Dental Journal
Majalah Kedokteran Gigi

Dental Journal
(Majalah Kedokteran Gigi)
2024 March; 57(1): 4–8

Original article

Effect of audiovisual distraction on pediatric dental anxiety: A cross-sectional study

Vivek Padmanabhan[1], Najma Raidullah[2], Balsam Kamel[2]
[1]Pediatric and Preventive Dentistry, RAK College of Dental Sciences, RAK Medical and Health Sciences University, Ras Al Khaimah, United Arab Emirates
[2]GP Dentist, RAK College of Dental Sciences, RAK Medical and Health Sciences University, Ras Al Khaimah, United Arab Emirates

ABSTRACT

Background: *Children's oral health and clinical management are significantly affected by dental fear and anxiety.* ***Purpose:*** *This study investigates the effectiveness of audiovisual distraction in reducing the anxiety levels of children visiting for dental treatment.* ***Methods:*** *Sixty pediatric patients ages 6–10 years were included in this cross-sectional study. They were divided into two groups—a study group and a control group—of 30 patients each. The study group was provided with a tablet and headphones that played their favorite shows, and the control group was not provided with any gadgets. For both groups, anxiety levels were scored using the Facial Image Scale. A two-way repeated-measure ANOVA test was used to compare the levels of dental anxiety among the study and control groups at three intervals: before treatment, during treatment, and after treatment. For the tests, the statistically significant difference was assumed at a* $p \leq 0.05$. ***Results:*** *The children of both study and control groups had the same anxiety levels* ($p > 0.05$) *before the treatment. The study group had reduced anxiety levels compared to the children in the control group during and after the treatment, with* $p < 0.05$. ***Conclusion:*** *A child's favorite show can be played using a tablet and headphones for the child, as it has been shown to be an effective and easy method to reduce anxiety in children visiting dentists for operative procedures. This technique of distraction also reduces post-operative stress on the pediatric dentist.*

Keywords: *audiovisual; cartoons; dental fear and anxiety; distraction*
Article history: *Received 29 March 2023; Revised 15 June 2023; Accepted 19 June 2023; Published 1 March 2024*

Correspondence: Vivek Padmanabhan, Pediatric and Preventive Dentistry, RAK College of Dental Sciences, RAK Medical and Health Sciences University, Ras Al Khaimah, United Arab Emirates. Email: vivek.padmanabhan@rakmhsu.ac.ae

INTRODUCTION

Fear is an unpleasant emotion caused by the threat of danger, pain, or harm, and it is innate.[1] Anxiety is a feeling of unease, such as worry or fear, that can be mild or severe. Anxiety is usually the fear of the unknown.[2] The fear of dentistry and dental anxiety are the two most common obstacles that prevent children from seeking much-needed dental care, whether it is prevention or treatment.[1,2] It becomes challenging for pediatric patients to cope with their dental appointments owing to fear and anxiety. The most common fear and anxiety seen in dentistry is the fear of needles or harm that can be induced by the dentist.[3] However, dentistry, and especially the discipline of pediatric dentistry, has evolved into having various pharmacological and non-pharmacological methods to reduce dental fear and anxiety (DFA) of children about pediatric dentistry.[4,5]

Many parts of the world depend on pharmacological management, including sedation and general anesthesia, as a common method used in the management of DFA.[6–8] The disadvantages of pharmacological management include nausea, vomiting, decreased heart rate, and respiratory depression.[9] Non-pharmacological methods include audiovisual (AV) distraction, virtual reality, reinforcement, musical distraction, and "tell-show-do" modeling.[10–13] Non-pharmacological interventions can provide a positive effect in reducing dental anxiety in children undergoing dental treatment, instilling a positive attitude in children while also gaining more acceptance from parents. Hence, non-pharmacological interventions can be used effectively to decrease dental anxiety in pediatric patients.[13]

DOI: 10.20473/j.djmkg.v57.i1.p4–8

Recent literature has suggested that distraction, which is one of the most commonly used non-pharmacological techniques of behavior guidance, can reduce fear and anxiety in children about pediatric dentistry. [12,13] Distraction is defined as a non-aversive approach used to modify a child's discomfort by disrupting their attention away from the main task to accomplish successful treatment with high quality.[13] It is one of the most common psychobehavioral approaches employed in both medical and dental treatments. It is used to distract or divert the patient's attention away from stimuli that are considered to be either toxic, disturbing, or threatening within the practice of dentistry, especially pediatric dentistry. The application of distraction methods is usually used to decrease fear and anxiety about dentistry.[14,15] A distraction method should contain multiple modalities, including auditory, visual, emotional, and kinetics, that will thereby distract the child effectively and reduce fear and anxiety.[15–17] Distraction can be either audio or video distraction or a combination of both. The combination of AV techniques can be more effective. AV distraction is a simple and inexpensive method when compared with pharmacological methods and does not interfere with dental treatment per se. This technique produces a barrier by keeping the sounds of the operatory away but simultaneously not greatly altering the communication between the child and the dentist.[18]

Distraction reduces patient distress and pain, and AV distraction is effective by involving visual and auditory senses. Although some studies show success in decreasing anxiety and pain perception, others report mixed results in reducing uncooperative behavior during dental treatment. Therefore, this clinical study was designed to evaluate whether the anxiety level of a pediatric patient is reduced when AV techniques are used as a distraction method during dental treatment.

MATERIALS AND METHODS

This was a cross-sectional study conducted at RAK College of Dental Sciences, RAK Medical and Health Sciences University, RAK, UAE. The objective of this study was to evaluate whether the anxiety level of a pediatric patient alters when an AV technique is used as a distraction method during dental treatment. This research was approved by the Research and Ethics Committee of the university and the RAK Research and Ethics Committee, Ministry of Health (Proposal number: RAKMHSU-REC-82-2018-UG-D). The study was conducted in 2020–2021. The age range of the children was between 6 and 10 years. The patients included in the study had a Frankl behavior rating of 2, and they required Class I cavity preparation and dental restorations as a part of their oral rehabilitation. None of the children had visited a dentist before. The reason why children with a Frankl behavior rating of 2 were included was to ensure that the children were exhibiting positive behavior as they were being recruited into the study. Children and parents who did not provide assent or consent for the study and also children who were uncooperative were not included in the study. The criteria for selection of the children as mentioned would standardize the samples and thereby prevent bias in the study.

The sample size was calculated using the understanding of how many patients visit the clinics. The clinics usually receive 10 new patients per week. The research was planned to be conducted for six months; therefore, approximately 250 patients were expected. At a margin of error of 10% and a confidence level of 90%, the required sample size was calculated as 53 using a Raosoft sample size calculator. Ultimately, a total of 60 children were recruited based on the defined criteria, and they were divided randomly into study and control groups using a lottery system (Figures 1A and 1B).

All the children were required to undergo Class I cavity preparation and restorations on either primary or permanent teeth. The parents and children were told about the research and the procedure involved. The cavity preparation and restoration were performed by a single operator to eliminate any kind of interventional variability. The facial image scale[19] was used to record their anxiety at three levels: before the procedure, during the procedure, and at the end of the treatment. The facial image scale consists of a series

Figure 1. **A.** Children being treated with AV distraction (study group); **B.** Children being treated without AV distraction (control group).

DOI: 10.20473/j.djmkg.v57.i1.p4–8

of five faces ranging from extremely joyful to extremely unhappy. The children were requested to indicate the face that best represented their current emotional state. To score the scale, the most positive face was assigned a value of one, while the most negative face was assigned a value of five (Figure 2). The 30 children in the study group were subjected to dental restoration procedures and were provided with AV distractions (Figure 1A). The children were shown cartoon films of their choice on tabs that were maintained only for the purposes of the study; headphones were also provided. The 30 children belonging to the control group were subjected to dental restoration procedures but were provided the treatment without AV distraction (Figure 1B). The data was analyzed using the statistical program SPSS version 20 (IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp). The descriptive statistics for prevalence percentage were calculated, and a two-way repeated-measure analysis of variance (ANOVA) test was used to compare the level of dental anxiety among the two study groups at three intervals. For the tests, the statistically significant difference was assumed at a p-value of < 0.05.

RESULTS

A total of 60 children (30 in each group) participated in the study. The study group had 14 males and 16 females whereas the control group had 19 males and 11 females. The anxiety levels were recorded using the facial image scale.[19] The mean scores of anxieties recorded are shown in Table 1. The dental anxiety levels among the two groups were compared at three intervals (before, during, and after treatment) using a two-way ANOVA test (Table 1). The difference in anxiety levels between both groups before treatment was measured and tabulated, and the results were not statistically significant ($p < 0.06$). However, the difference in anxiety levels between both groups was statistically significant during and after treatment ($p < 0.00$). When the mean anxiety levels before and after treatment were compared in the study and control groups, the results showed that anxiety levels in the study group decreased compared to the control group. In the latter, the anxiety levels were higher after treatment than before treatment. These differences were found to be statistically significant ($p < 0.00$), (Table 2).

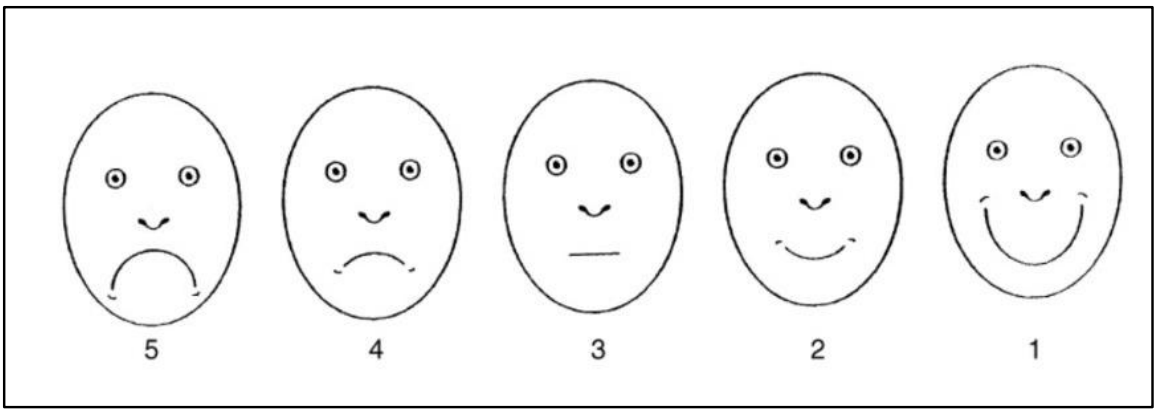

Figure 2. Facial image scale.[19]

Table 1. Comparison of anxiety levels between the study and control groups before, during, and after treatment using a two-way ANOVA test

Procedure	Study Group (mean ± SD)	Control Group (mean ± SD)	p-value
Before the treatment	2.6 ± 0.98	2.6 ± 0.76	0.06
During the treatment	1.8 ± 0.54	3.0 ± 0.87	0.00*
After the treatment	1.3 ± 0.48	3.0 ± 1.1	0.00*

*p < 0.05 = statistically significant.

Table 2. Comparison of anxiety levels between the study and control groups individually before and after dental treatment using paired t-test

Procedure	Study Group (mean ± SD)	Control Group (mean ± SD)
Before the treatment	2.6 ± 0.98	2.6 ± 0.76
After the treatment	1.3 ± 0.48	3.0 ± 1.1
p-value	0.00*	0.00*

*p < 0.05= statistically significant.

DOI: 10.20473/j.djmkg.v57.i1.p4–8

DISCUSSION

Dental anxiety is a type of behavior that is mainly seen in children and teenagers. The way this anxiety presents itself can vary among children. Some may be specifically anxious about certain dental procedures, such as getting an injection or having a drill used on their teeth, while others may experience more general fears related to dentistry.[8,9] Even though local anesthesia injections can provide relief from pain during dental surgery, the process of getting an injection itself can be uncomfortable. Research shows that dental instruments that involve needles are often a source of fear and anxiety for patients.[10] To help manage this anxiety, distraction is sometimes used, which involves shifting the patient's focus away from stressful aspects of the procedure.[10] The major goal of this therapy is to calm the patient down and lessen their worry while receiving treatment. According to a number of studies, the ideal distraction requires the patient's engagement while having active emotional involvement and an optimal level of attention using several sensory modalities (visual and aural).[10]

In this study, children ages 6–10 were included. The procedure to which the children were exposed was cavity preparation and dental restoration, which can induce DFA because of the use of the dental operatory, including the three-way syringes, suction, and several hand instruments. The children included in the study were recruited initially, randomly divided into a study group and control group, and then subjected to dental procedures.

The mean anxiety levels were lowest in both the study and control groups before the dental treatment began. The results showed low mean anxiety levels before treatment. This can be attributed to the fact that although the process was explained to the children, the actual procedure had not yet started, thereby showing lower levels of anxiety. This also can be due to the fact that the children were unaware of what they would be subjected to, as they were new to a dental environment. The results were not statistically significant at $p < 0.06$. The results found in the present study are comparable to studies done elsewhere, where it was found that a majority of patients showed mild anxiety before their dental appointments.[16] Studies in epidemiology have indicated that there is a range of 3% to 20% of individuals who experience anxiety related to dental treatments.[17] The discrepancies in the rates of anxiety found in different studies could be attributed to variations in factors such as study participants, age groups, economic and social backgrounds, and tools used for data collection.[16,17]

The mean anxiety levels when compared between the study and control groups during the dental treatment were found to be higher in the control group. The study group (with AV distraction) showed lower mean anxiety levels when compared to the control group (without AV distraction). The results were statistically significant at $p < 0.00$. The higher mean anxiety levels in the control group during dental treatment are plausible, as it is during the treatment that the child feels threatened and scared because of what they perceive as invasive instrumentation or treatment, including the sound of the operatory with suction and the use of several hand instruments. The study group with the AV distraction showed lower mean anxiety levels because they did not hear much of the sounds of the operatory, and they were distracted because of the AV intervention. These results are comparable to previous studies where anxiety levels were found to decrease when there was an AV distraction employed during dental treatment.[15,18] Also, studies have reported that anxiety levels increased with the severity of the dental procedure that the children were subjected to, with lower levels of anxiety for less invasive procedures when compared to invasive procedures such as dental extractions.[18,20]

In addition, the mean anxiety levels when compared between the study and control groups after the dental treatment were found to be higher in the control group than in the study group. The study group (with AV distraction) showed lower mean anxiety levels when compared to the control group (without AV distraction). The results were statistically significant at $p < 0.00$. These findings can be attributed to the fact that the children in the study group with the AV distraction did not feel anything different during the treatment, and they continued to show lower mean anxiety levels even after the treatment was completed. The control group, however, continued to be anxious after the treatment was completed because of what they were subjected to during the dental treatment phase. The findings are in accordance with previous studies wherein it was seen that the subjects showed lower levels of anxiety once the procedure or appointment was completed.[18,20,21] In this study a simple tablet was used, which is cost effective and easy to use. There are several virtual reality tools available, and these gadgets may provide more distraction when compared to the present study; however, cost-effectiveness is something that should be considered for use on patients.

With the results of the present study, it can be concluded that AV distraction has shown to be an effective method for reducing anxiety levels in children while also reducing post-operative stress on dentists treating children. Therefore, the authors of this study suggest that the use of AV distraction while treating pediatric patients is to be encouraged.

REFERENCES

1. Kilinç G, Akay A, Eden E, Sevinç N, Ellidokuz H. Evaluation of children's dental anxiety levels at a kindergarten and at a dental clinic. Braz Oral Res. 2016; 30: 1–8.
2. Prihastari L, Iswara RA, Al Afiani G, Ramadhan F, Octaviani M, Hidayat WA, Al Faqih M, Ronal A. The relationship between dental fear, anxiety and sociodemography in Jakarta, Indonesia. Dent J. 2020; 53(4): 175–80.
3. Balbeid M, Rachmawati YL, Wibowo MA. The correlation between the knowledge level related to practice protocols and dentists' anxiety levels in practice during the COVID-19 pandemic. Dent J. 2022; 55(2): 99–104.

DOI: 10.20473/j.djmkg.v57.i1.p4–8

4. Blomqvist M, Ek U, Fernell E, Holmberg K, Westerlund J, Dahllöf G. Cognitive ability and dental fear and anxiety. Eur J Oral Sci. 2013; 121(2): 117–20.
5. R. M, Prasad V, Menon PA. A case of accidental aspiration of an endodontic instrument by a child treated under conscious sedation. Eur J Dent. 2013; 7(2): 225–8.
6. Maiya A, Shetty Yr, Rai K, Padmanabhan V, Hegde A. Use of different oral hygiene strategies in children with cerebral palsy: A comparative study. J Int Soc Prev Community Dent. 2015; 5(5): 389–93.
7. Padmanabhan V, Rai K, Hegde AM. Stress responses in children during endodontic treatment. J Pediatr Dent. 2013; 1(1): 14–8.
8. Cianetti S, Paglia L, Gatto R, Montedori A, Lupatelli E. Evidence of pharmacological and non-pharmacological interventions for the management of dental fear in paediatric dentistry: a systematic review protocol. BMJ Open. 2017; 7(8): e016043.
9. Oliver K, Manton DJ. Contemporary behavior management techniques in clinical pediatric dentistry: out with the old and in with the new? J Dent Child (Chic). 2015; 82(1): 22–8.
10. Anthonappa RP, Ashley PF, Bonetti DL, Lombardo G, Riley P. Non-pharmacological interventions for managing dental anxiety in children. Cochrane Database Syst Rev. 2017; (6): CD012676.
11. Attar RH, Baghdadi ZD. Comparative efficacy of active and passive distraction during restorative treatment in children using an iPad versus audiovisual eyeglasses: a randomised controlled trial. Eur Arch Paediatr Dent. 2015; 16(1): 1–8.
12. Nuvvula S, Alahari S, Kamatham R, Challa RR. Effect of audiovisual distraction with 3D video glasses on dental anxiety of children experiencing administration of local analgesia: a randomised clinical trial. Eur Arch Paediatr Dent. 2015; 16(1): 43–50.
13. Fakhruddin KS, El Batawi HY. Effectiveness of audiovisual distraction in behavior modification during dental caries assessment and sealant placement in children with autism spectrum disorder. Dent Res J (Isfahan). 2017; 14(3): 177–82.
14. Navidian A, Moulaei N, Ebrahimi Tabas E, Solaymani S. The effect of audiovisual distraction on the tolerability of flexible bronchoscopy: a randomized trial. Clin Respir J. 2018; 12(1): 76–83.
15. Al-Namankany A, Petrie A, Ashley P. Video modelling and reducing anxiety related to dental injections – a randomised clinical trial. Br Dent J. 2014; 216(12): 675–9.
16. Vadiati Saberi B, Neshandaar Asli H, Sharifiyan HR. Evaluation of dental anxiety level and related factors in patients referred to dental school. J Guilan Univ Med Sci. 2018; 27(106): 9–16.
17. Pohjola V, Kunttu K, Virtanen JI. Psychological distress, dental health, and dental fear among Finnish University students: A national survey. Int J Environ Res Public Health. 2021; 18(19): 10245.
18. Al-Khotani A, Bello LA, Christidis N. Effects of audiovisual distraction on children's behaviour during dental treatment: a randomized controlled clinical trial. Acta Odontol Scand. 2016; 74(6): 494–501.
19. Davies EB, Buchanan H. An exploratory study investigating children's perceptions of dental behavioural management techniques. Int J Paediatr Dent. 2013; 23(4): 297–309.
20. Mishra R, Singh AK, Singh P. A comparison of audio and audio-visual distraction techniques in managing dental anxiety in pediatric patients: A clinical study. Orig Res Artic. 2019; 88(3): 88–91.
21. Gómez-Polo C, Vilches A-A, Ribas D, Castaño-Séiquer A, Montero J. Behaviour and anxiety management of paediatric dental patients through virtual reality: A randomised clinical trial. J Clin Med. 2021; 10(14): 3019.

DOI: 10.20473/j.djmkg.v57.i1.p4–8