

Evaluation of Effectiveness of Smart Phone Dental Simulation Application in Management of Child's Anxiety

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Aim: The purpose of this study was to assess the efficiency of Smart Phone Dental Simulation Application in controlling children's anxiety.

Material and Method: Fifty children in the age group of 6–10 years who visited to dental clinic for the first time and fulfilled the inclusion criteria were randomly selected from the Outpatient Department of Pedodontics and Preventive dentistry. Selected subjects were made to use mobile dental app called "Little Lovely Dentist" mobile dentistry app from Leaf Cottage Games, which is available on the Google Play Store for Android. Their anxiety levels were noted before and after playing the game using the facial imaging scale.

Result: It was observed that the mean anxiety level before use of smart phone dental application was 3.42 ± 0.32 which was reduced to 1.12 ± 0.25 after use of smart phone dental application which was found to statistically significant.

Conclusion: It was revealed that the mobile dental application was useful in the dental setting to minimize the anxiety of the young patients.

Keywords: Anxiety, Mobile Dental Application, Pediatric Patient

Introduction: Several factors, including the sound of a dental drill, air rotor noises, dread of needles, prior negative dental experiences, the odour of a dental office, and pain, are known to contribute to a child's dental anxiety and phobia.¹ All of these circumstances cause people to be unaware of dental maintenance requirements and to avoid it, which lowers the demand

for juvenile dental care. "Although operative dentistry may be perfect, the appointment is a failure if a child departs in tears," brilliantly noted by "McElroy" in 1895, highlighting the significance of behaviour shaping above technical competence in paediatric dentistry. Avoidance and neglect result in more problems and create the "vicious cycle of Dental Fear".^{2,3} Therefore, careful planning with the selection of specific approaches and adapting it to the needs of each individual parent and the dentist's abilities are crucial for improving oral care. Behavior guiding is a clinical art form that uses skills and safe, effective treatment based on research to change a child's behaviour. It's crucial to have a fundamental understanding of the child's social, emotional, and cognitive development in order to apply the proper behaviour counselling approaches.⁴ The traditional methods of behaviour modification have been altered to remain compatible with contemporary parenting practises and children's attitudes about emerging advanced technologies.⁵

The management of children's anxious and cooperative behaviour has resulted in the development of numerous linguistic, sophisticated, and pharmaceutical therapies. The tell-show-do method, modelling, and positive or negative reinforcement are the most frequently employed techniques by dentists to control children's anxiety and dread, and in some circumstances even resistant or resistive behaviours. The Tell-Show-Do technique, developed by Addelston in 1959, is still the cornerstone of behaviour management techniques (BMTs), which are frequently employed by paediatric dentists to decrease children's anxiety prior to treatment. It dictates that before anything is done, the child be told what will be done and then shown by some sort of simulation exactly what will happen before the procedure is started.^{7,8}

A typical mobile device today contains a mobile phone, a GPS navigation system, an embedded web browser and instant messaging software, as well as a handheld game console, as opposed to just being a basic two-way pager. This is due to the development of technology. From toddlers to teenagers, it is common to observe kids of all ages glued to their mobile devices, either playing interactive games or surfing the internet. There is an app available today for almost anything. However, not much has been done to advance paediatric dentistry or even inform patients about their treatments in order to allay their fears or anxieties.⁸ Hence, this study aims to assess the efficiency of dental application in the management of children's anxiety and behaviour.

Material and Method: The Ethics Committee of Centre approved this randomised clinical trial investigation, which was carried out in the Department of Pediatric and Preventive

Dentistry from October to November 2022. Fifty children (23 girls, 27 boys) in the age group of 6–10 years who visited to dental clinic for the first time and fulfilled the inclusion criteria were randomly selected from the outpatient department of Pedodontics and Preventive dentistry.

Inclusion Criteria

1. Children requiring any kind of dental treatment
2. Children with first dental visit
3. Children between 6 to 10 years of age
4. Children with no relevant medical conditions

Exclusion Criteria

1. Children with previous dental experience.
2. Children with any visual defect.
3. Children with any auditory defect.
4. Mentally or physically challenged child.
5. Children with learning disability.

In this study, we used the "Little Lovely Dentist" mobile dentistry app from Leaf Cottage Games, which is available on the Google Play Store for Android. **(Figure no. 1)** The programme gave patients an interactive preview of the type of treatment they will receive. Dental procedures such as extractions, scaling, and fillings were conducted on the patients by virtual dentists, who also showed the young patient how painlessly and trauma-freely they might be carried out. The children were made to use the software and execute digital dental procedures. Using facial imaging scale, the anxiety levels were measured before and after using the app. **(Figure no. 2)** It is a projective self support measure of anxiety consisting series of pictures ranging from very happy to very unhappy faces. The child was asked to choose picture which looks like the way child was feeling during the treatment. Score ranges from 1-5.

Statistical Analyses: Standard software was used to conduct all statistical analyses (SPSS 20.0 for Windows, SPSS Inc., Chicago, USA). The paired t-test was used to examine the variation in anxiety scores between pre- and post-intervention on the facial image scale.



Figure no. 1: Little Lovely Dentist App

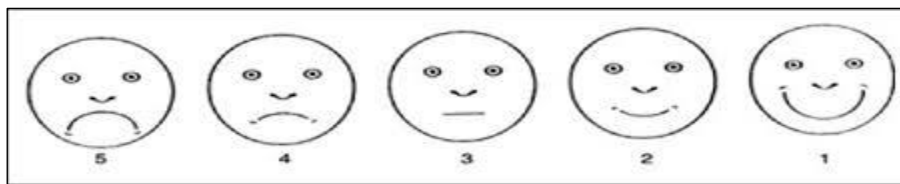


Figure no. 2: Facial Image Scale

Result: Table no. 1 shows mean difference in pre and post anxiety level. It was observed that the mean anxiety level before use of smart dental application was 3.42 ± 0.32 which was reduced to 1.12 ± 0.25 after use of smart dental application which was found to statistically significant.

Table no. 1: Paired <i>t</i> -test Comparing Pre- and Post anxiety		
Facial Image Scale	Mean	P Value
Pre	3.42 ± 0.32	0.001
Post	1.12 ± 0.25	

Discussion: This study tested the effects of smart dental application on anxiety level in children who were reported to department for any dental treatment. Anxiety and pain are unpleasant emotions and sentiments that are linked to actual or potential traumatic injuries to tissues.⁹ Management techniques have been suggested to lessen anxiety in children receiving dental care, and they can be broadly categorised into two groups. The first lesson covers behavioural strategies such as hypnosis, the tell-show-do method, inspiration, diversion, and modelling. The second group of methods is made up of pharmacologic methods.^{10,11} In addition to the methods previously stated, mobile phone technology presents a rare chance to covertly track daily activity and changes in emotional state in real time.¹² Mobile phone

health apps also give users the option of receiving an immediate response to the results of this monitoring by sending them information on their mental health based on changes in their actual emotional state. Despite being one of the few pieces of technology that the majority of people carry around with them every day, this technology has not yet been completely utilised for these objectives. Due to their widespread use, mobile phones provide a very natural and frequent way to gather information about emotional state. They are also a reasonably priced method of getting assistance for mental health problems that may transcend social and geographical barriers.¹³

The logical progression of computer-based applications is toward smartphone-compatible mobile apps. Numerous advantages, such as cost effectiveness, constant connectivity, near-constant availability, and the ability to gather location and other data through built-in sensors, may apply to smart phone-based mental health apps.

The behavioral intervention program using a smart phone application effectively relieved anxiety in children in an interactive, joyful, and playful manner through the dental app. In present study significant decrease in post mean facial image scores was found as compared to pre score Facial image score. Patil VH et al.(2017)⁸ conducted a study to evaluate the effectiveness of dental apps in the management of child's anxiety and behavior and they found that the mobile dental app was found to be very useful in the dental setup to reduce the fear and anxiety of the pediatric patients which is accordance to our study. This can be possibly attributed to the potentially counterproductive effect of elaborate explanation about the dental procedures before the treatment. According to the results of the present study, educating a child using a dental app is a better method to reduce anticipatory anxiety during their first dental visit.

Limitation: A potential limitation of this study is its small sample size and uneven age distribution of the children. Since this study was conducted during the initial dentist appointment in the outpatient department. Future research should be done employing the dental app as a behaviour guiding approach with invasive and non-invasive procedures such oral prophylaxis, restoration, pulp therapy, or extractions in order to prove its effectiveness.

Conclusion: According to the aforementioned interpretations, behaviour modification utilising a dental app is more helpful in reducing a child's fear by educating them about the procedure. To help youngsters behave appropriately during their first dental visit by lowering their fear of the procedure, paediatric dentists can consider using a dental app.

Conflict of Interest: Authors declare that there is no any conflict of interest.

References

1. Kaur R, Jindal R, Dua R, et al. Comparative evaluation of the effectiveness of audio and audiovisual distraction aids in the management of anxious pediatric dental patients. *J Indian Soc Pedodont Prevent Dent* 2015;33(3):192. DOI: 10.4103/0970-4388.160357.
2. 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;7(1):1. DOI: 10.1186/1472-6831-7-1.
3. Kapil D, Saraf BG, Sheoran N, et al. Contemporary Behavior Guidance Techniques to Outsmart Child's Anxious Mind. *J South Asian Assoc Pediatr Dent* 2021;4(1):41–49.
4. Oliver K, Manton DJ. Contemporary behavior management techniques in clinical pediatric dentistry: out with the old and in with the new? *J Dent Child* 2015;82(1):22–28.
5. Swarna K, Prathima GS, Suganya M, et al. Recent advances in non-pharmacological behaviour management techniques in children—an overview. *IOSR J dent Med Sci* 2019;18:18–21.
6. Wright GZ, Stigers JI. Non-pharmacologic management of children's behaviors. In: Dean JA, Avery DR, McDonald RE, editors. *Dentistry for the Child and Adolescence*. 9th ed.. St. Louis: CV Mosby Co.; 2011. p. 30.
7. Townsend JA. Behaviour guidance of the paediatric dental patient. In: Casa Massimo PS, Fields HW, McTigue DJ, Nowak AJ, editors. *Paediatric Dentistry: Infancy through Adolescence*. 5th ed. Philadelphia: Elsevier Saunders; 2013. p. 358.
8. Patil VH, Vaid K, Gokhale NS, Shah P, Mundada M, Hugar SM. Evaluation of effectiveness of dental apps in management of child behaviour: A pilot study. *Int J Pedod Rehabil* 2017;2:14-8
9. Mathew P, Mathew J. Assessment and management of pain in infants. *Postgrad Med J*. 2003;79:438–43.
10. Prabhaker AR, Marwah N, Raju OS. A comparison between audio and audiovisual distraction techniques in managing anxious pediatric dental patients. *J Indian Soc Pedod Prev Dent*. 2007;25:177–182.
11. Ram D, Peretz B. Administering Local anaesthesia to paediatric dental patients – current status and prospects for the future. *Int J Paediatr Dent*. 2002;12:80–9.

12. Kain ZN, Caldwell-Andrews AA, Maranets I, McClain B, Gaal D, Mayes LC, et al. Preoperative anxiety and emergence delirium and postoperative maladaptive behaviors. *Anesth Analg* 2004;99:1648-54.
13. Kim JE, Jo BY, Oh HM, Choi HS, Lee Y. High anxiety, young age and long waits increase the need for preoperative sedatives in children. *J Int Med Res* 2012;40:1381-9.