



ASSESSMENT OF BEHAVIOR AND FEAR OF DENTAL TREATMENT OF PRESCHOOL CHILDREN

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ABSTRACT

Introduction: Fear of dental treatment is an increasingly common problem in pediatric dentistry. Anxious patients tend to overestimate pain and discomfort during treatment, postpone or reschedule appointments, which results in negative consequences for their oral health.

Aim: To determine the relative share of children with problematic behavior in the dental office between the ages of 4 and 6 years.

Materials and methods: The subjects of the study were 300 children between 4 and 6 years of age. A comprehensive dental examination and professional oral hygiene were carried out on each child, during which the child's behavior was assessed using psychological methods - Frankl Scale and self-assessment methods related to dental fear - a pictorial modified version of the questionnaire of the Children's Fear Survey Schedule – Dental Subscale (CFSS-DS).

Results: Assessment of children's behavior according to the Frankl scale appears that just over half of the study group of children - 56.7% have a positive attitude towards dental treatment, but a significantly large group has a negative attitude - 43.3%. Among the negative group, 8% are strongly negative, which poses serious challenges for dentists and indicates approximately one in ten children exhibits problematic behavior in the office. The distribution of children using the CFSS-DS Scale reveals that about 47.3% show mild fear, 20.3% show a risk of dental anxiety, and 32.4% show dental fear.

Conclusion: The results indicate that there is a significant number of children who are highly anxious, warranting further studies to investigate the causes of dental fear.

Key words: dental fear, dental anxiety, behavior in the dental office,

INTRODUCTION:

Fear of dental treatment is an increasingly common problem in pediatric dentistry. Its prevalence among children varies between 3% and 21%, depending on the assessment methodology used and the age of the children [1, 2]. As children grow older, they develop methods for controlling fear, leading to a reduction in anxiety [3, 4]

Some authors define dental anxiety as “abnormal fear or apprehension when visiting a dentist and unwarranted concern about dental procedures” [5]. It is a cause for lack of cooperation during dental treatment [6]. Anxious patients tend to overestimate pain and discomfort during treatment, postpone or reschedule appointments, which results in negative consequences for their oral health, often requiring more complex interventions and leading to a vicious cycle that further increases anxiety regarding treatment [7, 8].

Several studies examine the most common fears among children in the dental office, such as fear of anticipated pain, loss of control, being betrayed or deceived, fear of the unknown (due to lack of information and communication), invasive procedures, psychological aggression (murmuring, criticism), fear of experiencing past negative experiences again, noise from various instruments, bleeding, unpleasant odors in the office, and fear of encountering unfriendly medical staff [9]. Specific fears are usually short-lived and dissipate within a few months; however, in some children, they persist and disrupt normal functioning. At this point, the diagnosis of specific phobia should be discussed [10, 11]. A phobia is a fear that is beyond conscious control, impairs normal functioning, and leads to avoidance of the trigger or object [12].

Researchers have achieved a consensus regarding the assessment and treatment of specific phobias in early childhood, but their etiology remains unclear [13]. Some scholars believe that the emergence of phobias results

from experiences, while others suggest that this phenomenon reflects innate, spontaneous reactions to stronger experiences during development [14].

The fear of dental treatment is unique compared to other specific fears because it includes a strong component related to the threat of bodily injury [11, 13]. The oral area is very sensitive with an abundance of tactile and proprioceptive receptors. Whether normal or not, the fear response to dental treatment can develop into a pathological one [13]. This fear is associated with many factors, such as direct experience or indirect learning from others, situations, and environmental factors [15, 16].

AIM

The primary objective of this study is to determine the relative share of children with problematic behavior in the dental office between the ages of 4 and 6 years.

MATERIAL:

The study subjects were 300 children without systemic diseases, aged between 4 and 6, attending kindergartens in Sofia. The study was conducted after obtaining informed consent from the parent or guardian accompanying the child, who completed the questionnaire and was present during the treatment.

METHODS:

A comprehensive dental examination and professional oral hygiene were carried out on each child, during which the child's behavior was assessed using psychological methods and self-assessment methods related to dental fear. The evaluation of children's behavior using the Frankl Scale was based on the original version of the Frankl scale, adapted by J. Machen and R. Johnson. The overall assessment was calculated based on the arithmetic mean of the behavior ratings across five stages of the dental situation. The evaluation of the children was performed by two independent researchers in the dental office, ranging from highly positive to highly negative at five different points: 1. Upon separation from the parent; 2. The child's first reaction to the office environment; 3. Attitude towards the dental team; 4. Behavior during tooth brushing with a toothbrush and toothpaste; 5. Behavior after tooth brushing.

For self-assessing dental fear in children, the Children's Fear Survey Schedule – Dental Subscale (CFSS-DS) was additionally used. To enhance the accuracy and reliability of the responses when using this tool in the age group we studied, we employed a pictorial modified version of the questionnaire. The pictures show how the child feels in the dental office, where 1 means calm, 2 means slightly worried, 3 means a little worried, 4 means very worried, and 5 means extremely anxious. In the dental office, each child completes the questionnaire for self-

assessment of dental fear with the help of the dentist. Participants selected a face that best described their dental fear for the 15 factors. The final score ranges from 15 to 75 points. Children are categorized into three groups according to the score obtained:

- Group 1: Children with low fear – under 32 points;
- Group 2: Children at risk of developing dental fear – from 32 to 38 points;
- Group 3: Children with dental fear – above 39 points.

Statistical analysis - All statistical analyses have been carried out using SPSSr v.30.0 statistical software (IBM, Armonk, NY). Differences have been considered statistically significant at the $p < 0.05$ level.

RESULTS

The present study involved 300 preschool-aged children between the ages of 4 and 6 from the city of Sofia. Their distribution using the Frankl scale is presented in the following table.

Table 1. Distribution of Children According to the Frankl Scale

Frankl Score	Number of Children	%
1	24	8%
2	106	35.33%
3	131	43.67%
4	39	13%
Total	300	100%

From the assessment of children's behavior according to the Frankl scale, it is evident that 43.33% of children exhibit negative behaviors, while 56.67% are positive. It appears that just over half of the study group of children have a positive attitude towards dental treatment, but a significantly large group has a negative attitude. The distribution of negative and positive children is almost equal. Among the negative group, 8% are strongly negative, which poses serious challenges for dentists, as this indicates that approximately one in ten children exhibits problematic behavior in the office.

The behavior assessment, likewise with the Frankl scale, is conducted on four levels, facilitating the comparison of the obtained results. For the purpose of comparison, we combined the mildly negative and mildly positive into one group for both tests. This group was named the group at risk of dental phobia.

The distribution of the studied children according to the CFSS-DS Scale, their source of information on oral health promotion, is presented in the following table.

Table 2. Distribution of Children Using the CFSS-DS Scale

Group	Number of Children	%	Total Points	SD	Ind T-test
Mild Fear	142	47.33	3641	25.64	T _{1,2} =-5,05 (P< 0,05)
Risk of Dental Fear	61	20.33	2081	34.11	T _{2,3} =-7,91 (P< 0,05)
Dental Fear	97	32.23	5000	51.55	T _{1,3} =3,48 (P< 0,05)
T test	T _{1,2} =7,13 (P< 0,05) T _{2,3} =2,39 (P< 0,05) T _{1,3} =4,62 (P< 0,05)				

Just like with the Frankl scale, the majority of the children are either positive or exhibit minimal fear according to this test. This is supported by both the distribution of children and the total score obtained in the study. This

test is more sensitive to dental phobia, revealing a greater number of such children. If we combine the children with dental phobia and those at risk, we obtain a significant group that needs intervention.

Table 3. Distribution of Children on the Frankl Scale with Combined Groups

Group	Number of Children	%	Total Points	SD	Ind T-test
Group One (4)	39	13	156	25.64	T _{1,2} =-9,23 (P< 0,05)
Group Two (3 and 2)	237	79	605	4	T _{2,3} =-37,34 (P< 0,05)
Group Three (1)	24	8	24	2.55	T _{1,3} =10,68 (P< 0,05)
T test	T _{4,3/2} = 9,14 (P< 0,05) T _{4,1} = 0,57 (P>0,05) T _{3/2,1} =11,56 (P< 0,05)				

When combining the groups according to the Frankl scale, with minor differences, a similar distribution is observed as with the other scale used. By comparing the distribution of children in the three categories — with mild fear, at risk of dental phobia, and with dental phobia — we obtained a very high degree of correlation between the two tests ($r = -0.8656$). This correlation indicates that the results from the two measures, with a very high degree of reliability, yield similar results concerning the behavior of children in the dental office. Furthermore, it is noted that there is a negative correlation, which in this case means that the largest group comprises children with mild phobia, while the smallest group represents those with dental phobia. Nevertheless, for working in a dental office with children in the studied age range, the large group of children at risk of phobia is significant, indicating the need for examination to determine the causes and reduce this risk. Additionally, we conducted a correlation with the points scored in these groups. Here too, there was a high degree of negative correlation ($r = -0.7634$). This result also indicates the similarity in the data obtained through the two research methods. This verification validates the results obtained by both methods, which led us to continue searching for a correlation between parenting styles and children's behavior in the dental office using the scores obtained from the Frankl scale.

DISCUSSION

Determining behavior in a dental office using various subjective and objective methods is very important when assessing the possibilities for their clinical application. The use of one or more methods to evaluate den-

tal anxiety in children allows for an objective assessment. According to studies, there is still no gold standard in the scales for assessing dental anxiety in children and adolescents. Researchers believe that there is a lack of cognitive elements in these scales. The behavioral scale of Frankel used in this study is accepted as valid and reliable for clinical behavior assessment. It is quick to calculate and allows for the selection of appropriate behavior modification techniques [10, 12].

In analyzing the results of the present study, it was found that children exhibiting slightly positive behavior according to the Frankel behavioral scale are the largest group (44%). The next group consists of mildly negative children (35%). The proportions of children with strongly positive behavior (13%) and those with strongly negative behavior (8%) are relatively small. The obtained results aligned with most studies that used the same scale. There is no consensus regarding the other three groups due to the varying ages of the children studied.

Comparing the obtained results with those of other authors shows that, on average, 6 to 22% of children exhibit dental fear and behave negatively in the dental office. These data are consistent with our results, indicating that most children do not experience dental fear and behave positively during treatment. Another study by Raj assessed the behavior of children aged 4 to 14 in a dental environment and identified the dominant behavioral characteristics in children not cooperating with treatment. The data obtained in the present study showed that 17.5% of the study population suffer from some degree of dental fear, possibly increasing with dental treatment. Two cut off points have been set representing different degree

of dental fear in children. The CFSS-DS scores of 39 and above (2.5%) were found to represent high dental fear in children. Likely to interfere with dental treatment, a borderline area for dental fear was set at a score between 32 and 39, with children scoring in this range (15%) also suffering some degree of dental fear and may be at risk for developing high dental fear or phobia. This group of children are of special interest in the study of dental fear. By providing extra attention and guidance for these children, the development of high dental fear may be prevented [17, 18]

Children's behavior in our study was also examined using the pictorial scale for assessing specific dental fear (CFSS-DS) to find the complete specificity of the problem under research and the best measurement scheme. Analyzing the results of the test shows that nearly half of the patients exhibit no or low dental fear. The next group comprises children at risk of developing dental phobia, and the smallest relative share consists of children with dental phobia. These results correspond with the studies by Shindova MP, et al. [18, 19]. The data obtained suggest a need for more in-depth studies regarding the implementation of the scale in our country. The number of children with dental phobia necessitates searching for the factors leading to this condition.

Other authors seek a correlation between dental fear, assessed by CFSS-DS, and cooperativeness during dental treatment, without including the Frankl scale. The

patients are aged between 5 and 12 years and are divided into cooperative and non-cooperative groups. The results obtained in both groups do not show statistically significant differences. Among the non-cooperative group, the average score is 31.79, while the cooperative group averages 24.02 ($P < 0.05$). In the group of children scoring over 35 points, only 11.2% fall into this category, which significantly differs from our results for the same group (32.33%). The highest scores were reported for the factors "injections" and "the dentist is using the drill." The data from this study demonstrate that many non-cooperative patients have low dental fear, while many cooperative patients exhibit high dental fear [19]. These results contradict our findings, with the likely reason being the different methodology used to assess the children's cooperativeness.

CONCLUSION

In conclusion, the results indicate that a significant portion of children are highly anxious, warranting further studies to investigate the causes of dental fear.

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REFERENCES:

1. Shim YS, Kim AH, Jeon EY, An SY. Dental fear & anxiety and dental pain in children and adolescents; a systemic review. *J Dent Anesth Pain Med.* 2015 Jun;15(2):53-61. [PubMed]
2. 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 Nov; 17(6):391-406. [PubMed]
3. Cianetti S, Lombardo G, Lupatelli E, Pagano S, Abraha I, Montedori A, et al. Dental fear/anxiety among children and adolescents. A systematic review. *Eur J Paediatr Dent.* 2017 Jun;18(2):121-130. [PubMed]
4. Murad MH, Ingle NA, Assery MK. Evaluating factors associated with fear and anxiety to dental treatment—A systematic review. *J Fam Med Prim Care.* 2020; Sep 30;(9): 4530-4535. [PubMed]
5. Rosa A, Pujia AM, Docimo R, Arcuri C. Managing Dental Phobia in Children with the Use of Virtual Reality: A Systematic Review of the Current Literature. *Children (Basel).* 2023 Oct 30;10(11):1763 [PubMed]
6. Seligman LD, Hovey JD, Chacon K, Ollendick TH. Dental anxiety: An understudied problem in youth. *Clin Psychol Rev.* 2017 Jul;55:2540. [PubMed]
7. 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 Jan 14;7:1. [PubMed]
8. Folayan MO, Idehen E. Factors influencing the use of behavioral management techniques during child management by dentists. *J Clin Pediatr Dent.* 2004 Winter;28(2):155-61. [PubMed]
9. Abrahamsson KH, Berggren U, Hallberg L, Carlsson SG. Dental phobic patients' view of dental anxiety and experiences in dental care: a qualitative study. *Scand J Caring Sci.* 2002 Jun;16(2):188-96. [PubMed]
10. Sun IG, Chu CH, Lo ECM, Duangthip D. Global prevalence of early childhood dental fear and anxiety: a systematic review and meta-analysis. *J Dent.* 2024 Mar;142: 104841. [PubMed]
11. Thakur S, Kadam H, Jha S, Lall A, Kondreddy K, Singh A. Assessment of Anxiety Associated with the Dental Treatments on the Quality of Life: An Original Research. *J Pharm Bioallied Sci.* 2021 Nov;13(Suppl 2):S1713-S1716. [PubMed]
12. Carrillo-Díaz M, Migueláñez-Medrán BC, Nieto-Moraleda C, Romero-Maroto M, González-Olmo MJ. How Can We Reduce Dental Fear in Children? The Importance of the First Dental Visit. *Children (Basel).* 2021 Dec 9;8(12):1167. [PubMed]
13. Kalra N, Sabherwal P, Tyagi R, Khatri A, Srivastava S. Relationship between subjective and objective measures of anticipatory anxiety prior to extraction procedures in 8- to 12-year-old children. *J Dent Anesth Pain Med.* 2021 Apr;21(2):119-128. [PubMed]

14. Oosterink FM, de Jongh A, Aartman IH. Negative events and their potential risk of precipitating pathological forms of dental anxiety. *J Anxiety Disord.* 2009 May;23(4):451-7. [[PubMed](#)]
15. Carter AE, Carter G, Boschen M, AlShwaimi E, George R. Pathways of fear and anxiety in dentistry: A review. *World J Clin Cases.* 2014 Nov 16;2(11):642-53. [[PubMed](#)]
16. Viswanath D, Kumar MR, Prabhuji MLV. Dental anxiety, fear and phobia in children. *Int J Dent Res Dev.* 2014 Feb;4(1):1-14.
17. Raj S, Agarwal M, Aradhya K, Konde S, Nagakishore V. Evaluation of Dental Fear in Children during Dental Visit using Children's Fear Survey Schedule-Dental Subscale. *Int J Clin Pediatr Dent.* 2013 Jan;6(1):12-5. [[PubMed](#)]
18. Shindova MP, Belcheva AB, Raycheva GJ. Dental Fear of 6-12-year-old Children - Role of Parents, Gender and Age. *Folia Med (Plovdiv).* 2019 Sep 30;61(3):444-450. [[PubMed](#)]
19. Yamada MK, Tanabe Y, Sano T, Noda T. Cooperation during dental treatment: The Children's Fear Survey Schedule in Japanese children. *Int J Pediatr Dent.* 2002 Nov;12(6):404-9. [[PubMed](#)]

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