Abstract

Physical contact with patients by health care providers has been found to benefit the patients by reducing their fearful or avoidant reactions. This study tested whether a reassuring touch could be used during a routine pediatric dental examination to reduce children's anxiety and improve their behavior. Thirty-eight children between 3.5 and 10 years of age were randomly assigned to one of two experimental conditions. Children assigned to the touch condition were patted on the upper arm or shoulder on two separate occasions by the dentist during the examination while simultaneously receiving verbal reassurance and descriptions of the upcoming procedures. Children in the no-touch control condition received only the reassuring verbal descriptions without contact. Results indicated that touched children between the ages of 7 and 10 years (but not children aged 3.5 to 7 years) displayed less fidgeting behavior than their no-touch counterparts ($P < 0.05$). Post-treatment, children who were touched tended to report greater pleasure ($P < 0.06$) but less dominance ($P < 0.10$) than children not touched. (Pediatr Dent:15:21–24, 1993)

Dentist's reassuring touch: effects on children's behavior

Paul E. Greenbaum, PhD Mark A. Lumley, PhD Clara Turner, DMD
Barbara G. Melamed, PhD

Introduction

Anxiety-related behavior or reactions occur commonly during the delivery of health care to children. Specific procedures such as inoculations, venipuncture, or anesthesia induction; and general events such as separation from parents and meeting strangers may induce fear and subsequent disruptive behavior. In the dental environment, children's fearful, resistant, and/or disruptive behavior has been considered an obstacle to adequate care, resulting in management problems and/or avoidance of future treatment.[1,2] Finding effective ways to reduce fear and manage disruptive behavior has been a common concern among pediatric dentists, and comprehensive discussions and lists of behavior management strategies have been published.[3–7] One potentially effective strategy not mentioned in these lists is the use of a reassuring touch. Touch may be a simple and effective way to reduce the fears that may accompany dental care.

Among adults, results from a number of medical studies have supported the efficacy of touch for improving patients' reactions. Patients who were touched either just before or during treatment reported better rapport with nurses and doctors,[8,9] and less pain and anxiety.[10] Outside of medical settings and within the more controlled laboratory environment, adult responses to touch have indicated a lowering of psychophysiological arousal as indexed by heart rate.[11,12] Studies of hospitalized preschool children also have found touch to be effective in reducing distress.[13,14] For example, Triplett and Arneson[13] found that among very young children, ages 3 days to 44 months, distress behavior (i.e., crying, verbal protests) terminated more quickly when nurses patted, stroked, or hugged the children while providing verbal reassurance, compared with using verbal reassurance alone.

The topography or type of touch as well as its environmental context can affect patients' responses to touch. This study used gentle arm or shoulder patting — a type of touch that is appropriate to the dental context and that was expected to maximize fear reduction. Since touch given without accompanying verbal statements can be perceived as threatening or unfriendly,[15] touches in this study always were accompanied by a verbal description of upcoming procedures and reassuring statements to ensure that they would be perceived as supportive.

No experimental studies of the effects of touch have been conducted in the dental setting, and no studies of touch have examined effects on preschool or elementary school-aged children. From a practical perspective, it is this age group that most often presents for dental treatment and, therefore, may benefit from touch as a fear reducer. Thus, this study of children undergoing a dental examination and prophylaxis tested the effects of a dentist's touch when provided in an appropriate verbal context, compared with the effects of a control condition (verbal description alone) on children's self-reported and behavioral anxiety.

Method

Forty-four children between 3.5 and 10 years of age who were patients at the University of Florida Faculty Pediatric Dental Clinicparticipated. Children were selected as potential subjects from dentists' appointment calendars if they were the appropriate age and were scheduled for a dental examination, prophylaxis, and fluoride treatment. To increase sample size yet maximize sample ho-

mogeneity, only children who had had a prior dental examination were included. Six children (three from each experimental condition) who were studied initially were dropped from analyses because their data were incomplete (five cases) or the dentist failed to complete the experimental protocol (one case). The remaining 38 children (20 males and 18 females) constituted the experimental sample.

Two faculty dentists, one female and one male, conducted the examinations and provided the experimental manipulation. Experimental conditions were counterbalanced across dentists; each dentist saw an equal number of patients in each condition (Dentist 1: 16 touch, 16 no-touch; Dentist 2: three touch, three no-touch). The protocol for the experimental manipulation and measures was reviewed and approved by the University of Florida Health Center Institutional Review Board.

Before arriving at the clinic, children were randomly assigned by coin toss to either the touch or no-touch condition, after matching for gender and age (younger than or older than 7 years); this resulted in 19 patients per group. Hence, the groups did not differ in age (touch M = 83.3 months vs. no-touch M = 84.7 months), and there were approximately equal numbers of males and females in each condition (touch: 11 males, eight females; no-touch: nine males, 10 females). Treatment groups were matched for age and gender primarily as control variables as both have been shown to covary with dependent variables used in this study (subjective reports and overt behavioral indices of emotion). Along with reducing error variance, gender and age were included as factors in this study because any differences moderated by these patient characteristics would provide data useful for the practitioner and for understanding the development of touch effects.

Upon arrival, informed consent was obtained from parents and children. Children were separated from their parents and were first administered the Dental Fear Scale (DFS),[16] and then asked to report their feelings about "being at the dentist" using the Self-Assessment Manikin (SAM).[17] Immediately following the dental examination and treatment, children again used the SAM to rate their feelings about being at the dentist. Both the DFS and SAM provide measures of children's dental fear; however, the DFS represents a relatively stable, more trait-like index, whereas SAM measures situational fluctuations in emotion. In the current study, DFS ratings were taken before treatment to ascertain that the randomization procedure generated two experimental groups that were equivalent in pretreatment levels of dental fear. The SAM ratings were used to provide an index of the effects of the experimental conditions on children's subjective reactions.

The DFS is a 15-item questionnaire derived from a subscale of the 50-item Children's Fear Survey Schedule (CFSS).[18] The 15 items include a range of dental stimuli potentially evoking fear in children (e.g., having to open your mouth, having instruments in your mouth, choking, injections, the sight of a drill, the sound of the drill, etc.). Children rated how afraid they were of each item on a 5-point Likert-type scale, and a total score was obtained by summing the ratings. The DFS has a test-retest reliability coefficient of .86,[19] and its validity in predicting behavioral and physiological indices of fear has been demonstrated in several studies.[19,20]

The SAM assesses a respondent's current subjective state on three, independent dimensions of emotion. The version of the SAM used in this study was designed specifically to measure these dimensions in children. The SAM consists of three sets of drawings of a schematized human figure.[17] Each set depicts one of the three emotional dimensions with five drawings of the figure varying from one extreme of the dimension to the other. For the "displeasure-pleasure" dimension, SAM's facial expression changes from a frown to a smile. For the "arousal-calmness" dimension, SAM changes from being "jumpy" and "agitated" with eyes wide open to being a motionless, relaxed figure with eyes closed. In the "submission-dominance" dimension, SAM changes in size from very small to very large. The displeasure, arousal, and submission poles of the dimensions are descriptive of negative emotional states such as fear and anxiety. Each dimension of the SAM is presented to the children, who point to the one figure in each series of five that represents their current emotional state, and a value from 1 to 5 is recorded for each dimension. The validity of this measure has been shown in several studies.[17,21]

Upon completion of the pretreatment self-report measures, the children were escorted into the dental operatory, and seated in a dental chair. A wall-mounted video camera recorded children's behavior during the examination. Videotapes were scored later for overt behavior by a rater who was blind to the hypothesis of the study. A second independent rater served to determine interobserver reliability. The Behavior Profile Rating Scale (BPRS),[22] an instrument designed specifically to measure fear-related behavior of children undergoing dental procedures, provided operational definitions of the two behaviors observed in this study: fidgeting (defined as repetitive hand, leg, or foot movement), and inappropriate mouth closing (preventing the dentist from continuing treatment and operationally defined as the dentist asking the child to "open your mouth," "open wider," etc.). Interobserver reliability was adequate for each behavior; r = .92 and .88, respectively.

Dentists in the touch condition were instructed to pat children on the upper arm or shoulder for approximately 10 seconds on two occasions during the examination. The first touch occurred when the dentist entered the operatory and greeted the child. The second touch occurred during the dental examination, just before the dental explorer was used to check for carious lesions. During each touch, dentists described the upcoming procedure in a calm and friendly voice along with reassuring statements such as "This will be easy," or "This won't hurt." In the no-touch condition, children also received the verbal description

and reassurance during the greeting and before the dental explorer; however, touching did not accompany these verbal messages. Dentists were not restricted from talking during the examination, but they did avoid any other touching of the child, except for contact around the oral cavity as required by the examination.

Results

Statistical analyses and pretreatment differences

Data for each dependent variable were analyzed using a 2 x 2 x 2 cross-classified hierarchical analysis of variance (ANOVA). In each ANOVA, the three independent factors were gender (male/female), age (3.5–6.9 years/7.0–10 years), and touch condition (touch/no-touch). The hierarchical order of entry removed age and gender effects before testing the focal variable of touch.

Pretreatment DFS and pre- and post-treatment SAM scores for both experimental conditions are presented in Table 1. Among pretreatment measures, DFS and SAM displeasure and arousal did not differ significantly between touch and no-touch groups, F (1, 30) < 1.0, NS. However, younger children (ages 3.5 to 7 years) in the no-touch condition had higher submission self-ratings than children in either the older no-touch, or the younger or older touch groups, Touch X Age interaction, F (1, 30) = 4.25, $P < 0.05$. Thus, in analyzing post-treatment SAM scores, pretreatment SAM scores were entered as covariates, thereby removing variance associated with pretreatment differences prior to testing for post-treatment differences.[23] None of the subjective or behavioral dependent measures differed significantly between the two dentists, and no consistent differential effects of dentist for each Touch condition were noted.

Effects of touch

Overt behavior. Fidgeting behavior, scored as the percentage of total examination time, was log transformed prior to analysis to increase variance homogeneity. The ANOVA indicated a significant main effect for touch, F (1, 30) = 4.63, $P < 0.05$. Children who were touched showed less fidgeting time than those who were not touched (touch M = 12.5% vs. no-touch M = 22.2%). The touch main effect was qualified by a significant Touch X Age interaction, F (1, 30) = 7.52, $P < 0.01$. Tests for simple effects indicated that only older children in the touch condition showed less fidgeting than their no-touch counterparts (older touch M = 7.4% vs. older no-touch M = 27.5%), F (1, 30) = 16.60, $P < 0.001$; (younger touch M = 18.2% vs. younger no-touch M = 16.3%), F (1, 30) = 1.58, $P > 0.10$. The analysis of inappropriate mouth closings revealed no significant main effects or interactions.

Self-report. As indicated in the Table, at post-treatment, children who were touched tended to rate "being at the dentist" as more pleasurable than their no-touch counterparts, F (1, 30) = 3.85, $P < 0.06$. The touch group also reported a tendency for higher submission ratings (less dominance) than the no-touch group, F (1, 30) = 2.95, $P < 0.10$. No significant effects were associated with the SAM arousal scale.

Discussion

Results from this study support the view that a dentist's reassuring touch affects children's emotional and behavioral reactions during a dental examination. Children who were randomly assigned to receive touch rated their feelings about being at the dentist as more pleasant (or less unpleasant), compared to those not touched. During the examination, children who were touched by the dentist exhibited less fidgeting behavior than those not touched. The latter effect, however, was limited to older children, ages 7 to 10 years; children ages 3.5 to 7 years who were touched did not differ in their fidgeting behavior from those not touched. Fidgeting is considered by lay people as a "nervous" behavior, and by psychologists and ethologists as a behavioral mechanism to displace or adapt to high arousal and conflict.[24] Research on psychiatric patients and normals has found that such repetitive movements increase as a person's psychological discomfort and anxiety increase.[25] Thus, although the true meaning of a child's fidgeting behavior is unknown, there is some evidence that it is a behavioral manifestation or sign of fear or

Table. Mean (standard deviation) self-reported dental fear (DFS) and pre- and post-treatment emotion (SAM) scores for the touch and no-touch conditions

Self-Report Variable	*Experimental Condition*			
	Touch		*No-Touch*	
Dental fear (DFS)	38.68	(9.42)	36.21	(13.97)
Displeasure/pleasure (SAM)				
Pretreatment	3.32	(1.34)	3.32	(1.34)
Post-treatment	3.68	(0.58	3.05	(1.51)
Arousal/calmness (SAM)				
Pretreatment	2.79	(1.81)	2.68	(1.86)
Post-treatment	2.37	(1.74)	2.10	(1.63)
Submission/dominance (SAM)				
Pretreatment	3.00	(1.15)	2.58	(1.39)
Post-treatment	2.90	(1.29)	2.95	(1.39)

Note: The SAM variables were rated on 1- to 5-point scales, with higher values indicating greater pleasure, calmness, and dominance. The SAM means are unadjusted although analyses used pretreatment scores as covariates.

anxiety. In summary, this study indicates that, for some children, touch accompanied by reassuring explanations can reduce anxiety as measured in both subjective and behavioral domains.

Yet touch, as provided in this study, appears to have limited effects, in that only two anxiety-related variables — subjective displeasure and fidgeting — were influenced. Other variables thought to be measures of a child's anxiety — subjective arousal and noncompliance (inappropriate mouth closings) — were not affected. It should be recognized, however, that the brief dental examination was minimally stressful for many children. Further, the study of only recall patients potentially reduced the degree of anxiety observed by eliminating fear associated with novelty. As a result, a "floor effect" may have occurred in which the base rate of arousal and noncompliance was so low that even a powerful intervention would have had difficulty showing an effect. It is possible that touch during a more distressing procedure such as a restoration would have greater anxiolytic properties. Alternatively, certain dental procedures may be so anxiety-inducing (or certain children so anxiety-prone) that touch proves to be too weak an intervention, and stronger measures are indicated. For example, a dentist's use of a loud voice to control highly distressed children was found to reduce disruptive behavior and self-reported arousal during a dental restoration.[26] Research should address the effects of touch during procedures more stressful than a dental examination and prophylaxis.

The mechanism by which touch affects behavior and subjective experience is unclear. Some studies of adults suggest that touching may induce a direct reduction of arousal in the recipient's physiology,[11,12,27-29] which then is manifest in motor and subjective responses. Alternatively, touch may work less directly by helping the children to believe that the dentist is caring and will not harm them. The marginal increase in the touched children's reported submission found in this study suggests that touch may communicate to children that they can temporarily give up control to the dentist. Research which assesses psychophysiological responding and interviews children about their experience may clarify these issues.

Another question for further study is to what extent the observed effects were a function of touch as opposed to the combination of touch and a reassuring verbal description. The present study separated the effects of verbal statements from verbal statements and touch; future research should separate the effects of touch from the combination, thereby clarifying what elements constitute the effective intervention.

Several methodological issues render the results of this study preliminary. First, as noted above, the study included only experienced patients having an examination; the study's applicability to new patients and/or other dental procedures is unknown. Second, touching and verbal descriptions of the upcoming procedures are relatively objective interventions; however, the "reassuring" quality of the touch and verbal statements is admittedly subjective. Although the dentists' behavior appeared reassuring to them and to the investigators, the children's experiences might have been different, especially to statements such as "This won't hurt." Also, the touches might have been perceived as artificial by the children, although both dentists felt that it was a comfortable, natural interaction for them with their patients. Third, the location of the touch (upper arm or shoulder) and the use of only two touches during the examination were somewhat arbitrary decisions that arguably could have been administered differently (and perhaps with greater effect). Finally, the gender, appearance, and personality of the dentists might have influenced the effects of the intervention. This study included only two dentists, and although no differences between them were found, the study was not designed to test the effects of dentist characteristics on children's behavior.

These sources of variance are not experimental confounds, but they do potentially limit the applicability of the findings. Future research should seek to control or experimentally evaluate these variables. Nonetheless, this study, in combination with the larger literature on the beneficial effects of touch in general health care, suggests that the dentist's judicious use of gentle touch while simultaneously providing a reassuring description of upcoming procedures may affect the child's emotional experience at the dentist positively.

Dr. Greenbaum is visiting associate professor, Department of Child and Family Studies/Department of Psychology, University of South Florida. Dr. Lumley is Assistant Professor, Department of Psychology, Wayne State University. Dr. Turner is associate professor, Department of Pediatric Dentistry, University of Florida. Dr. Melamed is professor and dean, Ferkauf Graduate School of Psychology, Yeshiva University.

This research was conducted while all authors were at the University of Florida. The study was supported, in part, by the National Institute of Dental Research Training Grant 5T32DE07133 to Dr. Melamed. The authors thank Greg Jerrell, DDS, for his assistance in data collection.

1. Corah NL, O,Shea RM, Ayer WA: Dentists' management of patients' fear and anxiety. J Am Dent Assoc 110:734–36, 1985.
2. Ingersoll BD: Behavioral Aspects in Dentistry. New York: Appleton-Century-Crofts, 1982.
3. Glasrud PH: Dentists' characteristics and child behavior management techniques. ASDC J Dent Child 51:337–43, 1984.
4. Wright FAC, McMurray NE, Giebartowski J: Strategies used by dentists in Victoria, Australia, to manage children with anxiety or behavior problems. ASDC J Dent Child 58:223–28, 1991.
5. Association of Pedodontic Diplomates: Survey of attitudes and practices in behavior management. Pediatr Dent 3:246–50, 1981.
6. Chambers DW: Managing the anxieties of young dental patients. ASDC J Dent Child 37:363–74, 1970.
7. Allen KD, Stanley RT, McPherson K: Evaluation of behav-

ior management technology dissemination in pediatric dentistry. Pediatr Dent 12:79–82, 1990.
8. Aguilera DC: Relationship between physical contact and verbal interaction between nurses and patients. J Psychiatr Nurs 5:5–21, 1967.
9. McCorkle R: Effects of touch on seriously ill patients. Nur Res 23:125–32, 1974.
10. Whitcher SJ, Fisher JD: Multidimensional reaction to therapeutic touch in a hospital setting. J Pers Soc Psychol 37:87–96, 1979.
11. Drescher VM, Gantt WH, Whitehead WE: Heart rate response to touch. Psychosom Med 42:559–65, 1980.
12. Drescher VM, Whitehead WE, Morrill-Corbin ED, Cataldo MF: Physiological and subjective reactions to being touched. Psychophysiology 22:96–100, 1985.
13. Triplett JL, Arneson SW: The use of verbal and tactile comfort to alleviate distress in young hospitalized children. Res Nurs Health 2:17–23, 1979.
14. Whitehead WE, Drescher VM, Morrill-Corbin E, Cataldo MF: Rumination syndrome in children treated by increased holding. J Pediatr Gastroenterol Nutr 4:550–56, 1985.
15. Sussman NM, Rosenfeld HM: Touch, justification, and sex: Influences on the aversiveness of spatial violations. J Soc Psychol 106:215–25, 1978.
16. Cuthbert MI, Melamed BG: A screening device: Children at risk for dental fears and management problems. ASDC J Dent Child 49:432–36, 1982.
17. Hodes RL, Cook EW, Lang PJ: Individual differences in autonomic response: Conditioned association or conditioned fear? Psychophysiology 22:545–60, 1985.
18. Scherer MW, Nakamura CY: A fear survey schedule for children (FSS-FC): A factor analytic comparison with manifest anxiety (CMAS). Behav Res Ther 6:173–82, 1968.
19. Klingman A, Melamed BG, Cuthbert MI, Hermecz DA: Effects of participant modeling on information acquisition and skill utilization. J Consult Clin Psychol 52:414–22, 1984.
20. Melamed BG, Yurcheson R, Fleece EL, Hutcherson S, Hawes R: Effects of film modeling on the reduction of anxiet-related behaviors in individuals varying in level of previous experience in the stress situation. J Consult Clin Psychol 46:1357–67, 1978.
21. Lumley MA, Melamed BG: Blood phobics and nonphobics: Psychological differences and affect during exposure. Behav Res Ther 30:425–34, 1992.
22. Melamed B, Weinstein D, Hawes R, Katin-Borland M: Reduction of fear-related dental management problems with use of filmed modeling. J Am Dent Assoc 90:822–26, 1975.
23. Cohen J, Cohen P: Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences, 2nd Ed. Hillsdale, L. Erlbaum Associates, 1983.
24. Ekman P, Friesen WV: The repertoire of nonverbal behavior: Categories, origins, usage, and coding. Semiotica 1:49–98, 1969.
25. Ekman P, Friesen WV: Hand movements. J Communication 22:353–74, 1972.
26. Greenbaum PE, Turner C, Cook EW, Melamed BG: Dentists' voice control: Effects on children's disruptive and affective behavior. Health Psychol 9:546–58, 1990.
27. Drescher VM, Hayhurst V, Whitehead WE, Joseph JA: The effects of tactile stimulation on pulse rate and blood pressure. Biol Psychiatry 17:1347–52, 1982.
28. Mills ME, Thomas SA, Lynch JJ, Katcher AH: Effect of pulse palpation on cardiac arrhythmia in coronary care patients. Nur Res 25:378–82, 1976.
29. Lynch JJ, Thomas SA, Mills ME, Malinow K, Katcher AH: The effects of human contact on cardiac arrhythmia in coronary care patients. J Nerv Ment Dis 158:88–99, 1974.