

Predictive factors for child behaviour in the dental environment.

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Abstract

Aim: This was to evaluate the potential factors that influence behaviour in the paediatric dentistry environment of children aged 48 to 68 months who have never before been to a dentist. Study Design. Cross sectional. **Methods:** Child behaviour was evaluated using the Frankl scale during both clinical examination procedures and prophylaxis. All mothers of the 118 children investigated underwent a test to assess their anxiety (Manifest Anxiety Scale-MAS) and responded to a questionnaire on the medical history of the child as well as socioeconomic factors. The children were given a test to assess their anxiety (Venham Picture Test-VPT). **Statistics:** The statistical tests adopted were the Chi-squared test and both simple and multiple unconditional logistic regression. **Results:** Children with high anxiety, those who had previously experienced toothache and those had behaved uncooperatively during prior medical experiences, had a greater probability of behaving uncooperatively during their first dental consultation. **Conclusions:** Dental professionals can identify the presence of predictive factors for child behaviour prior to the first clinical examination by including relevant questions in the dental and medical history, thereby facilitating a more positive initial contact between paediatric dentists and their patients.

Introduction

Child behaviour has always been considered the main difficulty in paediatric dental care [Jordon, 1926]. The traditionally established age of three or four years for a child's first dental consultation was based on children's behaviour and the capacity of their dentist to control such behaviour [Pinkam, 1995].

Behaviour management problems are among the most frequent reasons for referral to specialised paediatric dentistry. The prediction of child behaviour during a first dental consultation would favour the use of adequate techniques and contribute towards the development of a trusting relationship between the child and the dental professional. A number of studies have been developed with the aim of identifying the principal factors involved in uncooperative children's behaviour in a dental clinic [Klingberg et al., 1995; Colares and Richman, 2002; Arrrup et al., 2003].

There are a number of factors affecting behaviour. These include family circumstances (socioeconomic disadvantages and single-parent families), mother's dental anxiety, previous negative dental treatment experiences, traumatic

medical experiences [Klingberg et al., 1995; Colares and Richman, 2002; Arrrup et al., 2003]. Other factors are child's age, parent's level of education and child's oral health status [Colares and Richman, 2002].

Dentistry has placed increasing emphasis on the human aspect of the dental professional-patient relationship. Researchers strive to identify better child behaviour management techniques and reduce negative responses from children in the dental clinic. However, these researchers have encountered great difficulties in studying behavioural and emotional aspects as such measures are subjective and often momentary. The use of scales, images, and behavioural observations, either assessed by the dentist and established through self reporting, are techniques described in the scientific literature for evaluating behaviour and feelings such as anxiety, fear and pain [Sanger et al., 1992; Aartman et al., 1998; Colares and Richman, 2002].

The aim of the present study was to identify factors that are potentially capable of predicting a child's behaviour during his/her first dental consultation. This information would allow the professional to anticipate the patient's needs, thereby offering better care and concluding treatment with greater efficiency [Udin, 1988].

Materials and Methods

A cross-sectional study was conducted involving 118 children aged 48 to 68 months with no previous dental experience. The convenience sample was selected from a group of children at a preschool in the city of Belo Horizonte – Brazil.

Outcome variables. Child behaviour during the first dental appointment (outcome variable) was evaluated by a single calibrated examiner using the Frankl Behaviour Rating Scale, ranging from definitely positive to definitely negative [Frankl et al., 1962]. Child behaviour was observed with regard to the following six aspects:

1. Reaction to the dentist;
2. Separation from the mother;
3. Entering the dental office/surgery;
4. Sitting down in the dental chair;
5. Clinical exam and prophylaxis;
6. After the examination.

Key words: child behaviour, dental environment, paediatric dentistry

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The clinical examination and prophylaxis were performed by an experienced dentist who adopted the same approach for all the children. The "tell, show and do" technique was used. Behavioural analysis of the child obtained values ranging from 6 to 24 (sum score 6 = definitely positive; sum score 7 to 12 = positive; sum score 13 to 18 = negative; sum score 19 to 24 = definitely negative). The cut-off point was determined through the median values (six: positive behaviour; and values higher than six: negative behaviour).

Independent variables. The key independent variables were:

- Child's age at the time of observation,
- Child's anxiety, assessed using the modified Venham Picture Test-VPT [Venham and Gaulin-Kremer, 1979; Ramos-Jorge and Pordeus, 2004],
- Mother's prediction of child anxiety (questionnaire – response options: high, medium, low).
- Mother's prediction of child behaviour (questionnaire – response options: negative, positive),
- Child's behaviour during prior medical consultations (mother's report – questionnaire – response options: negative, positive).
- Chronic maternal anxiety, using Manifest Anxiety Scale (MAS) [Taylor, 1953].
- Previous toothache experience (questionnaire – response options: yes or no).
- Economic level of family, determined using the ABA-ABIPEME criteria for socio-economic classification in Brazil.
- Questions were asked on the possession of household items, such as bathroom, radio, television, washing machine, vacuum cleaner and car, as well as the presence of a full-time domestic servant and the educational level of the head of the household.
- Mother's level of schooling, evaluated in years of successfully completed study: low (0 to 3 years), medium (4 to 7 years) and high (8 to 11 years) (questionnaire).

Considerations regarding child anxiety assessment. Child anxiety was assessed using the modified Venham Picture Test-VPT [Ramos-Jorge and Pordeus, 2004]. VPT is a technique that uses a collection of figures. The child chooses the one with which he/she most identifies at the moment. The children were shown eight figures of pairs of children expressing a range of reactions and were encouraged to choose figures that reflect their emotions [Venham and Gaulin-Kremer, 1979]. As this test is projective in nature, it was fundamental that the children be able to identify with the characters in the figures. However, VPT has some limitations. For example, the figures on the cards are all male, which may present problems when the young patient is a girl

[Buchanan and Niven, 2002]. To correct this, a graphic designer specialised in cartooning faithfully reproduced the body language and facial expressions contained in the original test figures, but made the following adjustments to the original VPT: 1. Show one pair of pictures at a time to the child; 2. Create four characters: two boys and two girls, one boy and girl being black and one boy and girl being white; 3. Increase the size of the faces relative to the bodies and hair [Ramos-Jorge and Pordeus, 2004].

Inclusion criteria for the children in the study.

- Aged between 48 and 71 months,
- No prior dental experience.

Exclusion criteria for the children in the study

- Presence of chronic illness,
- Not living in the same house as the mother and father,
- Having a sibling less than 6 months old,
- Having suffered a recent loss, such as the death of a close relative, friend or pet, or having recently changed schools.
- Prior dental experience.

Assessments. The research team consisted of three dentists and a dental assistant. Each participant of the team had a pre-determined function, A) Application of VPT test to the children; B) Evaluation of child behaviour, and C) Clinical examination and prophylaxis.

Statistical methods. For the univariate analysis, 2x2 and 2x3 tables were constructed. The association between child behaviour and the independent variables was evaluated using the Chi-squared test. The criteria for the selection of variables in the development of the multivariate analysis (unconditional logistic regression) were obtained from the results of the univariate analysis. Variables with statistical significance equal to or less than 25 percent were included [Mickey and Greenland, 1989]. Both simple and multiple unconditional stepwise logistic regressions were performed, sequentially eliminating the variables that did not fit into the model. Having identified the final model, exponential transformations were performed to obtain the Odds Ratio. Thus, the chance of uncooperative behaviour during the first dental consultation was determined in the presence of the independent variables.

Results

Sample characteristics. The results revealed a majority of girls in the sample (55.9%). Most of the children were five years of age (mean \pm SD age 59.4 \pm 6.4 months). There was a predominance of a low-level of education. In regards to the socio-economic level, the following distribution was found between economic classes: B (4.5%), C (45.5%), D (44.9%) and E (5.1%). Thus, there was a balance between more priv-

ileged socio-economic groups (B and C) and the less privileged (D and E).

Behaviour evaluation based on the Frankl scale revealed that 58 children (49%) showed definitely positive behaviour, 17 (14.4%) positive behaviour, 25 (21.2%) negative behaviour and 18 (15.3%) definitely negative behaviour. Child anxiety levels evaluated with the VPT test revealed that 21 children (17.8%) were considered highly anxious, 30 children (25.4%) had medium levels of anxiety, 37 children (31.4%) had low levels of anxiety and 30 children (25.4%) were considered free of anxiety. The majority of mothers 52 (44%) predicted their child would have a medium level of anxiety during the first consultation (Table 1) and the majority of mothers predicted that their children would show cooperative behaviour (Excellent and Good) (Table 1). It was found that 99 (83.9%) of the children behaved in a cooperative way (Excellent and Good) and 19 (16.1%) showed uncooperative behaviour during previous medical experiences.

Responses to the MAS Test showed that the majority of mothers recorded medium anxiety. Mothers' scores for the 28 questions on the MAS Test ranged from 2 to 23. According to values established by the quartiles, we determined that responses with values between two and nine represented low anxiety; from 10 to 17 representing a medium level of anxiety; and from 18 to 23 a high level of anxiety. When a child's prior toothache experience was considered, 95 children (80.5%) had never had a toothache.

Univariate Analysis. Through the univariate analysis (Chi-squared Test), statistically significant associations were found between child behaviour and the following variables: anxiety of the child as evaluated through the VPT, mother's prediction of child's behaviour and prior toothache experience (Table 1).

Multivariate Analysis – Unconditional logistic regression. Variables with a p-value <0.25 were included in the final multiple logistic analysis. The variable "Anxiety of the child – VPT" was inserted initially. The other variables were inserted in increasing order according to their statistical significance and only remained in the model if they maintained significance. These variables were then adjusted to the model. The final adjusted logistic regression model included the following variables: child anxiety as evaluated by VPT, prior toothache experience and the mother's prediction of the child's behaviour. Table 2 displays the final model after the exponential transformations to obtain the Odds Ratio, which represents the likelihood that a child with characteristics related to a behaviour variable will behave negatively during their first dental consultation.

Discussion

To eliminate the effect of treatment on child behaviour, the decision was made to include only children without prior dental experience, as previous studies are unanimous in

confirming the change in child behaviour after the first dental visit [Koenigsberg and Johnson, 1972; Venham et al., 1977; Venham and Gaulin-Kremer, 1979; Klingberg et al., 1995]. Regardless of the treatment, improvements have been demonstrated in child behaviour after further dental consultations [Koenigsberg and Johnson, 1972].

In the present study, most children presented cooperative behaviour. The possible explanations for this finding may be the age of the child, the procedure employed and the experience of the dental professional (Colares and Richman, 2002). After four years of age, many children present sufficient cognitive maturity to control their anxiety and cooperate with dental treatment [Pinkham, 1995]. In the present study, 13.7% of the children who were considered highly anxious presented definitely positive behaviour.

In spite of the VPT test having originally been elaborated to assess anxiety in children from 36 to 72 months of age [Venham and Gaulin-Kremer, 1979], children in the present study aged between 36 and 47 months were not capable of reliably responding to the VPT test. Therefore, the option was made to include children aged 48 months and above. The VPT was chosen for two main reasons. First, it is a test that is especially appropriate for preschool children (3 to 6 years of age). Secondly, it not only has moderate to high reliability [Venham and Gaulin-Kremer, 1979; Aartman et al., 1998], but can also identify anxious and non-anxious children [Alwin et al., 1994].

The exclusion criteria were selected based on previous studies [Milgrom et al., 1995; Pinkham, 1995] in which events such as divorce, birth of a sibling, hospitalisations and changes of school were identified as possible stress factors for children. Children with chronic disease may present behaviour problems if a parent considers the disease a tragedy or if parents are either over-protective or neglect the sick child [Pinkham, 1995].

The mother is the principal caregiver, in most cases, entrusted to take the child to the dentist. Therefore, the decision was made to evaluate mother's anxiety and not parental anxiety in the present study. Mothers usually play the key role in the family regarding health and are consequently a strong determinant of their children's behaviour [Kinirons and McCabe, 1995].

In the present study, three predictive factors were associated with child behaviour: mother's prediction of child's behaviour, child's anxiety level (VPT) and whether the child had previously experienced a toothache. Children for whom their mothers had predicted negative behaviour had a greater chance of behaving uncooperatively. Similar results have been obtained in other studies [Klorman et al., 1979; Venham and Gaulin-Kremer, 1979].

The experience of a toothache can also be seen as a determinant of behaviour. A child who has already suffered

Table 1 Child behaviour during first visit to dentist: analysis of independent variables in a population of Brazilian children.

Variables	Child behaviour		Total (column %)	p
	Negative n (row %)	Positive n (row %)		
Age of child				
4 years	18 (60.0)	12 (40.0)	30 (25.4)	0.246*
5 years	42 (47.7)	46 (52.3)	88 (74.6)	
Gender				
Male	25 (48.1)	27 (51.9)	52 (44.1)	0.593
Female	35 (53.0)	31 (47.0)	66 (55.9)	
Anxiety of the child VPT				
Low	16 (23.9)	51 (76.1)	67 (56.7)	<0.001*
High	44 (86.3)	7 (13.7)	51 (43.3)	
Anxiety of the child: mother's report				
Low	14 (46.7)	16 (53.3)	30 (25.4)	0.335
Intermediate	24 (46.2)	28 (53.8)	52 (44.1)	
High	22 (61.1)	14 (38.9)	36 (30.5)	
Mother's prediction of child behaviour				
Excellent	3 (20.0)	12 (80.0)	15 (12.7)	0.008*
Good	40 (50.6)	39 (49.4)	79 (66.9)	
Poor	17 (70.8)	7 (29.2)	24 (20.4)	
Child behaviour during previous medical consultations: mother's report				
Excellent	8 (33.3)	16 (66.7)	24 (20.4)	0.153*
Good	41 (54.7)	34 (45.3)	75 (63.5)	
Poor	11 (57.9)	8 (42.1)	19 (16.1)	
Chronic maternal anxiety MAS Test				
Low	16 (59.3)	11 (40.7)	27 (22.9)	0.293
Intermediate	28 (53.8)	24 (46.2)	52 (44.1)	
High	16 (41.0)	23 (59.0)	39 (33.0)	
Previous toothache experience				
No	42 (44.2)	53 (55.8)	95 (80.5)	0.003*
Yes	18 (78.3)	5 (21.7)	23 (19.5)	
Economic level of family				
More privileged	26 (44.8)	32 (55.2)	58 (49.1)	0.198*
Less privileged	34 (56.7)	26 (43.3)	60 (50.9)	
Education level of the mother				
4 -11 years schooling	20 (58.8)	14 (41.2)	34 (28.8)	0.270
0-3 years schooling	40 (47.6)	44 (52.4)	84 (71.2)	

* Variables with a p-value ≤ 0.25 underwent logistic regression analysis.

toothache has over 3 times' greater chances of showing negative behaviour during the first dental visit than a child who has never experienced a toothache. There is a tendency toward negative behaviour when the child knows that he/she has a dental problem [Wright and Alpern, 1971]. A child's knowledge regarding an oral problem may increase the degree of anxiety during the dental consultation. This is a compelling reason to encourage parents to adopt preven-

tive strategies for their children and thus avoid increased anxiety during dental treatment.

Various studies have related the state of children's oral health with their level of dental anxiety [Klorman et al., 1979; Venham and Gaulin-Kremer, 1979]. A more recent study has shown that all children with negative behaviour had dental caries and the majority had a dmft index greater than eight [Colares and Richman, 2002].

Table 2 Odds ratio (OR) – unadjusted and adjusted for predictive factors of child behaviour variables in a population of Brazilian children.

Variable	Unadjusted Odds Ratio (95%CI)	Adjusted Odds Ratio (95%CI)
Child Anxiety –VPT		
Low	1	1
High	20.0 (7.5-53.1) ⁴	25.2 (8.2-77.7) ⁴
Previous experience toothache		
No	1	1
Yes	4.5 (1.5-13.2) ³	3.6 (1.1-15.3) ²
Mother's prediction of child's behaviour		
Excellent	1	1
Good	4.1 (1.1-15.6) ²	3.7 (0.7-20.1) ¹
Poor	9.7 (2.1-45.4) ³	9.0 (1.1-70.8) ²

⁴P<0.001; ³P<0.01; ²P<0.05; ¹n.s.

Children whose mothers predicted uncooperative behaviour during the first dental consultation showed a 9 times greater chance of behaving uncooperatively than those children whose mothers did not make such a prediction. A number of researchers [Johnson and Baldwin, 1969; Klorman et al., 1979; Pfefferle et al., 1982] confirmed that the mother's opinion regarding her child's behaviour during the first dental consultation was a reliable predictive measure. The results of this study reveal that the dental professional can predict child behaviour during the first dental consultation. The inclusion of questions on mother's prediction of a child's probable behaviour, as well as previous toothache experience and the adoption of the VPT to evaluate child anxiety, would contribute toward an appropriate approach on the part of paediatric dentists with regard to their patients.

An improvement in the relationship between paediatric dentists and their young patients would improve the quality of dental care for young children and consequently reduce the fear and stress of dental treatment that may well extend into adult life.

The present cross-sectional study presents results from data collected from a convenience sample, which limits its external validity. Therefore, these findings should be interpreted and discussed with this limitation in mind. There is a lack of longitudinal and case-control studies in the literature involving randomly selected representative samples that present more consistent scientific evidence regarding the assessment of child behaviour in the dental setting.

Conclusion

Dental professionals can identify predictive factors for child behaviour prior to the first clinical examination by including relevant questions in the dental and medical history, thereby facilitating a more positive initial contact between paediatric dentists and their patients.

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