD, Salmivalli C. Individual and contextual predictors of cyberbullying: the influence of children's provictim attitudes and teachers' ability to intervene. *J Youth Adolesc*. 2013;42:698-710.
21. García CM, Fernández EM, Félix R, Ruiz RO. Explicative factors of face-to-face harassment and cyberbullying in a sample of primary students. *Psicothema*. 2015;27(4):347-353.
22. Wright MF, Wachs S. Adolescents' psychological consequences and cyber victimization: the moderation of school-belongingness and ethnicity. *Int J Environ Res Public Health*. 2019;16(14):2493.
23. Randa R, Reyns BW, Nobles MR. Measuring the effects of limited and persistent school bullying victimization: repeat victimization, fear, and adaptive behaviors. *J Interpers Violence*. 2019;34:392-415.
24. Fahy AE, Stansfeld SA, Smuk M, Smith NR, Cummins S, Clark C. Longitudinal associations between cyberbullying involvement and adolescent mental health. *J Adolesc Health*. 2016;59:502-509.
25. Vidourek RA, King KA, Merianos AL. School bullying and student trauma: fear and avoidance associated with victimization. *J Prev Interv Community*. 2016;44:121-129.
26. Navarro R, Serna C, Martínez V, Ruiz-Oliva R. The role of internet use and parental mediation on cyberbullying victimization among Spanish children from rural public schools. *Eur J Psychol Educ*. 2015;28:725-745.
27. Armfield JM, Heaton LJ. Management of fear and anxiety in the dental clinic: a review. *Aust Dent J*. 2013;58(4):390-407.
28. Al-Omari IK, Al-Bitar ZB, Sonbol HN, Al-Ahmad HT, Cunningham SJ, Al-Omiri M. Impact of bullying due to dentofacial features on oral health-related quality of life. *Am J Orthod Dentofacial Orthop*. 2014;146:734-739.
29. Seehra J, Newton JT, Dibiase AT. Interceptive orthodontic treatment in bullied adolescents and its impact on self-esteem and oral-health-related quality of life. *Eur J Orthod*. 2013;35:615-621.
30. Espelage DL, Hong JS. Cyberbullying prevention and intervention efforts: current knowledge and future directions. *Can J Psychiatry*. 2017;62:374-380.
31. Krikken JB, Vanwijk AJ, Tencate JM, Veerkamp JS. Child dental anxiety, parental rearing style and dental history reported by parents. *Eur J Paediatr Dent*. 2013;14:258-262.
32. Armfield JM. How do we measure dental fear and what are we measuring anyway? *Oral Health Prev Dent*. 2010;8(2):107-115.
33. Fulgencio LB, Corrêa-Faria P, Lage CF, et al, Diagnosis of sleep bruxism can assist in the detection of cases of verbal school bullying and measure the life satisfaction of adolescents. *Int J Paediatr Dent*. 2017;27(4):293-301.

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