

Distraction techniques in management of apprehensive child in dental practice.
Systematic review of randomized controlled trials.

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Abstract

Anxiety is characterized as a combination of an emotional reaction such as fear, apprehension, tension, uneasiness, and a physiological reaction such as sweating, feeling tense symptoms that can arise out of a variety of reasons. Both patients and dentists face challenges dealing with dental anxiety. Aim of this systematic review is to provide an overview of the most relevant studies on non-pharmacological behaviour management techniques for contemporary alpha children, who undergo dental treatment. Data extraction was done according to the standard Cochrane systematic review methodology. Pubmed, Web of Science, Scopus, and Embase databases were searched from the year 2010 to 2022, for randomized clinical trials (RCT) and observational studies. Search strategy was performed for children younger than 10 years old according to definitions set by the World Health Organisation.

keywords ‘Distraction; Pediatric Dentistry; Behavior Mechanisms; Child Behavior; Fear; Anxiety.’

Introduction

Fear of the dentist, like any other kind of fear, can cause a wide range of uncomfortable physiological, mental, emotional, and behavioral reactions. This is a common issue at dentist's offices. Patients with anxiety report more severe pain that lasts for longer and that is remembered in greater detail. Anxiety is characterized as a combination of an emotional reaction such as fear, apprehension, tension, uneasiness and a physiological reaction such as sweating, feeling tense symptoms that can arise out of a variety of reasons. Both patients and dentists face challenges dealing with dental anxiety. Dental practitioners have known for some time that diverting patient attention away from painful stimuli can have a significant impact on how intense that stimulus is experienced as painful. Child dental behavior management is an emerging field of science that aims to build trust between dentist and patient. Some children can handle stress better, while others can't seem to control their own emotions and tend to act out or be uncooperative (1). Reaction of children to dental treatment are correlated with age, temperament features, maturity, personality, past experiences, and common and dentist-related phobias (2,3). Distraction is the practice of diverting the patient's attention from what may be viewed as an unpleasant process (AAPD 2016). When developing their theory of distraction, Mc Caul and Mallet focused on the finite nature of human attention. They noted that focus on the painful stimuli was required for pain perception, and that diversion from the stimulus reduced pain sensation [4]. Distractions can be either in active or passive form. Audiovisual distraction is a mode of passively distracting two types of sensations—hearing and vision. In contrast, engaging in gaming is an active strategy that diverts attention away from an additional source of experience, namely, one's own body's kinesthetic perceptions. There is a large and growing population of young people who like using their mobile devices for video entertainment and gaming. These can be employed by the dentists as means of diversion for pediatric patients. Unfortunately, there is a dearth of research on the impact of mental distraction in the dentist chair.

Aim of the study:

To provide an overview of the most relevant studies on non-pharmacological behaviour management techniques for contemporary alpha children, who undergo dental treatment.

Materials and method:

'This study was approved by ethical committee of Riyadh Elm University' with IRB number "FRP/2022/472/831/791"

Study Design**Data sources**

Data extraction was done according to the standard Cochrane systematic review methodology. Pubmed, Web of Science, Scopus, and Embase databases were searched from the year 2010 to 2022, for randomized clinical trials (RCT) and observational studies, with keywords 'Distraction; Pediatric Dentistry; Behavior Mechanisms; Child Behavior; Fear; Anxiety.'

Search strategy was performed for children younger than 10 years old according to definitions set by the World Health Organisation. Type of dental care and behaviour management techniques was considered for systematisation of information rather than for comparison, which can contribute to the practice and research by identifying gaps in the existing literature.

Selection and Eligibility Criteria

The selection of studies was performed on an independent basis. Disagreements were solved by a third research expert on the theme. The inclusion criteria of the studies were: a) focus on nonpharmacological behaviour management techniques in paediatric dentistry; b) prospective clinical assays (i.e., parallel groups or cross designs); observational studies (i.e., cohort, cross-sectional and case-control studies) 3) publication from 2010 (beginning of the generation alpha era). The exclusion criteria are: 1) studies with children older than 10 years old (out of the generation alpha); 2) studies with special need patients; 3) studies using pharmacological techniques; and 4) studies conducted before 2010. Only studies fully available for reading were considered for analysis.

Data extraction

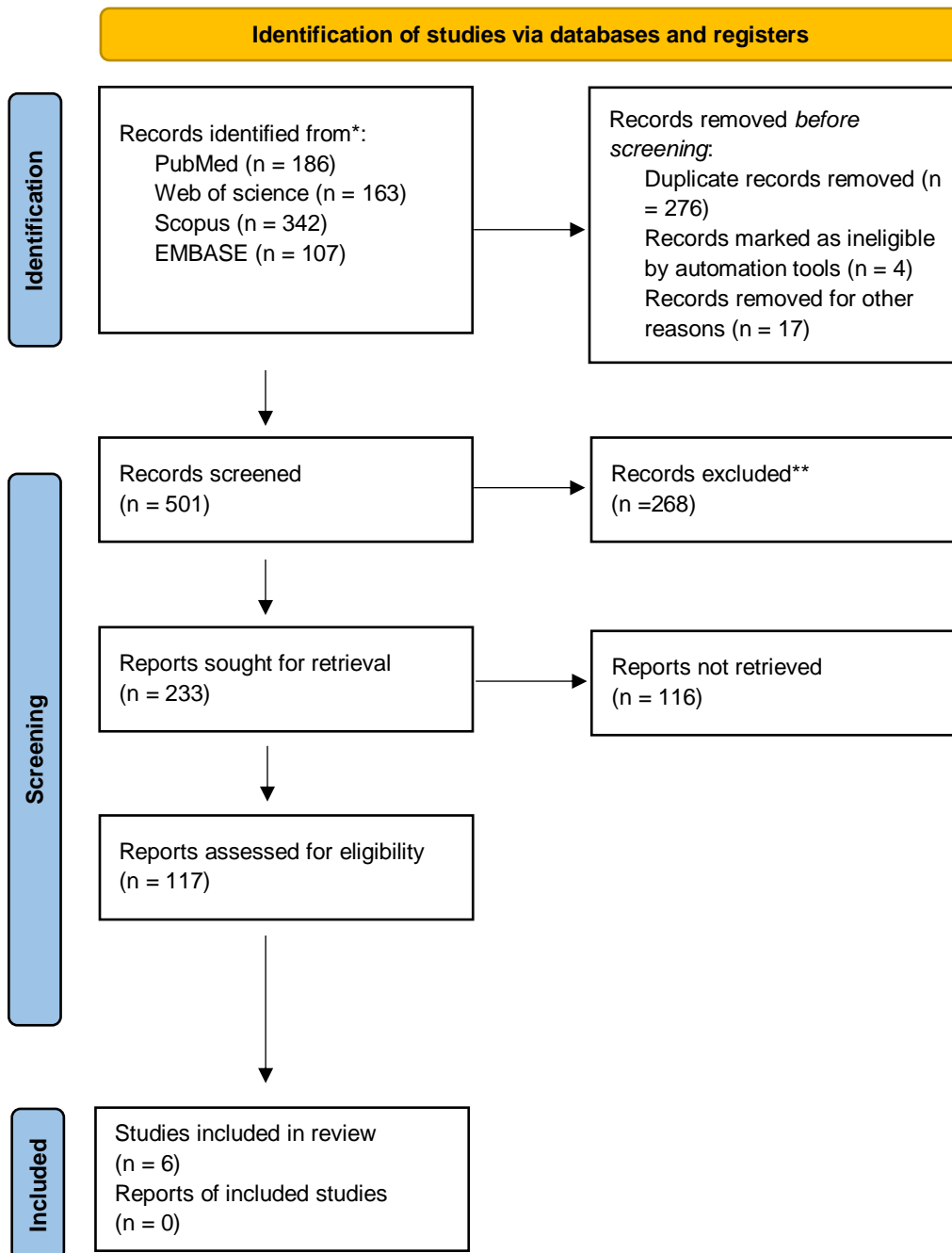
Screening of eligible studies, assessment of the methodological quality and data extraction were conducted independently and in duplicate. Two reviewers evaluated the references using the same search strategy and then the same inclusion criteria to the selected studies were applied. PRISMA 2020 guidelines and flow diagram was used to describe the selection process of searched articles.

Results

The original search yielded 798 titles, of which 233 were chosen based on their title and abstract. Nine articles were discarded as they did not match the inclusion criteria. Criteria examined were retention, time and cost, adaptation of the tissue surface, patient experience and satisfaction, and unplanned and postinsertion adjustment visits of digital and traditional CDs.

The authors of this systematic review followed the steps outlined in the PRISMA 2020 flowchart (shown in Figure 1). Duplicates that were discovered simultaneously across databases were eliminated. Screening articles by their titles and abstract summaries yielded a final count of 117. After reading the entire articles and making connections with the inclusion and exclusion criteria, additional articles were removed. This systematic review included 6 articles, all of which were evaluated for potential bias (Table 1).





































Fig 1-PRISMA 2020 flow diagram for new systematic reviews which included searches of databases and registers only



Risk of bias assessment:

Cochrane risk of bias assessment method was used to assess the quality of the studies included.

Table 1: Risk of bias assessment with the recommended approach of Cochrane ROB 2

<u>Authors</u>	<u>D1</u>	<u>D2</u>	<u>D3</u>	<u>D4</u>	<u>D5</u>	<u>Overall</u>
Koticha et al.						
Nunna et al						
Chaturvedi et al						
Radhakrishna et al						
Dahlquist et al						
Prabhakar et al						

Discussion

The Pedodontist faces a substantial challenge in the form of dental anxiety in children. Preventive dental care is highly effective, but its benefits are diminished in children who are unwilling to cooperate due to significant fear and anguish. Therefore, many people put off visiting the dentist, which can lead to further complications and poor oral health. Reducing a child's fear of the dentist at an early age can help ensure that they don't carry that fear into adulthood. The goal of this analysis was to provide clinicians and researchers with a critical evaluation of the existing literature on pediatric distraction strategies. Research gaps appear to be intrinsically linked to the use of distraction methods. There is a call to recognize children's preferences as a means of illuminating best practices and supporting children's rights to participate in healthcare decision-making. (5) Considering the high degree of link between the two, it is crucial to assess how children and teenagers cope with procedures in light of the fact that pain is a major predictor of anxiety. (5. Whitehead-Pleaux et al judiciously evaluated utilizing a combination of methods such as questionnaires, interviews, and/or laboratory tests (6). There is a paucity of objective distraction measures and effective pain evaluation instruments are not always employed or readily available ((7)). Even though quantitative scales and

measurements are commonly used, some researchers argue that bigger samples are necessary to ensure reliable results (8,9). There is a dearth of qualitative research that thoroughly examine the individual experiences of pediatric patients using distraction tactics. Others have pointed out that qualitative or inductive methods, which can give a more nuanced understanding of complex phenomena, are more suited to the study of health care experiences than quantitative methods (10). Children born after 2010 and those who will be born up to 2025 are part of generation alpha because they are immersed in a world dominated by technology from an early age. Due to their facility with technology, these children are able to become more self-reliant than previous generations at an earlier age (11). This idea is critical for modifying the standard methods of behavior management. Therefore, we looked through databases for research on psychological regulation of kid behavior that had been published after 2010. We decided not to do a meta-analysis due, in part, to the fact that the methodologies used in the individual studies were too different from one another. Recent literature searches using the inclusion criteria yielded studies published in 2014. Children between the ages of three and four are in the early childhood phase, a time when they are semi-independent thanks to the development of self-control, logical reasoning, and communication skills that enhance their ability to interact with their practitioner. These children of Generation Alpha are able to learn more quickly, acquire more skills, and form more habitual behaviors than any previous generation. management (12).

Types of distraction

Dental phobia and anxiety can be reduced without the use of harmful drugs using hypnosis, biofeedback with guided imagery [13], distraction through storytelling, audio, and audio-visual assistance. Parents also choose non-invasive treatments instead of general anesthesia, sedation, restraint, and hand over mouth. During the 1980s, live modeling, desensitization, and contingency management procedures such as contingent distraction, contingent escape, reward, and relaxation techniques came into existence to treat unruly youngsters during dental treatments. Additionally, gentle stroking of the mucosa during the injection with topical anesthetic has been effective in the field of medicine (14,15,16). Aminabadi et al. found counter-stimulation (CS) useful in lowering discomfort during LA administration in children under five years old [17]. Distraction or redirection is believed to function by diverting attention to modify pain perception. Gate control theory by Melzack and Wall clearly explains the principle behind

distraction through the stimulation of the larger diameter type A and type B nerve fibers in a specified area using appropriate pressure or vibration, decreasing the perception of pain by closing a neural gate to nociceptive signals.

Mahesh et al evaluated the efficacy of virtual reality (VR) distraction and counter-stimulation (CS) on dental anxiety and pain perception to local anesthesia in children and based on the data, drew the following conclusions: Firstly, Virtual reality is an effective behavior guidance modality for reducing children's dental fear and anxiety during LA administration, as compared to CS. Secondly, Not just in the LA administration, but across the board, most of the kids in the VR group wanted to keep watching cartoons in the headset the whole time they were getting their teeth cleaned. Thirdly, when compared to other virtual reality distraction gadgets, the ANTVR headset is both affordable and widely available. (18) Interestingly, Sullivan et al. found that VR distraction was ineffective for decreasing anxiety levels in children undergoing invasive dental procedures. (19) Koticha et al evaluated the effectiveness of virtual reality eyeglasses as a distraction aid to reduce anxiety of children undergoing dental extraction procedure. A total of 60 bilateral primary maxillary and mandibular molars in 30 patients aged 6–10 years were selected for this study. Bilateral nonrestorable primary molars were assigned for the dental extraction procedure. The randomization procedure was performed before the clinical procedure by using the split mouth study design. In a split mouth design, there are two study treatments (group I and group II) that are randomly assigned to left or right dentition sites. In group I (VR group), extraction was done with wearing VR eyeglasses whereas in group II (control group), the dental extraction procedure was done without wearing VR eyeglasses. Child's anxiety level in each procedural visit was assessed using a combination of three measures: The Venham's picture test (VPT), which is a projective, psychometric, self-measure test that is used to measure the state anxiety of the young child. It comprises of eight cards, with two pictures in each card, one anxious figure and one nonanxious figure. The child was asked to select one of the figures he or she felt most like at that moment. All the cards were shown with number and ordered accordingly. If the child selects anxious figure, then score of 1 was recorded; if the child selects nonanxious figure, a score of 0 was recorded. The scale has a range of 0–8.17 Pulse rate and oxygen saturation measured by the finger pulse oximeter (Choicemmed MD300C15D Pulse Oximeter, India), which is a direct measure of physiological arousal since its increase is attributed to stress during dental procedures. Some scholars also revised the practice of

role modeling to make it more relevant to the present day. While the youngster was waiting for dental care, the surgeon dentist made a film displaying models utilizing the T-S-D technique so that the child could see what would happen and have some notion of what to expect. Modifying these techniques for use with a computer monitor and/or audio-visual spectacles can help a youngster feel more at ease during dental procedures. Parental attendance or absence did not seem to make a difference in the child's behavior improvement during dental care. It is crucial to note, however, that all the included studies indicated multiple strategies for dealing with the child's behavior, including regular dental checkups. Therefore, the outcome of any dental treatment will depend on the paediatric dentist's interaction with the child. A combination of tried-and-true techniques (such the T-S-D method, positive reinforcement, and music) and cutting-edge gear (like audio-visual spectacles) can help both the practitioner and the kid feel more at ease. The practitioner can better manage the children's behavior and have an adequate grasp of each patient if they have as much information as possible about the children and their interaction with the environment where they reside. To lessen the child's fear of, or resistance to, dental treatment, it is crucial to be familiar with and regularly update these techniques.

Conclusion

In conclusion, pedodontists are tasked with ensuring that dental care is as comfortable and stress-free as feasible for young patients to improve their conduct throughout procedures. When compared to the Tell-Show-Do method, dental playthings like the Play-Doh Doctor Drill 'n Fill set and the "Dentist games for kids" smartphone app are vastly superior at calming a child's nerves and keeping them under control during dental treatment. They are innovative, easy to use, and efficient methods that have the potential to alleviate patients' dental anxiety and terror. In today's age of digital dentistry, a child's fear of the dentist can be eased with the help of a visual or aural aid.

Table 2. Summary of Selected articles

Authors	Title	Research Purpose	Methodology	Result	Conclusion
Koticha et al (20)	Effectiveness of virtual reality eyeglasses as a distraction aid to reduce anxiety among 6–10-year-old children undergoing dental extraction procedure (2019)	The aim of this study is to evaluate the effectiveness of virtual reality eyeglasses as a distraction aid to reduce anxiety of children undergoing dental extraction procedure.	Thirty children of age 6–10 years (n= 60) with bilateral carious primary molars indicated for extraction were randomly selected	The pulse rate values in intergroup comparison were found statistically significant $p = 0.03$	The virtual reality used as a distraction technique improves the physiologic parameters of children aged 6–10 years but does not reduce the patient's self-reported anxiety according to Venham's picture test used.
Nunna et al. (18)	Comparative evaluation of virtual reality distraction and counter-stimulation on dental anxiety and pain perception in children (2019)	This study evaluated the efficacy of virtual reality (VR) distraction and counter-stimulation (CS) on dental anxiety and pain perception to local anesthesia in children	randomized, single-blinded interventional clinical trial with a parallel design was used. Seventy children 7–11 years old who required local anesthesia (LA) for pulp therapy or tooth extraction	WBFPS scores showed less pain perception to LA needle prick in the CS group while the same change was observed in the VR group with VAS scores	VR distraction is better than CS for reducing anxiety to injection in children undergoing extraction and pulpectomy
Chaturvedi et al. (24)	Comparative evaluation of anxiety level during the conventional dental procedures with and without	to evaluate the effectiveness of the audiovisual distraction (AVD) eyeglasses in reduction of anxiety during conventional dental procedures in	40 healthy children between 6 and 10 years old visiting Dr. D.Y. Patil Dental College and Hospital, Pimpri, Pune, for the dental treatment with Frankl's behavior rating scale score 3 and 4.	It was found that anxiety reduction was seen via WongBakers Pain Rating Score in Group A in children wearing AV eyeglasses being statistically significant in oral prophylaxis ($P < 0.05$), restoration ($P < 0.05$), and pulpectomy/root canal treatment.	Results suggest that the use of an AVD system may be a beneficial option for patients with mild to moderate fear and anxiety associated with dental treatment in children

	audiovisual distraction eyeglasses in pediatric dental patients (2019)	pediatric dental patients			
Radhakrishna et al. (25)	Comparison of three behavior modification techniques for management of anxious children aged 4-8 years. (2009)	The aim of this study was to compare the techniques of Tell-Show-Play-doh, a smartphone dentist game, and a conventional Tell-Show-Do method in the behavior modification of anxious children in the dental operatory.	Sixty children in the age group of 4-8 years, with Frankl's behavior rating score of 2 or 3, requiring Class I and II cavity restorations were divided into three groups	The results showed lower mean pulse rates, lower FIS and FLACC scores, higher percentage of children with Frankl's behavior rating score of 4, and better operator compliance in both the Tell-Show-Play-doh and smartphone dentist game groups than in the conventional Tell-Show-Do group.	The Tell-Show-Play-doh and smartphone dentist game techniques are effective tools to reduce dental anxiety in pediatric patients.
Dahlquist et al (26)	Effects of videogame distraction using a virtual reality type head-mounted display helmet on cold pressor pain in children (2009)	To test whether a head mounted display helmet enhances the effectiveness of video game distraction for children experiencing cold pressor pain.	Experimental stratified random sampling design – All participants underwent 1 or 2 baseline cold processor trials followed by 2 distraction trials (played the same VG with and without the helmet in counterbalanced order) – Pain threshold and pain tolerance were measured for each cold processor trial	Both distraction conditions resulted in improved pain tolerance relative to baseline	Virtual reality technology can enhance the effects of distraction for some children

Prabhakar et al. (27)	A comparison between audio and audiovisual distraction techniques in managing anxious pediatric dental patients. (2007)	aim of this study was to evaluate and compare the two distraction techniques, viz, audio distraction and audiovisual distraction, in management of anxious pediatric dental patients.	Sixty children aged between 4-8 years were divided into three groups. Each child had four dental visits - screening visit, prophylaxis visit, cavity preparation and restoration visit, and extraction visit.	The patients had an overwhelming response to music presentation and wanted to hear it at their subsequent visits.	audiovisual distraction technique was more effective in managing anxious pediatric dental patient as compared to audio distraction technique.
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