

ORIGINAL ARTICLE

Evaluation of children's behavior aged 0–3 years during dental care: A longitudinal analysis

Abstract

Child temperament has been studied in various researches and may be useful to predict how a child responds to dental treatment, especially very young children. The purpose of the present longitudinal study was to evaluate the behavioral manifestation of children aged 0 to 3 years, considering different types of dental situation. A total of 169 children were selected and the following data were collected: the age of the child, gender, age of the mother, number of dental visits and their respective dates, stimuli offered to the child, and behavioral response to these stimuli. The children and their respective behaviors were divided into five groups according to the dental situation offered: control, missed visits, fluoride varnish, restoration, and dental trauma. The data were submitted to descriptive and inferential analysis using the chi-square test, with the level of significance set at 5%. Analysis of the different situation offered to infants during routine dental care revealed a predominance of collaborating and partially collaborating behavior, and age at the time of dental care influenced the behavior of the infants, irrespective of the stimulus group. The different types of dental situation provoked changes in the behavioral response of the children of certain age groups, especially in the dental trauma group.

Key words

Child behavior, pediatric dentistry, psychology

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Introduction

Since 1986, when the American Academy of Pediatric Dentistry suggested that the first dental visit of a child should occur at about 6 months of age,^[1] the number of professionals providing dental care to infants has greatly increased. This early care is justified not only in terms of the maintenance of oral health, but also

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because it permits the child to get used to routine dental procedures.^[2] However, the psychological aspects of dental care at this age have been little studied.

Knowledge about early childhood psychological development is fundamental for the understanding of behavioral aspects related to dental care at this age. The observation of behavioral responses of children to standardized dental stimuli permits the establishment of distinct behavioral patterns. In children considered to be “normal,” the approach frequently used to describe behavioral patterns is their association with the child's age based on the concepts of psychosocial and psychomotor development widely reported in the psychology literature. According to Rud and Kisling,^[3] chronologic and mental age have a significant influence upon the time taken for children to accept dental treatment.

Klein^[2] reports that the way the child assimilates its experience with the dentist is decisive for the formation of attitudes and expectations toward dental treatment, although the emotional impact of dental treatment started during early childhood is not exactly known.^[4,5]

Thus, the repercussions of dental treatment on the infant should be carefully evaluated in order to provide data that not only ensure the patient's physical but also his/her emotional well-being at present and mainly in

the future. Thus, the objective of the present study was to assess the behavioral manifestation of a group of infants in response to different dental stimuli since their enrollment in the baby clinic.

Materials and Methods

The study population was obtained by individual analysis of 1103 records from all children enrolled in the Baby Clinic of the Pediatric Dentistry, Scholl of Dentistry of Araçatuba, Brazil, according to the following criteria: children who were enrolled in the program within the first year of life, clinical record completely filled out, and a minimum age of 36 complete months on the day of analysis of the record. The children were healthy and free from physical or mental handicaps. The following data were collected from the records: date of birth, gender, maternal age at the time of delivery, number of dental visits and their respective dates, dental stimuli offered to the child, and behavioral response to these stimuli.

Each child whose record was selected and analyzed was subsequently allocated to one of the following five groups according to the stimuli to which the infant was submitted over the dental visits:

- Control: children submitted to stimuli of oral hygiene, clinical examination, and topical fluoride application.
- Varnish: children submitted to the same stimuli of control group plus topical application of fluoride varnish.
- Restoration: children submitted to the same stimuli of control group plus restorative procedure
- Trauma: children submitted to the same stimuli of control group and who suffered some type of dental trauma
- Missed visit: children only submitted to stimuli of oral hygiene, clinical examination and topical fluoride application who missed a visit at some time, a fact altering the periodicity of the indicated return visits

The children of the control, varnish, restoration, and trauma groups were not allowed to miss any visit in order to maintain the periodicity of the return visits which is in every 2 months according to the care protocol proposed by Cunha, *et al.*^[6] The behavioral classification used in the present study is an adaptation of the scale proposed by Walter, *et al.*^[7] that is appropriate to the child's age studied and is based on the observation of the child's behavioral response to

the stimuli used. This classification has been used at baby clinic since its implantation at 1994. The infants were classified as follows:

- Collaborator: an infant who does not cry when in the arms of the operator, does not try to prevent the execution of the procedures, reacts favorably, and acts normally when in the dental chair without demonstrating fear of what is new.
- Partially collaborator: an infant who does not cry when in the arms of the operator or in the dental chair, does not prevent the procedures but cries during their execution.
- Non-collaborator: an infant who cries when in the arms of the operator or lying in the dental chair, keeps his lips closed during the oral hygiene procedure, and tries to prevent the dental procedures with his hands.

All data of interest were recorded on a chart specifically elaborated for this study and were then analyzed according to the following age groups (in months): 0–6, 7–12, 13–18, 19–24, 25–30, 31–36, and older than 37. The data collected were processed and submitted to the chi-square test for the determination of an association between variables. A level of significance of 5% was adopted. The study was approved by the local ethics committee (registration number: Protocol FOA 753/2004).

Results

On the basis of the inclusion and exclusion criteria, 169 records were selected and allocated as follows: 40 in the control group, 40 in the missed visit group, 29 in the varnish group, 24 in the restoration group, and 36 in the trauma group.

The infants were enrolled in the early prevention program at a mean age of 8 months (SD: 3.275). The mean age of the mothers was 28 years (SD: 5.509). Among the patients analysed there was a predominance of boys (54%) over girls (46%).

Table 1 shows the distribution of the infants according to group and behavior. Most infants presented a collaborating behavior (59%), followed by partially collaborating (27%) and non-collaborating (14%) behavior.

Tables 2 to 6 show the results of the evaluation of the influence of the groups of stimuli on the behavior of the infants, separately for each age group. In these

tables, the percentage was calculated based on the frequency of the stimulus selected for each age group, followed by the application of the chi-square test.

Table 2 shows the distribution of infants of the control group according to behavior and age group. Collaborating behavior was the predominant behavior

Table 1: Number and percentage of the behavior distribution exhibited by children since 0–3 years old, according to the group in which they were divided

Behavior	Group					Total
	Control	Missed visit	Varnish	Filling	Trauma	
NC	89 (13%)	98 (14%)	87 (17%)	60 (13%)	88 (14%)	422 (14%)
PC	187 (29%)	149 (22%)	130 (25%)	134 (28%)	206 (32%)	806 (27%)
C	379 (58%)	439 (64%)	298 (58%)	285 (59%)	351 (54%)	1752 (59%)
Total	655 (100%)	686 (100%)	515 (100%)	479 (100%)	645 (100%)	2980 (100%)

P value = 0.0027; χ^2 = 23.59. Statistical significance (*P* < 0.05). NC: Non-collaborator; PC: Partially collaborator; C: Collaborator.

in the age groups of 0–6 months (76%), 7–12 (51%), 19–24 (45%), 25–30 (75%), 31–36 (89%) and older than 36 months (81%). Partially collaborating behavior predominated only in the 13- to 18-month age group (49%).

The distribution of infants of the missed visit group according to behavior and age group is shown in Table 3. There was a predominance of collaborating behavior in the age groups of 0–6 months (96%), 7–12 (58%), 25–30 (61%), 31–36 (70%) and older than 37 months (83%), as well as of partially collaborating behavior in the age groups of 13–18 months (39%) and 19–24 months (46%).

Table 4 shows the distribution of infants of the varnish group according to behavior and age group. A predominance of collaborating behavior was observed in the age groups of 0–6 months (96%), 19–24 (36%), 25–30 (60%), 31–36 (78%) and older than 37 months (81%), whereas partially collaborating behavior predominated in the age groups of 7–12 months (43%) and 13–18 months (44%).

Table 2: Number and percentage of the behavior distribution exhibited by children in the control group, according to the age

Behavior	Child's age (months)							Total
	0-6	7-12	13-18	19-24	25-30	31-36	+37	
NC	2 (6)	26 (22)	37 (33)	11 (11)	7 (6)	3 (3)	3 (3)	89 (14)
PC	6 (18)	41 (35)	55 (49)	44 (44)	21 (19)	7 (8)	13 (16)	187 (28)
C	25 (76)	51 (43)	21 (18)	46 (45)	84 (75)	85 (89)	67 (81)	379 (58)
Total	33 (100)	118 (100)	113 (100)	101 (100)	112 (100)	95 (100)	83 (100)	655 (100)

χ^2 = 175.67. *P* value < 0.0001; statistical significance (*P* < 0.05). Figures in parentheses are in percentage

Table 3: Number and percentage of the behavior distribution exhibited by children in the missed visit group, according to the age

Behavior	Child's age (months)							Total
	0-6	7-12	13-18	19-24	25-30	31-36	+37	
NC	1 (1)	18 (16)	27 (32)	22 (24)	14 (17)	12 (15)	4 (4)	98 (14)
CR	5 (3)	29 (26)	32 (39)	42 (46)	18 (22)	12 (15)	11 (13)	149 (22)
C	144 (96)	64 (58)	24 (29)	28 (30)	50 (61)	57 (70)	72 (83)	439 (64)
Total	150 (100)	111 (100)	83 (100)	92 (100)	82 (100)	81 (100)	87 (100)	686 (100)

χ^2 = 178.04. *P* value < 0.0001; statistical significance (*P* < 0.05). Figures in parentheses are in percentage

Table 4: Number and percentage of the behavior distribution exhibited by children in the varnish group, according to the age

Behavior	Child's age (months)							Total
	0-6	7-12	13-18	19-24	25-30	31-36	+37	
NC	1 (4)	12 (16)	16 (21)	27 (32)	18 (22)	9 (10)	4 (5)	87 (17)
CR	0 (0)	32 (43)	34 (44)	27 (32)	15 (18)	11 (12)	11 (14)	130 (25)
C	23 (96)	30 (41)	27 (35)	31 (36)	50 (60)	73 (78)	64 (81)	298 (58)
Total	24 (100)	74 (100)	77 (100)	85 (100)	83 (100)	93 (100)	79 (100)	515 (100)

χ^2 = 10260. *P* value < 0.0001; statistical significance (*P* < 0.05). Figures in parentheses are in percentage

Table 5: Number and percentage of the behavior distribution exhibited by children in the filling group, according to the age

Filling group Behavior	Child's age (months)							Total
	0-6	7-12	13-18	19-24	25-30	31-36	+ 37	
NC	0 (0)	12 (17)	21 (30)	15 (20)	4 (5)	2 (2)	6 (7)	60 (12)
CR	1 (9)	32 (45)	33 (47)	27 (36)	20 (24)	15 (18)	6 (7)	134 (28)
C	10 (91)	27 (38)	16 (23)	33 (44)	60 (71)	69 (80)	70 (86)	285 (60)
Total	11 (100)	71 (100)	70 (100)	75 (100)	84 (100)	86 (100)	82 (100)	479 (100)

$\chi^2 = 115.61$. P value < 0.0001; statistical significance ($P < 0.05$). Figures in parentheses are in percentage

Table 6: Number and percentage of the behavior distribution exhibited by children in the trauma group, according to the age

Behavior	Child's age (months)							Total
	0-6	7-12	13-18	19-24	25-30	31-36	+ 37	
NC	1 (3)	12 (11)	18 (18)	20 (20)	14 (14)	10 (10)	13 (11)	88 (14)
CR	3 (10)	51 (48)	54 (55)	44 (45)	24 (25)	20 (21)	10 (9)	206 (32)
C	27 (87)	44 (41)	26 (27)	34 (35)	59 (61)	67 (69)	94 (80)	351 (54)
Total	31 (100)	107 (100)	98 (100)	98 (100)	97 (100)	97 (100)	117 (100)	645 (100)

$\chi^2 = 119.00$. P value < 0.0001; statistical significance ($P < 0.05$). Figures in parentheses are in percentage

Table 5 shows the distribution of infants of the restoration group according to behavior and age group. There was a predominance of collaborating behavior in the age groups of 0–6 months (91%), 19–24 (44%), 25–30 (71%), 31–36 (80%) and older than 37 months (86%), and of partially collaborating behavior in the age groups of 7–12 months (45%) and 13–18 months (47%).

The distribution of infants of the trauma group according to behavior and age group is shown in Table 6. A predominance of collaborating behavior was observed in the age groups of 0–6 months (87%), 25–30 (61%), 31–36 (69%) and older than 37 months (80%), and partially collaborating behavior predominated in the age groups of 7–12 (48%), 13–18 (55%), and 19–24 months (45%).

Age at the time of dental care influenced the behavior of the infants, irrespective of the stimulus group, as demonstrated by the significant difference observed in all tables.

Discussion

Because infant oral health emerged as an important theme in pediatric dentistry only relatively late in the past years and because the infant often cannot be reached linguistically, there is not much written behaviorally about this age group. So, the findings of this work must be empathized.

Analysis of the different situation offered to infants during routine dental care and of the behavioral

response to these stimuli in this study, revealed a predominance of collaborating and partially collaborating behavior [Table 1]. Separate analysis of the influence of the child's age at the time of dental care for each group [Tables 2–6] showed the existence of a closely similar pattern. This finding led us to believe that, regardless of the stimulus offered, the determinant factor for the behavioral response of the infants was their age at the time of dental care.

Percinoto and Cunha^[8] and Cunha, *et al.*^[6] observed a process of maturation of behavioral reactions over the first 3 years of life in infants participating in a program of early dental caries prevention. This process can be divided into three phases. During the first phase that corresponds to the first year of life, the behavior of the patient is characterized by collaboration with the dental procedures. During this phase, the infant strongly manifests one of the global responses to the complex of environmental stimuli offered, a behavior called affectionate reaction. During the second phase that comprises the period between the first and the end of the second year of life of the infant, maturation of the child's motor skills is observed. Therefore, episodes of crying, mouth closing, tongue action, and introduction of other body parts that have acquired the notion of movement such as the arms may now try to prevent the action of the professional. Finally, during the third phase corresponding to the third year of life of the infant that is characterized by periodical visits, the responses become more favorable and the children start to cooperate with the treatment.

In the control group [Table 2], collaborating behavior predominated in all age groups, except for the 13- to 18-month age group in which the partially collaborating behavior was predominant. In contrast, in the missed visit group [Table 3] the collaborating behavior continued to be predominant, but a higher prevalence of partially collaborating behavior was observed in the age groups of 13–18 and 19–24 months. The varnish group [Table 4] also presented a prevalence of collaborating behavior in most age groups, except for the age groups of 7–12 and 13–18 months, in which the partially collaborating behavior predominated. The same was observed for the restoration group [Table 5]. Brill [9] found equal results in the children under 3 years, in whose a previous restorative dentistry experience did not influenced behavior at recall.

A distinct pattern was noted for the trauma group in which the partially collaborating behavior was prevalent in three age groups (7–12, 13–18 and 19–24 months), whereas in the other groups this type of behavior predominated in a maximum of two age groups. This finding might be explained by the fact that most episodes of dental trauma occur in the 13- to 18-month age group, followed by the 19- to 24-month age group.^[10] On the basis of these results, we may suspect that the occurrence of dental trauma influences the behavior of infants during routine dental care since this stimulus is more intense. Kleincknecht *et al.*^[5] and Weinstein *et al.*,^[11] reported that individuals suffering some type of dental trauma tend to develop fear of dental care.

Our results showed a trend toward partially collaborating behavior during dental care in children aged 7–18 months, a finding demonstrating a certain disadaptation. This might be explained by the fact that the infant's behavior is altered or influenced by diverse factors such as internal characteristics and situational variables, depending on the age of the child. However, different types of behavior are the result of the environment that provides distinct opportunities for each individual, a condition called individual experience.^[12]

Our results agree with those reported by Cunha *et al.*^[6] with respect to the age group of 0–6 months. However, comparison of the results obtained for the other age groups showed differences, with infants aged 7–30 months presenting a non-collaborating behavior and no defined behavioral pattern being observed in infants aged 31–36 months in the study of Cunha *et*

al.^[6] This difference compared to the present findings might be explained by the fact that the study conducted in 2003 was not longitudinal since it evaluated different children in each age group. Another aspect related to our observations is the fact that the infant's recall capacity seems to increase after the age of 8 months when the child becomes more capable to relate one event that has occurred in the present to a past event.^[12] Thus, the infant recalls a previous visit and the stimuli and sensations he/she felt.

These data may explain our findings regarding the missed visit group in which, as in the trauma group, a high percentage of partially collaborating behavior was observed in the age group of 19–24 months, a pattern differing from that of the other groups in which collaborating behavior predominated in this age group. Supporting data regarding the occurrence of dental trauma are available in the literature, but we found no data regarding the consequence of missing visits that change the periodicity considered to be ideal for the return visits of the child. In this respect, the child may take longer to adapt to the dental experience due to its level of psychomotor development. We believe that missing visits during the first 6 months of life, during which behavior is guided by reflexes, does not have as a great an influence as when this event occurs during a more advanced age when the child interacts more with his environment and requires more familiarization with it to demonstrate adaptation and favorable responses. Thus, age becomes more important in relation to the behavior shown if the child does not attend dental visits for a prolonged period of time, a fact impairing his adaptation.

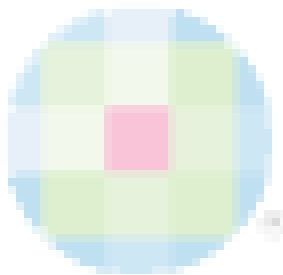
On the basis of our results, we believe that age at the time of dental care was the determinant factor for the behavior of the infants studied. However, it should be emphasized that the dental situation influenced the behavioral response of the children, especially when they suffered some episode of dental trauma.

References

1. Croll TP. The three-year-myth. *Pediatr Dent* 1987;9:86-7.
2. Klein H. Psychological effects of dental treatment on children of different ages. *J Dent Child* 1967;34:30-6.
3. Rud B, Kisling E. The influence of mental development on children's acceptance of dental treatment. *Scand J Dent Res* 1973;81:343-52.
4. Cunha RF, Delbem AC, Percinoto C, Melhado FL. Behavioral evaluation during dental care in children aged 0 to 3 years. *J Dent Child* 2003;70:100-3.

5. Kleinknecht RA, Klepac RK, Alexander LD. Origins and characteristics of fear of dentistry. *J Am Dent Assoc* 1973;86:842-8.
6. Cunha RF, Delbem AC, Percinoto C, Saito TE. Dentistry for babies: a preventive protocol. *ASDC J Dent Child* 2000;67:89-92.
7. Walter LRF, Ferelle A, Issao M. Odontologia para o Bebê: Odontopediatria do nascimento aos 3 anos, São Paulo: Artes Médicas; 1996.
8. Percinoto, C, Cunha, RF. A influência positiva da assistência odontológica para bebês no comportamento futuro do paciente. In: Corrêa MSNP editors. Sucesso no Atendimento Odontopediátrico: Aspectos Psicológicos. São Paulo: Santos; 2002. p. 609-15.
9. Brill WA. The effect of restorative treatment on children's behavior at the first recall visit in a private pediatric dental practice. *J Clin Pediatr Dent* 2002;26:389-93.
10. Pugliesi DM, Cunha RF, Delbem AC, Sundefeld ML. Influence of the type of dental trauma on the pulp vitality and the time elapsed until treatment: A study in patients aged 0-3 years. *Dent Traumatol* 2004;20:139-42.
11. Weinstein P, Getz T, Ratener P, Domoto P. Dentist's responses to fear-and nonfear-related behaviors in children. *J Am Dent Assoc* 1982;104:38-40.
12. Mussen, PH. The psychological development of the child, Englewood Cliffs: Prentice- Hall Inc; 1964.

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