
ANXIETY

A Sequential Analysis of Parent–Child Interactions in Anxious and Nonanxious Families

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Although theoretical work has suggested that reciprocal behavior patterns between parent and child may be important in the development of childhood anxiety, most empirical work has failed to consider the bidirectional nature of interactions. The current study sought to address this limitation by utilizing a sequential approach to exploring parent–child interactions. Participants included 161 children (ages 3–12 years) and their parents. Parent and child dyads were classified into four categories: anxious parent–anxious child ($n = 45$), anxious parent–nonanxious child ($n = 45$), nonanxious parent–anxious child ($n = 21$), and nonanxious parent–nonanxious child ($n = 50$). Parent and child behaviors were coded from two 10-min interactions. Results indicated that anxious parents of children with anxiety disorders were more likely to respond with negative behaviors, which their child then mirrored. Nonanxious parents of nonanxious children responded with more warmth, which was then mirrored by their child. These results provide evidence for differential patterns of behaviors between anxious and nonanxious parents and children following critical moments in their interactions.

Previous work on the development of anxiety has demonstrated that both its disorders and symptoms are highly familial (Turner, Beidel, & Costello, 1987). Evidence exists for a biological component to this familial link, indicating that genetics account for around one third of the overall variance in child anxiety (Eley, Vasey, & Dadds, 2001). With a large portion of variance left unexplained, researchers have focused their attention on identifying possible environmental influences (Bögels & Brechman-Toussaint, 2006; Wood, McLeod, Sigman, Hwang, & Chu, 2003). As a result, current work has focused on the family system and, more specifically, differences in parenting behaviors.

The literature on the contribution of parenting behavior to the development of child anxiety remains unclear, and several hypotheses have been made regarding its inconclusive nature. For instance, some have suggested (e.g., Rapee, 1997; Wood et al., 2003; Woodruff-Borden, Morrow, Bourland, & Cambron, 2002) that both definitional issues (e.g., utilizing broad definitions of parenting behaviors such as “control”) and statistical analyses (e.g., exploring mean levels of behaviors across entire parent–child interactions) may have resulted in underestimations of the contribution of parenting behavior to child anxiety. Further, theoretical work has suggested that reciprocal behavior patterns, similar to those identified between aggressive children and their parents, may serve as etiological or maintaining factors in the development of childhood anxiety (Hudson & Rapee, 2004).

However, most empirical work has failed to consider this bidirectional nature of interactions (Schrock & Woodruff-Borden, 2010). More specifically, existing studies have focused primarily on the independent impacts of parent or child behaviors during interactions, ignoring possible interaction effects. As such, the current study sought to bridge existing gaps in the literature through a sequential exploration of the interactions between anxious and nonanxious parent-child dyads.

Of importance, a review of the research on parenting and child anxiety indicated that studies utilizing child and parent report remain inconclusive (Wood et al., 2003). However, observational studies have produced larger effect sizes for overall differences in parenting behaviors between parents of children with an anxiety disorder and nonanxious children. More specifically, in a review of 21 observational studies of parent-child interactions published between the years of 1991 and 2001, parental control was associated with child shyness and increased risk for developing an anxiety disorder (Wood et al., 2003). However, a recent meta-analysis found that differences in parenting behavior account for only approximately 4 to 6% of the variance in child anxiety (McLeod, Wood, & Weisz, 2007). Several explanations have been offered for the relatively low effect sizes associated with parenting behavior and child anxiety.

First, some researchers hypothesized that using broad measures of parenting behaviors, such as control and rejection, may have resulted in an underestimation of the relationship between the behavior of anxious parents and child anxiety in previous research (Woodruff-Borden et al., 2002). For example, McLeod and colleagues (2007) found that the effect for parental control was relatively small ($M ES = 0.25$). However, when control was divided into subdimensions of overinvolvement and autonomy granting, the effect for autonomy granting was large, 0.42. Second, small effect sizes might also be due in part to overreliance on frequency data. Many of the previous studies examined differences between anxious and nonanxious groups by analyzing the means and frequencies of parenting behavior dimensions across the entire parent-child interaction (Hudson & Rapee, 2001; Moore, Whaley, & Sigman, 2004; Rapee, 2001; Siqueland, Kendall, & Steinberg, 1996; Turner, Beidel, Roberson-Nay, & Tervo, 2003; Whaley, Pinto, & Sigman, 1999). This use of frequency counts and mean levels of behaviors may obscure critical behavioral response patterns within interactions in anxious and nonanxious dyads. Third, conclusions about the impact of parental behavior patterns on the child and their role in the development of an anxious response style are very limited, because previous work has been restricted to analyzing one dimension of the interaction (i.e., the parent's behavior).

An analysis of the contextual dyadic behavior patterns through the use of sequential techniques may help to clarify the role of parent behavior (Schrock & Woodruff-Borden, 2010). For example, understanding whether anxious parents respond to their children with less autonomy granting overall, or whether they are more likely to respond to specific child behaviors with control, will offer important insight into the impacts these behaviors have on the child. Partial support for dyadic interaction patterns was found in a sequential analysis of verbalizations during parent-child interactions (Hummel & Gross, 2001). In this study, 30 children ages 9 to 12 years (15 anxious and 15 controls) and their parents were invited to participate in a discussion task. Parent and child verbalizations were coded as positive, neutral, and negative. Results indicated that, overall, nonanxious and anxious groups did not differ in their conditional responses to their parents' positive or neutral verbalizations. In both groups, children tended to mirror the verbalization of the parent (e.g., responding with positive feedback to a positive statement). Following a parent's negative verbalization, children in the anxious group were more likely to mirror their parent's negative feedback than nonanxious children. Further, it was found that parents of nonanxious children tended to respond to child negativity with either positive or neutral feedback. Although this study highlights the importance of exploring conditional responses of both parent and child during these interactions, it fails to consider the impact of parent psychopathology on the patterns of responding.

Whaley and colleagues (1999) found that maternal and child anxiety had differential impacts on response patterns exhibited during parent-child interactions. More specifically, they found that maternal anxiety status significantly predicted warmth during an interaction with their children. However, in a separate model, when child anxiety status was considered, maternal anxiety significantly predicted maternal autonomy granting. Two recent studies also provide preliminary support for the notion that parents change their behavior as a function of child anxiety. Lindhout and colleagues (2009) explored the differences in parenting behavior across children with anxiety disorders ($n = 25$), their non-disordered siblings ($n = 25$), and a nonanxious control group ($n = 25$). They found that parents directed more negative affect toward their child with an anxiety disorder and were more critical of that child compared to their nonanxious siblings or controls. Similarly, in their study of 45 children with anxiety disorders and 46 nonclinical control children, Hudson, Doyle, and Gar (2009) explored the impact child anxiety alone had on parent behavior by testing differences in maternal responses to anxious and nonanxious children who were not their own. The authors found that mothers respond with

more involvement to the anxious group compared to nonanxious children regardless of a familial relationship.

All of these studies have failed to consider the influence that parental psychopathology has within the interaction. To date, little empirical work is available to support theoretical models of reciprocal patterns of behavior in anxious and nonanxious families (Murray, Creswell, & Cooper, 2009). In an effort to begin testing these models, a recent study considered the mutual impact of child and parent anxiety status on the interaction between parents and their children (Schrock & Woodruff-Borden, 2010). Results indicate that dyadic interactions are influenced by both the behaviors of parent and child, as well as the anxiety status of parent and child. The study highlights the importance of considering mutual dyadic influences or transactions within interactions, and the authors suggest that future work should explore the conditional response patterns between anxious and nonanxious dyads using sequential analysis.

Literature on the development of aggressive behavior in children offers further empirical support for a transactional model of parent-child interactions and may provide a useful paradigm to understand possible transactional models among anxious and nonanxious families. Research on childhood aggression has shown that in the face of conflict, children who are aggressive experience higher levels of negative affect, increasing the risk for emotional dysregulation (Dodge, 1989). Dysregulated emotion leads to a disruption in the child's coping mechanisms resulting in aggressive behavior. Scaramella and Leve (2004) proposed a model that delineates bidirectional parent-child interactions as particularly important in the development of poor emotion regulation. The authors suggest that children with a tendency to experience negative emotional reactivity have difficulty controlling negative emotions. A coercive cycle begins when parents respond to this quick and highly negative reactivity with harsh parenting, inducing further emotional arousal in their children and perpetuating the process. Earlier work explored this process by analyzing conditional behavioral responses in interactions between aggressive mother-child dyads (Snyder & Patterson, 1995). The study elucidated a coercive pattern of behavior in which mother and child tend to escalate each other's aversive behavior, resulting in the parent giving into the child's demands. By acquiescing, parents negatively reinforce the child's aggressive behavior, which in turn serves as reinforcement for the parent's yielding.

A similar model has been suggested for the development of an anxious response-style in children (Hudson & Rapee, 2004). For instance, controlling behavior differentiates parents who are anxious and nonanxious (Ballash, Leyfer, Buckley, & Woodruff-Borden, 2006; Muris, Meesters, Schouten, & Hoge, 2004; Wood et al., 2003), and a recent study using conditional probabilities showed

that parents display controlling behavior following instances of child negative affect (Woodruff-Borden et al., 2002). Specifically, parents who were anxious were more likely to mirror child negative affect, as well as respond to their children with controlling behavior. The authors suggest that when children experience negative affect, parents who are anxious respond with controlling behavior, leading to a decrease in self-efficacy in children and, consequently, an avoidance of stimuli that the child believes he or she cannot successfully navigate. Avoidance on the child's part may serve as reinforcement for the parent's controlling behaviors (e.g., Hudson et al., 2004; Rubin & Mills, 1991), as well as decrease opportunities for the child to learn and practice appropriate coping mechanisms. Both the controlling behaviors by the parent and avoidance by the child may then serve to perpetuate the cycle of anxious behavior.

THE PRESENT STUDY

Thus, previous research has offered preliminary support for a transactional model of parent-child interactions in the development of anxiety among families. However, few studies have sought to explore parent and child behaviors as multiple conditional events within the interaction (Hummel & Gross, 2001). As such, few data are available to bridge the gap between global differences in behavior and specific operant behavior patterns hypothesized to contribute to anxiety in children. Identifying patterns in parent-child interactions, with carefully defined behaviors, may explain small effect sizes found for the relationship between parenting behavior on child anxiety (McLeod et al., 2007). In addition, few studies have examined the role of child anxiety and child behavior within the context of the interaction (Dumas, LaFreniere, & Serketich, 1995; Schrock & Woodruff-Borden, 2010).

Thus, the current study investigated differences in reciprocal responding of anxious and nonanxious parent-child dyads using sequential analysis of behavior to address several primary goals. First, we examined potential bidirectional influences on parent and child behavior within the dyadic interaction. We expanded on the existing literature, which has focused on mean levels of parent behavior (e.g., control, warmth) across interactions, by defining specific subdimensions of parental rejection and control. As noted earlier, previous work on differences in the responses of parents who are anxious and nonanxious parent have utilized global measures of behaviors across the interaction but has not considered these differences as direct responses to child behaviors among anxious and nonanxious dyads. Using a sequential analysis, we tested the conditional responses of parent behavior to child behavior. It was

hypothesized that parents who are anxious and who have children who are anxious would be more likely than non-anxious parents and children to respond with less autonomy granting, less warmth, more control, and more aversiveness to instances of child aversiveness, control, or withdrawal. As a second aim of this study, we explored conditional child responses to parenting behavior. We were interested in testing differences in the responses of children who are anxious and nonanxious to the behavior of their parents. This type of analysis is the first step in understanding how children who are anxious and nonanxious may cope differently with different parenting behaviors. Based on previous work in the area (Hudson et al., 2009), we hypothesized that, following parental controlling behaviors, anxious children would display more withdrawal and less controlling behaviors compared to nonanxious children.

METHOD

Participants

Participants were recruited through referrals from local mental health agencies, community self-help groups, and flyers and letters distributed to schools and after-school programs. Parents and their biological child, aged 3 to 12 years, were included in the study. All children were living with the participating parent at the time of assessment. Participation was limited to one parent and one child per family. The sample for this study was drawn from a larger study of anxiety and families. Dyads were excluded from the study if either parent or child met criteria for a primary diagnosis other than anxiety or if the child met criteria for an additional diagnosis of an externalizing disorder. The final sample included 161 parent-child dyads. The dyads were grouped into four categories based on the presence of a primary diagnosis of anxiety: anxious parent-anxious child ($n=45$), anxious parent-nonanxious child ($n=45$), nonanxious parent-anxious child ($n=21$), and nonanxious parent-nonanxious child ($n=50$). Control participants (either parent or child) were classified as nonanxious based on a failure to meet criteria for an anxiety disorder at the time of assessment.

Ethnic composition of the sample was as follows: 70% ($n=112$) European American, 11.2% ($n=18$) African American, 10.6% ($n=17$) Hispanic, 0.6% ($n=1$) Asian, 2.5% ($n=4$) other/mixed, and 5.6% ($n=9$) declined to respond. Child age ranged from 3 to 12 years ($M=7.29$, $SD=2.91$), and most were girls ($n=95$). Parent age ranged from 21 to 52 years ($M=36.17$, $SD=6.56$), and most were women ($n=145$). The median gross family income was \$50,000 to \$60,000. Median parent education level was college graduate.

Fifty-eight children and 84 parents met criteria for a primary anxiety diagnosis. Child diagnoses included specific phobia ($n=19$), generalized anxiety disorder ($n=17$), social phobia ($n=11$), separation anxiety ($n=9$), obsessive-compulsive disorder ($n=1$), and post-traumatic stress disorder ($n=1$). A chi-square test of primary diagnoses across children of anxious and nonanxious parents revealed no significant differences in terms of type anxiety diagnosis, $\chi^2(5)=10.14$, $p=.07$. Parents of a subset of children were administered the Child Behavior Checklist (Achenbach, 1991), which is a parent-report measure of their child's emotional and behavioral problems. Children with a primary diagnosis of anxiety received significantly higher ratings on the Internalizing subscale of this measure ($M=52.33$) when compared to children without a primary diagnosis of anxiety ($M=48.88$), $t(70)=3.16$, $p=.002$. Parent diagnoses were generalized anxiety disorder ($n=39$), social phobia ($n=19$), specific phobia ($n=11$), panic disorder with agoraphobia ($n=8$), panic disorder ($n=3$), posttraumatic stress disorder ($n=3$), and obsessive-compulsive disorder ($n=1$). Similarly, chi-square tests of primary parental diagnoses across child anxiety groups revealed no significant differences in terms of type anxiety diagnosis, $\chi^2(9)=10.63$, $p=.30$. A subset of parents were also administered the Beck Anxiety Inventory (Beck, Epstein, Brown, & Steer, 1988), which is a self-report measure of somatic symptoms of anxiety. Parents with a primary diagnosis of anxiety reported significantly higher scores ($M=9.97$) when compared to parents without a primary diagnosis of anxiety ($M=1.94$), $t(103)=-6.88$, $p<.001$. Comorbidity in this sample was also common. Of the parents with an anxiety disorder, 41 met criteria for a secondary anxiety diagnosis, 4 for a secondary dysthymia diagnosis, and 7 for a secondary diagnosis for major depressive disorder. *T* tests revealed no significant differences in the number of comorbid problems between parents with anxiety disorder across child anxiety groups, $t(53)=-1.17$, $p=.25$. Thirty-four percent of the children with anxiety disorders ($n=22$) met criteria for a secondary anxiety diagnosis. *T* tests indicated no significant differences in the number of secondary diagnoses in children with anxiety disorders across parental groups, $t(43)=1.61$, $p=.12$.

Procedure

As part of this study, participating parent and child dyads were brought into the lab for diagnostic interviews. Each mother or father provided informed consent to participate and children provided their assent. The study was approved and conducted in compliance with university Institutional Review Board guidelines. The interviews lasted between 1.5 to 3 hr, depending on the

nature of their symptoms. All interviews were conducted by advanced doctoral students and supervised by a licensed clinical psychologist. Following the diagnostic interviews, parents and their children were then asked to complete two 10-min interaction tasks. Interactions tasks were recorded. Doctoral students, who were blind to both the parent and child's diagnostic category, completed the coding and transcription of the recorded interactions.

Measures

Interviews

Anxiety Disorders Interview Schedule-IV-Client Version (ADIS-IV; Brown, Di Nardo, & Barlow, 1994). The ADIS-IV is a semistructured interview that assesses for anxiety and mood disorders as outlined in the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; American Psychiatric Association, 1994). The interview is organized by initial screening questions for each of the disorders, with in-depth modules administered following positive responses. The ADIS-IV lifetime version has strong psychometric properties, with good to excellent levels of reliability for the majority of the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.) categories (Brown, Di Nardo, Lehman, & Campbell, 2001).

Anxiety Disorders Interview Schedule-Parent and Child Versions (ADIS-P/C; Silverman & Albano, 2004). The ADIS-P/C is a semistructured interview that parallels the ADIS-IV and is used to assess anxiety and related disorders in youth ages 6 to 17 years old. Parent and child are interviewed individually and reports are combined for a composite diagnosis. The ADIS-P/C has demonstrated good to excellent levels of interrater reliability and test-retest reliability (Silverman, Saavedra, & Pina, 2001). Interviewers were upper-level doctoral students in clinical psychology trained to a reliability criterion of four consecutive matches on diagnosis and severity rating with the primary investigator. One third of the recorded interviews were rated by a second interviewer yielding a kappa of 0.89 for primary diagnoses. Training took approximately 12 hr to complete.

Interaction Tasks

Parent-child dyads completed two 10-min interaction tasks. Tasks were relatively unstructured and designed to reflect achievement and social themes. In the first task, children ages 6 to 12 years attempted a set of unsolvable anagrams and were told that the researchers would return to see how many they were able to complete. Children ages 3 to 5 years were asked to complete a series of difficult puzzles. In the second task, the children ages 6 to 12 years

were instructed to use the 10 min to prepare a speech about himself or herself to be delivered to a camera following the preparation period. Children ages 3 to 5 years were asked to tell a story out loud. Instructions for both tasks were delivered to the child who was told that they could involve their parents however they liked. Tasks were counterbalanced to control for order effects.

Parent and child behaviors were coded from the recorded interaction tasks. Within these interactions, each discrete behavior of both the parent and the child was coded sequentially. This created a single stream of behavior codes, or the behavior sequence, matching the order as they occurred within the interaction. Thus, each dyad interaction was symbolized as an event sequence of discrete behaviors. Codes were mutually exclusive and exhaustive and were identified using a scheme adapted from Kerig, Cowan, and Cowan (1993). Developed specifically for parent-child interactions, this coding scheme captures differences in the quality of parent-child language, contingent responding, and affective interchange. The scheme was based on prior empirical work of parenting style and the emotional environment of family life and includes 38 separate content codes. Broad categories of content included positive responses, negative responses, and assertions, and they were found to have acceptable reliability ($\alpha = 0.77, 0.79, \text{ and } 0.71$, respectively; Kerig et al., 1993). Interactions were transcribed and transcripts were used along with the videos to code each identifiable unit of behavior for speaker, function, content, and affective tone. All coders were doctoral students trained to 80% agreement with each other on each of the 32 behavior categories. Coders were blind to group membership. One third of all interactions for the current study were coded by a second coder with resulting kappas ranging from 0.80 to 1.0. Content codes and reliabilities are presented in Table 1.

Data Analyses

Power Analysis

To calculate the required sample size, G*Power 3.1 (Faul, Erdfelder, Lang, & Bauchner, 2007) was used. To detect a large effect size (.40) with a power of 0.80 for an analysis of variance (ANOVA), a minimum sample size of 112 is needed. To detect a large effect size (.40) with a power of 0.80 for a mixed-design analysis of variance, a minimum sample size of 76 is needed. There is no widely accepted method for calculating power and sample size for sequential analysis. Bakeman and Gottman (1997) outlined the need to consider the number of events coded to analyze data for statistical significance. They suggested that the number of coded events required for analysis should be a function of the number of discrete event codes used and the number of time lags used in analysis. Given these

TABLE 1
Interrater Reliability of Observational Codes

Code	Kappa
Content Codes	
1. Answer other's question	.88
2. Agree/comply/accept	.81
3. Interpretation of other's intention or meaning	.83
4. Nonverbal listening	.80
5. Praise/compliments	.91
6. Reassurance/complements	.81
7. Minimal response (brief noncommittal response)	.97
8. Explicit rejection, disagreement, disapproval	.81
9. Complaints, protests	1.00
10. Behavior regulation	.82
11. Disruptive, off task	.95
12. Explicit directive, command	.84
13. Explicit directive, suggestion	.85
14. Choice making, taking over	.81
15. Attention devices	.80
16. Thinking aloud	.83
17. Complaints about task	.88
18. Helpful attempt/teaching	.82
19. Offer of assistance	1.00
20. Supplying answer	.88
21. Spelling on specific request	.84
22. Asking real questions	.86
23. Clarification requests	.83
24. Requests for permission	.93
25. Requests for assistance	.93
26. Test questions	.88
27. Requests for confirmation	.86
28. Personal referent, positive	1.00
29. Personal referent, negative	.91
30. Humor, word play, nonsense, jokes	.96
31. Uncodeable	.96

guidelines, it was estimated that the current study would require a minimum of 40,000 individual events to be coded to ensure an appropriate distribution of event data and reduce the possibility of committing a Type 1 error. As a result, it was necessary to collapse the current data across interaction tasks and age ranges to provide the necessary number of event codes (33,773) for the analysis.

As power was a concern for this study, behaviors from both tasks were examined together. These tasks were conceptually similar and both designed to elicit mild feelings of stress. Using the individual content codes from Table 1, five superordinate categories were created. These categories were organized to reflect subdimensions of rejection and control, as outlined in McLeod et al.'s (2007) meta-analysis. Dimensions of rejection include withdrawal, aversiveness, and warmth, and dimensions of control include overinvolvement and autonomy granting. Table 2 illustrates definitions of the subdimensions, outlines the behavior codes from Table 1 used to create each subdimension, and provides Cronbach's alphas for the subdimensions. Sequential ordering within the interactions of parent and child was retained, thus

TABLE 2
Definition and Internal Consistency (Alpha) of Parent and Child Behavior Composites

Parent Behavior Composites
a. Withdrawal (Cronbach's $\alpha = 0.228$)—"lack of involvement between parent and child, lack of interest in the activities of the child, or lack of emotional support/reciprocity (p. 161)"
Ignore/switch topic
Minimal response
b. Aversiveness (Cronbach's $\alpha = 0.437$)—"parental hostility toward children hypothesized to reflect a lack of acceptance (p. 161)"
Explicit rejection
Challenge/implicit rejection
Interruption
Complaints/put-downs
c. Warmth (Cronbach's $\alpha = 0.411$)—"a sense of positive regard expressed by the parent toward the child, pleasant interaction shared between parent and child, or parenting involvement in children's activities (p. 161)"
Humor/language play
Agree/comply/accept
Nonverbal listening
Praise/compliment
Teaching
Helpful attempt
Offer of assistance
d. Overinvolvement (Cronbach's $\alpha = 0.569$)—"parental interference with children's age normative autonomy and emotional independence, boundary problems (e.g., parent-child role reversal), excessive restrictiveness, and encouragement of excessive dependence on the parent (p. 161)"
Explicit directive/command
Behavior regulation
Choice making/taking over
Implicit directive/command
Attention devices
e. Autonomy granting (Cronbach's $\alpha = 0.621$)—"parental encouragement of children's opinions and choices, acknowledgement of children's independent perspectives on issues, and solicitation of children's input on decisions and solutions of problems (p. 162)"
Acknowledge/reflect
Ask questions
Reassurance/encouragement
Child Behavior Composites
a. Withdrawal (Cronbach's $\alpha = 0.409$)—lack of involvement between parent and child, lack of interest in the interaction, or lack of emotional support/reciprocity
Ignore/switch topic
Minimal response
Disruptive/off task
b. Aversiveness (Cronbach's $\alpha = 0.441$)—child hostility toward parent
Explicit rejection
Challenge/implicit rejection
Interruption
Complaints/put-downs
c. Warmth (Cronbach's $\alpha = 0.041$)—a sense of positive regard expressed by the child toward the parent, pleasant interaction shared between parent and child, child interest in mutual activity of the task
Humor/language play
Agree/comply/accept
Nonverbal listening
Praise/compliment
Teaching

(Continued)

TABLE 2
Continued

Helpful attempt
Offer of assistance
d. Taking Control (Cronbach's $\alpha=0.636$) — child interference in mutual activity of the task, child direction of parent's behaviors, boundary problems (e.g., parent-child role reversal), excessive restrictiveness, and lack of inclusiveness of the parent
Explicit directive/command
Implicit directive/command
Behavior regulation
Choice making/taking over
e. Lack of Autonomy (Cronbach's $\alpha=0.433$) — lack of child independent involvement in the task, excessive reassurance seeking from the parent
Request clarification
Request for assistance
Permission request
Ask for reassurance

^aMcLeod, Wood, and Weisz (2007, pp.161–162).

creating event sequences symbolized by a stream of category codes.

Analysis Plan

Possible differences in terms of age and gender were first examined across the four dyads. ANOVAs were conducted on parent age, child age, parent gender, and child gender. No differences were revealed across the four groups. Next, to test possible patterns of behavior between anxious and nonanxious parent/child dyads, data were then explored through three levels of analysis. The aim of Level 1 was to determine differences across the dyads in terms of child behavior. The child behavior composites identified in this step as differentiating the four dyads were then used as the initiating behavior in the second level. We utilized a sequential analysis of conditional child responses to parent behaviors to explore differences in response patterns between anxious and nonanxious parent-child dyads. In an effort to reduce the amount of statistical tests, we first analyzed differences in the relative frequency of child behaviors among the four dyads. Based on these findings, at the second level we then explored the conditional probabilities of parent behavior following the child behaviors identified in the previous level. Finally, the parental behaviors shown to be different across the dyads were then used as the initiating behavior and we explored the modal child response across the next five child behaviors.

RESULTS

Data were analyzed in the first level with GSEQ 5.0 (Bakeman & Quera, 2001) to examine parent response

to child initiating behavior. GSEQ is a data analysis program designed to explore observational sequential data. This program allows for the computation of both simple statistics, such as frequencies, and contingent statistics, such as relative frequency or conditional probabilities. All significance tests were conducted using the SPSS statistical package (SPSS Inc., 2009). To begin exploring for patterns, the relative frequency of each of the five child behavior composites (with respect to the other four composites) was calculated across the entire interaction. Relative versus raw frequency was chosen as a way to control for possible variations in the amount of behaviors across the interactions. An ANOVA test was conducted with dyads as the between-subjects factor, and the relative frequencies of each of the five child behavior composites were entered as dependent variables. Results indicate significant differences between the dyads in the relative frequency of child warmth, $F(3, 160)=4.19$, $p < .01$, partial $\eta^2=0.07$, with the nonanxious parent-nonanxious child dyad exhibiting the most child warmth ($M=0.38$, $SE=0.02$) and the anxious parent-anxious child dyad displaying the least child warmth ($M=0.27$, $SE=0.02$). Results also indicated significant differences between the dyads in the relative frequency of child controlling behaviors, $F(3, 160)=2.70$, $p=.05$, partial $\eta^2=0.05$, with the nonanxious parent-anxious child dyad displaying the most child control ($M=0.20$, $SE=0.03$) and the nonanxious parent-nonanxious child dyad exhibiting the least child control ($M=0.12$, $SE=0.02$). Due to the centrality of the construct of control in past research on anxiety and parent-child dyads, this behavior was used as the initiating behavior for further analysis. Although child warmth was significant, we chose to focus on the more conceptually interesting question of child control; thus, child warmth was not considered in further analyses.

For the second level of analysis, we examined differences in patterns of behaviors between dyads by calculating parental conditional responses to child control (i.e., the likelihood of each of the five parent behavioral responses immediately following the given child behavior of control). *T* tests were conducted to explore the effects of child sex, and no significant sex differences were found. Similar to earlier, the data were then analyzed in GSEQ 5.0 using a least-squares lagged sequential analysis. First, Lag 1 probabilities were calculated following instances of child control. Lag 1, for purposes of our data, refers to the next immediate behavior occurring following the behavior of interest (i.e., parental control). To examine the effect of dyad and parent behavior on response to child control, a 4 (dyad) \times 5 (parent behavior) ANOVA was conducted in SPSS. Results are presented in Table 3. A two-way interaction was found between parent conditional response and dyad, $F(12, 804)=2.20$, $p=.01$, partial $\eta^2=0.03$. The main effect

TABLE 3
Results of Analysis of Variance of Conditional Probabilities of Parent Behavior Following Child Control

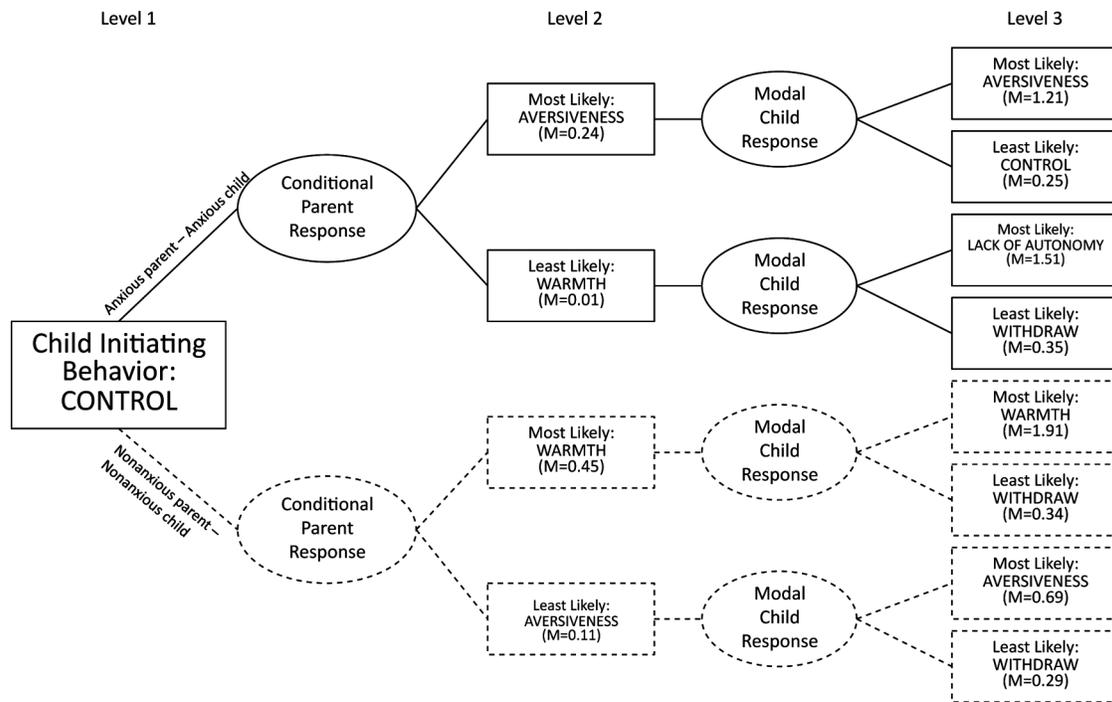
	Sum of Squares	df	M Square	F	p	Partial η^2
Dyad	0.02	3	0.01	0.11	.96	0.00
Parent Behavior	9.53	4	2.38	34.30	<.001	0.15
Interaction	1.83	12	0.15	2.20	.01	0.03
Error	54.55	785	0.07			
Total	87.82	805				

for parent conditional response was also significant, $F(4, 804) = 34.30, p < .01$, partial $\eta^2 = 0.15$.

To explore the interaction between parent conditional response to child control and dyad, separate ANOVAs were run for each parent response with dyad entered as the between-subjects factor. Results indicate that parents in the anxious parents-anxious children dyad were less likely to respond to their child's controlling behaviors with warmth compared to parents in the nonanxious parent-nonanxious child dyad, $F(3, 160) = 2.73, p = .05$, partial $\eta^2 = 0.05$. A trend toward significance was also noted for parent responses of aversiveness, $F(3, 160) = 2.35, p = .074$, partial $\eta^2 = 0.04$, indicating that parents in the anxious parents-anxious children dyad were more

likely to respond with aversiveness than parents in the nonanxious parents-nonanxious children dyad. The models for parent responses of autonomy granting, control, and withdraw failed to reach significance.

To complete the response pattern analysis for the third level, child responses to these behaviors were calculated. Specifically, conditional probabilities were calculated for each of the five child behaviors at Lags 1 through 5 following each of the two target parent behaviors identified in the previous level of analysis, specifically warmth and aversiveness. These summed conditional probabilities for each child behavior response were then used to calculate the modal child response. Aversiveness was the most frequent parent response to child control for the anxious-anxious dyad. To understand further response patterns within this dyad, we used this behavior as an initiating behavior. It should be noted that because analyses with the two mixed dyads (i.e., nonanxious children of anxious parents and anxious children of nonanxious parents) failed to reach significance in the previous step, they were not included in this level of the analysis. Results indicate that, following parental aversiveness, children in anxious parent-anxious children dyad were most likely to mirror this aversive response ($M = 1.21$) and least likely to respond with control behaviors ($M = 0.25$), $t(88) = 4.72, p < .001$. The modal child response was also calculated



Note: The top half of the graph represents anxious parents and anxious children (denoted by solid lines). The bottom half represents nonanxious parents and nonanxious children (denoted by dashed lines). The means reported are means of the conditional probabilities for the specific behavior occurring following the previous behavior in the graph.

FIGURE 1 Graphical representation of interactions between anxious and nonanxious parent-child dyads.

for the least likely response (i.e., warmth) for this dyad. Results indicate that when parents who were anxious display warmth, their children with an anxiety disorder were more likely to respond with a lack of autonomy ($M=1.50$) and less likely to respond with withdraw behaviors ($M=0.35$), $t(88)=5.83$, $p<.001$. Children in the nonanxious parent–nonanxious children dyad were most likely to mirror displays of parental warmth ($M=1.91$) and least likely to respond with withdraw behaviors ($M=0.34$), $t(98)=9.28$, $p<.001$. The modal child response was also calculated for the least likely response (i.e., aversiveness) within this dyad. Results indicate that when parents who were nonanxious displayed aversiveness, their children who were nonanxious were most likely to respond with aversiveness ($M=0.69$) and least likely to respond with withdraw behaviors ($M=0.29$), $t(98)=2.74$, $p<.01$. These data are illustrated graphically in Figure 1.

DISCUSSION

The purpose of the current study was to examine possible sequential patterns within the dyadic interaction that would serve to reinforce an anxious response style in parents and children. The first aim of this study used sequential analysis to explore possible patterns among carefully defined behavioral responses of parents who are anxious and nonanxious in direct response to child-initiating behaviors. Several related hypotheses were tested. Utilizing behavior composites suggested by McLeod and colleagues (2007), which break control behaviors into the more carefully defined subdimensions of overinvolvement and lack of autonomy, we explored the conditional parent responses to child behavior. Results of this study offer partial support for our first hypotheses. Results showed that parents who were anxious and had children who were anxious were less likely to respond to child control with warmth and more likely to respond with aversiveness. In contrast, parent who were nonanxious and who had children who were nonanxious were most likely to respond to child control with warmth and least likely to respond to child control with aversiveness.

Next, based on previous work in the area (Hudson et al., 2009), we hypothesized that, following parental controlling behaviors, children who were anxious would display more withdrawn and less controlling behaviors compared to children who were nonanxious. Further, we hypothesized that following instances of parental warmth, children who were anxious and nonanxious would be equally likely to mirror this warmth. These hypotheses were partially supported. Children in anxious parent–child dyads were mostly likely to respond to their parents aversive behavior with aversive-

ness and less likely to respond with control. In contrast, children in nonanxious parent–child dyads were more likely to respond to parental warmth with warmth and least likely to respond with withdrawal.

Overall these findings support differential responding between anxious parent–anxious child and nonanxious parent–nonanxious child dyads. Differences in parental response to child control behavior suggest that critical moments within the interaction may exist, which underlie an anxious response style between parents and children who are anxious. For parents and children who are anxious, the child's attempts to take over or control the parent or the task elicited parent aversive behavior. Aversiveness on behalf of the parent may then perpetuate the child's negative interaction by increasing child distress and encourage more negative behavior on the behalf of the child. Increased negative child behavior may then serve to perpetuate the negative cycle within the interaction. However, within the nonanxious parent–nonanxious child dyad, parents responded to child control with warmth. This may be an effort on the parent's part to shift the interaction back to a positive one, which would more successfully promote an achievement of the goal of the interaction. Following these instances of parental warmth, the children were most likely to respond with warmth. This indicates that, similar to the anxious dyads, a unique pattern of behavior exists. Among the nonanxious parent–nonanxious dyads, though these interactions may experience moments of disruption, it was found that these disruptions are only temporary. Once the parents rebalanced the interaction by responding in a warm manner to the child, the child then reciprocated this warmth and, thus, the mutually influencing cycle is reinforced.

There are several limitations in the current study. First, results should be interpreted with caution as the study consisted of a wide age range (3–12 years). Due to the large number of statistical tests, two age groups within the study (3–5-year-olds and 6–12-year-olds) were combined in an effort to increase power, reduce Type I error, and provide an appropriate number of event codes with which to analyze data sequentially (Bakeman & Gottman, 1997). Thus, the effects of the child's developmental stage on the parent–child interactions remain an important focus for future research. For instance, the patterns of parent–child interactions likely change over time, and how these interactions impact anxiety symptom maintenance or the development of symptoms remain unclear. Further, how these interactions have a differential impact over the course of the development of the child remains to be understood. Next, both parent and child were asked to engage in interactions that were targeted specifically to produce mild levels of anxiety. So despite our significant findings in terms of the matched dyads (anxious–anxious and

nonanxious–nonanxious), we were unable to find any significant patterns in the behaviors of mismatched dyads (anxious–nonanxious). It may be that these tasks did not produce enough distress to detect important differences in the interactions of these mismatched dyads and possibly underestimated the transactions where significant differences were found. Similarly, the interactions were restricted to 10 min each (20 min combined across the two tasks) in length producing a limited amount of behavioral data for this type of analysis. By calculating a conditional probability, the data are limited in terms of the number of instances the given behavior occurred. Although this study was able to produce significant findings, the restricted data may have obscured some relationships. For instance, the relatively small number of data points for the sequential analysis and resulting limited power to detect differences may also partially explain the lack of differences in terms of the mixed dyads. Further, due to a limited number of behaviors within some of the behavior categories, several of the alphas for these categories were low. Future studies, utilizing longer observational periods, will help alleviate this problem and likely allow for the detection of differences among the mixed dyads.

Implications for Research, Policy, and Practice

Despite these limitations, the current study has advanced our understanding of the parenting literature among anxious and nonanxious families in two important ways. First, the results of this study support the transactional and mutually impacting model suggested in previous work for both anxious and nonanxious dyads (Dumas et al., 1995; Schrock & Woodruff-Borden, 2010). Thus, future work on parent and child interactions should consider the interaction as a mutually influencing process between both parent and child. In line with this, our results offer support for the hypothesis that during warm moments within the interaction, both anxious and non-anxious parent–child dyads mirrored a warm response. Second, the interaction should not be considered a linear process. Differences emerged following negative points in the interaction and suggested that when parents who are anxious resort to maladaptive parenting behaviors the child responds with maladaptive behaviors of their own. By using means levels or frequencies of behavior across the entire interaction, these critical moments may be obscured. Continued examination of the sequence of interactions may help to address the complex roles of parenting, child contributions, and the dyadic interactions. Sequential conceptualizations of interactions will further inform clinical practice by consideration of treatment targeted at shifting these interactional patterns to increase the odds for a successful outcome in treatment.

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