

ORIGINAL ARTICLE

# Child dental fear and behavior: The role of environmental factors in a hospital cohort

## Abstract

**Introduction:** Information on the origin of dental fear and uncooperative behavior in a child patient is important for behavior management strategy. The effects of environmental factors have been comparatively less studied, especially in an Indian scenario. **Objectives:** To find the association of (1) age, gender, family characteristics, previous medical, and dental experiences with dental fear and behavior (2) dental fear with dental behavior. **Materials and Methods:** A cross-sectional questionnaire study involving 125 children aged between 7 and 14 years undergoing dental treatment under local anesthesia. The parent completed a questionnaire on family situation, medical history, and past dental experiences of the child. Child's dental fear was recorded using Children's Fear Survey Schedule-Dental Subscale and behavior was rated using Frankl Behaviour Rating Scale. **Statistical Analysis:** Data were analyzed using chi square test and binary logistic regression analysis. **Results:** Unpleasant experience in dental clinic and age of the child significantly influenced dental behavior. Visited pediatrician in the past one year, prior history of hospital admission, previous visit to dentist, experience at the first dental visit, and age of the child were contributing factors for dental fear. There was also significant association between dental fear levels and behavior. **Conclusions:** In 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 the previous dental visits seem to influence both dental fear and behavior. Past medical experiences are likely to influence dental fear but not dental behavior.

## Key words

Behavior, dental fear, factors

## Introduction

Dental fear in children has been recognized as a source of problems in patient management.<sup>[1]</sup> Information on the origin of dental fear and uncooperative behavior in a child patient prior to the treatment procedures may help the pediatric dentist plan appropriate behavior management and treatment strategy.<sup>[2]</sup> Dental fear and behavior are likely to have multifactorial origins

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which are broadly divided into personal characteristics, environmental factors, or situational factors.<sup>[3]</sup> Most of the existing literature on factors affecting dental fear and behavior focuses on the preschool age group as they most often present with behavior problems. However, school-aged child through adolescence can also present with behavior problems where communication cannot be established by the clinician.<sup>[4]</sup> Though personality characteristics are said to influence dental fear and behavior the most, they are also strongly affected by social and family environments. Although the effect of personality factors like temperament, general fearfulness, and behavioral problems have been studied extensively, the effect of environmental and situational factors have been comparatively less studied.<sup>[5]</sup>

Among environmental factors, it has been well documented that parental dental fear strongly correlates with that of the child.<sup>[6,7]</sup> Environmental and situational factors such as socioeconomic status,

family situation, frequent exposure to invasive medical care, and past experience of operative dental care have been explored as potential causes of dental fear and behavior problems, but the results have been inconsistent.<sup>[2,5,8-10]</sup> Studies considering environmental and situational factors are few and most of them have been carried out in European and South-east Asian countries. As cultural factors are known to influence the environmental factors affecting dental fear and behavior,<sup>[7]</sup> this study was designed to know the association of past medical experience, previous dental history and family characteristics on dental fear, and behavior of a hospital cohort of 7 to 14 year old children in India.

## Aims and Objectives

To find the association of age, gender, family characteristics, previous medical experience, and previous dental experience with dental fear as well as dental behavior of the child.

To find the association of dental fear and behavior in the given sample.

## Materials and Methods

### Sample characteristics

This cross-sectional questionnaire study was carried out in a dental hospital set up over a period of two months, involving 125 children aged between 7 and 14 years who were visiting the pediatric dentistry department for routine dental treatment. Children with mental retardation, psychotic disorders, and severe sensory motor impairment (cerebral palsy, blindness, deafness, etc.) were excluded. Upon routine clinical examination, those children who were undergoing operative dental treatment such as extractions, restorations, and pulp therapy under local anesthesia were included. Children who had to undergo only preventive procedures such as oral prophylaxis, fluoride applications, and orthodontic interventions were excluded. Also, children and parents who could not understand English language were excluded from the study. A total of 178 children (age, 7-14 years) visiting the pediatric dental department were screened and 125 children fulfilling the above criteria were selected for the study.

The study was independently reviewed and approved by the institutional ethical committee. Informed consent was obtained prior to the study after clearly explaining the purpose of the study.

## Variables studied

In the first step, mother/father/guardian who accompanied the child patient were asked to complete the questionnaire which included questions on family situation, general medical history, and past dental experiences of the child. Specific questions pertaining to first dental visit of the child were also included.

Child's own dental fear was recorded using Children's Fear Survey Schedule-Dental Subscale (CFSS-DS). This is a psychometric method of assessing dental fear in children developed by Cuthbert and Melamed.<sup>[11]</sup> The children filled the CFSS-DS which consists of 15 items, before commencement of dental treatment. The reliability and validity of the CFSS-DS scale is shown to be satisfactory.<sup>[12]</sup> The score can range from 15 to 75 and scores of 38 and above are indicative of dental fear.<sup>[13]</sup>

All the treatment procedures were carried out by a single trained dentist. The behavior of the children was rated by an independent trained pediatric dentist who was unaware of their dental fear scores, using Frankl Behaviour Rating Scale.<sup>[14]</sup> Children showing positive and definitely positive behavior were grouped as cooperative and children with negative and definitely negative behavior were grouped as uncooperative. The Frankl scale is reported to have good reliability and the scale correlates moderately well with questionnaires assessing dental anxiety and fear.<sup>[12]</sup> The intraexaminer reliability was checked with a sample of ten children before carrying out the final study.

## Data analysis

Data were analyzed using SPSS for Windows release 11.5 (SPSS, Chicago, IL, USA). Association of fear and behavior with age, gender, family characteristics, past medical history, and previous dental experience was determined using chi square test. Binary logistic regression analysis was done to determine the relationship of various independent variables with dental behavior and dental fear. The level of significance was set at 5% (i.e.,  $P < 0.05$ ).

## Results

### Effect of age and gender on dental fear and behavior

The mean age of the sample was  $9.9 \pm 2.0$  years with 58 boys (mean age = 10.4 years, s.d  $\pm 1.9$ ) and 67 girls (mean age = 9.5 years, s.d  $\pm 1.9$ ). There was no statistically significant difference in age between boys

and girls ( $P = 0.08$ ). The children were divided into two age groups, preadolescent (7-10 years – 83 [66.4%]) and adolescent (11-14 years – 42 [33.6%]). Of 23 children who had dental fear, 20 were in the age group of 7 to 10 years. There was statistically significant difference in fear levels of both the age groups ( $X^2 = 5.330$ ;  $P = 0.021$ ). In the preadolescent group, 30 were uncooperative and in the adolescent group, only six were uncooperative. There was a significant difference in the dental behavior of the children in the two age groups ( $X^2 = 6.498$ ;  $P = 0.011$ ). No statistically significant difference in the dental fear levels ( $X^2 = 0.023$ ;  $P = 0.53$ ) and in the dental behavior ( $X^2 = 0.078$ ;  $P = 0.46$ ) was seen among boys and girls.

### Effect of family characteristics, past medical and dental experiences on fear and behavior [Tables 1 and 2]

Chi square test was employed to find the association of

fear/behavior with above given variables. Among the family characteristics, the type of family, whether the child was a first born or not did not have significant effect on the dental fear and behavior. Presence of sibling had significant association for dental fear ( $P = 0.04$ ).

Regarding the past medical experience, when asked about prior hospital admission of the child, 34 parents replied in the affirmative. Seventy-seven parents had visited a pediatrician or medical practitioner in the past six months for general health problems. Both recent visit to the pediatrician/medical practitioner and prior hospital admission were not associated with the dental fear and behavior.

There was association of previous positive history of dental visit with dental behavior but not with dental fear. Majority of them (89) had undergone

**Table 1: Effect of family characteristics, previous medical experience, and previous dental experience on dental fear**

Variable		CFSS-DS <38	CFSS-DS ≥38	Total	X <sup>2</sup> value	P value
Type of family	Nuclear	69	15	84	0.050	0.50
	Joint	33	8	41		
	Total	102	23	125		
Presence of sibling	Yes	86	15	101	4.412	0.04*
	No	16	8	24		
	Total	102	23	125		
First born	Yes	50	13	63	0.423	0.33
	No	52	10	62		
	Total	102	23	125		
Visited pediatrician in past one year	Yes	66	11	77	2.261	0.13
	No	36	12	48		
	Total	102	23	125		
Hospital admission	Yes	25	9	34	2.026	0.12
	No	77	14	91		
	Total	102	23	125		
Visited dentist before	Yes	93	18	111	3.009	0.09
	No	9	5	14		
	Total	102	23	125		
Number of times visited dentist	≤5	56	14	70	1.385	0.50
	>5	37	4	41		
	Total	93	18	111		
Experience at the first visit	Pleasant	62	13	75	3.365	0.49
	Unpleasant	31	5	36		
	Total	93	18	109		
Age at the first dental visit	≤5	26	7	33	0.705	0.95
	>5	67	11	78		
	Total	93	18	111		
Experience at the dental clinic	Pleasant	45	10	55	3.695	0.29
	Unpleasant	48	17	56		
	Total	93	18	111		

\* $P < 0.05$  - significant

**Table 2: Effect of family characteristics, previous medical experience, and previous dental experience on behavior**

Variable		Cooperative	Uncooperative	Total	X <sup>2</sup> value	P value
Type of family	Nuclear	64	20	84	3.110	0.06
	Joint	25	16	41		
	Total	89	36	125		
Presence of sibling	Yes	73	28	101	0.298	0.37
	No	16	8	24		
	Total	89	36	125		
First born	Yes	42	13	63	1.273	0.17
	No	47	10	62		
	Total	89	36	125		
Visited pediatrician in past one year	Yes	54	23	77	0.112	0.45
	No	35	13	48		
	Total	89	36	125		
Hospital admission	Yes	21	13	34	2.028	0.11
	No	68	23	91		
	Total	89	36	125		
Visited dentist before	Yes	83	28	111	6.386	0.01*
	No	6	8	14		
	Total	89	36	125		
Number of times visited dentist	≤5	49	21	70	3.018	0.22
	>5	34	7	41		
	Total	83	28	111		
Experience at the first visit	Pleasant	62	12	75	9.882	0.04*
	Unpleasant	20	16	36		
	Total	83	28	111		
Age at the first dental visit	≤5	24	9	33	5.575	0.23
	>5	59	19	78		
	Total	83	28	111		
Experience at the dental clinic	Pleasant	45	10	55	12.447	0.006*
	Unpleasant	38	18	66		
	Total	83	28	111		

\*P<0.05 - significant

treatment by one or two dentists. Children who were uncooperative or fearful had not visited more than three dentists. Statistically, both behavior and dental fear were not associated with number of visits to dental clinic and number of dentists visited by the child. Also, no association was seen between age at the first dental visit and dental fear as well as their current behavior in the dental clinic. Parents were asked to respond regarding the pleasantness of the first dental visit and the general inference of the parent regarding their child's experience in dental clinic, by choosing their response from a Likert scale: very much, mostly, slightly, and not at all. A response of "very much" and "mostly" was taken as *pleasant experience* and "slightly" and "not at all" was taken as *unpleasant experience*. Any painful, frightening, or embarrassing experiences were defined as unpleasant experience. There was significant association between behavior and parent's perception of the child's

experience at first dental visit and subsequently at later dental visits, but no association with dental fear.

### Relationship of dental fear and dental behavior

Table 3 shows the distribution of fearful and non-fearful, cooperative and uncooperative children in the study sample. A significant association was found between dental behavior and the level of dental fear.

### Binary logistic regression analysis [Tables 4 and 5]

Variables of age, gender, type of family, presence of sibling, first born, visited pediatrician, prior hospital admission, visited dentist before, age at first dental visit, experience at the first dental visit, number of visits, number of dentists visited, and previous unpleasant experience in dental clinic were entered into binary logistic regression analysis with dental fear as dependent

**Table 3: Association between dental fear and behavior in dental clinic**

	CFSS- DS score <38	CFSS-DS score ≥38	Total
Cooperative	79	10	89
Uncooperative	23	13	35
Total	102	23	125

**Table 5: Binary logistic regression analysis with behavior as dependent factor**

Variable	P value	Odds ratio
Gender	0.694	0.808
Age	0.021*	0.216
Type of family	0.547	1.231
Presence of sibling	0.892	1.101
First born	0.650	0.771
Visited pediatrician	0.557	1.419
Hospital admission	0.171	0.442
Visited dentist before	0.816	1.362
Number of times visited dentist	0.746	0.891
Experience at the first dental visit	0.682	0.901
Experience at the dental clinic	0.005*	2.361
Age at first visit	0.458	1.172
Dental fear	0.853	0.884

\*P<0.05: significant

variable. In the second step, the above mentioned variables along with dental fear were entered into binary logistic regression analysis with dental behavior as dependent variable. Visited pediatrician in the past one year, prior history of hospital admission, previous visit to dentist, experience at the first dental visit, and age of the child were contributing factors for dental fear ( $P = 0.009, 0.026, 0.028, 0.049, \text{ and } 0.012$ , respectively). Unpleasant experience in dental clinic and age of the child significantly influenced dental behavior ( $P = 0.005$  and  $0.021$ , respectively).

## Discussion

Fear of “injections” has been shown to be the major cause of dental fear and uncooperative behavior in 7- to 14-year-old children.<sup>[15]</sup> Therefore, in this study, only children undergoing dental treatment under local anesthesia were included.

### Factors affecting dental fear

In this study, the past medical experience and dental experience had significant influence on dental fear. This is in accordance with previous studies wherein the multifactorial etiology of dental fear, direct conditioning due to past medical and dental

**Table 4: Binary logistic regression analysis with dental fear as dependent factor**

Variable	P value	Odds ratio
Gender	0.975	0.979
Age	0.012*	0.094
Type of family	0.873	1.068
First born	0.327	2.108
Presence of sibling	0.162	3.745
Visited pediatrician	0.009*	7.699
Hospital admission	0.026*	0.178
Visited dentist before	0.028*	30.379
Number of times visited dentist	0.421	0.700
Age at first dental visit	0.950	0.972
Experience at the first dental visit	0.049*	0.506
Experience at the dental clinic	0.117	1.785

\*P<0.05: significant

experiences were shown as the most prominent factors.<sup>[16,17]</sup> Children visit the pediatrician and acquire some medical experience which affects their attitude to future dental treatment.<sup>[18]</sup> Painful and threatening experiences such as injections in the medical setup provoke fearful reactions in the dental setup. The stressful and fearful reaction exists regardless of pain etiology.<sup>[15]</sup> Dental fear due to previous visit to dental clinic could be due to stressful events that might have occurred during previous appointments. In our study, dental fear was associated with unpleasant experience at the first dental visit. Lee *et al.*<sup>[8]</sup> also found that invasive dental treatment and painful experience during first dental visit were predictors of CFSS-DS score. According to Davey,<sup>[19]</sup> traumatic experiences are more likely to give rise to dental anxiety if they occurred in the first dental visit than during the subsequent dental visits. This is in accordance with latent inhibition theory, whereby children tend to become less afraid if they have had more neutral visits (e.g., check-up, cleaning) before exposure to invasive dental treatments (e.g., restorations, extractions). In this sample, more than half of the children had undergone extractions or restorations during the first visit. Presence of siblings was associated with dental fear when analyzed independently, but not when other factors were considered. The results indicate that within the direct conditioning pathway of Rachman’s theory of fear,<sup>[20]</sup> objective experience such as previous visit to pediatrician or experience during first visit plays a greater role in the child’s fear acquisition than subjective dental experiences due to siblings or child-rearing practices in the family.

In this study, children in 7 to 10 years age group

exhibited greater dental fear than 11 to 14 years age group. The result was similar to findings of Lee *et al.*<sup>[8]</sup> that younger children express higher dental fear, but different from Arapostathis *et al.*<sup>[21]</sup> where mean scores were not related to age differences. The influence of age can be explained by the immature psychological development of children. In early childhood, fear toward unknown is prominent and by 9 years of age, fears are linked to blood and body injuries, situations mostly encountered in a dental clinic.<sup>[22]</sup> In general, girls are expected to display their fear while boys are not. However, no statistically significant difference in mean fear scores of boys and girls as seen in our study.

### Factors affecting behavior

Statistically significant association was seen between dental fear and behavior of the child patient, which is in accordance with earlier studies.<sup>[9,23,24]</sup> However, it should be noted that there were patients who were cooperative but fearful and uncooperative patients who were non-fearful. Klingberg *et al.*<sup>[9]</sup> indicated that child patients with behavior management problems do not always have dental fear, which was seen in this study sample also. Hence, other factors that affect behavior need to be explored before commencing the treatment.

Age was significantly associated with dental behavior in this study. This means that in 7 to 14 year olds, the ability to comply with the dental treatment increases with age. The effect of treatment variables and subjective experiences on child dental fear seems to diminish over time. Based on this finding, dentists should keep in mind the effect of conditioning and gradual exposure in children to obtain cooperation during dental treatment. However, the gender of the child patient was unrelated to behavior. Kyritsi *et al.*,<sup>[10]</sup> in their study in Greek population, found that dental behavior is unrelated to gender but related to age of the child patient. Children in joint family or with siblings are likely to learn lessons of patience, tolerance, and cooperation. In a nuclear family, parents play an important role in shaping the personality characteristics of the child. But this difference did not have an effect on behavior, indicating that child-rearing practices may not be related to dental behavior.

Children who view their previous medical experience positively are more likely to be cooperative in the dental clinic.<sup>[25]</sup> It should be noted that the emotional quality of past visits rather than number of visits is significant. This is evident in this study as a recent visit to pediatrician/prior history of hospitalization was not

associated with behavior of the patient in dental clinic. Thus, a mere history of hospitalization or presence of health problems is not an indicator of the behavior in the dental setup.

Regarding the previous dental experience, the age at first dental visit, number of visits to dentist, and number of dentists visited was not associated with dental fear. Children of those parents who perceived their child's previous appointments to be unpleasant showed negative behavior. This perception of the parent can arise due to pain experienced by the child and negative behavior during previous appointments. Also, parent's perception of dental appointments being unpleasant may be passed onto the child creating more anxiety. Versloot *et al.*<sup>[24]</sup> also found that a child with a previous negative dental experience displayed more anxiety and uncooperative behavior.

This study was done on a dental hospital cohort who underwent treatment under local anesthesia by a single dentist. It should be noted that behavior modification employed by the dentist could have influenced the behavior outcome, which was unavoidable. Further population-based studies need to be done to interpret the results to the whole population.

### Conclusions

Under the conditions of this study, it can be concluded that in 7 to 14 year olds, though dental fear can significantly influence dental behavior, the factors affecting them are not the same. While dental fear decreases and dental behavior improves with age, experiences at the first dental visit and subsequent visits seem to influence dental fear and behavior, respectively. However, past medical experiences are likely to influence dental fear, but not dental behavior.

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