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Effects Of Maternal Fearfulness And Children'S Inhibition On Children'S Response To Dental Treatment.

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EFFECTS OF MATERNAL FEARFULNESS AND CHILDREN'S INHIBITION ON CHILDREN'S RESPONSE TO DENTAL TREATMENT

by

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A DISSERTATION

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ABSTRACT OF DISSERTATION
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Forty 3-4 year-olds and their mothers participated in a study of the effect of maternal anxiety and children's inhibition on children's response to dental prophylaxis. Prior to treatment, children were observed in a "risk room" assessment of behavioral inhibition and mothers completed the Fear Survey Schedule. Mothers were randomly assigned to be present or absent during treatment. Behavior during inhibition assessment was coded for 12 variables suggestive of inhibition, and behavioral response to treatment was coded using the Observational Scale of Behavioral Distress. Girls were generally more behaviorally distressed than boys during dental treatment. Furthermore, girls tended to display more behavioral distress than boys when mothers were present. The child's gender did not affect behavioral distress levels when mothers were absent from treatment. In this investigation, inhibition and maternal presence did interact to predict the distress of children during dental

treatment. Among younger subjects (36-50 months), inhibited children whose mothers were absent were significantly more behaviorally distressed than inhibited children whose mothers were present. However, the effect of maternal presence on behavioral distress did not vary as a function of the mother's anxiety, and maternal fearfulness and child inhibition were uncorrelated.

Abstract Approved by: Committee Chairman Edwin W. Cook III, Ph.D.

Program Director

Date 8/28/92 Dean of Graduate School W. A. Sibley

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INTRODUCTION

Children exhibiting distress behaviors in pediatric medical and dental settings often do not receive services of the same quality as those given to cooperative children. Health care providers may rush or skip procedures with an unruly, anxious child (Hubert, Jay, Saltoun, & Hayes, in press; Melamed et al., 1983; Venham, Gaulin-Kremer, Munster, Bengston-Audia, & Cohan, 1980). A better understanding of the factors that contribute to and exacerbate distress responses in children undergoing medical/dental procedures may allow appropriate interventions to be implemented, thus enabling more children to receive the quality of services they require.

In Western culture the mother remains the primary caretaker and socializing agent for her child. As such, mothers most often accompany their children to the dentist's office, and maternal characteristics have been a primary focus of research on the etiology of dental anxiety in the pediatric patient. Although a variety of empirical approaches have been taken in elucidating the determinants of children's dental fears, some investigators have relied exclusively upon self-reports of anxiety by the mother and child. Studies using a variety of questionnaires to assess

anxiety have generally found that maternal self-reported anxiety correlates positively with child self-reports of anxiety (e.g., Heffernan & Azarnoff (1971); Jay, Ozolins, Elliott, & Caldwell (1983); see Appendix A for a review). Other investigators (e.g., Hawley, McCorkle, Wittemann, & Van Ostenberg (1974); Johnson & Baldwin (1969)) assessed distress through behavioral observation of the child prior to and during treatment. In these studies as well, a generally positive relationship has been found between maternal self-reported anxiety and child distress (see Appendix A for a review).

These important correlational findings do not address the question of the mechanism underlying the generally positive relationship between maternal and child anxiety. The extent to which characteristics of the mother and child are responsible, either individually or in combination, for shared anxiety and distress within a mother-child dyad cannot be explicated through correlational studies. Experimental manipulation aimed at isolating the effects of individuals in a dyad and their interaction is necessary. The first empirical research of this sort involved manipulation of the medical/dental environment by controlling the mother's presence or absence during the pediatric procedure.

In several studies, dyads were randomly assigned to either mother-present or mother-absent conditions upon arrival at the medical or dental clinic. In the mother-

present condition, the mother accompanied her child into the examination; in the mother-absent condition, the child was treated alone. The child's behavior during examination was rated and these ratings were analyzed. This methodology has yielded mixed results. Frankl, Shiere, and Fogels (1962) and Venham (1979) studied the reactions of dental patients between the ages of 3 1/2 and 5 1/2 years old, and 3 and 8 years old, respectively. The child's behavior during the examination was rated using a four-point scale developed by Frankl et al. (1962). Results of these early studies indicated that children were significantly less distressed when the mother was present for the examination.

Later investigations that manipulated maternal presence in pediatric outpatient settings found that children displayed significantly more distress when the mother was present (Gonzalez et al., 1989; Gross, Stern, Levin, Dale, & Wojnilower, 1983; Shaw & Routh, 1982). In these studies children were observed undergoing routine vaccinations or venipuncture. The children's behavior in the Gonzalez et al. (1989) and Shaw and Routh (1982) studies was again coded using the Frankl et al. (1962) scale. The investigators attributed the increase in child distress when mothers were present to the child's seeking of comfort and help from his or her mother. It was felt that the children in the mother-absent group did not cry and fuss as often because there was no recipient for their solicitations.

Age effects relating to degree of distress were found in many of the studies in which maternal presence was experimentally manipulated. Venham (1979) found that children between the ages of 3 and 5 were more distressed (as assessed by behavioral observation and self-report) than children aged 5 1/2 to 8 regardless of maternal condition. Frankl et al. (1962) and Shaw & Routh (1982) found significant interactions between age and maternal absence, such that within the mother-absent groups, the younger patients were found to be significantly more distressed than the older patients when mothers were absent. Frankl et al. (1962) found that children between 3 1/2 and 4 years of age were distressed during the examination when the mother was absent, whereas children over the age of 4 years showed no difference in behavioral distress with respect to maternal presence or absence. The younger patients in Shaw & Routh's (1982) investigation were significantly more distressed than 5-year-olds at two points in the procedure: when the mother departed from the examination room and during the injection.

In an recent effort to clarify the characteristics and mechanism of the relationship between maternal and child anxiety in medical/dental settings, Fishman (1989) manipulated maternal presence during routine dental prophylaxis. Subjects in this study were children between 3 and 6 years of age and their mothers. Maternal anxiety was assessed by trait (Fear Survey Schedule), situational (Dental Fear

Questionnaire) and state (State-Trait Anxiety Inventory-State Form) self-report. The children were administered the Venham Picture Test (Venham & Gaulin-Kremer, 1979) as a state measure of pediatric anxiety. Dyads were randomly assigned to mother-present or mother-absent conditions, the dental examinations were videotaped and the children's behavior was coded using the Observational Scale of Behavioral Distress (OSBD; Jay et al., 1983).

Although no relationship was found between maternal and child self-reports of anxiety, a complex relationship was uncovered in the prediction of the child's behavioral distress. Behavioral distress during dental treatment resulted from the combined effects of the child's age, the mother's general fearfulness, and the mother's presence or absence during treatment. Thus, young children (36-54 months) of highly fearful mothers demonstrated greater behavioral distress when their mothers were present than when their mothers were absent. The opposite relationship was found for dyads with moderate and low fear mothers. Thus, young children of moderate and low fear mothers showed reduced distress when their mothers were present, compared to when their mothers were absent. Little behavioral distress was demonstrated by the older children (54-83 months) and no relationship between maternal anxiety and the distress of these older children was found. These results suggest that the mixed findings of previous research in maternal presence manipulation may be due to

uncontrolled differences in maternal anxiety. None of these earlier studies assessed maternal anxiety prior to manipulation of maternal presence/absence, and were thus unable to characterize the mothers on a dimension that the most recent results suggest to be critical.

There are a number of theories that may explain why children of highly anxious mothers who are present during treatment show high levels of behavioral distress and why children of low anxious mothers who are present show low levels of distress, as was the case for young children in the Fishman (1989) study. For example, social referencing theory (Bretherton, 1984; Campos, 1983) suggests that, in an ambiguous and novel situation, children perceive their mothers' emotional responses and use them to evaluate the potential for danger. Social learning theory (Bandura, 1969) emphasizes the importance of modelling and social rewards and punishments in determining behavior. Parents, and mothers in particular, provide many of these social influences on young children's behavior.

Furthermore, the high levels of behavioral distress in children of low/moderate trait anxious mothers who are absent from treatment may be viewed as the child's reaction to separation from the mother. None of these theories, however, readily explains the reduced behavioral distress of children of high trait anxious mothers in the maternal absent condition. The finding that children of highly anxious mothers are less behaviorally distressed when

mothers are absent than when mothers are present is in fact beyond the scope of any hypothesis that restricts its explanation to processes that occur during the stressful situation. Rather, these findings can only be explained in terms of characteristics of the child or mother-child relationship that generalize beyond the medical/dental setting.

One possibility is that children of highly fearful mothers are generally shy, timid, or "behaviorally inhibited," as described by Kagan, Reznick, and Snidman (1987). While inhibited and uninhibited children are equally likely to communicate with their mothers, inhibited children are less likely to communicate with unfamiliar experimenters and observers (Kagan et al., 1987). If crying is viewed as a form of communication from child to mother (Lester, 1984), inhibited children in the present study would be more likely to cry in the presence of the mother, with whom they willingly communicate. These children would be less likely to cry in the mothers' absence, when the only objects of communication are strangers (e.g., the hygienist). Because crying was the most frequently observed component of behavioral distress measured by Fishman (1989), reduced crying would have accounted for the reduction in overall behavioral distress. Inhibited children in the Kagan et al. (1987) study also consistently displayed high heart rates in response to stressful situations. In the Fishman (1989) study, reduced behavioral

distress was found among the children of highly fearful mothers who were absent from treatment, although regardless of maternal presence, children of high fear mothers were more physiologically aroused during treatment. These results are consistent with the hypothesis that children of highly fearful mothers are more behaviorally inhibited than children of low or moderate fear mothers.

Inhibited children have been described as generally more fearful and anxious than uninhibited children by their mothers (Kagan et al., 1987). Furthermore, as noted above, fearful mothers have often been found to have more fearful children. On the basis of these findings and the preliminary results of the Fishman (1989) study, one may hypothesize that the children of fearful mothers are more inhibited than children of low-fear mothers and that this relationship mediates the interaction between maternal fear and maternal presence described above. This hypothesis has not been directly addressed in previous research and was a major focus of the present investigation.

Two shortcomings in design temper the Fishman (1989) findings. Subject numbers for the young children were small, particularly in the high maternal fear group. Furthermore, a single hygienist was employed throughout the data collection, challenging the generalizability of the results. Thus, replication that increases subject number and employs multiple hygienists is needed. This need for replication was a second major focus of the present study.

The proposed research addressed the hypothesis that child distress in the pediatric dental setting is a function of maternal anxiety and maternal presence. The mechanism underlying this relationship was further investigated by assessing the behavioral inhibition of children prior to the dental examination. Inhibition was assessed by behavioral observation. Maternal anxiety was assessed by questionnaire, and dyads were randomly assigned to conditions in which the mother was either present or absent during her child's dental treatment. Thus, the study design permitted an assessment of the effect of maternal anxiety as it interacts with maternal presence to determine the child's distress during treatment. In addition, the role of child behavioral inhibition in mediating the Maternal Anxiety X Presence interaction was assessed. The following specific predictions were tested:

1. Children of high-fear mothers manifest greater behavioral distress when their mothers are present than when their mothers are absent, whereas children of moderate and low fear mothers show reduced distress when their mothers are present, compared to when mothers are absent.

2. Children of high-fear mothers display more signs of behavioral inhibition than children of moderate and low fear mothers and this relationship mediates the interaction between maternal fear and maternal presence described above.

METHOD

Subjects

Subjects in this investigation were forty 3- and 4-year-old patients at the pediatric dental clinic within the School of Dentistry of the University of Alabama at Birmingham, and their mothers. Mothers were solicited through advertisements in the University newspaper and from the School of Dentistry's recall list. Telephone contact was made with mothers who responded to the advertisement or appeared on the recall list, and the study was briefly described at that time. In addition, mothers were informed that they would be reimbursed in full for their child's dental treatment should they choose to participate. Information regarding the child's previous experience with dental treatment was obtained at this time, in order to balance the subject population between naive and experienced dental patients. Children with previous dental treatment of any kind were considered experienced; only children with no previous exposure to dentistry were defined as naive.

Informed consent was obtained on the day of the appointment. Only dyads with children seeking routine prophylaxis were included (i.e., emergency care patients were

excluded). Mothers were asked about any remedial or special educational classes in which her child participates in order to screen out mentally retarded children from the subject pool. Information concerning any psychological or psychiatric treatment was also obtained in order to remove severely emotionally disturbed children from the subject population. No children were eliminated from participation on the basis of this screening.

The proposed sample size of 40 subjects was selected by power analysis relative to the test of the maternal Fear X Presence interaction (Hypothesis 1). First, based on experience with the OSBD and its relationship to children's distress during treatment, a minimal clinically significant effect size of 5 points was selected for both the mother present and mother absent conditions. Standard deviations around these mean effects were estimated based on the previous study (Fishman, 1989). Based on these assumptions, 40 subjects are needed to obtain power of .81 for the interaction test. Cohen (1988) labels power of .8 or more as "high" on a "low," "medium," "high" scale.

Measures

The Fear Survey Schedule (FSS; Wolpe & Lang, 1964) is a self-administered questionnaire evaluating the subject's reactions to a variety of fear related situations. The subject rates her reaction to each situation on a 5-point Likert-type scale ranging from "not at all" to "very much," resulting in six subscale scores and an overall score of

trait anxiety. Test-retest reliability is reported as .78 on an earlier 98 item form of the FSS and .63 on an earlier 122 item form (Spielberger, 1978). The FSS correlates with another measure of trait anxiety, the Taylor Manifest Anxiety Scale, at .46 (Grossberg & Wilson, 1965). For the present study the 52-item form of the FSS (Arrindell, Emmelkamp, & van der Ende, 1984) was selected on the basis of its brevity and consistency of factorial structure across samples. Internal consistency (coefficient alpha) of this 52-item form was found to be .94 in a sample of 264 subjects (Cook, Hawk, Davis, & Stevenson, 1991).

The behavioral inhibition assessment consisted of two phases (Kagan, Reznick, & Gibbons, 1989). The first phase began when the mother-child dyad entered a "risk room" containing four objects that were unfamiliar to the child and suggestive of risk. These objects were a 44 in. x 30 in. black box with an 8 in. diameter hole cut into one side, a 48 in. x 3.5 in. balance beam elevated 2 in. from the ground, a halloween mask hung from the wall, and a set of wind chimes hung from the ceiling, both within reach of the child. The mother was asked not to intervene in her child's play unless a potentially harmful situation developed. The child was given no specific instructions and was observed for 5 minutes in his/her interaction with the objects. The following variables reflecting inhibition were recorded from the first phase: (1) latency to the first touch of an object, (2) latency to the first

vocalization, (3) a binary "touch/no touch" count for each object with an additional count for reaching inside the hole cut into the box, (4) sum of the "touch/no touch" count for each object, and (4) total time spent in close proximity to mother (Kagan et al., 1989; N. Snidman, personal communication, September 26, 1989).

The experimenter modeled a series of actions for the child in the second phase of assessment. The procedure for this modelling involved the experimenter performing a specific action with each risk item while asking the child "Can you do what I do?" and smiling to encourage the child. If the child did not imitate within 5 sec, the experimenter repeated the prompt and waited another 5 sec. The prompted actions were as follows: to place one's arm in the hole cut into the black box, to elicit sound from the wind chimes by touching them, to step onto the balance beam, and to put on the mask. Three variables reflecting inhibition were recorded from the second phase: (1) number of refusals to imitate, (2) number of spontaneous "bursts" of communication, and (3) total time talking (N. Snidman, personal communication, September 26, 1989).

Videotaped data from the child's dental examination and treatment was coded using the Observation Scale of Behavioral Distress (Jay et al., 1983). The OSBD consists of 8 operationally defined behavioral categories relating to pain and anxiety in children. Each category is weighted on a 0-4 scale as follows: cry (1.5), scream (4.0), physical

restraint (4.0), verbal resistance (2.5), requests emotional support (2.0), verbal pain (2.5), flail (4.0), and information seeking (1.5). This weighting is intended to increase the validity of the OSBD by placing more emphasis on behaviors that are judged by experienced clinicians to be representative of more intense distress. Behaviors are recorded in continuous 15 sec intervals, and raters record whether the behavior in each category occurred during each interval. A weighted distress sum is obtained for each interval, and interval sums are averaged across the observational periods to obtain an overall distress score for each child.

Procedures

After informed consent was obtained, participating dyads were ushered into a private room in which the assessment of behavioral inhibition took place. Upon completion of this assessment of behavioral inhibition, the mother completed the Fear Survey Schedule while the child was engaged with familiar toys (e.g., coloring books, stickers). The child was then ushered into the operatory. Mothers in the mother-present condition accompanied their children into the dental operatory and were instructed not to speak to or to otherwise interact with their child during treatment. The audio portion of the videotape recording was used to verify compliance with these instructions. Videotaping of the child in the operatory began at this time.

The examination began upon the operator's arrival. The dental procedure consisted of preliminary prophylaxis and the evaluation of need for restorative treatment. Behavioral data was collected throughout these procedures.

Apparatus

The child's behavior during the behavioral inhibition assessment and treatment was videotaped using wall-mounted Panasonic PK 452 color video cameras attached to a Panasonic NV-8420 portable videocassette recorder.

Data Reduction

Inhibition assessment. Two raters were initially trained with 14 videotapes in order to clarify the decision rules by which the twelve behavioral inhibition variables were to be scored. The raters then independently scored each subject's videotape. Discrepancies between raters in these original codings were resolved by a committee consisting of the investigators (BEF and EWC) and the two raters in order to obtain a third set of ratings representing the group consensus.

In order to assess inter-rater reliability and fidelity of group consensus to the original ratings, Pearson product moment correlation coefficients were calculated between the two raters and between each rater and the group consensus ratings, as shown in Table 1. These intercorrelations were high (greater than .95) for eleven of the twelve inhibition variables.

Table 1

Intercorrelations Between Raters and Group Consensus for Inhibition Variables

	Inhibition Variables											
	Fvc	Ftch	Obox	Ibx	Chim	Bm	Msk	Nobj	Prox	Nrf	Nbrst	Ttalk
R 1, R 2	0.99	1.00	0.95	1.00	1.00	0.95	0.95	0.99	0.98	1.00	0.88	0.99
R 1, group	0.99	1.00	1.00	1.00	1.00	1.00	0.95	0.99	0.99	1.00	0.99	0.99
R 2, group	0.99	1.00	0.95	1.00	1.00	0.95	1.00	0.99	0.99	1.00	0.90	0.99

Note. Fvc = latency to child's first vocalization. Ftch = latency to child's first touch of "risk" object. Obox = touch outside of black box. Ibx = touch inside of black box. Chim = touch wind chime. Bm = touch balance beam. Msk = touch Halloween mask. Nobj = number of "risk" objects touched. Prox = total time spent in proximity to mother during first phase of assessment. Nrf = number of refusals to imitate experimenter. Nbrst = number of spontaneous verbal "bursts." Ttalk = total time talking spontaneously during imitation phase of assessment. R 1 = Rater 1. R 2 = Rater 2.

The inter-rater reliability was somewhat lower (.88) for "number of spontaneous bursts," perhaps due in part to the difficulty in understanding the verbalizations of the children. In light of the overall pattern of strong inter-correlations, the group consensus ratings were used in all subsequent analyses. Table 2 displays the intercorrelations among the twelve behavioral inhibition variables based on group consensus ratings.

Following Kagan et al. (1989), all twelve variables reflecting behavioral inhibition were converted to z-scores (with sign reversed for number of objects touched, number of spontaneous bursts, and total time talking) and then averaged in order to obtain an index of behavioral inhibition for each subject. A principal components factor analysis was then conducted in order to assess the nature and validity of the behavioral inhibition construct as measured by these twelve variables. This analysis yielded a first factor that accounted for 36.2% of common variance. All inhibition variables loaded on this factor in the predicted direction. A factor score was computed for this first factor as a second index of behavioral inhibition for each subject.

Initial analysis revealed that the inhibition factor score and inhibition z-score were very highly correlated, $r = 0.98$, $p < .0001$. Thus, in keeping with earlier research in childhood inhibition (Kagan et al., 1989) the z-score was used in all further analyses involving inhibition.

Table 2

Intercorrelations Among Group Consensus Ratings for Inhibition Variables

	Inhibition Variables										
	Fvc	Ftch	Obox[a]	Ibx[a]	Chim[a]	Bm[a]	Msk[a]	Nobj	Prox	Nrf	Nbrst
Ftch	-0.05										
Obox	-0.14	-0.43*									
Ibx	-0.14	-0.43*	1.00*								
Chim	-0.21	-0.59*	0.32*	0.32*							
Bm	0.20	-0.38*	0.25	0.25	0.38*						
Msk	0.18	-0.51*	0.19	0.19	0.12	0.25					
Nobj	-0.04	-0.69*	0.81*	0.81*	0.64*	0.62*	0.51*				
Prox	-0.08	0.65*	-0.23	-0.23	-0.35*	-0.31	-0.17	-0.40*			
Nrf	-0.20	0.25	-0.15	-0.15	0.02	-0.03	-0.05	-0.11	0.22		
Nbrst	-0.22	-0.23	0.29	0.29	-0.10	-0.05	0.06	0.14	-0.19	-0.04	
Ttalk	-0.15	-0.24	0.22	0.22	-0.07	-0.02	0.14	0.14	-0.11	-0.08	0.91*

*p < .05.
[a]Binary variables, coded with a "0" if child did not touch the object during phase 1 of inhibition assessment, "1" if child did touch the object during this time.

Note. Fvc = latency to child's first vocalization. Ftch = latency to child's first touch of "risk" object. Obox = touch outside of black box. Ibx = reach inside of black box. Chim = touch wind chime. Bm = step on balance beam. Msk = touch Halloween mask. Nobj = number of "risk" objects touched. Prox = total time spent in proximity to mother during first phase of assessment. Nrf = number of refusals to imitate experimenter. Nbrst = number of spontaneous verbal "bursts." Ttalk = total time talking spontaneously during imitation phase of assessment.

Child's response to dental treatment. Videotaped data from the child's dental examination and treatment were coded using the Observational Scale of Behavioral Distress (Jay et al., 1983). Preliminary inspection of treatment videotapes led to the identification of three specific phases of treatment that consistently occurred across subjects. Phase 1 (Preparation) consisted of 75 seconds beginning when the dental chair was reclined. During this time the operator placed a towel across the child's chest and demonstrated the use of the dental instruments to the child. Phase 2 (Brushing) began with the first insertion of the toothbrush into the child's mouth and continued for 150 seconds, during which time the child's teeth were brushed. The final phase (Fluoride) consisted of 60 seconds beginning with the first insertion of fluoride. During this phase, the child's teeth were swabbed with fluoride gel. Although behavioral data were recorded continuously during treatment, only data from these three phases were analyzed.

Following training and practice with sample videotapes from a prior investigation (Fishman, 1989), two raters independently scored each subject's videotape using the OSBD. This scoring involved coding whether each of eight behaviors occurred during consecutive 15 sec intervals within each phase. Discrepancies between raters in these original codings were resolved by a committee consisting of the investigators and the two raters. This procedure

yielded a third set of ratings representing the group consensus. Based on each set of ratings, and using procedures detailed by Jay et al. (1983), distress scores were calculated for the three treatment phases and then combined to yield a total distress score. In order to assess inter-rater reliability and fidelity of group consensus to the original ratings, Pearson product moment correlation coefficients were calculated between the two raters and between each rater's and the group consensus ratings, as shown in Table 3. These intercorrelations were high (greater than .90) for all phases and for the total distress scores. Based on the overall pattern of strong intercorrelations, the group consensus ratings were used in all subsequent analyses.

Data Analysis

Initial inspection of the data led to the identification of one subject whose total distress score on the Observational Scale of Behavioral Distress was over three standard deviations above the rest of the sample. Tabachnick and Fidell (1983) indicate that such outlying observations exert undue influence on statistical analyses and therefore can lead to erroneous conclusions. Two recommended means of reducing the influence of the present outlier (deletion and winsorization of the observation) were considered. Deletion of the outlying case was chosen, both for its expediency and in consideration of the fact

Table 3

Intercorrelations Between Raters and Group for OSBD

	Phase			
	Prep	Brushing	Fluoride	Total
Rater 1 and Rater 2	0.92	0.95	0.91	0.95
Rater 1 and group	0.99	0.99	0.98	0.99
Rater 2 and group	0.93	0.96	0.91	0.96

Note. OSBD = Observational Scale of Behavioral Distress.

that this subject may differ in other, unquantified ways from the rest of the subject sample and may therefore "not [be] a member of the population to begin with" (Tabachnick & Fidell, 1983, p. 76).

Behavioral data from the three phases of treatment were analyzed by repeated measures regression analysis (Pedhazur, 1973; Cohen & Cohen, 1983). Consistent with the hierarchical approach recommended by Cohen and Cohen (1983), significance tests for each variable were based on the increment in variance accounted for by that variable. Based on considerations of causal priority, stable characteristics of the child (e.g., gender, age, inhibition score) were entered first, followed by the maternal fear variable (Fear Survey Schedule score). Lastly, experimental variables (maternal presence vs. absence, dental operator, phase of treatment) were entered into the model.

Within these constraints, the specific models which were tested are presented in Results.

Kagan et al.'s research on inhibition in children has been longitudinal in nature (e.g., Garcia-Coll, Kagan, & Reznick, 1984; Kagan, Reznick, Clarke, Snidman, & Garcia-Coll, 1984; Kagan et al., 1987). Thus, inhibition assessments have included children from 21 months to 7 1/2 years of age. Normal developmental changes have required different assessment techniques for children of different ages. Thus, Kagan, Reznick, and Snidman (1988) stated that "the phenotypic display of [inhibited and uninhibited] tendencies changes with age...a 2 year old will become uncertain in an unfamiliar room with unfamiliar objects, but older children require more potent incentives (p. 167)". The inhibition assessment procedures used by Kagan et al. (1988) for children between 42 and 66 months of age included measures of reluctance to play with unfamiliar toys and to verbalize in the presence of an unfamiliar adult, as these were noted to be particularly sensitive signs of inhibition for such children (p. 168). In the present study the inhibition assessment was based on these procedures, as subjects were in a comparable age range (36-59 months). The research of Kagan et al. (1988) suggests nonetheless that children of different ages may respond differently to inhibition assessment procedures. Age was therefore included as a factor in all regression analyses.

RESULTS

Results of this research are organized in the following manner: descriptive statistics for all variables are presented first, followed by tests of specific hypotheses. Additional hypotheses are then addressed through post-hoc analyses.

Table 4 presents means and standard deviations for children's age and inhibition factor score and maternal fearfulness. All variables presented in this table were tested for differences between maternal present and maternal absent groups, and no significant differences were found. This lack of differences between maternal present and absent groups attests to the effectiveness of the random assignment to conditions in this study.

Interrelationships among these variables, including gender and prior dental experience, were tested for the full sample. A significant relationship was found between age and prior experience, in that experienced dental patients were older (mean = 52.10 mos, s.d. = 6.08) than inexperienced patients (mean = 47.53 mos, s.d. = 6.83), t (34) = 2.11, $p < .04$. Furthermore, FSS scores tended to be higher among mothers of experienced dental patients (mean = 100.40, s.d. = 20.09) than inexperienced dental patients

Table 4

Description of Maternal Present and Maternal Absent Groups on Pre-treatment and Treatment Variables

	Maternal Present (N = 17)	Maternal Absent (N = 19)	Total Sample (N = 36)
Child's Age	51.47	48.79	50.05
	(5.87)	(7.71)	(6.84)
Inhibition Factor Score	-0.11	0.03	-0.03
	(0.55)	(0.58)	(0.55)
Maternal FSS	90.24	101.00	95.92
	(15.99)	(23.02)	(20.19)

Note. Table entries are means with standard deviations in parentheses.

(mean = 89.63, s.d. 19.47), t (34) = 1.91, $p < .06$. No statistically significant relationship was found between the child's gender and his or her age or prior experience, t's (34) = 1.21 and 0.33, respectively, both n.s.

The overall inhibition score was not reliably related to the child's age, gender, or prior experience with dentistry. Also, contrary to prediction, the inhibition score was not reliably related to maternal FSS (r = -0.05, n.s.). No other relationships between the maternal and child variables given in Table 4 were significant.

Behavioral Distress During Treatment

Table 5 presents means and standard deviations for behavioral distress across treatment phases for maternal present and maternal absent groups. No significant differences in distress were observed among phases of

Table 5

Behavioral Distress Across Treatment Phases for Maternal Present and Maternal Absent Groups

Treatment Phase	Maternal Present	Maternal Absent	Total Sample
Prep	1.01	0.52	0.75
	(1.55)	(0.74)	(1.18)
Brushing	0.49	0.51	0.50
	(0.83)	(0.92)	(0.85)
Fluoride	0.99	0.41	0.69
	(1.61)	(0.81)	(1.25)
Total	2.52	1.43	1.95
	(3.06)	(2.19)	(2.62)

Note. Table entries are means with standard deviations in parentheses.

treatment for the maternal present or absent groups, Preparation F (1,34) = 1.55; Brushing F (1,34) = 0.005; Fluoride F (1,34) = 1.91, all n.s. Table 6 presents intercorrelations for behavioral distress across treatment phases. Intercorrelations among treatment phases were all positive and statistically significant. Based on the stability of distress across treatment phases suggested by these preliminary analyses, and in order to reduce experimentwise Type I error rate, all subsequent analyses were conducted with OSBD Total Distress as the dependent measure, and did not include distress scores for the separate phases.

Preliminary correlational analyses indicated that a significant relationship existed between gender and OSBD Total Distress, in that girls exhibited more behavioral

Table 6

Intercorrelations Among Phases for OSBD Scores

	Preparation	Brushing	Fluoride
Brushing	0.36*		
Fluoride	0.43**	0.55**	
Total Distress	0.78**	0.75**	0.85**

**p < .01. *p < .03.

distress (mean = 3.01, s.d. = 3.15) than boys (mean = 0.99, s.d. = 1.70), t (34) = 2.42, $p < .03$ (see Table 8). In light of this gender effect, regression models used to test the primary hypothesis included gender and its interactions with other individual difference and experimental variables.

Factors Influencing Behavioral Distress During Treatment

Maternal anxiety and presence during treatment. A primary hypothesis of this study addressed the nature of the relationship between maternal anxiety, maternal presence during treatment, and children's distress. Based on previous findings (Fishman, 1989), it was hypothesized that children of high-fear mothers would manifest greater behavioral distress when their mothers were present than when their mothers were absent, whereas children of moderate and low fear mothers would show reduced distress when their mothers were present, compared to when mothers were absent. In order to test this hypothesis, a regression model

including child's gender, maternal Fear Survey Schedule score, maternal presence, and their interactions was tested.

Contrary to prediction, the effect of maternal presence on behavioral distress did not vary as a function of the mother's anxiety, Maternal Presence X Maternal FSS F (1,29) = 0.03, n.s. Rather, the child's distress tended to vary as a function of gender and maternal presence, Gender X Maternal Presence F (1,28) = 4.08, $p < .06$. Because effects of maternal presence were a main focus of this investigation, simple main effects analyses were carried out to explicate this interaction. As shown in Table 7, girls displayed more distress than boys during dental treatment when mothers were present, F (1,28) = 2.73, $p < .02$, whereas distress levels were not significantly different for boys and girls when mothers were absent from treatment, F (1,28) = 0.15, n.s. As noted earlier, the main effect of gender was also significant in this analysis, F (1,28) = 6.02; $p < .03$.

Behavioral inhibition and distress during treatment. A second hypothesis of the present research suggested that children of high-fear mothers would display more signs of behavioral inhibition than children of moderate and low fear mothers and that this relationship would mediate the interaction between maternal fear and maternal presence described in the first hypothesis, described above. The initial assertion of this hypothesis was not supported, in

Table 7

Means and Standard Deviations for Total Distress During Dental Treatment

		Maternal Present	Maternal Absent
Gender	Girls (N = 17)	4.33 (3.29)	1.83 (2.66)
	Boys (N = 19)	0.91 (1.76)	1.07 (1.75)

that maternal fearfulness and child inhibition were not reliably correlated.

As described below (see Discussion), characteristics of the current sample may have attenuated the relationship between maternal fear and both children's distress and behavioral inhibition. Moreover, previous research on behavioral inhibition suggests that behavioral inhibition and maternal presence may relate to children's distress during treatment independently of maternal fearfulness. Therefore, a regression model including child's age, child's inhibition score, maternal presence, and their interactions was used to evaluate the effect of behavioral inhibition and maternal presence on children's distress. The analysis revealed that these variables did interact to determine the child's behavioral distress during treatment, Age X Inhibition X Maternal Presence F (1,28) = 10.57, $p < .003$ (see Table 9). Simple effects analyses were conducted

to explicate this interaction. Among subjects younger than the median age of 50 months, behavioral inhibition and maternal presence interacted to predict child distress during treatment, F (1,28) = 9.50, $p < .01$. However, the effect was in the opposite direction to that which had been predicted. Thus, follow-up analyses on younger subjects indicated that inhibited children whose mothers were absent were significantly more behaviorally distressed than inhibited children whose mothers were present, F (1,28) = 15.26, $p < .002$. Maternal presence/absence did not affect distress levels among the uninhibited children, F (1,28) = 3.33, $p = .24$. Figure 1 shows that distress among older children (more than 50 months of age) was unrelated to inhibition or maternal presence during treatment, inhibition F (1,28) = 1.56, maternal presence F (1,28) = 0.09, Inhibition X Maternal Presence F (1,28) = 0.31, all n.s.

Other potential influences on behavioral distress during treatment. Children's distress did not differ significantly between the two dental operators, F (1,24) = 0.57, n.s. Lastly, behavioral distress did not differ based on the children's prior experience with dental treatment, t (34) = 1.31, n.s.

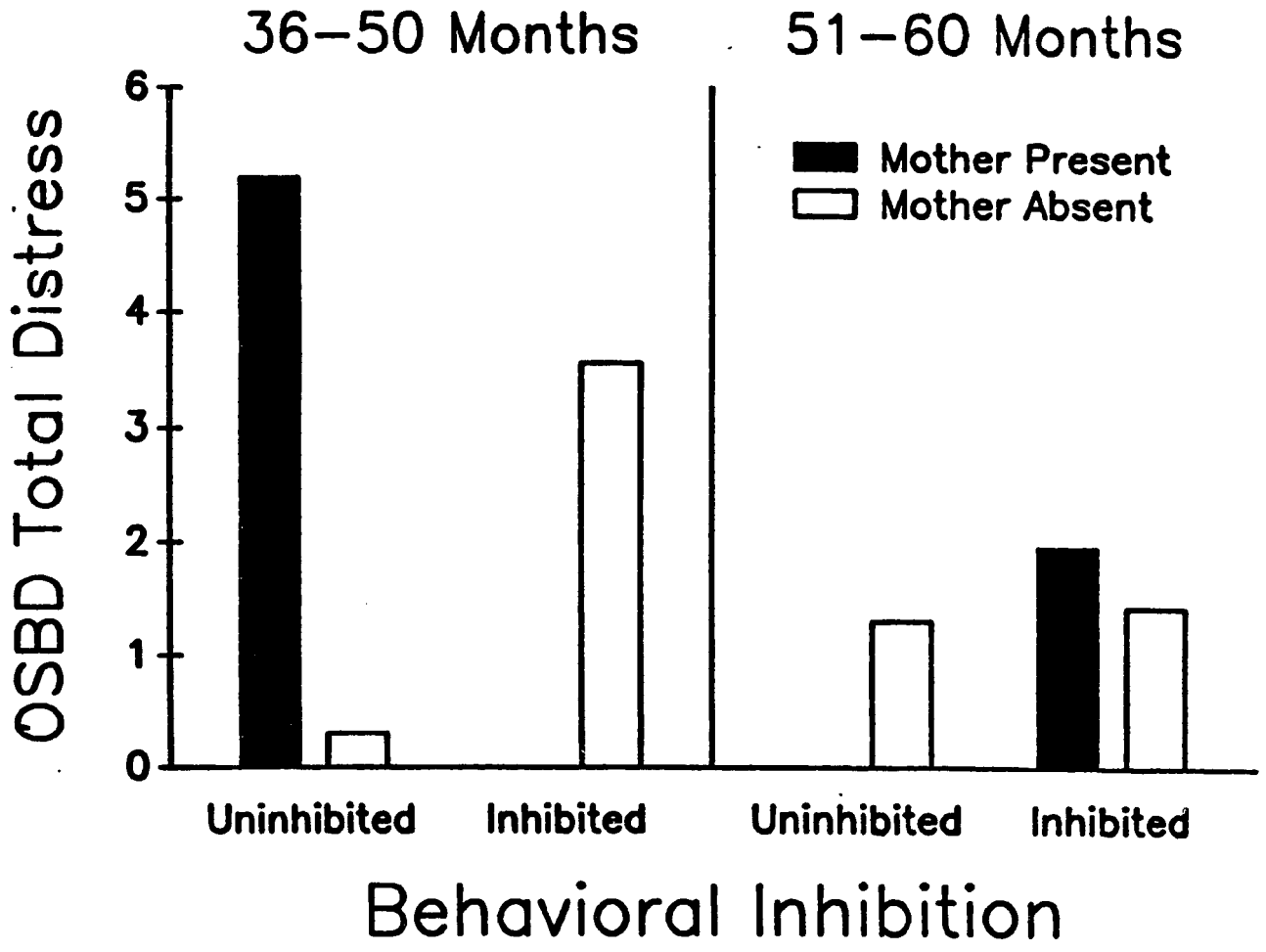

Figure 1. Child's total behavioral distress during dental treatment as a function of child's age, child's inhibition score, and maternal presence.

DISCUSSION

The results of this research did not support the predicted relationship among mothers' fear, mothers' presence, and the behavioral distress of children between 36-54 months of age. This relationship was hypothesized based on previous findings (Fishman, 1989). In that study, children of highly fearful mothers were significantly more behaviorally distressed when mothers were present during dental treatment than when mothers were absent. The opposite relationship was found for dyads with moderate or low fear mothers. Thus, children of moderate or low fear mothers were significantly less behaviorally distressed when mothers were present during treatment than when mothers were absent. In the present study, however, children's distress tended to vary as a function of gender and maternal presence, and maternal anxiety was unrelated to the behavioral distress of children. Only three previous studies have also failed to find a significant relationship between maternal and child anxiety (Klorman, Ratner, Arata, King, & Sveen, 1978; Pinkham & Fields, 1976; Wright, Alpern, & Leake, 1973), as prior literature in this field has typically found strong positive correlations between maternal and child distress (e.g., Bush, Melamed, Sheras, &

Greenbaum, 1986; Hawley et al., 1974; Jay et al., 1983; Johnson & Baldwin, 1969).

Differing characteristics of the Fishman (1989) and present subject populations may account for the discrepancy between the two sets of findings. For example, the mean level of behavioral distress among younger children in the present sample was significantly lower than the distress of children of comparable age in the Fishman (1989) sample, t (57) = 2.04, $p < .05$. Klorman et al. (1978) also found maternal and child distress to be uncorrelated and attributed this unusual finding to the low levels of distress exhibited by their pediatric patients. The investigators suggested that the subjects, all experienced dental patients, were less fearful than inexperienced patients, and that a "floor" effect on the child anxiety measures may have resulted in reduced variability and a consequent attenuation of the correlation with the maternal measures. While the present sample included both experienced and inexperienced dental patients, and no difference in distress was found between the two groups, the low overall level of behavioral distress as compared to the Fishman (1989) sample may also have reduced variability and attenuated the relationship between maternal fear and child distress.

Maternal Fear Survey Schedule scores were also significantly lower in the present sample than the Fishman (1989) sample, t (78) = 2.01, $p < .05$. These findings

suggest that the mothers in the present sample were generally less fearful than those in the prior sample. Both Pinkham and Fields (1976) and Wright et al. (1973) found maternal and child distress to be uncorrelated and attributed their findings to low maternal anxiety levels resulting from pre-appointment procedures aimed at reducing maternal anxiety. In both studies, mothers receiving preappointment procedures reported significantly lower anxiety levels than control subjects. Furthermore, maternal and child anxiety was uncorrelated among these experimental dyads, while control dyads demonstrated the typical positive relationship between maternal and child distress. The investigators suggested that reduction of maternal anxiety level by pre-appointment procedures attenuated the strong correlation between maternal anxiety and child behavioral distress that studies without this manipulation have shown. Thus, there is precedent in the literature for a lack of significant relationship between maternal and child distress when the fear levels of the subjects has been intentionally reduced or may be considered atypically low.

These differences in fearfulness may relate to differences in demographic characteristics between the Fishman (1989) and current subject populations. The subject population in the Fishman (1989) study was 92.5% black, while the population in the current study was 17.5% black. Furthermore, 65% of the Fishman (1989) sample qualified for

and received county- or federally-subsidized dental care, whereas virtually all of the present sample were employees (or their dependents) of the University of Alabama at Birmingham and were private-pay patients.

Such demographic characteristics have been found to influence patient perception of and response to dental services. Wright and Alpern (1971) found a significant relationship between socioeconomic status (SES) and children's cooperative behavior during first dental examination, in that less cooperative children were of a lower socioeconomic group than highly cooperative children. Similarly, Mejare, Ljungkvist, and Quensel (1989) found a greater percentage of lower SES children among those referred to a clinic for disruptive dental patients than would be predicted from the catchment area surrounding the clinic.

Racial and economic variables have also been found to impact on the attitudes of adults. Recent administration of the Fear Survey Schedule to 316 undergraduate women at the University of Alabama at Birmingham resulted in significantly higher fear scores among blacks (n = 110) than whites (n = 206), $\underline{t}$ (314) = 2.46, $\underline{p} < .01$ (E. W. Cook, personal communication, April, 1991). In 1976, Strauss reported that a population of lower SES black dental patients were more fearful and avoidant of dental treatment than their middle class white counterparts. Correspondingly, Weisenberg, Kreindler, Schachat, & Werboffet (1975)

found that lower SES black and Puerto Rican dental patients showed greater state and trait anxiety than upper middle class white patients. Thus, racial and economic variables have been consistently shown to influence anxiety and cooperativeness in the dental setting and may account for differences in maternal and child responses in the Fishman (1989) and present results.

Confounding all of these results, however, is the "social situation defined by a predominantly white professional health clinic that is intimidating to the minority patient (Strauss, 1976, p. 377)". The studies cited above, as well as both the Fishman (1989) and present projects, were conducted in predominantly white-staffed clinics. The differences in fear levels among mothers and children in the Fishman (1989) study and the present study may in part reflect the different social influences at play in a white-staff, black-patient situation versus a white-staff, white-patient situation. White professionals continue to dominate the field, thereby impeding research on fear and perception among dental patients of various racial and SES groups that might in fact be largely an artifact of treatment in predominantly white-staffed clinics. Future research should address these issues, as the professional ranks continue to become more racially diverse and increasing numbers of American minorities are represented.

There is evidence to suggest that maternal fearfulness in the present sample is not only significantly lower than

the Fishman (1989) sample, but also lower than that of both black and white female undergraduates from the university at which this study was conducted, t (143) = 5.88 and t (240) = 4.78, both p's < .005. These results suggest that the present sample of mothers was unusually low in fearfulness, which may have attenuated the relationship between maternal fear and children's distress.

Two aspects of subject recruitment may have resulted in this unusual sample. First, the overwhelming majority of these women were employees of the University of Alabama Medical Center, at which the study was conducted. Such women would be more familiar and comfortable with a variety of medical and dental procedures than other populations. One might expect that individuals who are highly fearful would be unlikely to be employed in a medical center, where they would be apt to encounter many typical fear-producing stimuli (blood, surgical procedures, injections, wounds, infirmed people). Thus, the present sample of women may be expected to be generally less fearful than other women of comparable age and social background who are not employed at a University Medical Center.

Other elements of subject recruitment may have further impacted maternal fearfulness in the present sample. Mothers were solicited from two University Medical Center sources, the recall list from the Pediatric Dentistry Clinic and from an advertisement in the University employee's weekly newspaper. The recall list supplied the names

of children who had had previous treatment at the Clinic and were ready for their six-month check-up. All of the mothers of children inexperienced in dental treatment were reached through the newspaper solicitation. One might expect that individuals who would be comfortable responding to a newspaper advertisement of this nature would be low in medical/dental fear, and consequently tend to be low in overall fearfulness, as the two have been found to be highly correlated (Arrindell et al., 1984; Fishman, 1989). As mentioned in Results, mothers of inexperienced children, reached through the newspaper advertisement, tended to have lower FSS scores than mothers of experienced children, reached primarily through the recall list. Thus, not only was the overall sample of mothers low in fearfulness, but those mothers reached through the newspaper tended to be lower in fearfulness than those reached through the recall list, who had originally presented their young children for dental treatment for a variety of reasons.

In summary, the present sample of children demonstrated significantly less behavioral distress than the children in the Fishman (1989) sample. Furthermore, the mothers in the present sample were significantly lower in fearfulness than both the Fishman (1989) sample and other normative samples. At this time it is not clear whether racial, socioeconomic, or recruitment factors were responsible for this effect. Regardless of the origin of the effect, however, low maternal and child fearfulness in the present study may have

attenuated the relationship between maternal fear and children's behavioral distress during treatment.

Furthermore, the present results do not support the previous findings, in which maternal fearfulness and maternal presence interacted to predict children's behavioral distress during dental treatment. At this time it is not clear if differences in population characteristics or other factors account for the discrepancies in results.

Although the hypothesized interaction between maternal anxiety and maternal presence on child's distress during treatment did not occur in the present study, the results suggest that maternal presence interacted with children's gender to account for significant variance in behavioral distress among 3 and 4 year old children. Specifically, girls tended to display more distress than boys during dental treatment when mothers were present. The child's gender did not affect distress levels when mothers were absent from treatment. Gender influences have not routinely been found in earlier studies on children's responses to dental treatment (cf. Bailey, Talbot, & Taylor, 1973; Johnson & Baldwin, 1969; Koenigsberg & Johnson, 1972). In particular, gender effects in studies relating children's distress to maternal presence during dental treatment were either not found or not reported (Frankl et al., 1962; Gonzalez et al., 1989; Gross et al., 1983; Jay et al., 1983; Shaw & Routh, 1982).

While the dental literature has not routinely found gender differences in distress during treatment, developmental theory provides a foundation for understanding such gender differences. Developmental theory suggests that by the age of three, children begin to display sex-stereotyped behaviors (Huston, 1983, p.407). In the present study, girls displayed significantly more distress than boys overall, and were significantly more distressed than boys in the presence of the mother. Both of these findings can be understood in light of relevant sex-stereotyped behaviors: increased emotional expression and dependence on relationships in girls, decreased emotional expression and enhanced independence in boys (Maccoby & Masters, 1970; Spence, Helmreich, & Stapp, 1975). Thus, while developmental theory would predict gender differences in behavioral distress during treatment, there is little evidence within the dental literature itself to support such a prediction. Therefore, no firm conclusions may yet be drawn concerning the effects of gender on children's distress during dental treatment.

Behavioral Inhibition and Maternal Fear

It was hypothesized that high maternal fear would be correlated with behavioral inhibition in children. Fishman (1989) found that children of high-fear mothers were less distressed during treatment when mothers were absent than when mothers were present. To explain this finding, it was suggested that the children of high fear mothers were

behaviorally inhibited, as inhibited children are known to be reluctant to communicate with an unfamiliar adults (e.g., Kagan et al., 1988). In the mother-absent condition of the Fishman (1989) study, the unfamiliar hygienist was the only adult present during treatment, and it was proposed that if the children of high fear mothers were behaviorally inhibited, they would be less likely to display their distress in the mother's absence. Furthermore, the hypothesis that maternal fearfulness or anxiety and child behavioral inhibition are related is consistent with recent research suggesting that behavioral inhibition is more prevalent among children of parents with clinical anxiety disorders than among children of parents with other psychiatric diagnoses (Rosenbaum et al., 1988).

However, in the present study, children of high-fear and low-fear mothers were equally likely to display behavioral inhibition as assessed in this research. As discussed above, elements of the subject recruitment procedures utilized in the present study may have resulted in a sample of unusually low-fear mothers, thereby attenuating the relationship between maternal fear and behavioral inhibition.

Subject selection procedures, in which children were recruited for participation regardless of their temperamental tendencies, may have also resulted in a dilution of the inhibition variable and a weakening of the relationship between maternal fear and behavioral inhibition. Previous

research in this area is of a longitudinal nature, in which infants were first observed in a 6-episode assessment and divided into "inhibited," "uninhibited," and "neither" groups (Garcia-Coll et al., 1984). Over 40% of such samples have been categorized as neither inhibited nor uninhibited.

Subsequent studies including subjects that could not be classified as "inhibited" or "uninhibited," or that were based on an unselected sample of children, found no preservation of temperamental stability across time (Kagan et al., 1989; Reznick et al., 1986). These findings suggested that behavioral inhibition, although appearing to represent a phenotypic continuum of behaviors in children, may actually depict discrete categories in its extreme manifestations. As the subjects in the present study constitute a sample of children unselected with respect to behavioral inhibition, it is possible that a large percentage of the subjects were neither inhibited nor uninhibited, thereby diluting the strength of the relationship between this construct and maternal fear.

Future investigations of the role of behavioral inhibition in mediating the relationship between maternal fear and child distress in medical/dental settings could involve screening a large number of potential subjects for behavioral inhibition. Children who display extreme behavior at either end of the phenotypic continuum could then be

selected as subjects for investigation of the relationship of behavioral inhibition to maternal fear.

As mentioned in Results, theoretical considerations suggest that behavioral inhibition and maternal presence may relate to children's distress during treatment independently of maternal fearfulness. The work of Kagan and his colleagues is replete with techniques for the assessment of inhibition in which maternal presence is purposefully manipulated (e.g., Garcia-Coll et al., 1984; Kagan et al., 1984; Kagan et al., 1989; Reznick et al., 1986). For example, maintenance of proximity to mother in a "risk room," crying upon separation from mother, and long latency and infrequent spontaneous comments when alone with an unfamiliar adult in a testing situation are all viewed as particularly sensitive measures of behavioral inhibition. Thus one of the cardinal features of inhibited children is their preference for the company of their mothers and their shy, restrained behavior when left alone with an unfamiliar adult. Although Kagan and his colleagues have not focussed on the importance of the mother-child relationship in the creation and maintenance of behavioral inhibition, this relationship clearly plays a central role in determining the behavior of children in various assessment settings. Therefore, it is reasonable to suggest that inhibition and maternal presence may have an effect on children's distress independent of maternal fearfulness.

Behavioral Inhibition and Distress

Behavioral inhibition as assessed in the present study was correlated with children's behavioral distress, although not in the predicted direction. It was hypothesized that inhibited children would be more distressed in the mother present condition than the mother absent condition. This hypothesis was based on previous data (Fishman, 1989) in which the predominant distress behavior of young children in the dental setting was crying. It was suggested that crying can be construed as a form of communication from child to mother. As inhibited children are known to be less likely to communicate with an unfamiliar adult than with a familiar adult such as a parent, it was hypothesized that inhibited children would be less likely to cry when the mother was absent from treatment and the unfamiliar hygienist was thus the only adult present in the room.

Contrary to this hypothesis, inhibited children under the age of 50 months in the present study were significantly more distressed (distress being characterized predominantly as crying) when mothers were absent than when mothers were present. This pattern of results can be understood in light of one of the most salient characteristics of inhibited children, that is, their preference for the company of their mothers. Thus, inhibited children in the mother-absent condition can be viewed as responding with distress to the separation from mother. Furthermore, Kagan and his colleagues have demonstrated that inhibited

children respond in a more fearful fashion to "novel" situations than do their uninhibited counterparts (e.g., Garcia-Coll et al., 1984; Kagan et al., 1984; Kagan et al., 1988). The manipulation of maternal presence/absence in the present study may have impacted the novelty of the dental situation. The treatment setting might have been perceived as more novel, and therefore more threatening, to the inhibited children whose mothers were absent. In contrast, the mothers' presence in the dental operatory would render the setting more familiar to the inhibited children, reducing the novelty and threat of the situation. Viewed in this light, inhibited children would be more threatened by the treatment situation when mothers were absent and would be expected to be more distressed, as the current results indicated.

Perhaps these children were, in fact, communicating with their mothers in the manner suggested by the original hypothesis. All of the subjects in the mother-absent condition were informed that their mothers were waiting in a nearby room. Crying can be a particularly loud, effective means of communication from child to mother. One may then suppose that these children were distressed by the separation from mother and/or threatened by the novelty of the treatment setting with the unfamiliar hygienist, and were attempting an urgent communication with the nearby mother. The desire to communicate with the mother who was out of sight but not necessarily out of auditory range may

have been more pressing in such a stressful situation than the tendency of the inhibited child to suppress verbal communication in the presence of an unfamiliar adult.

Communication from child to mother as measured in the treatment phase of the present study was primarily vocal and elicited under potentially stressful conditions. These characteristics are markedly different from those that typified child-parent communication in the majority of the research on behavioral inhibition (Kagan et al., 1984; Kagan et al., 1988). In these studies the definition of communication between child and mother in this age range was primarily nonverbal, expressed as the child's physical proximity to or glancing at the mother. Furthermore, communication was elicited from the child during laboratory-controlled evaluative stressors that included no potential or actual physical threat to the child, in contrast to the clinical dental setting of the current study. Thus, the current study extends prior research by indicating that in a situation in which children may show substantial distress, that distress is positively related to behavioral inhibition.

While these differences may have precluded the ability to find support for the present hypotheses, they also suggest paths along which future research may extend the utility of the behavioral inhibition paradigm. The present results suggest that behavioral inhibition has value in predicting the distress responses of children in dental

(and similar medical) treatment settings. Future research that selects subjects on the basis of extreme and stable characteristics of inhibition may clarify the ways in which childrens' characteristic styles in combination with external factors (i.e., maternal presence or absence) ultimately determines their stress response in a given situation. The implications for treatment of children in stressful situations are clear: individual differences among children relating to the way they express their distress may be critical to consider in attempting to solicit cooperative behavior during treatment. Furthermore, these individual differences may interact with characteristics of the clinical environment (i.e., maternal presence) that may be easily manipulated to encourage a positive outcome.

The present findings are consistent with those of Holst, Schroder, Ek, Hallonsten, and Crossner (1988), who suggested that children's responses to dental treatment may be related, in part, to individual differences that do not pertain directly to the dental situation. These investigators sought to identify subject factors that would enable clinic staff to recognize children who might pose management problems during dental treatment. Structured interviews were conducted with either the mothers of young children (3-6 years old) or with the children themselves (between 7 and 16 years old) who had been referred to a dental clinic specializing in the care of uncooperative pediatric patients. Interviews were followed by evaluative

and restorative treatment. Among their 3-6 year old subjects, three non-dental factors were independent predictors of uncooperative behavior during the subsequent dental treatment: problems on visiting a medical doctor, dental fear in the mother or father, and anxiety when meeting unfamiliar people. This last factor is likely related to the characteristic withdrawal demonstrated by inhibited children when confronted with novel people or situations as employed in the present study, and as such lends further support to the notion that behavioral inhibition is a useful predictor in research striving to understand children's distress during dental treatment. The findings of Holst et al. (1988) further suggest that a structured interview would be a worthwhile addition to future research in behavioral inhibition. Its inclusion in a project that also utilized behavioral assessment of inhibition would allow for the comparison of the power of these two measurement techniques in predicting children's distress. Should the interview and observational data be found to be highly correlated and equally able to predict children's distress during treatment, the interview would provide researchers with a less cumbersome means of identifying inhibited children.

In evaluating the assessment of inhibition employed in the present study, both strengths and weaknesses were noted. The primary weakness focused on the definition and accurate measurement of two variables (proximity to mother,

number of spontaneous bursts). Measurement of the child's proximity to mother proved challenging in that "proximity" had not been operationally defined by previous researchers, and accurate distances between mother and child were difficult to ascertain from the videotapes. Number of spontaneous bursts was similarly difficult to measure, as "bursts" had not been adequately defined in previous research, and the utterances of these young children were unclear at times.

The assessment of behavioral inhibition in previous research has taken the form of multiple assessment sessions in various settings (Kagan et al., 1984; Kagan et al., 1987; Kagan et al., 1988; Reznick et al., 1986). The inference of a stable temperamental characteristic would be stronger when made on the basis of such multiple assessments, rather than the single assessment employed in the present study. Furthermore, an inhibition assessment occurring outside of the dental setting would remove any potential confounds that the current procedures may have provoked.

However, factor analysis demonstrated that all twelve variables that comprised the overall inhibition score were related in the manner one would predict from an understanding of the construct. For example, one would expect that an inhibited child would have a long latency to her first verbalization or first contact with an novel object, would remain in closer proximity to the mother, and refuse to

imitate an action performed by an unfamiliar adult more frequently than an uninhibited child. All of these variables loaded in the negative direction on the first factor obtained from the factor analysis of these data. The remaining variables (number of objects touched, number of spontaneous verbalizations, total time talking) loaded in the positive direction on this factor, as would be expected. Thus, this inhibition assessment appears to have resulted in the measurement of an internally consistent dimension, in addition to being based on a growing body of research on fearfulness in children (Kagan et al., 1984; Kagan et al., 1987; Kagan et al., 1988; Reznick et al., 1986).

Summary and Conclusions

The present study did not replicate the Fishman (1989) results. Maternal anxiety and maternal presence did not interact to determine children's distress during dental treatment, and maternal fearfulness and children's behavioral inhibition were uncorrelated. Finally, maternal anxiety was not significantly related to children's distress. The present sample demonstrated a significantly lower level of maternal fear than both the Fishman (1989) sample and other normative samples. While the elements responsible for this effect are unclear and may reflect the influence of racial, socioeconomic, and/or subject recruitment factors, such low levels of maternal fear may have

attenuated the relationship between maternal fear and child distress.

Children's distress was related to gender, but only in the mother present condition. Thus, girls tended to display more distress than boys during dental treatment when mothers were present. The child's gender did not affect behavioral distress levels when mothers were absent from treatment.

In the present study, inhibition and maternal presence did interact to predict the distress of younger children (under 50 months of age) during treatment. Thus, inhibited children whose mothers were absent from treatment were significantly more behaviorally distressed than inhibited children whose mothers were present. These results suggest that in attempting to obtain cooperative behavior from children in the dental setting, individual differences in the children's expression of distress might be considered in combination with external factors such as maternal presence. In so doing, treatment may be provided to children whose behavior may have otherwise precluded careful and complete health care. Furthermore, careful attention to such subject factors during the child's initial dental treatment may reduce the trauma of treatment. The creation of dental fears may therefore be prevented, along with the avoidance of necessary dental services that typically accompany these fears (Kleinknecht, Klepac, & Alexander, 1973).

The factors controlling children's distress during dental treatment remain unclear. In the introduction to this paper it was noted that while many studies in the area report theoretically and clinically significant findings, these findings have frequently resisted replication. The present attempt to replicate factors found to influence children's distress in an earlier and similarly designed study (Fishman, 1989) was also unsuccessful. While the present study thus joins a number of previous studies in suggesting factors influencing children's distress during treatment, replication of such factors is a goal that remains to be met before specific recommendations to health care providers can be made.

REFERENCES

Arrindell, A., Emmelkamp, P. M. G., & van der Ende, J. (1984). Phobic dimensions: I. Reliability and generalizability across samples, gender and nations. Advances in Behavior Research and Therapy, 6, 207-253.

Bailey, P. M., Talbot, A., & Taylor, P. P. (1973). A comparison of maternal anxiety levels with anxiety levels manifested in the child dental patient. Journal of Dentistry for Children, 40, 277-284.

Bandura, A. (1969). Principles of behavior modification. New York: Holt, Rinehart, & Winston.

Beiderman, J., Rosenbaum, J. F., Hirshfeld, D. R., Faraone, S. V., Boldue, E. A., Gersten, M., Meminger, S. R., Kagan, J., Snidman, N., & Reznick, S. (1990). Psychiatric correlates of behavioral inhibition in young children of parents with and without psychiatric disorders. Archives of General Psychiatry, 47, 21-26.

Bretherton, I. (1984). Social referencing and the interfacing of minds: A commentary on the views of Feinman and Campos. Merrill-Palmer Quarterly, 30, 419-427.

Bush, J. P., Melamed, B. G., Sheras, P. L., & Greenbaum, P. E. (1986). Mother-child patterns of coping with anticipatory medical stress. Health Psychology, 5, 137-157.

Campos, J. J. (1983). The importance of affective communication in social referencing: A commentary on Feinman. Merrill-Palmer Quarterly, 29, 83-87.

Cohen, J., & Cohen, P. (1983). Applied multiple regression/correlation analysis for the behavioral sciences. Hillsdale, New Jersey: Erlbaum.

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale, New Jersey: Erlbaum.

Cook, E. W. III, Hawk, L. W., Davis, T. L., & Stevenson, V. E. (1991). Affective individual differences and startle reflex modulation. Journal of Abnormal Psychology, 100, 1-9.

Fishman, B. E. (1989). Familial transmission of fear: Effects of maternal anxiety and presence on children's responses to dental treatment. Unpublished master's thesis, University of Alabama, Birmingham, AL.

Frankl, S. N., Shiere, F. R., & Fogels, H. R. (1962). Should the parent remain with the child in the dental operatory? Journal of Dentistry for Children, 29, 150-163.

Garcia-Coll, C., Kagan, J., & Reznick, J. S. (1984). Behavioral inhibition in young children. Child Development, 55, 1005-1019.

Gonzalez, J. C., Routh, D. K., Saab, P. G., Armstrong, F. D., Shifman, L., Guerra, E., & Fawcett, N. (1989). Effects of parent presence on children's reactions to injections: Behavioral, physiological, and subjective aspects. Journal of Pediatric Psychology, 12, 22-26.

Gross, A. M., Stern, R. M., Levin, R. B., Dale, J., & Wojnilower, D. A. (1983). The effect of mother-child separation on the behavior of children experiencing a diagnostic medical procedure. Journal of Consulting and Clinical Psychology, 51, 783-785.

Grossberg, J. M., & Wilson, H. K. (1965). A correlational comparison of the Wolpe-Lang Fear Survey Schedule and the Taylor Manifest Anxiety Scale. Behaviour Research and Therapy, 3, 125-128.

Hawley, B. P., McCorkle, A. D., Wittemann, J. K., & Van Ostenberg, P. (1974). The first dental visit for children from low socioeconomic families. Journal of Dentistry for Children, 41, 376-381.

Heffernan, M., & Azarnoff, P. (1971). Factors in reducing children's anxiety about clinic visits. HSMHA Health Reports, 86, 1131-1133.

Holst, A., Schroder, U., Ek, L., Hallonsten, A., & Crossner, C. (1988). Prediction of behavior management problems in children. Scandinavian Journal of Dental Research, 96, 457-465.

Hubert, N. C., Jay, S. M., Saltoun, M., & Hayes, M. (in press). Approach/Avoidance and distress in children undergoing preparation for painful medical procedures. Journal of Clinical Child Psychology.

Huston, A. C. (1983). Sex-typing. In P. H. Mussen (Ed.), Handbook of Child Psychology: Vol 4. Socialization, personality, and social development (pp. 387-467). New York: Wiley.

Jay, S. M., Ozolins, M., Elliott, C. H., & Caldwell, S. (1983). Assessment of children's distress during painful medical procedures. Health Psychology, 2, 133-147.

Johnson, R., & Baldwin, D. C. (1969). Maternal anxiety and child behavior. Journal of Dentistry for Children, 36, 13-18.

Kagan, J., Reznick, S. J., & Gibbons, J. (1989). Inhibited and uninhibited types of children. Child Development, 60, 838-845.

Kagan, J., Reznick, S. J., Clarke, C., Snidman, N., & Garcia-Coll. (1984). Behavioral inhibition to the unfamiliar. Child Development, 55, 2212-2225.

Kagan, J., Reznick, S. J., & Snidman, N. (1987). The physiology and psychology of behavioral inhibition in children. Child Development, 58, 1459-1473.

Kagan, J., Reznick, S. J., & Snidman, N. (1988). Biological bases of childhood shyness. Science, 240, 167-171.

Kleinknecht, R. A., Klepac, R. K., & Alexander, L. D. (1973). Origins and characteristics of fear of dentistry. Journal of the American Dental Association, 86, 842-848.

Klorman, R., Ratner, J., Arata, C. L. G., King, J. B., & Sveen, O. B. (1978). Predicting the child's uncooperativeness in dental treatment from maternal trait, state, and dental anxiety. Journal of Dentistry for Children, 45, 62-67.

Koenigsberg, S. R., & Johnson, R. (1972). Child behavior during sequential dental visits. Journal of the American Dental Association, 85, 128-132.

Lester, B. M. (1984). Infant crying and the development of communication. In N. A. Fox & R. J. Davidson (Eds.), The psychobiology of affective development (pp. 231-258). Hillsdale, New Jersey: Erlbaum.

Maccoby, E. E., & Masters, J. C. (1970). Attachment and dependency. In P. Mussen (Ed.), Handbook of child psychology Vol. 2 (pp. 73-158). New York: Wiley.

Mejare, I., Ljungkvist, B., & Quensel, E. (1989). Pre-school children with uncooperative behavior in the dental situation. Acta Odontologica Scandinavia, 47, 337-345.

Melamed, B. G., Bennett, C. G., Jerrell, G., Ross, S. L., Bush, J. P., Hill, C., Courts, F., & Ronk, S. (1983). Dentists' behavior management as it affects compliance and fear in pediatric patients. Journal of the American Dental Association, 106, 324-330.

Pedhazur, E. J. (1973). Multiple regression in behavioral research. New York: Holt, Rinehart & Winston.

Pinkham, J. R., & Fields, H. W. (1976). The effects of preappointment procedures on maternal manifest anxiety. Journal of Dentistry for Children, 43, 180-183.

Reznick, J. S., Kagan, J., Snidman, N., Gersten, M., Baak, K., & Rosenberg, A. (1986). Inhibited and uninhibited children: A follow-up study. Child Development, 57, 660-680.

Rosenbaum, J. F., Beiderman, J., Gersten, M., Hirshfeld, D. R., Meminger, S. R., Herman, J. B., Kagan, J., Reznick, S., & Snidman, N. (1988). Behavioral inhibition in children of parents with panic disorder and agoraphobia. Archives of General Psychiatry, 45, 463-470.

Shaw, E. G., & Routh, D. K. (1982). Effect of mother presence on children's reaction to aversive procedures. Journal of Pediatric Psychology, 7, 33-42.

Spence, J. T., Helmreich, R. L., & Stapp, J. (1975). Ratings of self and peers on sex-role attributes and their relation to self-esteem and conceptions of masculinity and femininity. Journal of Personality and Social Psychology, 32, 29-39.

Spielberger, C. (1973). State-Trait Anxiety Inventory for Children: Preliminary Manual. Palo Alto, CA: Consulting Psychologists Press.

Spielberger, C. (1978). Review of the Fear Survey Schedule. In O. K. Buros (Ed.), The eighth mental measurements yearbook. Highland Park, New Jersey: The Gryphon Press.

Strauss, R. P. (1976). Sociocultural influences upon preventive health behavior and attitudes towards dentistry. American Journal of Public Health, 66, 375-377.

Tabachnick, B. G., & Fidell, L. S. (1983). Using multivariate statistics. New York, NY: Harper & Row.

Venham, L. L. (1979). The effect of mother's presence on child's response to dental treatment. Journal of Dentistry for Children, 46, 219-225.

Venham, L. L., & Gaulin-Kremer, E. (1979). A self-report measure of situational anxiety for young children. Pediatric Dentistry, 1, 91-96.

Venham, L. L., Gaulin-Kremer, E., Munster, E., Bengston-Audia, D., & Cohan, J. (1980). Interval rating scales for children's dental anxiety and uncooperative behavior. Pediatric Dentistry, 2, 195-202.

Weisenberg, M., Kreindler, M. L., Schachat, B., & Werboff, J. (1975). Pain: Anxiety and attitudes in Black, White, and Puerto Rican patients. Psychosomatic Medicine, 37, 123-135.

Winer, B. J. (1962). Statistical principles in experimental design. New York, NY: McGraw-Hill.

Wolpe, J., & Lang, P.J. (1964). A Fear Survey Schedule for use in behaviour therapy. Behaviour Research and Therapy, 2, 27-30.

Wright, G. Z., & Alpern, G. D. (1971). Variables influencing children's cooperative behavior at the first dental visit. Journal of Dentistry for Children, 38, 124-128.

Wright, G. Z., Alpern, G. D., & Leake, J. L. (1973). The modifiability of maternal anxiety as it relates to children's cooperative dental behavior. Journal of Dentistry for Children, 40, 265-271.

APPENDIX A

Review of Literature on the Relationship Between Maternal and Child Anxiety

Maternal and Child Self-Reports.

Heffernan and Azarnoff (1971) assessed maternal anxiety with a questionnaire of their own design. This instrument contained questions about the mother's feelings regarding visiting medical/dental clinics for her own treatment, about the preparation she had given her child prior to this clinic visit, about her assessment of her child's fear of clinic visits, and finally about her attitudes regarding the expression of her child's fears in this situation. The child's feelings about the clinic visit were assessed by responses to the Thematic Apperception Test and an adjective checklist. Strong positive correlations were found between the maternal and child self-reports of anxiety.

Jay et al., (1983) studied maternal and child anxiety in a pediatric oncology unit. Patients over the age of eight who were undergoing bone marrow aspiration were administered the State-Trait Anxiety Inventory for Children (Spielberger, 1973), while the mother completed the adult form of this questionnaire. Here again, strong positive correlations between maternal and child anxiety were found.

Two additional studies provided evidence that age and prior experience with medical/dental treatment moderate the relationship between maternal and child anxiety. Scores on the Taylor Manifest Anxiety Scale administered to the mother and child immediately prior to pediatric dental treatment were strongly and positively correlated for the entire subject sample in a study conducted by Bailey et al., (1973). Subjects were 9 to 12 years of age. However, further analysis revealed that this correlation was primarily due to the younger subjects. When 9- and 10-year-olds were removed from the analysis, the mothers' and children's TMAS scores were uncorrelated. Koenigsberg and Johnson (1972) studied self-reports of anxiety among inexperienced dental patients over three sequential clinic visits. Maternal and child state anxiety were assessed at each visit. The results again indicated a generally positive correlation between maternal and child self-reports of anxiety; however, an experience effect was also observed. Whereas the anxiety scores obtained at the time of the first visit were positively correlated, maternal and child anxiety scores were unrelated on subsequent visits. These findings suggest that the state anxiety scores of naive pediatric dental patients correlate more strongly with maternal state anxiety than state anxiety scores of experienced patients.

Maternal Self-Report and Child Behavioral Distress.

Wright et al., (1973) conducted a study in the pediatric dental clinic. A pre-appointment letter was given to one-half of the mothers in an attempt to reduce their anxiety about the dental visit, and thereby indirectly reduce their children's anxiety. All patients were under the age of seven and had no previous dental experience. All mothers were administered the Taylor Manifest Anxiety Scale (TMAS). Children's behavioral distress during the dental procedure was rated using a 4-point scale developed by Frankl et al., (1962). On this scale, behavior is rated as definitely negative, slightly negative, slightly positive, or definitely positive. The results of Wright et al. (1973) indicated a strong positive correlation between maternal anxiety and child behavioral distress during treatment, but only for the control dyads in which the mothers had not received a pre-appointment letter. The mothers who did receive the pre-appointment letter reported lower anxiety prior to the children's treatment. Furthermore, maternal anxiety in the experimental group was not significantly correlated with children's behavioral distress score.

Johnson & Baldwin (1969) also used the Frankl et al. (1962) observational scale to study anxiety in a pediatric dental population. As in the Wright et al. (1973) study, mothers were administered the TMAS and the child's behavior was rated before, during, and after the examination.

Results again indicated a highly significant relationship between maternal self-reported anxiety and child behavioral distress. Highly anxious mothers had children with more negative behavior ratings than did low anxious mothers.

Further evidence for the correlation between maternal self-report of anxiety and negative child behavior came from the work of Hawley et al., (1974). In this study, maternal anxiety was assessed by questionnaire and child anxiety was measured before and during a dental examination using the Frankl et al. (1962) scale. Positive correlations between maternal anxiety and child distress were found; however, the results indicated that the child's age influenced the behavioral ratings. All of the children receiving negative behavior ratings were under the age of seven, and over one-half of the subjects receiving negative ratings were under age three. These results suggest that the distress of younger children is expressed through overt behavior, while older children are more behaviorally inhibited. Alternatively, it may be hypothesized that the older children are actually less distressed. These data, restricted as they are to overt behavioral observation of the child, are limited in their ability to separate these hypotheses.

A more sophisticated behavioral rating system for measuring child distress has been developed by Jay et al. (1983). The Observation Scale of Behavioral Distress (OSBD) codes behaviors in contiguous 15-second intervals

within separate phases of the procedure. Each behavioral category in the code is weighted according to the intensity of the reaction. The OSBD was first utilized with pediatric oncology patients undergoing bone marrow aspirations. Child behavioral distress ratings from the OSBD showed a positive correlation with maternal anxiety as measured by the State-Trait Anxiety Inventory. Further evidence was also found for the behavioral expression of distress in younger children, as behavioral distress scores were significantly higher for patients under age seven.

The OSBD was recently used with a pediatric outpatient population (Bush et al., 1986). The mother completed the State-Trait Anxiety Inventory and the Hospital Fears Rating Scale, and the child's behavior during the medical treatment was rated using the OSBD. Significant positive correlations were found between maternal state anxiety and child behavioral distress.

Although most research has found strong positive relationships between maternal self-reports of anxiety and child distress, two studies found no significant correlation between maternal anxiety and child distress (Klorman, Ratner, Arata, King, & Sveen, 1978; Pinkham & Fields, 1976). Subject selection and pretreatment aspects of both investigations may account for these atypical findings. The subject sample utilized by Klorman et al. (1978) consisted of experienced pediatric dental patients. The investigators suggested that the experienced patients were

less fearful than inexperienced patients, and a "floor" effect on their child anxiety measures may have resulted in reduced variability and a consequent attenuation of the correlation with the maternal measures. Other studies showing a positive relationship between maternal and child anxiety have typically included patient populations that were mixed with respect to this characteristic (cf. Koenigsberg & Johnson, 1972).

Pinkham and Fields (1976) also found no correlation between maternal self-report of anxiety and observer-rated child anxiety in their investigation of preappointment procedures aimed at reducing maternal anxiety (Pinkham & Fields, 1976). As in the Wright et al. (1973) study discussed above, manipulation of maternal anxiety level by pre-appointment procedures seemed to attenuate the strong correlation between maternal anxiety and child distress behavior that studies without this manipulation have consistently shown.

APPENDIX B

Summary of Regression Analyses for Dental Treatment

Table 8 summarizes regression analyses for the prediction of behavioral distress (OSBD Total Distress) from child's gender, maternal anxiety (FSS) and maternal presence. Table 9 summarizes regression analyses for the prediction of behavioral distress (OSBD Total Distress) from child's age, behavioral inhibition and maternal presence. Table entries are R^2 values based on the between-subjects variance.

Table 8

Regression Analysis with Gender, Maternal Fear, and Maternal Presence

SOURCE	DF	MEAN SQUARE	F-RATIO	P
Gender	1	12.114	6.02	0.021
FSS	1	0.446	0.22	0.642
MPA	1	4.659	2.31	0.139
Gender X FSS	1	0.038	0.02	0.892
Gender X MPA	1	8.219	4.08	0.053
FSS X MPA	1	0.748	0.37	0.547
Gender X FSS X MPA	1	0.016	0.01	0.929
Subject	28	2.013		

Note. DF = Degrees of Freedom. FSS = Fear Survey Schedule. MPA = Maternal Presence/Absence.

Table 9

Regression Analysis with Age, Behavioral Inhibition, and Maternal Presence

SOURCE	DF	MEAN SQUARE	F-RATIO	P
Age	1	5.649	0.89	0.356
Inhibition	1	4.627	0.73	0.402
FSS	1	5.211	0.82	0.374
MPA	1	22.056	3.48	0.076
Age X BI	1	0.000	0.00	0.996
Age X FSS	1	1.229	0.19	0.664
Age X MPA	1	13.160	2.08	0.164
FSS X BI	1	5.889	0.93	0.346
BI X MPA	1	4.029	0.64	0.434
FSS X MPA	1	0.012	0.00	0.965
Age X BI X FSS	1	13.119	2.07	0.164
Age X BI X MPA	1	30.019	4.73	0.041
BI X FSS X MPA	1	3.361	0.53	0.474
RESIDUAL	22	6.340		

Note. DF = Degrees of Freedom. FSS = Fear Survey Schedule. MPA = Maternal Presence/Absence. BI = Behavioral Inhibition.

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