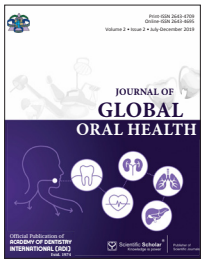
ScientificScholar®
Knowledge is power
Publisher of Scientific Journals

www.jglobaloralhealth.org

Journal of Global Oral Health



Systematic Reviews and Meta-analysis

Appropriateness of various behavior rating scales used in pediatric dentistry: A Review

V. K. Narayan[1], S. R. Samuel[2]

[1]Department of Oral and Maxillofacial Pathology, Thai Moogambigai Dental College and Hospital, [2]Department of Public Health Dentistry, Saveetha Dental College and Hospital, Saveetha Institute of Medical and Technical Sciences, Chennai, Tamil Nadu, India.

***Corresponding author:**
Dr. S. R. Samuel,
Department of Public Health Dentistry, Saveetha Dental College and Hospital, Saveetha Institute of Medical and Technical Sciences, Chennai - 600 077, Tamil Nadu, India.

samuelrajsrinivasan@gmail.com

Received : 20 September 19
Accepted : 18 December 19
Published : 29 February 20

DOI
10.25259/JGOH_64_2019

Quick Response Code:

ABSTRACT

A youngster's response to dental treatment may greatly facilitate or hinder the course and quality of treatment provided. Numerous children tend to experience various clinical levels of anxiety and some will go on to develop as an anxiety disorder. Estimates suggest that approximately 10–25% of the population may experience an anxiety disorder at some time. Without adequate tools to measure the levels of anxiety in children, it is not possible to isolate the problem and give them the early attention they need. Problems which have arisen in using rating scales typically involve difficulties related to reliability, validity, and measurement level. The major drawbacks of the rating system lie in possible undetected bias and misrepresentation of data. The scorer weighs the evidence on which the rating is based on a complex manner which is not easily specified, standardized, or objectified. The present review was carried out to understand the clinical significance of various behavior rating scales practiced over the years in pediatric practice.

Keywords: Anxiety, Behaviour scales, Children, Rating scales, Management

INTRODUCTION

One of the cornerstones in practicing pediatric dentistry is the ability to guide children positively throughout their dental experience and encourage a positive dental attitude to improve their oral health.[1] Assessment and management of children based on their behavior are the most important skills for a pediatric dentist. Behavior rating scales are a common component of many multisource, multimethod frameworks for socioemotional and behavior assessment of children. It is important for pediatric dentists to assess and evaluate psychological, personal traits, and behavioral responses of the child,[2] as they play a major role in the management of dental anxiety and fear. Evaluation of the child's behavior serves as an aid in directing individualized behavior guidance approach that facilitates dental treatment and provides a means for systematically recording behaviors for future appointments.[1,3]

Many behavioral rating scales for evaluating child's behavior on each dental visit have been reported in literature. The aim of this review article is to analyze different evaluation scales that are used to assess the behavior in children.

CHRONOLOGICAL DEVELOPMENT OF BEHAVIOR RATING SCALE

Frankl's behavior rating scale (FBRS) (1962)

FBRS, developed in 1962, is one of the most widely used behavior evaluation scales in pediatric dental research and in daily clinical practice. It classifies child behavior into four groups

according to the child's attitude during dental treatment.[4] It consists of four behavior categories ranging from definitely positive to definitely negative which are assigned by the treating clinician and can be applied at various stages during treatment. It is considered as one of the most reliable tools developed for behavior rating of children in dental setting.[4,5] However, this classification does not provide definite items for observation [Table 1].

Global rating scale (GRS) (1965)

The 5-point GRS of overall behavior is scored by the child's dentist and is a measure of both the successful completion of treatment at the visit and of the dentist's perception of the child's anxiety. It is simple to use and reliable to evaluate the responses of anxious pediatric patient to treatment[6] [Table 2].

Corah's dental anxiety scale (Corah and Pantera, 1968)

This scale was originally developed to measure dental anxiety and fear in adult dental patients. It consists of a four questionnaire with five answers for each of them. The total scores range between 4 (not anxious) and 20 (extremely anxious). This scale is generally applied to older children, who are able to understand the questions.[7]

DENTAL ANXIETY SCALE QUESTIONNAIRE

1. If you had to go to the dentist tomorrow, how would you feel about it?
   a. I would look forward to it as a reasonably enjoyable experience
   b. I would not care one way or the other
   c. I would be a little uneasy about it
   d. I would be afraid that it would be unpleasant and painful
   e. I would be very frightened of what the dentist might do.
2. When you are waiting in the dentist's office for your turn in the chair, how do you feel?
   a. Relaxed
   b. A little uneasy
   c. Tense
   d. Anxious
   e. So anxious that I sometimes break out in a sweat or almost feel physically sick.
3. When you are in the dentist's chair waiting while he gets his drill ready to begin working on your teeth, how do you feel?
   a. Relaxed
   b. A little uneasy
   c. Tense
   d. Anxious
   e. So anxious that I sometimes break out in a sweat or almost feel physically sick.
4. You are in the dentist's chair to have your teeth cleaned. While you are waiting and the dentist is getting out the instruments which he will use to scrape your teeth around the gums, how do you feel?
   a. Relaxed
   b. A little uneasy
   c. Tense
   d. Anxious
   e. So anxious that I sometimes break out in a sweat or almost feel physically sick.

Points were assigned for the subject's choices, with 1 point for an (a) choice to 5 points for an (e) choice.

Table 1: Frankl's behavior rating scale.

1. Definitely negative refusal of treatment, crying forcefully, fearful, or any other overt evidence of extreme negativism
2. Negative reluctant to accept treatment, uncooperative, some evidence of negative attitude but not pronounced, i.e., sullen, withdrawn
3. Positive acceptance of treatment; at times curious, willingness to comply with the dentist, at times with reservation but patient follows the dentist's directions cooperatively
4. Definitely positive good rapport with the dentist, interested in the dental procedures, and laughing and enjoying the situation

Table 2: Global rating scale.

5=excellent
4=very good
3=good
2=fair
1=poor/aborted

Visual analog scale (VAS) (1969)

VAS consists of 10 cm horizontal line with two poles: Unsatisfactory and satisfactory [Figure 1]. It can be used

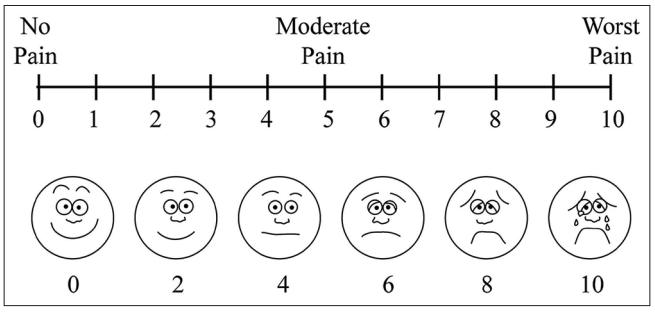


Figure 1: Visual analog scale.

both as a self-report and as an observational tool. A vertical line across the horizontal line is used to mark the operator's assessment of the child's behavior. The point where the vertical line crosses the horizontal line is measured with a ruler to give a score to the nearest centimeter. The VAS is validated for use with anxious dental patients[8] when compared to other scales it is found to be more sensitive and simpler to use [Figure 1].

Categorical rating scale

It was developed by Nazif (1971). This scale is popular among researchers. It monitors and measures behavior at specific time spots in the visit in each category (crying, cooperation, apprehension, and sleep). The scores from the four categories of the scale are summed up to give an overall time point score and then divided by the number of the time point periods. The scale is found to be a reliable tool if used to score a patient's response to a specific treatment such as local anesthetic agent.[9]

a. Crying:
   1 = screaming
   2 = continuous crying
   3 = mild, intermittent crying
   4 = no crying
b. Cooperation:
   1 = violently resist/disrupts treatment
   2 = movements which make treatment difficult
   3 = minor movements/intermittent
   4 = no movements
c. Apprehensive:
   1 = hysterical/disobey all instruction
   2 = extremely anxious/disobeys some/delays treatment
   3 = mild anxious/compiles with support
   4 = calm/relaxed/follows instruction
d. Sleep:
   1 = fully awake
   2 = drowsy
   3 = asleep/intermittent
   4 = sound asleep.

In 1975, Wright proposed a modification of FBRS.[10] He represented the symbols. Definitely positive was represented as (++), positive (+), negative (−), and definitely negative (--) [Table 3].

Behavior profile rating scale (1978)

Melamed *et al.* developed this rating scale which consists of 27 behavioral aspects during dental visits.[11] This scale was designed to allow an independent observer to record the frequency of the disruptive behavior during 3 min observation periods. Four of the items apply to behavior of the child on separation of the mother, while the other 23 statements assess office behavior; 2 of them concern the dentist, and the remaining 21 concern the behavior of the child. Each of the 27 behaviors is weighted by a factor that reflects the degree of its disruptiveness. The total Brief Psychiatric Rating Scale (BPRS) [Figure 2] score is obtained by multiplying the frequency at which a behavior in each category occurs (across 3 min intervals) by its weighted factor. These weighted frequencies are then added across categories and the sum is divided by the number of 3 min intervals. In this way, the total BPRS score is a measure of the average frequency of fear-related behaviors per 3 min interval. Aartman *et al.*[10] stated that of the behavioral measures, Melamed's BPRS is to be preferred to the FBRS, Venham's, and VAS. The main reason is that it measures the behavior of the child more precisely and that it has superior psychometric properties.[10] However, it can be a complicated score to calculate and takes a significant amount of time, also requires an external observer other than the treating dentist[11,12] [Table 4].

Venham's behavior rating scale

Venham *et al.* introduced and explored the use of 6-point cooperative behavioral scale also called uncooperative behavior rating scale.[13] The scale describes child's behavior in details and provides more information about pediatric patients with negative and disruptive behavior. It is a 6-point scale, with scale points anchored in objective, specific, and readily observable behavior and classifies child's behavior into six groups. The dentist indicates the patient's behavior by picking a number from 0 to 5 according to the scale after the dental visit or at specific time spots of it. Venham

Table 3: Wright's modification of Frankl's behavior scale.

Rating	Wright's modification	Attitude	Definition
1.	(−)	Definitely negative	Refusal of treatment, crying forcefully, fearful, or any other overt evidence of extreme negativism
2.	(−)	Negative	Reluctant to accept treatment, uncooperative, some evidence of negative attitude but not pronounced, i.e., sullen, withdrawn
3.	(+)	Positive	Acceptance of treatment; at times caution. Willingness to comply with dentist, at time with reservation but patient follows the dentist's direction cooperatively
4.	(++)	Definitely positive	Good rapport with the dentist, interested in the dental procedure, and laughing and enjoying the situation

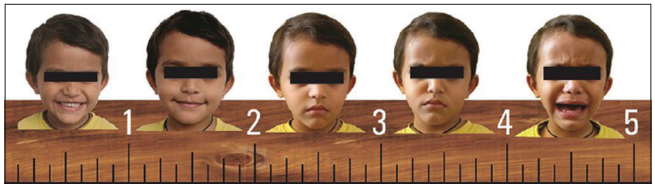


Figure 2: Raghavendra, Madhuri, and Sujata Pictorial Scale for boys.

Table 4: Behavior profile rating scale.

	Successive 3 min observation period						
	1	2	3	4	5	6	Etc.
Separation from mother							
(3) Cries							
(4) Clings to mother							
(4) Refuses to leave mother							
(5) Roddy carried in							
Office behavior							
(1) Inappropriate month closing							
(1) Choking							
(2) Will not sit hack							
(2) Attempts to dislodge instruments							
(2) Verbal complaints							
(2) Overreaction to pain							
(2) White knuckles							
(2) Negativism							
(2) Eyes closed							
(3) Cries at injection							
(3) Verbal message to terminate							
(3) Refuses to open mouth							
(3) Rigid posture							
(3) Crying							
(3) Dentist using loud yogi							
(4) Restraints used							
(4) Kicks							
(4) Stands up							
(4) Rolls over							
(5) Dislodges instruments							
(5) Refuses to sit in chair							
(5) Faints							
(5) Leaves chair							

et al. pointed out that the scale is a reliable and valid scale and provides interval level measurement. They found that the used behavioral labels accurately capture the essence and variable manifestations of "uncooperative behavior" in young children. In the same survey, it is demonstrated and the scale is proven as a useful instrument for assessing child's responses to dental stress[13,14] [Table 5].

Venham anxiety and behavioral rating scale

These two scales assess the anxiety and uncooperative behavior of children in the dental setting. Both scales consist of five behavioral defined categories ranging from 0 to 5 with higher score, indicating greater level of anxiety or lack of cooperation. A high degree of reliability is seen for both scales, even for untrained observer[13] [Table 6].

Modification and adaptation of FBRS

Machen and Johnson described an adaptation of FBRS (1991). According to the new version of the scale, two independent rates evaluate children's behavior in dental setting in the range from definitely positive to negative and definitely negative at five different moments.[14]

1. Separation of the child from the parent
2. First reaction of the child in dental setting
3. Attitude toward the dental staff
4. Behavior during the treatment
5. Behavior after the treatment.

The extra category could be expressed as (±), leading to the suggested modified Frankl categories of behavior are as follows:

Rating 1: Definitely negative (−): Refusal of treatment, crying forcefully, fearful, or any other overt evidence of extreme negativism

Rating 2: Negative (−): Reluctant to accept treatment, uncooperative, some evidence of negative attitude but not pronounced

Rating 3: Negative positive (±): Fluctuation between uncooperativeness and some evidence of unpronounced

Table 5: Venham behavior rating scale.

Rating	Definition (behavioral rating scale)
0.	Total cooperation, best possible working conditions, no crying or physical protest
1.	Mild, soft verbal protest or (quite) crying as a signal of discomfort, but does not obstruct progress. Appropriate behavior for procedure
2.	Protest more prominent. Both crying and hand signals. May move head around making it hard to administer treatment. Protest more distracting and troublesome. However, child still complies with request to cooperate
3.	Protest presents real problem to dentist. Complies with demands reluctantly, requiring extra effort by dentist. Body movement
4.	Protest disrupts procedure, requires that all of the dentist attention be directed toward the child behavior. Compliance eventually achieved after considerable effort by dentist, but without much actual physical restraints. More prominent body movement
5.	General protest, no compliance or cooperation. Physical restraint is required

Table 6: Venham anxiety and behavior rating scale.

Rating	Anxiety rating scale
0.	Relaxed, smiling, willing, and able to converse
1.	Uneasy, concerned. During stressful procedure may protest briefly and quietly to indicate discomfort. Hands remain down or partially raised to signal discomfort. Child willing and able to interpret experience as requested. Tense facial expression, may have tears in eyes
2.	Child appears scared. Tone of voice, questions and answers reflect anxiety. During stressful procedure, verbal protest, (quiet) crying, hands tense and raised, (not interfering much may touch dentist's hand or instrument, but not pull at it). Child interprets situation with reasonable accuracy and continues to work to cope with his/her anxiety
3.	Shows reluctance to enter situation, difficulty in correctly assessing situational threat. Pronounced verbal protest, crying. Using hands to try to stop procedure. Protest out of proportion to threat. Copes with situation with great reluctance
4.	Anxiety interferes with ability to assess situation. General crying not related to treatment. More prominent body movement. Child can be reached through verbal communication, and eventually with reluctance and great effort he or she begins the work of coping with the threat
5.	Child out of contact with the reality of the threat. Genera1 loud crying, unable to listen to verbal communication, makes no effort to cope with threat. Actively involved in escape behavior. Physical restraint required

negative attitude, and cautious acceptance to treatment with reservation shifting throughout the visit

Rating 4: Positive (+): Acceptance of treatment; at times cautious, willingness to comply with the dentist, at times with reservation but patient follows the dentist's directions cooperatively

Rating 5**:** Definitely positive (++): Good rapport with the dentist, interested in the dental procedures, and laughing and enjoying.

Raghavendra, Madhuri, and Sujata Pictorial Scale (2015) (RMS-PS)

RMS-PS is an innovative scale for the assessment of child's dental anxiety. It comprises a row of five faces ranging from very happy to unhappy. Two separate sets of photographs were used for boys and girls. The children were asked to choose the face they feel like about themselves at that moment. The scale was scored by giving a value of one to very happy and five to the very unhappy face.[15]

The RMS-PS has many advantages such as:

1. Attractive as it is colorful and easily understood by children.
2. It takes very short time to complete the test.
3. It gives immediate feedback about the anxiety of the child to the dental clinic to the dental team, in the waiting room itself. It can also be used to get the feedback in subsequent visits also so that we can treat accordingly with the appropriate behavior management technique.
4. With original color photographs in RMS-PS, the child can identify themselves better with them as compared to black and white and cartoon figures used in Venham's pictorial test and facial index scale.

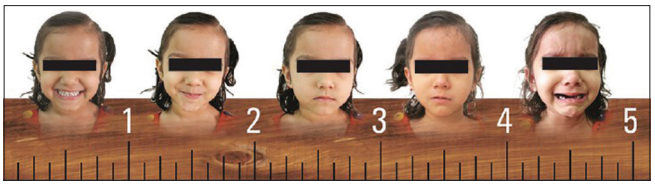


Figure 3: Raghavendra, Madhuri, and Sujata Pictorial Scale for girls.

RMS-PS is kept separate for girls and boys to maximize its acceptability among both the genders [Figures 2 and 3].

CLINICAL SIGNIFICANCE

The Frankl behavior evaluation scale along with other scales is highly useful in pediatric dentistry to assess the level of cooperativeness of the child during dental visits. A modification to the Frankl scale was suggested to add a fifth rating to make the scale more accurate and further reflective. Few authors suggest, of the behavior measures, that Melamed's behavior profile rating scale is to be preferred to Frankl's rating scale, Venham rating scale, and visual rating scale. The main reasons are that Melamed's BPRS measures the behavior of the child more precisely and it has superior psychometric properties. Furthermore, due to their practical, conceptual, and psychometric problems, physiological measures at this stage are found to be less appropriate for assessing dental fear in children. It is believed that behavioral measure is not always the ideal but often the only available technique for assessing dental fear in children.

CONCLUSION

Assessment of behavior is the most important tool in the hands of the dentist. This helps the dentist to execute required treatment plan in the most appropriate manner in children, thereby instilling positive attitude toward dental treatment

or procedures. One should also keep in mind that behavior rating scales should never be utilized as the sole source of information for the purposes of diagnosis or classification of a specific educational or psychological problem. Overall, the purpose of behavioral observations is to facilitate an accurate description and understanding of the child.

Declaration of patient consent

Patient's consent not required as patients identity is not disclosed or compromised.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Mcdonald RE, Avery DR, Dean JA. McDonald and Avery's Dentistry for the Child and Adolescent. 9th ed. Maryland Heights, St. Louis, Mo: Mosby, Elsevier Inc.; 2010. p. 212-24.
2. Shindova MP, Belcheva AB. Behaviour evaluation scales for pediatric dental patients review and clinical experience. Folia Med (Plovdiv) 2014;56:264-70.
3. American Academy on Pediatric Dentistry Clinical Affairs Committee-Behavior Management Subcommittee, American Academy on Pediatric Dentistry Council on Clinical Affairs. Guideline on behavior guidance for the pediatric dental patient. Pediatr Dent 2008;30:125-33.
4. Frankl SN, Shiere FR, Fogels HR. Should the parent remain with the child in the dental operatory? J Dent Child 1962;29:150-63.
5. Sharma A, Tyagi R. Behavior assessment of children in dental settings: A retrospective study. Int J Clin Pediatr Dent 2011;4:35-9.
6. Hosey MT, Blinkhorn AS. An evaluation of four methods of assessing the behaviour of anxious child dental patients. Int J Paediatr Dent 1995;5:87-95.
7. Corah NL, Gale EN, Illig SJ. Assessment of a dental anxiety scale. J Am Dent Assoc 1978;97:816-9.
8. Parkin SF. Assessment of the clinical validity of a simple scale for rating children's dental anxiety. ASDC J Dent Child 1989;56:40-3.
9. Houpt M. Project USAP the use of sedative agent in paediatric dentistry. Paediatr Dent 1991;20:242-53.
10. Aartman I, Everdingen VT, Johan H, Albert HB. Appraisal of behavioural measurement techniques for assessing dental anxiety and fear in children: A review. J Psychopathol Behav Assess 1996;18:153-71.
11. Melamed BG, Yurcheson R, Fleece EL, Hutcherson S, Hawes R. Effects of film modeling on the reduction of anxiety-related behaviors in individuals varying in level of previous experience in the stress situation. J Consult Clin Psychol 1978;46:1357-67.
12. Al-Namankany A, de Souza M, Ashley P. Evidence-based dentistry: Analysis of dental anxiety scales for children. Br Dent J 2012;212:219-22.
13. Venham LL, Gaulin-Kremer E, Munster E, Bengston-Audia D, Cohan J. Interval rating scales for children's dental anxiety and uncooperative behavior. Pediatr Dent 1980;2:195-202.
14. Wright GZ. Behaviour Management in Dentistry for Children. Philadelphia, PA: WB Saunders Company; 1975.
15. Shetty RM, Khandelwal M, Rath S. RMS pictorial scale (RMS-PS): An innovative scale for the assessment of child's dental anxiety. J Indian Soc Pedod Prev Dent 2015;33:48-52.

How to cite this article: Narayan VK, Samuel SR. Appropriateness of various behavior rating scales used in pediatric dentistry: A Review. J Global Oral Health 2019;2(2):112-7.