

# Live Modeling Versus Tell-Show-Do Technique Based on Children's Heart Rates, Oxygen Saturation and Facial Image Scale

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## ABSTRACT

**Background:** Tell-Show-Do is most popular and Live modeling is less frequently used behavior management techniques in pediatric dentistry. This study was conducted to compare the children's response to these two techniques by measuring the objective and subjective parameters of anxiety by using pulse rate, oxygen saturation and facial-image scale.

**Methods:** A cross-sectional study was conducted among 138 children aged 5-10 years from December 2020 - August 2021. Children were randomly divided into three groups: Group A: Live modelling technique (mother as model), Group B: Live modelling technique (father as model), Group C: Tell-Show-Do technique. All were subjected to oral examination and rotary prophylaxis on first dental visit. Pulse oximeter was used to record heart rate, oxygen saturation along with facial-image scale scores before and after the treatment period.

**Results:** The average heart rate at the end of rotary prophylaxis session was significantly lower among children in group A than in group C ( $p=0.05$ ). facial-image scale scores revealed high significance after the rotary prophylaxis treatment and it was lower in group A than group C and group B ( $p < 0.001$ ). Average facial-image scale scores of fear perception by girls in group A was lower than group C and group B ( $p < 0.001$ ). Oxygen saturation showed no significant differences between the three groups.

**Conclusions:** Live modelling is equally worth practicing as Tell Show Do technique to decrease the anxiety level of children. Anxiety level increased during the procedural work than oral examination and facial image scale indicated anxiety.

**Keywords:** Facial image scale; live modeling; oxygen saturation; pulse rate; tell-show-do.

## INTRODUCTION

Children find visiting dental office as a stressful event that elicit fear and anxiety in them. Prevalence of child dental anxiety has been estimated to range from 3% to 20%.<sup>1</sup> Dentists have a wide variety of techniques available to them to assist management of child with anxiety.<sup>2</sup> Tell-Show-Do<sup>3</sup> is most widely practiced non pharmacological techniques by pediatric dentists.<sup>4</sup> Modelling is another technique described by Bandura.<sup>5</sup>

Objective stress parameters can be obtained by measuring pulse rate, breath rate, skin resistance, blood pressure.<sup>6</sup> The Facial Image Scale (FIS) can be employed as an indicator of children's dental anxiety.<sup>7</sup>

The present study aims to compare Live Modeling and Tell-Show-Do techniques by assessing dental anxiety

with the use of objective and subjective parameters. Pulse oximeter was used for recording children's heart rates, oxygen saturation level ( $SpO_2$ ) and Facial Image Scale<sup>8</sup> is used as tool for recording subjective anxiety form during dental treatments.

## METHODS

This was a cross-sectional comparative study conducted among Nepalese children patient who came for first dental visit in Department of Pedodontics at Kantipur Dental College and Hospital (KDCH), Kathmandu, Nepal from December 2020 - August 2021. The study was approved from Institutional Review Committee of KDCH with reference number IRC: 42/020. Children accompanied by their father and mother during the first visit were selected, the nature and purpose of the study were well explained to both parents and written

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informed consent was obtained.

**Inclusion criteria:** Children between the age 5-10 years. Parents should be mentally and physically capable to serve as models.

**Exclusion criteria:** Children who are from single parent families, with mental or cognitive problems or having heart diseases.

With reference to Alrshah SA et al.<sup>9</sup> sample size was calculated using the formula:  $n = f(\alpha, \beta) \times 2 \times SD^2 / D^2$ , {where:  $n$  = sample size,  $f(\alpha, \beta) = 7.85$  (for 80% power with 5% significance),  $D = 6.15$  (the smallest difference in mean that it would be clinically meaningful to detect),  $SD = 10.39$  (variability, standard deviation of the outcome)}. Sample size  $n = \{7.85 \times 2 \times (10.39)^2\} / (6.15)^2 = 45$ , rounding off to 46. So for three groups our sample size was 138.

The procedure for data collection was a modified version of the one outlined by Faraht-McHayleh et al.<sup>10</sup> All subjects were randomly divided into three groups and each group composed of 46 children.

**Group A:** Children under Live modelling technique with the mother as model while undergoing dental treatments.

**Group B:** Children under Live modelling technique with the father as model while undergoing dental treatments.

**Group C:** Children under Tell-Show-Do technique by the pediatric dentist while undergoing dental treatments.

Each group was equally subdivided by gender to 23 girl and 23 boy and by age (5-6 years and 7-10 years) to determine whether gender and age were determining factors.

All children of the six subgroups were subjected to both oral examination and rotary prophylaxis treatment on first dental visit. Objective and subjective parameters were used for assessing the degree of dental anxiety of children. Two physiological parameters of anxiety- heart rate and  $SPO_2$  were measured with digital pulse oximeter (Bio Plus Pulse Oximeter -BE-P003) clipped to the index finger of child's left hand over the entire treatment period (oral examination and rotary prophylaxis). The child's hand was gently stabilized by a dental assistant to avoid ambiguous reading owing to even the slightest movement of the hand.<sup>11</sup> An assistant manually recorded

the data from the oximeter screen into the child's file at 30-second intervals for a total of 12 data points.<sup>10</sup>

The Facial Image Scale<sup>8</sup> was used to record the subjective anxiety. Children were asked to indicate the appropriate point that best represented their fear sensation on the scale, before and after oral examination and rotary prophylaxis.

The duration of each trial was 19-20 minutes: Familiarizing the child with staff and dentist was done within 1.30 minutes and the psychological preparation (either Live modelling or Tell-Show-Do) was done in the dental chair by 5 minutes. Pulse oximeter was attached within 1.30 minutes and 5.5 minutes each was given for performing the oral examination and rotary prophylaxis.

For children in groups A and B: They actively observed their mother or father, respectively undergoing oral examination and rotary prophylaxis (by the Tell-Show-Do method) in the dental chair. The child was encouraged to participate by asking questions about the instruments and how they worked. Later they sat in the chair and underwent oral examination and rotary prophylaxis with simultaneous recording of heart rate and  $SPO_2$ .

For children in group C: The Tell-Show-Do procedure was performed by the pediatric dentist without live modeling but with the child's active participation while undergoing oral examination and oral prophylaxis with simultaneous recording of heart rate and  $SPO_2$ .

The same pediatric dentist performed on all children of the study. The child's subjective anxiety was recorded with FIS before and after the completion of the oral examination and rotary prophylaxis.

The data were tabulated, coded and analyzed using statistical software SPSS (version 20). To obtain the statistical comparison between the different groups, the significance of difference was tested using ANOVA and Kruskal Wallis test based on normality assumptions and post hoc Bonferroni test for group comparison. Level of significance was taken at a 'p' value  $\leq 0.05$  (S). p value  $< 0.001$  was considered highly significant (HS) in all analyses.

## RESULTS

This study was carried out in 138 children aged 5-10 years within three groups. Each group composed of 46 children: Group A, B and C (Table 1). All clinical oral

Table 1. Distribution of children undergoing non-pharmacologic methods of behaviour management during dental care, by group and age.

Technique	Age group				Total
	5-6 years		7-10 years		
A	18	39.13	28	60.87	46
B	16	34.78	30	65.22	46
C	15	32.61	31	67.39	46
Total	49	35.51	89	64.49	138

\*Group A = Live Modelling with mother as model, group B = Live Modelling with father as model, group C = Tell-Show-Do method

Table 2. Multiple comparisons (Bonferroni test) of mean heart rates and oxygen saturation in subgroups by specific time periods.

Measurement <sup>a</sup>	Comparison of study groups <sup>b</sup>	Measurement oxygen saturation		Oral examination heart rate		Rotary prophylaxis heart rate	
		Mean difference	P	Mean difference	P	Mean difference	P
T1	Group A vs Group B	-0.174	1.000	0.913	1.000	0.087	1.000
	Group A vs Group C	-0.348	0.917	-2.174	1	-3.565	0.515
	Group C vs Group B	0.174	1.000	3.087	0.736	3.652	0.484
T2	Group A vs Group B	-0.217	1.000	0.239	1.000	-0.478	1.000
	Group A vs Group C	0	1.000	-3	0.829	-3.913	0.382
	Group C vs Group B	0.217	1.000	3.239	0.721	3.435	0.541
T3	Group A vs Group B	-0.326	0.806	-0.435	1.000	-0.957	1.000
	Group A vs Group C	-0.174	1.000	-2.891	0.901	-4.413	0.286
	Group C vs Group B	-0.152	1.000	2.457	1.000	3.457	0.571
T4	Group A vs Group B	0.043	1.000	0.065	1.000	-1.261	1.000
	Group A vs Group C	-0.217	1.000	-3.457	0.582	-4.935	0.173
	Group C vs Group B	0.261	1.000	3.522	0.557	3.674	0.470
T5	Group A vs Group B	0.109	1.000	-0.217	1	-1.739	1
	Group A vs Group C	0.087	1.000	-4.022	0.336	-4.457	0.236
	Group C vs Group B	0.022	1.000	3.804	0.398	2.717	0.845
T6	Group A vs Group B	0.022	1.000	-0.717	1	-2.13	1
	Group A vs Group C	-0.435	0.707	-3.391	0.550	-4.522	0.233
	Group C vs Group B	0.457	0.639	2.674	0.880	2.391	1.000
T7	Group A vs Group B	-0.065	1.000	-0.065	1	-3.13	0.598
	Group A vs Group C	-0.307	1.000	-3.304	0.557	-4.043	0.294
	Group C vs Group B	0.239	1.000	3.239	0.584	0.913	1.000
T8	Group A vs Group B	0.174	1.000	0.326	1	-2.5	0.892
	Group A vs Group C	-0.261	1.000	-3.652	0.393	-4.739	0.148
	Group C vs Group B	0.435	0.821	3.978	0.3	2.239	1
T9	Group A vs Group B	0.109	1.000	0.109	1.000	-2.326	0.909
	Group A vs Group C	-0.283	1.000	-4.435	0.192	-5.348	0.057
	Group C vs Group B	0.391	0.871	4.543	0.174	3.022	0.544

T10	Group A vs Group B	0.087	1.000	0.652	1.000	-1.609	1.000
	Group A vs Group C	-0.609	0.341	-5.391	0.081	-4.891	0.082
	Group C vs Group B	0.696	0.213	4.739	0.154	3.283	0.411
T11	Group A vs Group B	0.239	1.000	-0.239	1.000	-0.761	1.000
	Group A vs Group C	-0.37	1.000	-4.826	0.146	-4.739	0.113
	Group C vs Group B	0.609	0.337	4.587	0.182	3.978	0.241
T12	Group A vs Group B	-0.109	1.000	0.109	1.000	-1.000	1.000
	Group A vs Group C	-0.522	0.482	-4.652	0.171	-4.783	0.088
	Group C vs Group B	0.413	0.798	4.761	0.155	3.783	0.252

<sup>a</sup>The letter T followed by a number from 1 to 12 represents the time of specific measurement of heart rate (at 30-second intervals during treatment); <sup>b</sup>Group A = Live Modelling with mother as model, group B = Live Modelling with father as model, group C = Tell-Show-Do method.

**Table 3. FIS score between three groups before and after oral examination and rotary prophylaxis.**

Comparison of study groups	Before oral examination		FIS Score_Before rotary prophylaxis		FIS Score After rotary prophylaxis		FIS score difference before and after rotary prophylaxis		FIS score difference before oral examination and after rotary prophylaxis	
	Mean difference	P	Mean difference	P	Mean difference	P	Mean difference	P	Mean difference	P
Group A vs Group B	-0.065	1.000	0.087	1.000	0.239	0.485	0.326	<0.001	0.304	0.052
Group A vs Group C	0.022	1.000	-0.022	1.000	-0.043	1.000	0.478	<0.001	-0.065	1.000
Group C vs Group B	-0.087	1.000	0.109	1.000	0.283	0.296	0.304	0.001	0.369	0.012

examination and rotary prophylaxis were completed for each group.

Average oxygen saturation was found to be same and non-significant over the entire oral examination and rotary prophylaxis treatment period among all three groups: A (Live modelling by mother), B (Live modelling by father), C (Tell-Show-Do by pedodontist). There was no statistically significant difference when observed in relation to age or gender while compared with subgroups.

Over the entire clinical oral examination period the average heart rate was insignificant among children in group A, group B and group C (Table 2).

During the rotary prophylaxis period, the average heart rate was found to be significantly lower in group A (Live modelling by mother) than among those in group C (Tell-Show-Do,  $p=0.05$ ) (Table 2). This difference was evident during rotary prophylaxis where there was use of piezoelectric scaler indicating anxiety from stressful part of dental treatment. This period was represented by heart rate measurements from T9 (at 4 minutes) to T12 (at 5 minutes, 30 seconds); the mean difference between groups A and C was 4.94 beats/min (Table 2). This showed that Live modelling by mother was

more effective in reducing anxiety than Tell-Show-Do technique during dental treatment, and this also showed that anxiety was seen during the ending period of rotary prophylaxis (Table 2).

In terms of fear perception by analysis of FIS scores, the difference between the three groups were highly significant before and after the oral prophylaxis treatment ( $p<0.001$ ) where fear perception was less in Group A (Live Modeling by mother) than Group C (Tell-Show-Do) and Group B (Live Modeling by father) (Table 3). FIS also revealed that the children exhibited less anxiety at the end of the rotary prophylaxis treatment and this difference was statistically significant ( $p < 0.001$ ).

There was no significant FIS score difference before and after clinical oral examination indicating children were comfortable and had no anxiety during dental checkup. Our FIS score showed no significant difference due to age.

FIS score between the three groups showed significant difference between Group A vs Group B ( $p=0.05$ ) and Group C vs Group B ( $p=0.01$ ) when compared before oral examination and after rotary prophylaxis (Table 3). This indicated that the subjective anxiety level decreased in

children group of Live modelling by mother after rotary prophylaxis.

Analysis of FIS scores revealed that, the average scores of fear perception by girls in group B were higher than the scores in group A (0.782,  $p < 0.001$ ) and group C (0.869,  $p < 0.001$ ). The difference between the three groups was highly significant ( $p < 0.001$ ). However, no significant difference was observed among the boy respondents.

## DISCUSSION

Dental anxiety is a kind of fear exerted due to threatening stimuli.<sup>12</sup> Various behavior shaping techniques including Tell-Show-Do, positive reinforcement, effective communication, modeling and distraction are used to tackle children who are anxious and seem too uncooperative.<sup>5</sup> This study was undertaken to compare relative efficacy of Live modelling and Tell-Show-Do techniques in reducing anxiety in children undergoing dental treatment based on their heart rates, SPO<sub>2</sub> and facial image scale. Continuing to study and perfect non-pharmacologic techniques for behaviour management will help to fill the need for scientific data supporting this approach within pediatric dentistry.<sup>16,17</sup>

Physiological measures such as blood pressure, pulse rate, and psychological measures like modified child dental anxiety scale, Venham's picture test and facial image scale are used to assess the anxiety levels in children.<sup>13</sup> The ease of application and non-aversive nature puts Tell-Show-Do on top of the universally practiced techniques by dentists.<sup>14</sup> Modelling is another non-pharmacological technique described by Bandura,<sup>5</sup> modelling can be done live using a parent or significant other person in the child's life.<sup>15</sup>

The measurement tool used in this study was portable finger pulse oximeter which is considered as an excellent means of monitoring heart rate and less anxiety provoking in children.<sup>11</sup> Heart rate has been used in numerous medical, paramedical and dental studies of fear and anxiety as an outcome measure.<sup>16</sup>

All parents selected for Live modelling were willing to participate in our study. Similarly, the advantage of active participation has been described in several recent studies.<sup>10,16,17</sup>

In the study, while comparing Tell-Show-Do and Live modelling (with mother / father) techniques, over the entire clinical oral examination period the average

heart rate was insignificant among children in all three groups: A, B and C signifying both the techniques equally effective. This corroborated with studies which concluded that techniques like Live modelling and Tell-Show-Do are very effective in achieving treatment goals.<sup>9,10,19</sup> Studies have shown treatment alliance, where a child who has developed a good rapport with the dentist has lesser level of anxiety towards dental treatment.<sup>12,18</sup>

This study found insignificant difference between Live modelling by mother / father and Tell-Show-Do during the oral examination indicating children compliance during dental checkup. The study showed an increase in the heart rate during the rotary prophylaxis procedure than during the oral examination indicating anxiety during the dental procedure. Similarly, difference in heart rate was evident during oral prophylaxis where there was use of piezoelectric scaler indicating anxiety from stressful part of dental treatment.<sup>9,19</sup>

While comparing behavior management techniques during rotary prophylaxis our study showed Live modelling by mother to be more effective in reducing anxiety than Tell-Show-Do and anxiety was observed during the ending period of rotary prophylaxis period. Likewise, study has shown that children are highly anxious during oral prophylaxis and extractions.<sup>12</sup> Many studies showed that Live modelling with mother was more effective in reducing heart rate than Tell-Show-Do validating annotations of the current study.<sup>9,10,19,21</sup>

In our study, age and gender didn't play any important factor on child's anxiety level during and after the oral examination and rotary prophylaxis treatment in both techniques. In parallel, studies have shown that anxiety level was similar in both boys and girls.<sup>9,22,23</sup> However there are studies where the age of the child is a factor having an impact on a child's anxiety level and that the cognitive ability of a child develops with increase in age and more understanding.<sup>20,24</sup> Series of some studies have shown that girls reported higher anxiety.<sup>25-27</sup> Researchers have also proposed that gender differences in anxiety scores further validate children's dental anxiety assessment measures.<sup>28</sup>

The FIS is a commonly used tool by dentists, comprising a row of five faces where the unhappiest face was assigned a score of 5 and the happiest face was assigned a score of 1.<sup>15</sup> The FIS is a valid means of assessing child dental anxiety status and has the advantage of giving immediate 'state' feedback to the clinician in the dental waiting room and could allow the clinician to design

appropriate treatment plans for their child patient.<sup>15</sup>

There was no significant difference in FIS before and after oral examination indicating that children were comfortable and had no anxiety during dental checkup. Children from all three groups showed lower FIS scores indicating lesser anxiety level after the rotary prophylaxis. This finding of our study signifies that children loved and favored the outcome of rotary prophylaxis with optimal level of happiness by seeing their clean and beautiful teeth even after the stressful treatment. This result might not tally if other dental procedures were performed like extraction, pulpectomy, restorations, etc.

In the present study, FIS score difference before and after rotary prophylaxis showed fear perception range for anxiety was lower in Live modelling with mother when compared with Tell-Show-Do and Live modelling with father. Likewise, result was seen in a study done with analysis by FIS.<sup>9</sup>

In this study, FIS scores difference before oral examination and after rotary prophylaxis revealed that, fear perception by girls in group B were higher than in group A and group C and no significant difference was observed among the boys respondents. Likewise, study has shown female children are more anxious than male children toward dental treatment.<sup>12</sup> Whereas, study found that there were no significant differences in terms of gender while measuring dental anxiety levels with FIS.<sup>15</sup>

Our study FIS score showed no significant difference due to age. Similarly a study that showed FIS as a valid means of assessing dental anxiety status in clinical context found no effect of age differences in FIS score was compared due to age.<sup>15</sup>

The study was single-center with age limitation of 5-10 years and treatment procedure was restricted to oral examination and rotary prophylaxis only between Live modeling and Tell-Show-Do techniques. Multicentric study at a national scale could be done for better result with incorporation of more non-pharmacological behavior management techniques with increased sample size and age limitation for analyzing fear and anxiety in Nepalese child population. Future researches comparing more possible dental treatments would give better insight about the efficacy and effectiveness of mentioned behavior management techniques.

## CONCLUSIONS

Live modeling was found to be as effective as Tell-Show-Do technique that can be used as efficient alternative behavior management techniques during dental treatment. Children were equally comfortable with their pedodontist as with their parents during oral examination and rotary prophylaxis. Children showed compliance during dental checkup and their anxiety level increased during rotary prophylaxis procedure. FIS in children showed lower subjective anxiety, with happiness and more cooperative behavior output even after rotary prophylaxis in Live modeling by mother group. Pediatric dentist ability towards identification and assessment of children's dental anxiety helps in choosing and instituting behavior management techniques that can help the child in building confidence to overcome dental anxiety.

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## REFERENCES

1. Lee CY, Chang YY, Huang ST. The clinically related predictors of dental fear in Taiwanese children. *Int J Paediatr Dent.* 2008 Nov;18(6):415-22. [\[PubMed\]](#) [\[Download PDF\]](#)
2. Prabhakar AR, Marwah N, Raju OS. A comparison between audio and audiovisual distraction techniques in managing anxious pediatric dental patients. *J Indian Soc PedodPrev Dent.* 2007 Oct-Dec;25(4):177-82. [\[PubMed\]](#)
3. Crossley ML, Joshi G. An investigation of paediatric dentists' attitudes towards parental accompaniment and behavioural management techniques in the UK. *Br Dent J.* 2002 May 11;192(9):517-21. [\[PubMed\]](#) [\[Download PDF\]](#)
4. Chapman HR, Kirby-Turner NC. Dental fear in children--a proposed model. *Br Dent J.* 1999 Oct 23;187(8):408-12. [\[PubMed\]](#) [\[Download PDF\]](#)
5. Bandura A, Menlove FL. Factors determining vicarious extinction of avoidance behavior through symbolic modeling. *J Pers Soc Psychol.* 1968 Feb;8(2):99-108. [\[PubMed\]](#)

6. Ammann P, Kolb A, Lussi A, Seemann R. Influence of rubber dam on objective and subjective parameters of stress during dental treatment of children and adolescents - a randomized controlled clinical pilot study. *Int J Paediatr Dent*. 2013 Mar;23(2):110-5. [[PubMed](#)] [[Download PDF](#)]
7. Cuthbert MI, Melamed BG. A screening device: children at risk for dental fears and management problems. *ASDC J Dent Child*. 1982 Nov-Dec;49(6):432-6. [[PubMed](#)]
8. Heaton LJ, Carlson CR, Smith TA, Baer RA, De Leeuw R. Predicting anxiety during dental treatment using patients' self-reports: less is more. *J Am Dent Assoc*. 2007 Feb;138(2):188-95; quiz 248-9. [[PubMed](#)]
9. Alrshah SAM, Kalla IH, Abdellatif AM. Live modeling vs. tell-show-do technique for behaviour management of children in the first dental visit. *Mansoura J Dent*. 2014;1(3):72—77. [[Download PDF](#)] [[Google Scholar](#)]
10. Farhat-McHayleh N, Harfouche A, Souaid P. Techniques for managing behaviour in pediatric dentistry: comparative study of live modelling and tell-show-do based on children's heart rates during treatment. *J Can Dent Assoc*. 2009 May;75(4):283. [[PubMed](#)] [[Download PDF](#)]
11. Fukayama H, Yagiela JA. Monitoring of vital signs during dental care. *Int Dent J*. 2006 Apr;56(2):102-8. [[PubMed](#)] [[Download PDF](#)]
12. Kothari S, Gurunathan D. Factors influencing anxiety levels in children undergoing dental treatment in an undergraduate clinic. *J Family Med Prim Care*. 2019 Jun;8(6):2036-2041. [[PubMed](#)] [[Download PDF](#)]
13. Sullivan C, Schneider PE, Musselman RJ, Dummett CO Jr, Gardiner D. The effect of virtual reality during dental treatment on child anxiety and behavior. *ASDC J Dent Child*. 2000 May-Jun;67(3):193-6, 160-1. [[PubMed](#)]
14. McKnight-Hanes C, Myers DR, Dushku JC, Davis HC. The use of behavior management techniques by dentists across practitioner type, age, and geographic region. *Pediatr Dent*. 1993 Jul-Aug;15(4):267-71. [[PubMed](#)]
15. Buchanan H, Niven N. Validation of a Facial Image Scale to assess child dental anxiety. *Int J Paediatr Dent*. 2002 Jan;12(1):47-52. [[PubMed](#)] [[Download PDF](#)]
16. Adair SM. Behavior management conference panel I report- Rationale for behavior management techniques in pediatric dentistry. *Pediatr Dent*. 2004 Mar-Apr;26(2):167–70. [[PubMed](#)]
17. Wilson S, Cody WE. An analysis of behavior management papers published in the pediatric dental literature. *Pediatr Dent*. 2005 Jul-Aug;27(4):331-8. [[PubMed](#)]
18. Chandrapooja J, Selvarasu K. Behavioural management techniques in pediatric clinic. *Int J Pharm Bio Sci*. 2016;6:10–5. [[Google Scholar](#)] [[Download PDF](#)]
19. Sharma K, Malik M, Sachdev V. Relative efficacy of Tell-Show-Do and live modeling techniques on suburban Indian children during dental treatment based on heart rate values: a clinical study. *J Dent Spec* 2016;4(2):178-182. [[Download PDF](#)]
20. Achmad MH, Horax S, Rizki SS, Ramadhany S, Singgih MF, Handayani H, et al. Pulse rate change after childhood anxiety management with modeling and reinforcement technique of children's dental care. *Pesqui Bras Odontopediatria Clin Integr* 2019; 19:e4655. [[Download PDF](#)]
21. Roberts JF, Curzon ME, Koch G, Martens LC. Review: behaviour management techniques in paediatric dentistry. *Eur Arch Paediatr Dent*. 2010 Aug;11(4):166-74. [[PubMed](#)]
22. 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):349-52. [[PubMed](#)]
23. 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;12:20–24. [[Google Scholar](#)]
24. Liddell A, Locker D. Gender and age differences in attitudes to dental pain and dental control. *Community Dent Oral Epidemiol*. 1997 Aug;25(4):314-8. [[PubMed](#)] [[Download PDF](#)]
25. Klingberg G, Berggren U, Norén JG. Dental fear in an urban Swedish child population: prevalence and concomitant factors. *Community Dent Health*. 1994 Dec;11(4):208-14. [[PubMed](#)]
26. Chellappah NK, Vignehsa H, Milgrom P, Lam LG. Prevalence of dental anxiety and fear in children in Singapore. *Community Dent Oral Epidemiol*. 1990

- Oct;18(5):269-71. [\[PubMed\]](#) [\[Download PDF\]](#)
27. Raadal M, Milgrom P, Weinstein P, Mancl L, Cauce AM. The prevalence of dental anxiety in children from low-income families and its relationship to personality traits. *J Dent Res*. 1995 Aug;74(8):1439-43. [\[PubMed\]](#)
28. Wong HM, Humphris GM, Lee GT. Preliminary validation and reliability of the Modified Child Dental Anxiety Scale. *Psychol Rep*. 1998 Dec;83(3 Pt 2):1179-86. [\[PubMed\]](#)