Contemporary Orofacial Sciences (2025) 3(2): 6-12
DOI: 10.61186/cofs.3.2.2

ORIGINAL RESEARCH

The Effect of Environmental Factors on Dental anxiety and behavior in Children

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Received: 2024-11-30/ Accepted: 2025-03-16 / First publication date: 2025-05-20

Abstract

Background: The multifactorial etiology of children's dental anxiety and behavior identifies the influence of many different risk factors. The aim of this study was to evaluate the association between environmental factors on Dental anxiety and behavior in children.

Materials and methods: This descriptive-analytical cross-sectional study involved 239 children aged 6 to 10 and included their parents, who completed a questionnaire about family background, dental history, and the first dental visit. Children's anxiety and behaviour were measured, respectively, using the Modified Child Dental Anxiety Scale and Frankel's scale. Cooperative behavior was defined as positive or completely positive, while uncooperative behavior was considered negative or completely negative. Data were analyzed using Chi-square, Fisher's exact test, independent sample t-test, and Spearman correlation coefficient (α=0.05).

Results: No significant differences were found in cooperation and anxiety levels between children with and without siblings (p = 0.31) or between first-borns and others (P = 0.52). However, children who had a pleasant first visit to the dentist had significantly higher cooperation and lower anxiety levels (P < 0.001). Cooperation was also notably lower in children from divorced families compared to those from intact families (P < 0.001).

Conclusion: The experience of the first visit to the dentist and the unpleasant experience at the dental clinic can influence anxiety and fear levels. Cooperation is associated with parental divorce status and the quality of the first dental visit.

Keywords: Anxiety; Behavior; Pediatric Dentistry

Introduction

Despite the recent advances, dental fear and anxiety, as well as children's non-cooperation in the dental environment, are still raised as problems for patients and the dental team (1). Children's fear of dental treatments is among the difficulties faced by families and dentists, especially pediatric dentists (2,3). Patients usually experience anxiety and fear due to the dental environment and the tools used therein. Dental anxiety is characterized by psychological factors, such as pain anxiety, and mental pain. The dentist's office is often a fearful and anxious environment for a child (4). Dental fear and anxiety are common in children and are significantly affected by factors such as gender, age, history of hospitalization, children's overt anxiety, and mothers' anxiety. These concerns result in negative behaviors, such as anxiety, pain, and anger, during the examination, making dental service delivery impossible. Therefore, dealing with children's dental fear and anxiety is a challenge for current dentistry to maintain and improve children's oral and dental health (5).

Anxiety, fear, and pain play an important role in dental work. Patients with severe Dental anxiety not only avoid restorative and periodontal treatments but also postpone preventive treatments (6). Most anxious people imagine dentistry to be associated with pain, which is, in turn, a factor influencing the

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[DOI: 10.61186/cofs.3.2.2]

increase of psychological reactions to pain sensation and transmission (7). In addition, Dental anxiety reduces one's oral hygiene level and quality of life in the long term and causes a high level of social damage (8). The study of dental anxiety and its related factors is a method to improve the oral health level and quality of life (9).

Dental anxiety is known as the origin of problems in the management of dental patients (10). Preceding the treatment process, therefore, information on the origin of dental fear and anxiety and uncooperative behavior in children can help the pediatric dentist to select appropriate behavioral management and a suitable treatment strategy (11). Dental anxiety and dental behavior have multiple origins, divided into individual factors of patients and environmental factors (12). Most studies on the factors affecting dental anxiety and dental behavior focus on preschool children, who are the group most often seen with behavioral problems in dentistry. However, school children can also manifest behavioral problems that therapists cannot communicate with (13).

Dental anxiety and dental behaviors are influenced by individual characteristics, which are strongly affected by the family and social environment. Among the individual factors, mood, general fear, and behavioral problems have been widely studied, but the effects of environmental and situational factors have rarely been studied separately (14). Among the environmental factors, parental dental anxiety is strongly associated with child anxiety (15).

Environmental factors, such as socioeconomic status, frequency of exposure to invasive medical treatments, and past experiences with dental treatments, are known as the potential of people in Dental anxiety and behavioral problems, but contradictory results have been reported previously (11, 16-18).

According to the results of Bahrololoomi et al study (19), decreasing the score in emotional and shyness dimensions and increasing the score in physical activity and sociability can reduce the dental anxiety of children during dental treatment. The results of the study by Suprabha et al (18) showed that 7 to 14-year-olds ' dental fear influences dental behavior, but the factors affecting them are not the same. Although dental fear decreases and dental behavior improves with age, experiences at previous dental visits may influence both dental anxiety and behavior. Past medical experiences are likely to influence dental fear but not dental behavior.

Limited studies are available on environmental and situational factors, and most of such studies have been conducted in European and Southeast Asian countries, in which cultural factors are regarded as environmental factors affecting dental fear (20). Therefore, we decided to investigate the effects of environmental factors on children's dental anxiety and behavior.

Materials and methods

This descriptive-analytical cross-sectional study (ethical code: IR.IAU.KHUISF.REC.1398.024) was conducted on 239 children aged 6-10 years who were referred to the pediatric department of Islamic Azad University**.** The sampling method was convenience sampling. Children who required anesthetic injections for pulp therapy and restoration, and whose parents' literacy was sufficient to fill out the questionnaires, were included in the study. Children with mental retardation, behavioral problems, cerebral palsy, deafness, and blindness, patients with symptoms of severe toothache or other emergency cases (such as bleeding, swelling, or dental trauma), children who only required fluoride therapy or orthodontic treatments, and children with chronic systemic diseases were excluded from the study. The child's general characteristics (age and gender) were recorded initially, and the parents accompanying the patient were asked to complete a questionnaire consisting of questions about family status, previous dental history, and the first dental visit. The child's anxiety was evaluated with the Modified Child Dental Anxiety Scale (MCDAS). This questionnaire includes eight questions that measure anxiety level with a 5-point Likert scale, with the maximum and minimum scores of 40 and 8, respectively, for each participant (21, 22); scores higher than 17 were classified as indicating anxiety (18). The child's behavior during the dental procedure was determined by the researcher using Frankel's Behavior Rating Scale, a classification used for quantitative and qualitative measurements of five factors in a dental clinic (18, 23). These five factors include the entry mode into the examination room, the sitting mode on the chair, opening the mouth for the examination, verbal communication with the dentist, and accepting a reward or prize. In this scale, the scores range from -20 to +20.

The reliability and validity of this questionnaire have been previously assessed. Zhang et al. (24) reported a Cronbach's alpha test-retest reliability of 0.90 for the

[DOI: 10.61186/cofs.3.2.2]

MCDASF assessment. In Iran, a Cronbach's alpha of 0.85 was reported in the MCDASF evaluation by Javadinejad et al. (22), indicating excellent reliability of the questionnaire.

All treatments were performed by a single dentist, and the children's behavior was determined using Frankel's behavior rating scale by a dentist who was unaware of their fear scores. Children with positive and completely positive behaviors were regarded as cooperative, and those with negative and completely negative behaviors were considered uncooperative (20).

Data were analyzed Chi-square test, Fisher's exact test, independent test, and Spearman correlation coefficient using SPSS software version 25 (α=0.05).

Results

The Fisher exact test results revealed no significant differences in the anxiety status between children of divorced and intact families (P = 0.54), those with and without siblings (P = 0.61), and children who were and were not the first child in the family (P = 0.48). However, anxiety was significantly higher in children with a history of hospitalization compared to those without such a history (P = 0.001). The Fisher exact test showed that the frequency of anxiety in children whose first visit to the dentist was pleasant was significantly lower than in other children (P < 0.001). In addition, the Chi-square test showed that the level of cooperation with the dentist was significantly higher in children whose first visit to the dentist was pleasant than in other children (P < 0.001) (Table 1- 5). Significantly less anxiety was observed in children who had a pleasant experience at the dental clinic compared to other children (P < 0.001) (Table 1-6).

According to the results of the Chi-square test, levels of cooperation with the dentist were not significantly different between children with and without siblings (P = 0.31), those who were First born children and those who were not (P = 0.52), and children with and without a history of hospitalization (P = 0.62). However, children from divorced families showed significantly lower levels of cooperation with the dentist than those from undivorced families (P < 0.001). Children with a pleasant experience of their first visit to the dentist showed significantly more cooperation compared to the other children (P < 0.001). Significantly higher cooperation was found in children with a pleasant experience in the dental clinic than in the other children (P < 0.001) (Table 1-6).

Table 1. Frequency distribution of Children's anxiety and their cooperation with the dentist by family type

Variable		Divorced family	Intact family	P value
		N (%)	N (%)	
Anxiety	Normal	6 (16.2)	42 (22.5)	0.54
	Anxious	31 (83.8	145 (77.5)	
cooperation	Uncooperative	15 (40.5)	61 (32.6)	<0.001
	Poor cooperation	4 (10.9)	11 (5.9)	
	Treatment with caution	15 (40.5)	77 (41.2)	
	Cooperative	3 (8.1)	38 (20.3)	

Table 2. Frequency distribution of children's anxiety and their cooperation with the dentist according to siblings and without siblings

Variable		With siblings	Without siblings	P value
		N (%)	N (%)	
Anxiety	Normal	37 (24.2)	19 (22.9)	0.61
	Anxious	116 (75.8)	64 (77.1)	
cooperation	Uncooperative	46 (30.3)	32 (38.6)	0.31
	Poor cooperation	8 (5.3)	7 (8.4)	
	Treatment with caution	63 (41.4)	29 (34.9)	
	Cooperative	35 (23)	15 (18.1)	

[DOI: 10.61186/cofs.3.2.2]

Table 3. Frequency distribution of Children's anxiety and their cooperation with the dentist according to the firstborn and non-firstborn

Variable		First born	Non-firstborn	P value
		N (%)	N (%)	
Anxiety	Normal	29 (22.8)	28 (25.7)	0.48
	Anxious	98 (77.2)	81 (74.3)	
cooperation	Uncooperative	40 (31.7)	38 (34.9)	0.52
	Poor cooperation	11 (8.7)	4 (3.7)	
	Treatment with caution	50 (39.7)	42 (38.5)	
	Cooperative	25 (19.9)	25 (22.9)	

Table 4. Frequency distribution of Children's anxiety and their cooperation with the dentist according to the history of hospitalization

Variable		With a history of hospitalization	without a hospitalization history	P value
		N (%)	N (%)	
Anxiety	Normal	13 (12.9)	44 (31.9)	0.001
	Anxious	88 (87.1)	94 (68.1)	
cooperation	Very Uncooperative	5 (5.0)	10 (7.3)	0.62
	Uncooperative	33 (32.7)	46 (33.6)	
	Accept treatment with caution	46 (45.5)	48 (35.0)	
	Cooperative	17 (16.8)	33 (24.1)	

Table 5. Frequency distribution of children's anxiety and their cooperation with the dentist according to their experience of the first visit to the dentist

Variable		Good	Bad	P value
		N (%)	N (%)	
Anxiety	Normal	51 (37.2)	5 (5.0)	<0.001
	Anxious	86 (62.8)	96 (95.0)	
cooperation	Uncooperative	25 (18.4)	54 (53.5)	<0.001
	Poor cooperation	2 (1.5)	13 (12.8)	
	Treatment with caution	65 (47.8)	19 (28.7)	
	Cooperative	44 (32.3)	5 (5.5)	

Table 6. Frequency distribution of children's anxiety and their cooperation with the dentist according to their experience in the dental clinic

Variable		Good	Bad	P value
		N (%)	N (%)	
Anxiety	Normal	55 (38.7)	2 (2.1)	<0.001
	Anxious	87 (61.3)	95 (97.9)	
cooperation	Uncooperative	27 (19.2)	52 (53.6)	<0.001
	Poor cooperation	1 (0.7)	14 (14.4)	
	treatment with caution	68 (48.2)	16 (26.8)	
	Cooperative	45 (31.9)	5 (5.2)	

Spearman's correlation coefficient showed a direct intermediate correlation (r = 0.575) between the level of cooperation with the dentist and the frequency of visits to the dentist (P = 0.008). Additionally, the children's level of cooperation was directly intermediately correlated (r = 0.587) with the children's age (P = 0.004), with older children demonstrating greater cooperation.

The Chi-square test indicated no significant difference in the frequency of dental visits between children with and without DA (P = 0.56). Nevertheless, the age at the first visit to the dentist was significantly higher in children with DA than in the other children (P < 0.001).

The Fisher exact test showed no significant difference between anxiety status in girls and boys (P = 0.45). The Chi-square test revealed that the level of

[DOI: 10.61186/cofs.3.2.2]

cooperation with the dentist was not significantly different between girls and boys (P = 0.32) (Table 7). The independent t-test showed no significant difference between the mean age of anxious and non-anxious children when visiting the dentist (P = 0.45) (Table 8).

Table 7. Frequency distribution of children's anxiety and their cooperation with the dentist by Gender

Variable		Female	male	P value
		N (%)	N (%)	
Anxiety	Normal	23 (29.1)	35 (21.7)	0.45
	Anxious	56 (70.9)	126 (78.3)	
cooperation	Uncooperative	6 (7.7)	9 (5.6)	0.32
	Poor cooperation	22 (28.2)	57 (35.4)	
	Treatment with caution	32 (41)	63 (39.1)	
	Cooperative	18 (23.1)	32 (19.9)	

Table 8. The mean age of children by anxiety status

Variable	Mean ± SD	P value
Normal	8.3 ± 1.4	0.45
Anxious	8.02 ± 1.1	

Discussion

In our study, children often visited the dentist with their mothers, and the majority of children's families had a normal life in terms of their parents' relationship with each other. Most of these children visited the dentist more than 5 times, and most of them experienced a pleasant visit from their first visit to the dentist. Most of the children were aged more than 5 years, and they felt a pleasant experience in the dental clinic. A significant relationship was observed between age and the level of cooperation with the dentist. The levels of anxiety and cooperation with the dentist were not correlated with gender, and children of divorce showed much higher levels of anxiety than those of normal families.

The children's level of non-cooperation with the dentist was higher in children of divorce than in normal children, with the highest level recorded for uncooperating or cautious treatment acceptance. Children of divorce are more susceptible to social harm and anxiety, and fear problems. Marital conflicts, parental disputes, and ultimately separation and divorce are among the major problems with destructive and negative effects on individuals, society, and especially children (25).

Paryab et al. (26) reported that the behaviors of school-aged children during a dental visit were not significantly affected by family factors, which disagrees with our results, probably due to cultural differences in the studied communities.

Maughan et al.'s study (27) claimed that the impact of anxiety and fear was greater in children without siblings (single children). Thus, children with siblings were more inclined to social adaptation than single children, and the level of anxiety and fear was higher in single children, corresponding to the present results.

Our results revealed higher anxiety in the first children than in the second children of families, but it did not differ significantly. Therefore, the first or multiple birth order of children in families cannot be highly associated with children's anxiety and fear. Similar results were obtained after examining the level of cooperation with the dentist.

In the present study, more anxiety and fear were observed in children with a history of hospitalization than in the other children. Nonetheless, the children's hospitalization condition did not influence their cooperation levels with the dentist. However, children may have pleasant or unpleasant experiences after the first visit to the dentist and dental clinics. The level of anxiety was considerably higher in the group of children with unpleasant experiences than in the other children. A significant difference was also observed between the two groups. Furthermore, children with an unpleasant experience in visiting the dentist and the dental clinic showed lower levels of cooperation with the dentist than the other children, with a significant difference between the two groups.

Children's experiences in the first visit with the dentist are an important turning point for the child's attitude to dental treatment because it affects the child's cooperation in future visits. However, relatively less studies are available on the effect of age at the first dental visit on children's dental fear and anxiety (14). Suprabha et al. (18) found no association between the age at the first dental visit (≤ 5 years) and dental fear, as well as children's current

[DOI: 10.61186/cofs.3.2.2]

behaviors in the dental clinic. Likewise, Paryab et al. (26) presented evidence that children's cooperation was not affected by age, which corresponds with our results.

According to a review study by Shindova and Belcheva (28), dental fear and anxiety are a common problem in children worldwide; therefore, new strategies should be encouraged to overcome this relevant child condition. As the etiology is multifactorial, it is far more complex than being explained by a single contributing factor. To treat children and adolescents, pediatric dentists need to assess the patient about personal, social, and environmental aspects. Besides, assessments may be carried out using well-established methods to gain more knowledge about the individual patient.

Conclusion

The history of hospitalization, the first experience of visiting the dentist, and the unpleasant experience in the dental clinic were the factors affecting levels of dental fear and anxiety. The level of cooperation was correlated with the divorce of the parents, the presence /absence of siblings, the first dental visit experience, and the unpleasant experience in the dental clinic

Conflict of Interests: The authors of this manuscript declare that they have no conflicts of interest, real or perceived, financial, or non-financial in this article

References

1. Nematullahi H, Nashi A. Investigating the relationship between preschool children's sensory processing abilities and anxiety and their cooperation in the patients of Mashhad Dental School. J Mashhad Dent 2019; 43(2):179-96.
2. JabariFar SE, Ahmadi Roozbahani N, Javadinejad S, Hosseini L. Comparing the level of fear and anxiety of children aged 3-6 following outpatient dental treatments under general anesthesia in Isfahan city. J Mashhad Dent 2014; 38(1):9-16.
3. ParviziFard AA, Hashmati Kh, Taheri AA. Prediction of dental anxiety based on pain anxiety and mental pain among people referring to dental clinics in Kermanshah. J Mashhad Dent 2022; 46(1):25-34.
4. Maljaei E, Erfanparast L, Azima N, Babapour J, Hosseinpour K. The correlation between mother's emotional maturation with children's anxiety during routine dental procedures. J Res Dent Sci 2019; 16 (1):60-66.
5. Aminabadi NA, Vafaei A, Erfanparast L, Oskouei SG, Jamali Z. Impact of pictorial story on pain perception, situational anxiety and behavior in children: a cognitive-behavioral schema. J Clin Pediatr Dent. 2011;36(2):127-132.
6. Asna Ashari M, Satari M, Dadkhah M. The Survey of anxiety prevalence in patients undergoing root canal treatment referred to section Endodontics, School of Dentistry, Azad Islamic University, year 2000. Journal of Dental School Shahid Beheshti University of Medical Sciences 2003; 20(4):441-35
7. Semple D, Smyth R. Oxford Textbook of Psychiatry. 4th ed. Oxford: Oxford University Press. 2019:1139-1225.
8. Abrahamsson KH, Berggren U, Carlsson SG. Psychosocial aspects of dental and general fears in dental phobic patients. Acta Odontol Scand. 2000;58(1):37-43.
9. Nuttall NM, Bradnock G, White D, Morris J, Nunn J. Dental attendance in 1998 and implications for the future. Br Dent J. 2001;190(4):177-182.
10. Feigal R. Pediatric behavior management through nonpharmacologic methods. Gen Dent. 1995;43(4):327-334.
11. Colares V, Richman L. Factors associated with uncooperative behavior by Brazilian preschool children in the dental office. ASDC J Dent Child. 2002;69(1):87-13.
12. Koch G, Poulsen S, Espelid I, Haubek D. Pediatric dentistry: a clinical approach. 3rd ed. Chichester: John Wiley & Sons, 2017.
13. Nowak AJ, Christensen JR, Mabry TR, Townsend JA, Wells MH. Pediatric dentistry. Infancy through adolescence. 6th ed. Philadelphia: Elsevier, 2019
14. Gustafsson A, Arnrup K, Broberg AG, Bodin L, Berggren U. Psychosocial concomitants to dental fear and behaviour management problems. Int J Paediatr Dent. 2007;17(6):449-459.
15. Arnrup K, Berggren U, Broberg AG, Lundin SA, Hakeberg M. Attitudes to dental care among parents of uncooperative vs. cooperative child dental patients. Eur J Oral Sci. 2002;110(2):75-82.
16. Lee CY, Chang YY, Huang ST. The clinically related predictors of dental fear in Taiwanese children. Int J Paediatr Dent. 2008;18(6):415-422.
17. Kyritsi MA, Dimou G, Lygidakis NA. Parental attitudes and perceptions affecting children's dental behaviour in Greek population. A clinical study. Eur Arch Paediatr Dent. 2009;10(1):29-32.
18. Suprabha BS, Rao A, Choudhary S, Shenoy R. Child dental fear and behavior: the role of environmental factors in a hospital cohort. J Indian Soc Pedod Prev Dent. 2011;29(2):95-101.
19. Bahrololoomi Z, Zarebidoki F, Hosseini Yekani A, Boostanifard P. The Relationship between Temperament and Dental Anxiety in Children Aged 6 to 11 Referred to Yazd Dental School. J Mash Dent Sch. 2023; 47(2): 124-34.
20. Klingberg G, Broberg AG. Dental fear/anxiety and

[DOI: 10.61186/cofs.3.2.2]

dental behaviour management problems in children and adolescents: a review of prevalence and concomitant psychological factors. Int J Paediatr Dent. 2007; 17(6):391-406.
21. Javadinejad S, Farajzadegan Z, Madahain M. Iranian version of a face version of the modified child dental anxiety scale: transcultural adaptation and reliability analysis. J Res Med Sci 2011; 16(7):872-7.
22. Javadinejad S, Farajzadegan Z, Sherkat S, Shokri MM. Reliability and validity of the modified retranslated Persian version of the child dental anxiety scale in comparison with the Corah Dental Anxiety Scale and Venham picture test. J Res Med Sci 2014; 11(2):105-8.
23. Dean JA, Jones JE, Sanders BJ, Vinson LAW, Yepes JF. McDonald and Avery's dentistry for the child and adolescent.. 11th ed. St. Louis: Mosby, 2022. P: 38
24. Zhang HM, Xia B, Wang JH, Xie P, Huang Q, Ge LH. Chinese version of a face version of the modified child dental anxiety scale: transcultural adaptation and evaluation. Zhonghua Kou Qiang Yi Xue Za Zhi. 2013;48(7):403-8.
25. Ghorbani B. The comparison of depression in children and adolescents of normal families and families seeking divorce in Isfahan. Knowledge and research in psychology. 2006; 27:95-112.
26. Paryab M, Hosseinbor M. Dental anxiety and behavioral problems: a study of prevalence and related factors among a group of Iranian children aged 6-12. J Indian Soc Pedod Prev Dent. 2013;31(2):82-86.
27. Maughan DR, Christiansen E, Jenson WR, Olympia D, Clark E. Behavioral parent training as a treatment for externalizing behaviors and disruptive behavior disorders: A meta-analysis. School Psychology Review. 2005;34(3):267.
28. Shindova MP, Belcheva AB. Dental fear and anxiety in children: a review of the environmental factors. Folia Med (Plovdiv). 2021;63(2):177-182.

[DOI: 10.61186/cofs.3.2.2]