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The effect of structural variables on child behavior in the operatory

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Abstract

This paper, part of a larger study of child management, describes the influence of structural variables on the behavior of the child patient. Thirty-six child patients, ages 3-5, of eighteen dentists, each requiring at least two restorative visits, were videotaped in the provider's operatory. Each visit was broken into six procedural phases: chair placement, oral examination, injection, rubber dam placement, cavity preparation, and placement and finishing of restorative materials. Behaviors of providers and child patients were coded within phases in real time. Results of analyses of variance indicate that frequency of fear/distress-related child behaviors varied significantly between treatment phases. Differences between appointments were minimal. Length of a given procedural phase was found to be significantly related to fear/distress-related behaviors: the longer the phase, the greater percent duration of fear/distress. No relationship was found between child behavior and length of total appointment. Findings suggest the importance of length of procedure in the behavior of preschool children in the operatory.

Introduction

There is considerable agreement that successful management of the pre-school child is not only essential to completion of dental procedures, but is even more important in laying a foundation for future acceptance of dental services.[1] Just as standard restorative, endodontic, and orthodontic techniques have been modified to treat the primary dentition, the need to alter child management practices has also been recognized.[2]

Experts in child management have often written about the influence of structural variables, such as length and sequencing of appointments, time of day, and the presence of parents in the operatory on child behavior. However, most reports have been anecdotal; few present studies of behavior in the operatory. This paper is part of a larger field study of the structure and process of providing restorative care to children, and describes the preliminary results of the following structural variables: treatment procedures and their length, length of appointment, and treatment session.

Subjects and Design

Subjects in the larger field study are twenty-five volunteer practitioners randomly solicited from the Washington State Dental Association and the Washington State Academy of Pediatric Dentists. Twenty-two general practitioners and three pedodontists agreed to participate. Each dentist identified two 3- to 5-year-old children in his or her practice. At the child's next appointment, behavior during prophylaxis was observed and dental health recorded. Children needing treatment requiring two or more operative sessions were eligible for participation.

Dentists agreed not to use nitrous oxide or any other premedication. Aside from this prohibition, there were no other restrictions. All sessions were videotaped in the dentist's office by an experienced technician who visited the operatory earlier to establish optimal camera positions. The videotapes serve as the record of dentist and child behavior. In order to characterize these behaviors, a coding scheme was developed. An independent set of student and practitioner videotapes were observed in an attempt to list important behaviors. These behaviors were placed on cards and sorted and combined into categories which became the basis for the coding scheme, and were then used to generate tentative hypotheses. The final version of the code is presented in Figure 1.

The behavior categories are mutually exclusive (only one activity can be scored at any time) and exhaustive (no time can pass without a codable activity

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Figure 1. Dentist coding key (left), and Child coding key (right).

A. *Vocalization*

1. Dental (to child)
2. Non-dental (to child)
3. Dental (to other than child)
4. Non-dental (to other than child)
9. No vocalization

B. *Direction*

1. *Directs* immediate behavior by command
2. Shows, *demonstrates,* orients/explains and responds to questions
3. *Sets rules* and limits for future behavior (do's and don'ts)
4. Provides *specific feedback* concerning behavior — positive and negative
5. Provides *non-specific feedback* concerning behavior — positive and negative
6. *Finds fault* with behavior, threatens to gain cooperation
7. *Tries to persuade* (personal appeal), coaxes, pleads to direct behavior or gain confidence
8. Raises *rhetorical questions* (interest not in question but patient response)
9. *No* direction

C. *Empathy*

1. Questions for, or acknowledges feelings or pain
2. Reassures — verbal/non-verbal
3. Ignores expressed feeling or statement of pain
4. Denies statement or expression of feeling or pain
5. Humiliates, belittles, other putdowns or name-calling
6. Provides signal mechanism to stop procedure
9. None of the above

D. *Physical Contact*

1. Touches face or mouth as part of normal procedure
2. Touches, pats, strokes child or tickles
3. Hold child (child not moving or interfering with treatment)
4. Restrains child in any way, including mouth props
5. Assist child enter/leave chair; or positioning
9. No physical contact

A. *Physical Positioning and Movement*

1. Appropriate positioning
2. Child initiated appropriate child movement
3. Dentist initiated appropriate child movement
4. Child initiated minor movement, positioning still appropriate
5. Child initiated minor movement, positioning not appropriate
6. Child initiated major movement, positioning not appropriate

B. *Verbal Behavior*

1. Silence
2. Talk or question — uninterpretable
3. Talk or question non-dental matters
4. Talk or question dental matters
5. Statement of hurt or disconfort — including "Ouch!"
6. Verbal protest — "I don't want" or termination request, "Stop it!"
7. Verbal abuse/threats
8. Whimpering, sniveling, soft crying
9. Loud crying and screaming

C. *Comfort*

1. Comfort — pleasantness — lack of tension
   — smile, laugh
   — no tensing of brow or forehead
   — feet/hands relaxed
2. Neutral
3. Discomfort — unpleasantness — tension — both minor and major
   — grimaces — tensing of facial muscles
   — tears in eyes
   — chokes, gas, coughs
   — feet/hands tensed
4. Unobservable

being present). However some behaviors, particularly in the child code, may occur simultaneously. To handle this problem a priority system establishes precedence among the behaviors. For example the child may be asking a dentally related question while crying. As crying is considered potentially more disruptive to the completion of the appointment it is the behavior recorded. Since simultaneous activities within individuals are rare, coders have indicated that this situation is tolerable.

To facilitate exploratory data analyses, all child behaviors were grouped into two mutually exclusive composite categories. One category included: minor and major movement, crying, screaming, whimpering, protest, hurt, and nonverbal facial indications of discomfort. These behaviors indicate fear or distress-related behaviors and are found in Glennon and Weisz' Preschool Observation Scale of Anxiety.[3] The other category (non-fear) included all remaining child behaviors.

An initial hypothesis was that fear/distress behaviors would not be distributed evenly, but would occur most frequently during certain phases of the appointment. Secondly, it was hypothesized that the total percentage of fear/distress-related child behaviors would increase as the length of the appointment increases, and as the length of the individual

Figure 2. Microprocessor Operated Recording Equipment (MORE).

treatment phase increases. Third, that a greater frequency of fear/distress behaviors would be observed in the second appointment due to the age and relative lack of dental experience of the children.

The behavior of child, dentist, and assistant is coded independently in real time from the videotape. The equipment used for the coding is called MORE, i.e., Microprocessor Operated Recording Equipment (Figure 2). This system involves a microprocessor unit with a small keyboard, a recorder, and a computer interface device. When the coder identifies an event, he presses a series of keys. Events are timed in seconds from the first keystroke of an event to the first keystroke of the next event. Following the coding, data are transferred to audio tape for storage and transmission to the host computer. Such systems, first developed and tested by Sackett and colleagues in the early 1970s, have proved invaluable in sequential analyses of observational data.[4]

Interjudge agreement was established by directly comparing coding results of different researchers on the same child. Pearson r for major dimensions ranged from .85 to .94. Percent agreement averaged .89. Though an attempt was made to completely operationalize each behavior, it was found that the context of the behavior often must be considered when coding. For example, the dentist might say, "Sit back in the chair now." The context of the situation and voice tone will determine if this will be coded as dentist direction or use of coercion.

To this point in the project, seventy-two videotapes have been analyzed, representing two sequential appointments for thirty-six children.

Results and Discussion

In order to test the first hypothesis, the restorative appointment was divided into six distinct phases of treatment: chair placement, oral examination, injection, rubber dam, cavity preparation, and placement of filling materials. Results of analyses of variance (Table 1) indicate that the lowest percent frequency and duration of fear/distress-related child behaviors occurred during the oral examination, followed by the visual examination. The next significant increment in

Table 1. Analyses of variance for child behaviors between treatment phases and appointments.

Child Variable	% frequency % duration	Difference Between Phases F	Difference Between Phases p	Differences Between Appointments F	Differences Between Appointments p
Fear/Distress - related Behaviors (Composite Scale)	%f	2.88	.037	2.308	NS
	%d	12.272	.001	11.387	.001
Minor Child Movement	%f	5.353	.001	2.358	NS
	%d	11.111	.001	2.655	NS
Major Child Movement	%f	1.549	NS	.008	NS
	%d	1.923	NS	3.695	NS
Statement of Hurt	%f	6.108	.001	.230	NS
	%d	2.641	.051	2.710	NS
Verbal Protest	%f	1.180	NS	2.135	NS
	%d	.642	NS	4.580	.033
Whimpering	%f	2.498	NS	.413	NS
	%d	1.533	NS	1.942	NS
Loud Crying, Screaming	%f	5.065	.002	1.744	NS
	%d	2.994	.034	1.947	NS
Physical Discomfort	%f	3.927	.001	5.559	.018
	%d	5.975	.001	9.109	.003

Table 2. Analyses of variance and multiple range tests for dentist variables between treatment phases over both appointments.

	Variable	F	P	Least	Most
(d)	Question for Feeling	11.911	.001	Oral examination Chair placement	Rubber dam Cavity preparation
(d)	Reassurance	4.76	.005	Oral examination Chair placement	Injection Cavity preparation/ Filling
(d)	Dental talk to child	3.079	.029	Filling	Chair placement
(d)	Non-dental talk to child	3.17	.009	Cavity preparation	Chair placement Oral examination
(d)	Dentist to auxiliary appointment	25.842	.001	Oral examination	Rubber dam Cavity preparation/ Filling

fear/distress occurred during dam placement, and the highest frequencies were found in the injection, cavity preparation, and placement phases.

The second hypothesis was that differences for child and dentist behaviors *between* appointments would be observed. Results from analysis of variance techniques indicated that the number of incidences (f) of fear/distress behaviors did not vary significantly between appointments, but the percent duration (d) of fear/distress behaviors was significantly greater in the second appointment. This was a function of an increase in verbal protests and indications of facial discomfort. Increases in child movement, hurt, protest, whimpering, and crying observed in the second appointment were not significant, but contributed to the significance of the fear/distress scale.

Findings presented in Table 2 also show which dentist verbalizations varied significantly between phases of treatment. No significant differences in dentist verbalizations between appointments were found.

The third hypothesis was that as the length of the appointment increased, a significant increase in the percent frequency and duration of fear/distress-related behaviors would be observed. Results from Kendall's Correlation tests found no significant correlation for the first or the second appointment (Appt. 1 = .0824, p = .240; Appt. II = .006, p = .479).

The length of each treatment phase within appointments was also correlated with the percent duration of fear/distress-related behaviors. Results indicate that the percent duration of fear/distress-related behaviors such as movement or crying during some treatment phases was significantly correlated with the length of those phases; that is, the longer the phase, the greater the percent duration of fear/distress-related behaviors observed. Significant correlations were found in those phases (the injection and rubber dam) in which the highest percent of fear/distress was found.

Three interpretations of these findings can readily be made. One is that as the duration of a certain phase increases, the percent duration fear/distress-related behaviors increases. Conversely, it is possible that as the percent duration of fear/distress-related behavior increases, the length of the phase increases — presumably because of uncooperative behaviors by the child. A third interpretation is that an unknown variable is affecting the relationship.

In order to further explore the correlations between length of phase and child behavior, a closer examination of the rubber dam phase was undertaken. This phase was chosen because of the high percentage of fear/distress-related behaviors found, and because of the structured, routine nature of the task. The distribution of fear/distress-related behaviors was examined over the length of the phase. The phase was categorized either short (1-3 minutes), average (4 minutes), or long (5-10 minutes).

The distribution indicates fear/distress-related behaviors are not distributed evenly. They decreased or showed no trend in short phases, while they increased in frequency during the latter part of the longer phases (Figure 3).

These findings have led us to establish the hypothesis that increased fear/distress-related behavior is a function of the length of phase. However, this finding must be considered tentative and will be investigated further as the study is replicated with an additional set of subjects, and as a study of the sequential relationship between dentist and child behaviors is completed.

Few researchers have actually assessed differences in preschool child behavior treatment appointments, or length of appointments, and results have been inconclusive. Lenchner[5] found no difference between long or short appointments, though he reported a trend of behavior deterioration over time. Koenigsberg and Johnson,[6] the only previous researchers to

Figure 3. Length of rubber dam phase and trend within phase for fear/distress-related behaviors to increase or decrease over time.

Long Procedures (5-10 Minutes)

Cases
- 7 Fear-Distress Increase
- 3 No Trend

Average Procedures (3.5-4.5 Minutes)

Cases
- 2 Fear-Distress Decreases
- 4 No Trend

Short Procedures

Cases
- 4 Fear-Distress Decreases
- 2 No Trend

investigate behavior between treatment procedures within appointments, found no differences. However, previous studies in this area have not carefully demarcated treatment phases or specified child behaviors. Rating scales have been the instrumentation of choice. These findings, though preliminary, point to the importance of an improved methodology in conducting child management research. Finally, the results begin to suggest that the length of procedures within treatment may be an important variable associated with fear/distress-related behavior in preschool children.

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Quotable Quotes

One of the cunning schemes dreamed up by psychologists to dissuade children from smoking is to enlist clean-living kids in their campaigns, on the principle that children take more notice of their peers than of adults. But this seems doomed to failure in the light of a recent study by P. P. Aitken, of the University of Strathclyde. Quite simply, the sort of "adult-oriented" children that health educators enlist in their schemes are less likely to be respected by their peers. The children other kids look up to are, almost by definition, rebellious and uncooperative; and they boast of their smoking as a symbol of rebellion against authority.

Earlier studies had shown that children who smoke lack parental control — or rebel against it — with respect to smoking. Aitken's study puts this in context by showing that children who smoke most are subject to less parental control in general, with smoking just one facet of their rebellious behavior. The evidence showed older children had more smoking experience. But there were no significant differences directly attributable to sex, social class or catchment area (the children surveyed came from several schools across central Scotland). And across the range of all other variables the children who claimed to have experimented with cigarette smoking showed up as more responsive to their own age group than to adult roles. The children who said they had never smoked showed up as more responsive to parental demands, introverted, and unlikely to have a significant influence on the behavior of other children.

The best way to discourage children from smoking is, it seems, to discourage smoking by the kind of young adults that pre-adolescents regard as glamorous — musicians and sports personalities.

From: "Rebellious Children Smoke More Cigarettes," *New Scientist,* p 778. September 1980.