

## RESEARCH ARTICLE

# A Comparative Study of Filmed Modeling and Tell-show-do Technique on Anxiety in Children undergoing Dental Treatment

<sup>1</sup>NM Roshan, <sup>2</sup>Shruti G Virupaxi, <sup>3</sup>KP Bharath, <sup>4</sup>P Poornima, <sup>5</sup>NB Nagaveni, <sup>6</sup>IE Neena

## ABSTRACT

**Introduction:** Dental appointment has been considered a stressful situation in children with elevated anxiety and avoidance behavior, which if not effectively managed will possibly continue to adulthood. There are various techniques of managing anxious children in dental clinics like communicative, pharmacologic, and nonpharmacologic interventions, but recently the American Academy of Pediatric Dentistry has recommended to conduct more studies on nonpharmacologic interventions.

**Aim:** The purpose of this study was to evaluate the effectiveness of two nonpharmacologic behavior management techniques, filmed modeling (FM) and Tell-Show-Do (TSD) technique, on dental anxiety in children and to compare them based on heart rates and modified Venham's anxiety scale.

**Materials and methods:** Twenty children aged between 6 and 9 years who were on their first dental visit were split into groups I and II. Group I children were conditioned for restorative treatment by TSD technique, whereas group II with FM. The anxiety levels were recorded at different intervals for the two techniques using heart rate and modified Venham's anxiety rating scale. Student's t-test was done to compare heart rate between two groups at various time intervals, and Pearson's correlation coefficient was done to measure the relation between heart rate and Venham's score.

**Results:** No statistically significant differences were seen in heart rate measures, clinical anxiety scores of children between the two groups. The p-values for both the treatment groups at various time intervals were  $H_1=0.660$ ,  $H_2=0.665$ ,  $H_3=0.835$ ,  $H_4=0.483$ , and  $H_5=0.681$  respectively. Student's t-test shows that there was no significant difference in both the treatment groups, and Pearson's correlation coefficient test shows that there is highly positive correlation at different time intervals, which means that as the heart rate increases, the modified Venham's score also increases.

**Conclusion:** Filmed modeling can be an efficient alternative method to TSD technique in preparation of the 6- to 9-year-old children during dental treatment.

**Keywords:** Behavior management techniques, Dental anxieties, Film modeling, Phobia, Tell-show-do.

**How to cite this article:** Roshan NM, Virupaxi SG, Bharath KP, Poornima P, Nagaveni NB, Neena IE. A Comparative Study of Filmed Modeling and Tell-show-do Technique on Anxiety in Children undergoing Dental Treatment. J Oral Health Comm Dent 2018;12(1):20-24.

**Source of support:** Nil

**Conflict of interest:** None

## INTRODUCTION

Fear and anxiety are two concepts that are closely associated and for which there are many definitions. Fear is a response to a specific stimulus, while anxiety is a result of a more general or pervasive stimulus. Geer<sup>1</sup> stated that the difference between fear and anxiety is thus conceptualized as a difference in the specificity of the stimulus. Corah et al<sup>2</sup> stated that dental anxiety is more specific than general anxiety; it is the patient's response to the stress specific to the dental situation. Dental anxiety is a topic of concern for professionals, as it prevents many potential patients from seeking treatment and also causes strain to the dentists undertaking dental treatment. Hence, it can be challenging for the dental practitioner to treat young children as their level of cooperation can be restricted because of their anxiety.<sup>3</sup>

Dental anxiety among 13- to 14-year-old children was investigated by Bedi et al,<sup>4</sup> who reported a prevalence of 7.1% with a higher level among girls and in children of lower socioeconomic classes. Dental anxiety is most commonly measured using questionnaires and behavior rating scales.<sup>5</sup> Many techniques have been augmented to manage the anxiety of children in dental clinics. However, according to the American Academy of Pediatric Dentistry conference in 2003, it was reported that there were more studies done on pharmacological management technique than that of nonpharmacologic techniques.<sup>6</sup>

Several studies have shown that TSD (nonpharmacological technique) is the most commonly used technique

<sup>1,3,5,6</sup>Reader, <sup>2</sup>Senior Lecturer, <sup>4</sup>Professor and Head

<sup>1,3-6</sup>Department of Pedodontics and Preventive Dentistry, College of Dental Sciences, Davangere, Karnataka, India

<sup>2</sup>Department of Pedodontics and Preventive Dentistry, Maratha Mandals Nathajirao G. Halgekar Institute of Dental Sciences & Research Centre, Belgaum, Karnataka, India

**Corresponding Author:** Shruti G Virupaxi, Senior Lecturer Department of Pedodontics and Preventive Dentistry, Maratha Mandals Nathajirao G. Halgekar Institute of Dental Sciences & Research Centre, Belgaum, Karnataka, India, Phone: +918904535347, e-mail: dr.shrutigv@gmail.com

in pediatric dentistry. It consists of explaining and demonstrating the technique and the instruments used during treatment.<sup>6,7-9</sup>

Modeling another nonpharmacological technique is worth exploring. According to a review by Baghdadi,<sup>10</sup> modeling was described by Bandura in 1967, which is a course of acquiring behavior of a model by observing. The first study of modeling in pediatric dentistry was conducted in 1969, which was reported by Greenbaum and Melamed,<sup>11</sup> later several other studies followed in the 1980s.<sup>8,12</sup> According to these literature studies, two forms of modeling, live and filmed, are effective in decreasing children's fear and anxiety about dental treatments and promote positive behavior.<sup>11-15</sup>

According to the recommendations of the American Academy of Pediatric Dentistry<sup>6</sup> on the need to study nonpharmacologic behavior management techniques by means of various clinical protocols, the present study was undertaken to compare the effects of FM and the TSD method on anxiety in children undergoing dental treatment based on their heart rates and modified Venham's anxiety scale.<sup>16,17</sup>

## MATERIALS AND METHODS

The power analysis revealed that a total sample size of 20 (10 per group) was needed to detect clinically meaningful differences between the groups at a power of 85% and at 0.05 significance level. A randomized clinical trial study was done on 20 children aged between 6 and 9 years, who reported to the Department of Pedodontics and Preventive Dentistry, College of Dental Sciences, Davangere, India, with the chief complaint of decayed teeth and who met the following inclusion and exclusion criteria.

### Inclusion Criteria

Children were eligible for the study if they presented for a first visit to the dental care center with no medical history that might affect the heart rate and who had only occlusal caries (class I).

### Exclusion Criteria

Teeth were excluded if there was a history of pain, abscess, or there was definite or likely pulpal exposure. Informed consent was taken from parents of all participants prior to starting the treatment procedure.

The study subjects were randomly divided into two groups:

1. *Group I:* Ten children were conditioned to receive dental treatment by TSD technique. It consists of explaining and demonstrating the procedure and the instruments used during treatment.<sup>6-9</sup>

**Table 1:** Venham's index (modified 6-point scale according to Venham)<sup>16,17</sup>

Score	Criteria
0	<i>Relaxed:</i> Smiling, willing, able to converse, displays behavior desired by the dentist
1	<i>Uneasy:</i> Concerned, may protest briefly to indicate discomfort, hands remain down or partially raised; tense facial expression, high chest; capable to cooperate
2	<i>Tense:</i> Tone of voice, question, and answers reflect anxiety; during stressful procedure, verbal protest, crying, hands tensed and raised, but not interfering very much; protest more distracting and troublesome; child still complies with the request to cooperate
3	<i>Reluctant:</i> Pronounced verbal protest, crying; using hands to stop procedure; treatment proceeds with difficulty
4	<i>Interference:</i> General crying, body movements sometimes needing physical restraint; protest disrupts procedure
5	<i>Out of contact:</i> Hard loud crying, swearing, screaming; unable to listen, trying to escape; physical restraint required

2. *Group II:* Remaining 10 children were conditioned for dental treatment by FM technique with a video showing modeling by another child.<sup>13</sup>

After conditioning each subject, class I cavity preparation was done using a high-speed handpiece with water spray. Later, the teeth were restored with type II GIC under isolation using suction tip and cotton rolls. The anxiety level was recorded at five different stages during treatment using heart rate and modified Venham's anxiety scale (Table 1).<sup>16,17</sup>

1. When the child was sitting in the waiting area.
2. After demonstrating the behavior management technique (TSD or FM).
3. After the completion of cavity preparation.
4. At the moment when restoration was completed.
5. After the child was sent out of the operating room.

The heart rates of the patients were measured using a portable pulse oximeter device applied on the finger of the child. Both the recordings of the heart rate and the observations were carried out by one dentist not taking part in the actual treatment of the children.

## Statistical Analysis

To analyze a difference in the modified Venham's score between the two treatment groups, a chi-square test was used. Student's t-test was used to measure the heart rates of children recorded in both the treatment groups. Pearson's correlation coefficient was used to assess the relation between the heart rate and Venham's score.

## RESULTS

A total of 20 children aged 6 to 9 years participated in the study. Table 2 shows Student's t-test which was done to

**Table 2:** Student's t-test comparing heart rate between two groups at various time intervals

Heart rate at various time intervals	Mean heart rate		p-value
	TSD	FM	
H <sub>1</sub>	93.70 ± 6.732	93.40 ± 6.484	0.660 NS
H <sub>2</sub>	85.60 ± 7.516	85.30 ± 6.49	0.665 NS
H <sub>3</sub>	82.60 ± 6.467	79.70 ± 5.559	0.835 NS
H <sub>4</sub>	80.90 ± 6.999	76.50 ± 5.238	0.483 NS
H <sub>5</sub>	79.10 ± 7.015	76.50 ± 5.169	0.681 NS

p-value < 0.05 is significant; NS: Not significant

**Table 4:** Pearson's correlation coefficient measuring relation between the heart rate and Venham's score

	Group I (TSD)	Group II (FM)	
HR <sub>1</sub> vs VS <sub>1</sub>	0.971**	HR <sub>1</sub> vs VS <sub>1</sub>	0.951**
HR <sub>2</sub> vs VS <sub>2</sub>	0.978**	HR <sub>2</sub> vs VS <sub>2</sub>	0.911**
HR <sub>3</sub> vs VS <sub>3</sub>	0.972**	HR <sub>3</sub> vs VS <sub>3</sub>	0.937**
HR <sub>4</sub> vs VS <sub>4</sub>	0.963**	HR <sub>4</sub> vs VS <sub>4</sub>	0.865**
HR <sub>5</sub> vs VS <sub>5</sub>	0.932**	HR <sub>5</sub> vs VS <sub>5</sub>	0.816**

**Table 3:** Distribution of sample according to Venham's score at various time intervals of both the techniques

Venham's score rating	Interval 1		Interval 2		Interval 3		Interval 4		Interval 5	
	TSD	FM	TSD	FM	TSD	FM	TSD	FM	TSD	FM
Score 0	1	0	4	3	6	6	7	8	8	8
Score 1	3	4	4	5	3	4	2	2	1	2
Score 2	4	4	2	2	1	0	1	0	1	0
Score 3	2	2	0	0	0	0	0	0	0	0
Score 4	0	0	0	0	0	0	0	0	0	0
Score 5	0	0	0	0	0	0	0	0	0	0
Chi-square value	1.143		0.254		1.143		1.067		1.333	
p-value	0.767		0.881		0.565		0.587		0.513	

compare heart rate between TSD and FM group at various time intervals. The p-values for both the treatment groups at various time intervals were H<sub>1</sub>—0.660, H<sub>2</sub>—0.665, H<sub>3</sub>—0.835, H<sub>4</sub>—0.483, and H<sub>5</sub>—0.681 respectively. Student's t-test shows that there was no significant difference in both the treatment groups, and there was a decrease in heart rate from H<sub>1</sub> to H<sub>5</sub> in both the treatment groups.

Table 3 shows the distribution of the sample according to modified Venham's score at various time intervals of both the techniques. The p-value at the first interval was 0.767, second interval 0.881, third interval 0.565, fourth interval 0.587, and fifth interval 0.513 respectively. The result was statistically significant indicating that there was a reduction in modified Venham's score from interval 1 to interval 5 in both the groups compared.

Table 4 shows Pearson's correlation coefficient to measure the relation between the heart rate and modified Venham's score. This test shows that there is highly positive correlation observed at different time intervals, which means that as the heart rate increases, the modified Venham's score also increases.

## DISCUSSION

Noise, vibration of the drill, the sight of the injection needle, and sitting in the dental chair have been reported to cause fear and lead to unfavorable behavior in children.<sup>18</sup> Most often than not, fear of pain appears to be the most important predictor of dental anxiety. Dental fear is a multifactorial problem encountered during dental treatment which originates mainly in childhood, so it is

important that these fears are addressed early.<sup>19</sup> The role of the dentist is important in developing an understanding of how children become fearful of dental procedures. Therefore, the dentist should be capable to identify the children having dental anxiety, assess their fears, and help them to build confidence to overcome those fears. Suitable behavior management techniques like behavior shaping, TSD, and FM should be instituted in children who are predicted to behave poorly during treatment.

Tell-show-do is a technique based on the principle of learning theory. Several epidemiologic studies have shown its positive effect on the reduction of dental anxiety,<sup>20</sup> but performance of TSD needs time constraints of both the dentist and the parents. Another technique is modeling. Two forms of modeling, live and filmed, have been found to be effective in reducing children's fear and anxiety about dental treatments and promoting adaptive behaviors.<sup>11</sup> According to several studies, FM is proved to be efficient in reducing child's dental treatment anxiety.<sup>13,21-23</sup> It has been shown that FM can be as effective as live modeling and also desensitization methods.<sup>21,23</sup> Contrary to other behavior management techniques, FM does not take much time by the dentist or his team, though it has not gained much attention.<sup>11</sup> Thus, the objective of this study was to compare TSD technique and FM on anxiety in children undergoing dental treatment based on children heart rates and modified Venham's anxiety scale.

In our study, FM was as efficient as TSD to reduce anxiety in children and gain cooperative behavior during

dental treatment. The results of our study coincide with the studies done by various authors, e.g., Machen and Johnson<sup>21</sup> and Melamed et al,<sup>22</sup> who have found the effectiveness of FM in comparison with desensitization in various patients.

A study done by Prayab and Hosseinbor<sup>24</sup> reported that high prevalence of severe dental anxiety may be seen in the early years of school. However, general factors like family factor is seen to have less influence on the behavior of a school-aged child during a dental visit. So, the schoolchildren of age group 6 to 9 years were taken in our study so that we could demonstrate proper behavior management technique which could help us in assessing the reduction in their dental treatment-related anxiety.

Various researchers have investigated fear and anxiety in children using different scales and measurements.<sup>25-27</sup> Modified 6-point Venham's index was used in the study whose validity and reliability has been substantiated by Veerkamp et al<sup>28</sup> and Nathan et al.<sup>29</sup> In our study, anxiety and behavioral levels were assessed by two indexes (physiological and behavioral indexes). The physiological index was assessed by heart rate using pulse oximeter. Heart rate measurement related to dental treatment anxiety has been researched and found to be positively related to each other.<sup>30</sup> The measurement tool used in this study was pulse oximeter which is considered as an excellent means of monitoring heart rate, portable finger pulse oximeter, which itself will be less anxiety provoking in children. In our present study, positive correlation was established between heart rates and modified Venham's score at all five intervals of measurements, which coincides with the study done by Roshan and Sakeenabi.<sup>16</sup>

Heart rates of children in our study for both the treatment groups in the waiting area were higher (TSD:  $93.70 \pm 6.732$ , FM:  $93.40 \pm 6.484$ ), which was similar to previously mentioned study,<sup>16</sup> and after doing behavior management by either TSD and FM the heart rates reduced ( $85.60 \pm 7.516$  and  $85.30 \pm 6.49$ ), which was statistically not significant. This finding coincides with the study done by Paryab and Arab.<sup>17</sup> Although the result in both the treatment groups was statistically not significant, we could see that there was a decrease in heart rate and improvement in behavior from H<sub>1</sub> to H<sub>5</sub> interval in both the groups.

Gender is thought to be one of the factors which may influence the anxiety levels in children. Previous studies state that fear and anxiety are related to gender difference.<sup>31</sup> The results of our study for a given age group show that anxiety level was similar in both boys and girls, which coincides with previously mentioned study.<sup>16</sup> This finding is in contrast to the study done by Schriks and van Amerongen,<sup>30</sup> who have reported more anxiety for dental procedures in girls than in boys.

It is of utmost importance to give much attention to every child on their visit to the dental clinic and perform simple behavior management techniques that can create a profound effect in achieving our goal to teach good oral health habits and positive approach toward dentistry. Parental acceptance of behavior management technique used by a pediatric dentist is another concern. Parents reported a significant preference for noninvasive reinforcement techniques instead of sedation and restraints.<sup>32</sup> In our study, both TSD and FM behavior management techniques were effective in reducing children's fear and anxiety, as most of the children in our study were showing cooperative behavior at the end of the treatment. Hence, the behavior management techniques should be such that the child eagerly returns for the treatment and follow-up at regular intervals of time throughout lifetime and carries a positive approach toward dentistry.

## CONCLUSION

Assessment of behavior is the most important tool in the hands of the dentist. This helps the dentist to execute the required treatment plan in the most appropriate manner in children. Based on our study results, FM was found to be as effective as TSD technique, so it can be used as an alternative to TSD technique. It was also found that both behavior management techniques, TSD and FM, are effective in reducing child's anxiety levels when undergoing dental treatment. However, the limitation of the present study is that FM and TSD were compared for a particular treatment (restoration) only. Future research comparing all possible treatments after FM with TSD would give better insight about the efficacy and effectiveness of aforementioned behavior management techniques.

## REFERENCES

1. Geer JH. The development of a scale to measure fear. *Behav Res Ther* 1965 Aug;3:45-53.
2. Corah NL, Gale EN, Illig SJ. Assessment of a dental anxiety scale. *J Am Dent Assoc* 1978 Nov;97(5):816-819.
3. Blinkhorn AS. Chapter 2: Introduction to the dental surgery. In: Welbury R, Duggal MS, Hosey MT, editors. *Paediatric dentistry*. 3rd ed. Oxford: Oxford University Press; 2006. pp. 30-32.
4. Bedi R, Sutcliffe P, Donnan PT, McConnachie J. The prevalence of dental anxiety in a group of 13- and 14-year-old Scottish children. *Int J Paediatr Dent* 1992 Apr;2(1):17-24.
5. Corah NL. Development of a dental anxiety scale. *J Dent Res* 1969 Jul-Aug;48(4):596.
6. Adair SM. Behavior management conference panel I report-rationale for behavior management techniques in pediatric dentistry. *Pediatr Dent* 2004 Mar-Apr;26(2):167-170.
7. Eaton JJ, McTigue DJ, Fields HW Jr, Beck M. Attitudes of contemporary parents toward behavior management techniques used in pediatric dentistry. *Pediatr Dent* 2005 Mar-Apr;27(2):107-113.

8. Allen KD, Stanley RT, McPherson K. Evaluation of behavior management technology dissemination in pediatric dentistry. *Pediatr Dent* 1990 Apr-May;12(2):79-82.
9. Adair SM, Waller JL, Schafer TE, Rockman RA. A survey of members of the American Academy of Pediatric Dentistry on their use of behavior management techniques. *Pediatr Dent* 2004 Mar-Apr;26(2):159-166.
10. Baghdadi ZD. Principles and application of learning theory in child patient management. *Quintessence Int* 2001 Feb;32(2):135-141.
11. Greenbaum PE, Melamed BG. Pretreatment modeling. A technique for reducing children's fear in the dental operator. *Dent Clin North Am* 1988 Oct;32(4):693-704.
12. Weinstein P, Nathan JE. The challenge of fearful and phobic children. *Dent Clin North Am* 1988 Oct;32(4):667-692.
13. Rouleau J, Ladouceur R, Dufour L. Pre-exposure to the first dental treatment. *J Dent Res* 1981 Jan;60(1):30-34.
14. Do C. Applying social learning theory to children with dental anxiety. *J Contemp Dent Pract* 2004 Feb;5(1):126-135.
15. Wilson S, Cody WE. An analysis of behavior management papers published in the pediatric dental literature. *Pediatr Dent* 2005 Jul-Aug;27(4):331-338.
16. Roshan NM, Sakeenabi B. Anxiety in children during occlusal ART restorations in primary molars placed in school environment and hospital dental setup. *J Clin Pediatr Dent* 2012 Summer;36(4):349-352.
17. Paryab M, Arab Z. The effect of Filmed modeling on the anxious and cooperative behavior of 4-6 years old children during dental treatment: a randomized clinical trial study. *Dent Res J (Isfahan)* 2014 Jul;11(4):502-507.
18. Willershausen B, Azrak A, Wilms S. Fear of dental treatment and its possible effects on oral health. *Eur J Med Res* 1999 Feb;4(2):72-77.
19. Bankole OO, Denloye OO, Aderinokun GA, Jeboda SO. The relationship of childrens predicted behavior to their observed behavior during dental procedures. *Afr J Biomed Res* 2002;5(3):109-113.
20. Klinberg G, Raadal M, Arnrup K. Dental fear and behavior management problems. In: Koch G, Poulsen S, editors. *Pediatric dentistry – a clinical approach*. 2nd ed. Ames (IA): Wiley Blackwell publishing ltd; 2009. pp. 32-43.
21. Machen JB, Johnson R. Desensitization, model learning, and the dental behavior of children. *J Dent Res* 1974 Jan-Feb;53(1):83-87.
22. Melamed BG, Hawes RR, Heiby E, Glick J. Use of filmed modeling to reduce uncooperative behavior of children during dental treatment. *J Dent Res* 1975 Jul-Aug;54(4):797-801.
23. Fields H, Pinkham J. Videotape modeling of the child dental patient. *J Dent Res* 1976 Nov-Dec;55(6):958-963.
24. Paryab M, Hosseinbor M. Dental anxiety and behavioral problems: a study of prevalence and related factors among a group of Iranian children aged 6-12. *J Indian Soc Pedod Prev Dent* 2013 Apr-Jun;31(2):82-86.
25. Aartman IH, van Everdingen T, Hoogstraten J, Schuurs AH. Self-report measurements of dental anxiety and fear in children: a critical assessment. *ASDC J Dent Child* 1998 Jul-Aug;65(4):252-258, 229-230.
26. ten Berge M, Hoogstraten J, Veerkamp JS, Prins PJ. The Dental Subscale of the Children's Fear Survey Schedule: a factor analytic study in The Netherlands. *Community Dent Oral Epidemiol* 1998 Oct;26(5):340-343.
27. Gatchel RJ. Managing anxiety and pain during dental treatment. *J Am Dent Assoc* 1992 Jun;123(6):37-41.
28. Veerkamp JS, Gruythuysen RJ, van Amerongen WE, Hoogstraten J. Dental treatment of fearful children using nitrous oxide. Part 3: anxiety during sequential visits. *ASDC J Dent Child* 1993 May-Jun;60(3):175-182.
29. Nathan JE, Venham LL, West MS, Werboff J. The effects of nitrous oxide on anxious young pediatric patients across sequential visits: a double-blind study. *ASDC J Dent Child* 1988 May-Jun;55(3):220-230.
30. Schriks MC, van Amerongen WE. Atraumatic perspectives of ART: psychological and physiological aspects of treatment with and without rotary instruments. *Community Dent Oral Epidemiol* 2003 Feb;31(1):15-20.
31. Liddell A, Locker D. Gender and age differences in attitudes to dental pain and dental control. *Community Dent Oral Epidemiol* 1997 Aug;25(4):314-318.
32. Murphy MG, Fields HW Jr, Machen JB. Parental acceptance of pediatric dentistry behavior management techniques. *Pediatr Dent* 1984 Dec;6(4):193-198.