Published in final edited form as:
Behav Res Ther. 2010 June ; 48(6): 506–515. doi:10.1016/j.brat.2010.02.006.

The Effect of Parental Modeling of Anxious Behaviors and Cognitions in School-Aged Children: An Experimental Pilot Study

Marcy Burstein, Ph.D.[a,1,*] and **Golda S. Ginsburg, Ph.D.**[a]

[a]Johns Hopkins University School of Medicine, Department of Psychiatry and Behavioral Sciences, Division of Child and Adolescent Psychiatry, 600 North Wolfe Street/CMSC 312, Baltimore, Maryland 21287-3325, USA

Abstract

The current study tested: (1) the impact of parental modeling of anxious behaviors and cognitions on child anxiety level, anxious cognitions, desired avoidance, and objective performance using an experimental paradigm; and (2) whether the impact of parental modeling of anxious behaviors and cognitions differed by parent gender. Twenty-five parents (a random selection of 12 male and 13 female parents) participated with one of their children (ages 8 to 12 years; 56.0% male; 76.0% Caucasian). All children experienced two test conditions: an anxious condition in which their parent was trained to act anxiously before a planned spelling test and a non-anxious condition in which their parent was trained to act relaxed and confident before a planned spelling test. Results showed that, regardless of parent gender, children endorsed higher anxiety levels, anxious cognitions, and desired avoidance of the spelling test in the anxious relative to the non-anxious condition. Parental modeling of anxiety did not affect child spelling performance. Significant interaction effects indicated that fathers had a stronger impact on child anxiety level and cognitions than did mothers. Results highlight the importance of parental modeling and the potential role of both mothers and fathers in prevention and treatment for child anxiety.

Keywords

parental modeling of anxiety; child anxiety; parent gender; etiology

Introduction

A large body of work has shown that anxiety disorders aggregate within families (Beidel & Turner, 1997; Biederman, Rosenbaum, Bolduc, Faraone, & Hirshfeld, 1991; Last, Hersen, Kazdin, Francis, & Grubb, 1987; Merikangas, Dierker, & Szatmari, 1998; Turner, Beidel, & Costello, 1987). Indeed, family studies indicate that both children of parents with anxiety disorders (i.e., “top-down studies”; Beidel & Turner, 1997; Merikangas et al., 1998; Turner et al., 1987) and parents of children with anxiety disorders (i.e., “bottom-up studies”; Kashani et al., 1990; Last et al., 1987; Livingston, Nugent, Rader, & Smith, 1985; Rosenbaum et al.,

*Corresponding author: Tel: +1 301 496 8815; fax: +301 480 0278. bursteinme@mail.nih.gov.
[1]Current Address: National Institute of Mental Health, Section on Developmental Genetic Epidemiology, 35 Convent Drive, Room 1A104 (MSC 3720), Bethesda, MD 20814, USA, Telephone: (301) 496-8815, Fax: (301) 480-0278, bursteinme@mail.nih.gov

1992) display higher rates of anxiety disorders than do relatives of family members without anxiety disorders. Although these findings suggest that the transmission of anxiety within families is biological/genetic, quantitative behavioral genetic studies demonstrate that environmental factors have a prominent role in the etiology of anxiety disorders. For instance, a meta-analysis of 30 behavioral genetic studies revealed that both shared and non-shared environmental factors account for approximately 70% of the variance in child anxiety problems, above and beyond that of additive genetic factors (Eley & Gregory, 2004).

Given the estimated large contribution of environmental factors to child anxiety as well as the greater potential for their prompt detection and modification relative to genetic factors (Merikangas & Risch, 2003), research focusing on malleable environmental factors that confer risk for child anxiety may provide the most promising direction for programs of intervention. In particular, identification of environmental factors central to child development, such as parenting practices, may enable refinement of existing interventions as well as the development of novel methods of intervention for child anxiety problems.

While prior work has examined a variety of parenting practices (i.e., parental overcontrol, parental overprotection, parental emotional warmth/positivity, parental rejection/criticism, parenting styles) as factors that may pose risk for the development of child anxiety (Ginsburg & Schlossberg, 2002), parental modeling of anxious behaviors (e.g., behavioral expression and avoidance) and cognitions (e.g., communication of perceived threat or expectation of child lack of control/ability) are parenting practices that have largely been overlooked in previous research (Wood, McLeod, Sigman, Hwang, & Chu, 2003) and gained increasing empirical attention only in recent years (for a review see Fisak & Grills-Taquechel, 2007).

According to social learning theory, children observe and model the behaviors, attitudes, and emotional responses of others (Bandura, 1977). With respect to the development of fears and anxiety specifically, investigators (e.g., Bandura, 1986; Barlow, 1988; 2000) have proposed that children may adopt the anxious behaviors and cognitions of their caregivers via modeling, vicarious learning, and information transmission. Although parental modeling of anxious behaviors (e.g., affective/behavioral expressions) and parental modeling of anxious cognitions (e.g., transmission of threat-related information, negative expectations and/or perceived lack of child ability) are distinct but interrelated constructs, in the interest of brevity, we use the term “parental modeling of anxiety” to denote modeling of anxious behaviors as well as cognitions in the present study.

Parental Modeling of Anxiety and Child Anxiety: Quasi-Experimental Research

Several lines of research have converged to suggest that parents’ own anxious behaviors and cognitions may increase the likelihood of similar behaviors and cognitions in their children (e.g., Barrett, Rapee, Dadds, & Ryan, 1996; Chorpita, Albano, & Barlow, 1996; Cobham, Dadds, & Spence, 1999; Creswell, O’Conner, & Brewin, 2006; Creswell, Schniering, & Rapee, 2005; Kortlander, Kendall, & Panichelli-Mindel, 1997; Micco & Ehrenreich, 2008; Muris, Steerneman, Merckelback, & Meesters, 1996; Shortt, Barrett, Dadds, & Fox, 2001). In particular, work has demonstrated that parent and child threat interpretations are correlated (Creswell, Schneiring, & Rapee, 2005) and a number of studies have found that children report increased threat interpretations and avoidant responses to ambiguous situations following discussion with their parents (Barrett, Rapee, Dadds, & Ryan, 1996; Chorpita, Albano, & Barlow, 1996; Shortt, Barrett, Dadds, & Fox, 2001), with such increases in child threat interpretations and avoidant responses being directly related to parent anxiety (Shortt et al., 2001) and parent anxious communication (Chorpita et al., 1996) . Prior studies have also found that parents with anxiety disorders (e.g., Cobham, Dadds, & Spence, 1999) and parents of children with anxiety disorders (e.g., Barrett, Rapee, Dadds, & Ryan, 1996; Kortlander, Kendall, & Panichelli-Mindel, 1997; Micco & Ehrenreich, 2008; Shortt, Barrett, Dadds, &

Fox, 2001) report more negative expectations of their child's ability (skill, coping ability, and/or likelihood of experiencing distress) than do their non-anxious counterparts. Further, negative parental expectations of child ability predict child anxious cognitions both concurrently (Micco & Ehrenreich, 2008) and prospectively (Creswell, O'Connor, & Brewin, 2006). Taken together, this research provides some evidence that children may adopt anxious behaviors and cognitions by observing these features in their parents.

Although this work provides initial support for parental modeling of anxiety as a mechanism of risk for the development of child anxiety, several methodological features of these studies limit the conclusions that can be drawn. First, because much of this research examined mean differences between groups or relations between parental factors and child anxiety using a quasi-experimental or correlational approach (e.g., Chorpita et al., 1996; Cobham, et al., 1999; Creswell et al., 2005; Creswell et al., 2006; Dadds et al., 1996; Kortlander, et al., 1997; Micco & Ehrenreich, 2008; Muris et al., 1996), causation and the direction of effects cannot be reliably determined. For instance, it is also possible that child anxious behaviors and cognitions elicit anxious parenting behaviors (e.g., Hudson, Doyle, & Gar, 2009; Mills & Rubin, 1998; Whaley, Pinto, & Sigman, 1999; Moore, Whaley, & Sigman, 2004), rather than the reverse. Therefore, as has been recognized by others (e.g., Wood et al., 2003; de Wilde & Rapee, 2007), studies employing experimental designs are necessary to better understand the nature and direction of the relationship between parenting and child anxiety.

Additionally, the majority of studies that have examined parental modeling of anxiety and child anxiety have done so using samples including children with anxiety disorders (e.g., Chorpita et al., 1996; Cobham, et al., 1999; Creswell et al., 2005; Dadds et al., 1996; Kortlander, et al., 1997; Micco & Ehrenreich, 2008; Muris et al., 1996; Shortt et al., 2001). Because parents and children in these samples may share genetic vulnerabilities for the phenotypic expression of anxiety, it is not clear whether the differences across groups or relations observed between parent and child anxiety are due to modeling *per se* or a shared genetic predisposition for the demonstration of anxiety among both parents and children. Thus, it is important to examine these processes in samples without clinical diagnoses in order to determine whether similar results exist in the absence of this confound.

Parental Modeling of Anxiety and Child Anxiety: Experimental Research

Studies that have employed both an experimental approach and community samples to investigate the impact of parental modeling of anxiety on child anxiety are rare and to date, have focused on infants and toddlers. For example, Gerull and Rapee (2002) found that toddlers showed greater fear and avoidance of a stimulus (i.e., rubber snake or rubber spider) that had been paired with a negative maternal expression relative to a stimulus that had been paired with a neutral or positive maternal expression. Consistent with these findings, de Rosnay and colleagues (2006) found that infants displayed greater fear and avoidant behavior when exposed to a stranger with whom their mother had shown fearful behavior versus when exposed to a stranger with whom their mother had shown neutral or friendly behavior. These results suggest that parents may directly impact the development of anxious behavior in children by way of modeling. However, due to the young age of the children in these studies, it is not clear whether parental modeling of anxiety impacts children's anxious feelings, cognitions, and ultimately performance. Because cognitive theories of anxiety consider anxious cognitions and interpretations as central influences in the maintenance and exacerbation of anxiety disorders (Beck, Emery, & Greenberg, 1985; Creswell et al., 2006), greater attention to the possible effects of parental modeling of anxiety on children's anxious cognitions is warranted.

Parental Modeling of Anxiety and Child Anxiety: Parent Gender

An additional limitation of extant research on relations between parent and child anxiety in general, and parental modeling of anxiety in particular, is the relative scarcity of studies that have analyzed how parental factors and child anxiety differ according to parent gender (Bögels & Phares, 2008). Since many studies of parental modeling have included or examined only mothers (i.e., Cobham, et al., 1999; Creswell et al., 2006; Creswell et al., 2005; de Rosnay et al., 2006; Kortlander, et al., 1997; Gerull & Rapee, 2002; Micco & Ehrenreich, 2008), investigators have been unable to determine how processes may be similar or different across parent gender. The few studies that have included both parent genders have yielded inconsistent results. Whereas Muris et al. (1996) found a relationship between parent expression of fear and child fearfulness to exist only for mothers, Chorpita et al. (1996) found relations between parent anxious verbalizations and child anxious interpretations and avoidance to be higher for fathers relative to mothers. Nevertheless, no studies of which we are aware have statistically tested whether these relations differ across parent gender. In view of the shortage of studies in this area and their potential value for informing future clinical and empirical work, it is worthwhile to examine whether the impact of parent modeling on child anxiety differs for mothers versus fathers.

Goals and Hypotheses of Present Study

The following study sought to advance previous research on parental modeling of anxiety by: (1) examining whether parental modeling of anxiety impacts child perceived anxiety level, anxious cognitions, desired avoidance, and objective performance using an experimental paradigm; and (2) determining whether the effects of parental modeling of anxiety on child perceived anxiety level, anxious cognitions, desired avoidance, and objective performance differ by parent gender. In line with prior theoretical models for the development of child anxiety (Bandura, 1986; Barlow, 1988), we hypothesized that when parents modeled anxiety, children would endorse higher levels of anxiety, anxious cognitions, and desired avoidance relative to when parents modeled neutral or positive feelings, cognitions, and behavior. In addition, in consideration of research demonstrating the negative impact of high anxiety on focus, on-task performance, and recall of academic material (Horn & Dollinger, 1989; Ma, 1999), we expected that children's performance would decrease on a spelling test when they experienced higher levels of anxiety due to exposure to parental modeling of anxiety. Because no studies have investigated the role of parent gender in the operation of these processes by statistically testing differences between mothers and fathers, we performed exploratory analyses and made no predictions with regard to parent gender.

Method

Participants

Participants included 25 families recruited from the Baltimore area to take part in a study of parenting and child behavior. Both practical and methodological considerations informed our sample selection and exclusion/inclusion criteria. Given that very young children have difficulty understanding and expressing emotion (Aldridge & Wood, 1997; Pons, Lawson, Harris, & de Rosnay, 2003) and may not yet have the ability to draw connections between cognitions and emotions (Flavell, Flavell, & Green, 2001), children below 8 years of age were excluded. In addition, parents or children with lifetime or current psychiatric disorders were excluded in order to provide a more conservative test of the role of environmental mechanisms versus genetic and biological contributions to the expression of child anxiety. Families were enrolled in the study if they fulfilled the following inclusion criteria: 1) parents had at least one child between the ages of 8 and 12 (one child per family was randomly selected to participate when multiple children in the same family met inclusion criteria); 2) the child lived in a two-parent home; 3) both parents had no current psychiatric disorder (or a history of a psychiatric

disorder that was present during their child's lifetime); 4) the child had no current or past psychiatric disorder.

A total of 58 families completed an initial phone screen designed to determine study eligibility. Eleven (19.0%) of these families were ineligible because the family had no children between the ages of 8 and 12 (n = 5; 45.5%), the parent(s) or the child had a current or past psychiatric disorder (n = 3; 27.3%), or the child did not live in a two-parent home (n = 3; 27.3%). Of the 47 families who were eligible to participate, 18 (38.3%) did not participate due to the father disinterest (n = 8; 44.4%), scheduling difficulties (n = 5; 27.8%), or mother disinterest (n = 1; 5.6%). Among the 29 families who participated, there were 3 (10.3%) families in which the child became aware of the parent manipulation during the experiment and one (3.4%) family whose child scored in the clinical range on a norm-referenced screening instrument administered during the baseline portion of the study (i.e., Child Behavior Checklist). Therefore, data from these families were excluded from the present study.

The 25 parent participants included 13 female parents (52.0%) and 12 male parents (48.0%) who ranged in age from 24 to 53 years (M = 41.8, SD = 6.5). The majority of parents were currently married (n = 24; 96.0%) and had an annual household income greater than $80,000 (n = 16; 64.0%). The 25 child participants were 56.0% male (n = 14) and ranged in age between 8 and 12 years (M = 9.24; SD = 1.39). All of the children, with the exception of two, were biologically related to their parent (n = 23; 92%) and children were primarily of Caucasian (n = 19; 76.0%) ethnicity, followed by African American (n = 4; 16.0%), Asian (n = 1; 4.0%), and mixed ethnicity (n = 1; 4.0%).

Procedure

Recruitment—Parents and children were recruited through advertisements in local newspapers and flyers posted in community venues (hospitals, libraries, community centers, synagogues and churches) to participate in a study examining parenting and child behavior. All families who contacted the study were screened over the phone prior to their participation to determine their eligibility. During the phone screen, study staff asked parents about the presence or history of any psychiatric disorder (i.e., conduct disorder, attention deficit/hyperactivity disorder, depression, or anxiety), the presence or history of any medical condition, and whether they had obtained any psychological treatment during their child's lifetime. Parents were asked to respond to parallel questions about their spouse/significant other and their child. In addition, parents responded to supplemental questions about their child to determine whether their child exhibited any emotions or behaviors that were inappropriate to their age and developmental level. Families who successfully passed the phone screen were scheduled for an experimental session, during which all measures for the present study were collected.

Baseline Assessment—Before the experiment, parents completed a demographic questionnaire and several norm-referenced parent and child symptom measures (i.e., the Child Behavior Checklist, Screen for Child Anxiety and Related Emotional Disorders, and Adult Self Report). These measures were used to: 1) confirm that parents and children who had successfully passed the phone screen did not exhibit clinical level psychological problems (parent or child participants who obtained scores in the clinical range on norm-referenced instruments were excluded from the current study); and 2) validate the randomization of parents to groups defined by parent gender. Children were also administered a spelling achievement test, the Wide Range Achievement Test (WRAT), to determine their spelling ability level. Results of the WRAT were used to inform two grade-level spelling tests that were administered to children during the experimental portion of the study.

Experimental Conditions and Design—For all families, one parent (i.e., the child's mother or father) was selected to participate with their child. Parent participation for the first enrolled family was randomly selected; selection of each parent thereafter was alternated by parent gender to ensure equal numbers of male and female parents.

The experiment was conducted in a testing room located at the study site. All children experienced two experimental conditions (i.e., an anxious test condition and a non-anxious test condition). During the anxious test condition, parents were trained to act anxious and/or worried concerning their child's ability on a spelling test, whereas during the non-anxious test condition, parents were trained to act relaxed and confident concerning their child's ability on a spelling test. To control for order effects, the anxious and non-anxious experimental conditions were counter-balanced across parent groups. Parents were also videotaped acting in each condition to ensure fidelity to the experimental manipulation. Children's exposure to their parent in each condition lasted approximately two minutes.

During each of the two conditions, children were brought into the testing room and seated at a desk. The spelling test was placed face-down, on a table four feet from the child's desk. The parent entered the testing room alone, examined the spelling test (while holding it out-of-view of their child), and modeled anxiety or non-anxiety/confidence while viewing the spelling test. Parents were asked to use the following script as a guide:

Anxious Test Condition

Parent: *Oh….this test might be too hard for you. I'm worried you won't do well. What if you fail? How embarrassing that would be for you… I hope you don't make a fool of yourself!* After parent expresses their anxiety, they place the test on the table and pace the room for about one minute. Parent then returns to the table, picks up the test and looks at it.

Parent: *Oh boy, I don't know, it seems like it's too hard! …I hope you don't get a bad grade!*

Experimenter: *(Walks in room and interrupts) We need to start the testing*.

Non-anxious Test Condition

Parent: *Oh…this test shouldn't be too hard for you. I think you'll do fine. You're going to pass. You should be proud of how you do. I know you'll be able to show them how smart you are*. Parent puts down the test and looks around the room for about one minute. Parent then goes back to the table, picks up the test and looks at it.

Parent: *Yep, this test doesn't look too hard…I bet you'll do fine*.

Experimenter: *(Walks in room and interrupts) We need to start the testing*.

After parents were alone with their child for two minutes, study staff asked parents to leave the room so that testing could begin. Children then completed self-report forms concerning their own and their parent's feelings and thoughts about the spelling test. For children who had difficulty reading, forms were read aloud. Once forms were complete, study staff administered an ability-appropriate spelling test to the child.

All children also experienced a play condition between the first and second test conditions. The play condition was approximately 15 minutes and served to reduce test fatigue and possible carry-over effects from the first to the second testing condition. During the play condition, study staff engaged the child in a game of connect-four, let the child to win, and praised the child's performance.

Parent Manipulation Training—During the parent manipulation training, study staff presented a brief video, provided the selected parent with the script, and role-played these conditions with the parent. The video illustrated a male or female parent in each of the anxious and non-anxious test conditions. The anxious behaviors displayed by parents in the video were based on clinical descriptions and non-verbal expressions of anxiety, including a rigid posture, twitching, shifting eye gaze, and lip-biting (Clark & Wells, 1995; McNeil, Ries, & Turk, 1995; Waxer, 1977) that have been used in previous experimental studies (e.g., de Rosnay et al., 2006). The anxious cognitions expressed by parents in the video were derived from examples of threat-based cognitive biases that parents may have about their child's environment; such biases have been observed to be related to parental anxiety level (Lester, Field, Oliver, & Cartright-Hatton, 2009). The non-anxious behaviors and cognitions in the video included a relaxed posture, a positive or neutral facial expression, and positive or optimistic comments about the testing situation. During the role-play, study staff emphasized the importance of adhering to the content of the script, but parents were encouraged to use their own words rather than reciting the script verbatim. Parents were also encouraged to exhibit the behaviors they typically engaged in during moments of anxiety and relaxation/confidence for the anxious and non-anxious test conditions, respectively. Study staff practiced each condition with parents until parents felt comfortable and reached satisfactory competence. Training did not exceed 15 minutes.

Participant Consent and Debriefing—Prior to participation, study staff met with both parents alone to describe the study procedures and obtain informed written consent. Study staff also met with each child in the presence of the selected parent to obtain child assent to study procedures. To ensure honest responding during the experiment, children were kept naive to the parent manipulation. The study was presented to children as an attempt to better understand how parents and children "feel and think about tests." Children were told that they would complete a series of spelling tests and one of their parents would be selected to view these tests before they were given to the child.

Immediately after children experienced both test conditions, they were debriefed by study staff in the presence of their participating parent. The debriefing session adhered to federal regulations and scientific codes concerning the conduct of responsible research (American Psychological Association, 2002). Study staff fully informed children about the purpose and hypotheses of the study, responded to questions, and assessed whether participants were harmed by their experience during the experiment. Both child and parent participants were encouraged to discuss with study staff any possible dissatisfaction with the assessment activities or the experiment and any desire to withdraw their data. Staff members were trained to respond to embarrassment or discomfort in an appropriate and compassionate manner, made contact information available in the event that parents or children had any additional questions or concerns, and ensured that mental health service resources were provided at the parent or child's request. No parent or child participant reported distress or dissatisfaction with any assessment activity or experimental procedure. Further, no harm or adverse events were reported by participants or study staff. All study procedures and instruments were approved by the Johns Hopkins University School of Medicine Institutional Review Board.

Baseline Assessment Instruments

Demographic Questionnaire—Parents completed a 24-item questionnaire regarding family demographics and family psychiatric history, as well as child medical, psychiatric, educational and developmental history.

Adult Self Report (ASR; Achenbach & Rescorla, 2003)—Parents completed the ASR as a norm-referenced screening measure of adult symptoms. The ASR is a self-report

instrument which obtains ratings on 33 competence items, 126 problem items, 2 open-ended items and yields scores on adult adaptive functioning in 5 domains (i.e., friends, spouse, family, job, education), substance use frequency, 8 narrow-band syndromes (i.e., Anxious/Depressed, Withdrawn, Somatic Complaints, Thought Problems, Attention Problems, Aggressive Behavior, Rule-Breaking Behavior, and Intrusive) and 2 broad-band syndromes (Internalizing and Externalizing). For the purposes of the present study, the ASR Internalizing (α = .89) and Externalizing (α = .77) scales were used as indices of parent emotional and behavioral symptoms. Higher scores on these scales indicate a greater number of symptoms, with *T*-scores greater than or equal to 64 reflecting clinical level symptoms. The ASR has shown excellent test-retest reliability and discriminates well between adult clinical and non-clinical samples (Achenbach & Rescorla, 2003).

Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001)—Parents completed the CBCL as a norm-referenced screening measure of child symptoms. The CBCL obtains ratings of 20 competence items, 118 specific behavioral/emotional items, and 2 open-ended items and yields 7 narrow-band syndromes (i.e., Anxious/Depressed, Withdrawn/Depressed, Somatic Complaints, Thought Problems, Attention Problems, Aggressive Behavior, Rule-Breaking Behavior) and 2 broad-band syndromes (Internalizing and Externalizing). The response scale ranges from 0 (*Not True*) to 2 (*Very or Often True*). In the present study, the CBCL Internalizing (α = .68) and Externalizing (α = .81) scales were used as measures of child emotional and behavioral symptoms. Higher scores on these scales indicate a greater number of symptoms, with *T*-scores greater than or equal to 64 reflecting clinical level symptoms. The CBCL demonstrates excellent test-retest reliability and discriminates well between referred and non-referred samples (Achenbach & Rescorla, 2001).

Screen for Child Anxiety Related Emotional Disorders (SCARED; Birmaher et al., 1997)—Parents completed the SCARED as a screening measure of child anxiety symptoms. The SCARED is a 41-item measure that assesses anxiety symptoms observed in children over the previous 3 months. The response scale ranges from 0 (*Not True or Hardly Ever True*) to 2 (*Very True or Often True*). The measure yields a total score of anxiety symptoms as well as scores in several specific domains (panic/somatic, general anxiety, separation anxiety, social phobia, and school phobia). In the present study, the SCARED total score (α = .87) was used. Higher total scores indicate greater anxiety symptoms, with scores greater than or equal to 25 reflecting clinical levels of anxiety. The SCARED has shown good test-retest reliability and discriminative validity (Birmaher et al., 1997).

Wide Range Achievement Test-Fourth Edition (WRAT-4; Wilkinson & Robertson, 2006)—Children were administered the WRAT-4 spelling subtest as a measure of spelling ability in order to determine the appropriate grade-level spelling tests to administer to children during the experimental portion of the study. The WRAT-4 spelling subtest consists of 84 words frequently used from kindergarten through the 12th grade and generates both grade-referenced standard scores (*M* = 100, *SD* = 15) and grade-level equivalents. There are two alternate forms of the test (each consisting of 42 words) that may be combined to generate a composite spelling ability score. In the current study, the green alternate form was used as a measure of spelling ability. The WRAT-4 has shown excellent test-retest reliability across age levels and correlates highly with other measures of spelling ability (Wilkinson & Robertson, 2006).

Experimental Condition Instruments

State-Trait Anxiety Inventory for Children—(STAIC; Spielberger,1973). Children completed the state subscale of the STAIC after experiencing the parent manipulation in each

condition. The STAIC state subscale is a self-report measure of transitory anxiety in school-aged children. The scale includes 20 items for which children select the phrase that best describes how they feel at a particular moment in time (e.g., *I feel not worried = 1, I feel worried = 2, I feel very worried =3*). Ten items are reverse scored and a total score is derived from the sum of all 20 items. Higher scores indicate greater apprehension, tension, and worry. The STAIC state subscale shows acceptable reliability and validity as a measure of momentary stress and anxiety (Spielberger, 1973). Average internal consistency of the STAIC state subscale across conditions was excellent (α = .92).

Child Feelings and Thoughts Measure (C-FAT)—Children also completed the C-FAT after experiencing the parent manipulation in each condition. The C-FAT is an instrument that we developed to serve as a manipulation check and supplement the STAIC measure as a measure of child anxious feelings, cognitions, and desired avoidance. The C-FAT contains 4 scales, each consisting of two to three 5-point Likert-type items: *Parent Anxious Feelings* (*how nervous or worried is your parent about you taking this test?; how relaxed or calm is your parent about you taking this test?*), *Parent Anxious Cognitions* (*how hard does your parent think this test will be for you?; how does your parent think you will do on the test?), Child Anxious Feelings (how nervous or worried are you about taking this test?; how relaxed or calm are you about taking this test?),* and *Child Anxious Cognitions (how hard do you think this test will be for you?; how easy do you think this test will be for you?; how do you think you will do on the test?).* Children rated their parent's and their own anxious feelings and cognitions on a scale from 0 (*not at all; excellent*) to 4 (*extremely; very bad*), with higher scores reflecting more anxious feelings and cognitions about the spelling test. One item assessing the degree to which children wanted to avoid the spelling test (i.e., "*how much do you want to skip this test?*") was also included as an index of *Child Desired Avoidance*. This item was rated on a scale from 0 (*not at all*) to 4 (*very much*), with higher scores indicating a greater desire to avoid the testing situation. In addition to these items, the C-FAT also consists of several miscellaneous and open-ended items that were included to reduce possible demand characteristics by de-emphasizing anxiety as a salient dimension[2]. Average internal consistency of the scales in this sample across conditions was good: *Parent Anxious Feelings* (α = 0.88), *Parent Anxious Cognitions* (α = 0.89), *Child Anxious Feelings* (α = 0.78), and *Child Anxious Cognitions* (α = 0.91). Scores were calculated by taking the sum of the items comprising each scale.

Three independent observers also completed two scales of the C-FAT (*Parent Anxious Feelings* and *Parent Anxious Cognitions*) after viewing videotapes of parents in each experimental condition. The C-FAT scales rated by independent observers also showed excellent average internal consistency across conditions: *Parent Anxious Feelings* (α = 0.92) and *Parent Anxious Cognitions* (α = 0.97). All independent observers who viewed and rated videotapes of parents were blind to the aims, protocol, and experimental conditions of the present study.

Spelling Test—Based on the grade-level equivalent children obtained at baseline, they were administered a spelling test appropriate to their ability in both experimental conditions. Each of the two spelling tests consisted of 15 unique words derived from the reading curriculum standards for grade-level achievement in the state of Maryland and included words appropriate for 1st to 12th grade children (Taylor, Frackenpohl, & White, 1989). Tests were scored for the number of correct words, with higher scores reflecting better spelling performance. Average internal consistency of the spelling test across conditions was fair: α = 0.64

[2]The Child Feelings and Thoughts measure is available upon request from the first author.

Results

Preliminary Analyses

Manipulation Check—Child and independent observer ratings were used determine the validity of the parent manipulation. In order to establish that parents appeared more anxious in the anxious condition relative to the non-anxious condition, four one-way within-subject analyses of variance (ANOVAs) were performed on the outcomes of *Parent Anxious Feelings* and *Parent Anxious Cognitions*. As is shown in Table 1, both children and independent observers reported that parents demonstrated greater anxious feelings in the anxious condition relative to the non-anxious condition (all *ps* < .001). Likewise, both children and independent observers reported that parents expressed greater anxious cognitions in the anxious relative to the non-anxious condition (all *ps* < .001). These findings indicate that the parent manipulation was effective.

Randomization Check, Order Effects, and Child Gender Effects—We tested whether families exhibited similar baseline characteristics across parent groups (male vs. female parents) by conducting chi-square difference tests and one-way ANOVAs. As is displayed in Table 2, there were no differences in baseline family demographic or clinical characteristics across the male and female parent groups (all *ps* > 0.05), suggesting the successful randomization of families to groups defined by parent gender.

To examine the order of condition presentation and child gender as a possible confound, we performed several 2 × 2 mixed-model ANOVAs. Due to limited power, only two-way interactions between experimental condition and each variable of interest were performed. No main or interaction effects involving order or child gender were significant for any outcome variable (all *ps* > 0.05). Therefore, the effects of order and child gender were not considered further.

Primary Analyses

In order to examine the effect of parental modeling of anxiety and parent gender on child anxiety level, anxious cognitions, desired avoidance, and spelling performance, we performed a series of 2 × 2 mixed-model ANOVAs. In all models, experimental condition served as the within-subjects factor and parent gender served as the between-subjects factor allowing us to consider the main effects of condition and parent gender, and the interaction effect of condition with parent gender on each outcome of interest. Effect sizes for between-group differences were calculated using Cohen's *d* (standardized mean difference using common standard deviation; Cohen, 1988). Effect sizes for within-group differences were adjusted for the correlation of observations across measures as recommended by Dunlop, Cortina, Vaslow, and Burke (1996). Means and standard deviations for all child outcome variables are displayed by condition and parent group in Table 3.

Child State Anxiety and Anxious Feelings—As measured by the STAIC, the 2 (condition) × 2 (parent gender) ANOVA revealed a main effect of condition, $F(1, 23) = 52.99$, $p < .001$, such that children reported higher levels of anxiety in the anxious ($M = 34.56$, $SD = 6.53$) relative to the non-anxious condition ($M = 26.56$, $SD = 4.68$). The effect size of this difference was large ($d = 1.38$). Although parent gender had no main effect on child anxiety, $F(1, 23) = 2.25$, $p > .05$, there was a significant interaction effect of condition and parent gender on child anxiety, $F(1, 23) = 7.45$, $p < .05$ (see Figure 1).

Analysis of the simple effects of condition indicated that children in both parent groups exhibited higher levels of anxiety in the anxious vs. the non-anxious condition (male parent group: $F(1, 11) = 29.84$,, $p < .001$; female parent group: $F(1, 11) = 24.68$. However,

examination of the simple effects of parent gender showed that during the anxious condition, children in the male parent group endorsed greater levels of anxiety (M = 37.58, SD = 6.22) than did children in the female parent group (M = 31.77, SD = 5.67), $F(1, 23) = 5.98$, $p < .05$, d = 1.00. In contrast, during the non-anxious condition, children in the male and female parent groups did not significantly differ in anxiety levels, $F(1, 23) = 0.02$, $p > .05$.

As measured by the C-FAT *Child Anxious Feelings* scale, the 2 (condition) × 2 (parent gender) ANOVA also revealed a main effect of condition, $F(1, 23) = 52.82$, $p < .001$, such that children reported higher levels of anxious feelings in the anxious (M = 3.68, SD = 1.75) relative to the non-anxious condition (M = 1.36, SD = 1.35). The effect size of this difference was large (d = 1.47). Similar to the results obtained using the STAIC, parent gender had no main effect on child anxiety, $F(1, 23) = 0.15$, $p > .05$, however there was a significant interaction effect of condition and parent gender on child anxiety, $F(1, 23) = 5.16$, $p < .05$.

Examination of the simple effects of condition indicated that children in both parent groups displayed higher levels of anxious feelings in the anxious vs. the non-anxious condition (male parent group: $F(1, 11) = 30.67$, $p < .001$; female parent group: $F(1, 11) = 21.34$, $p = .001$). The simple effects of parent gender indicated that during the anxious condition, there was a trend for children in the male parent group to endorse greater anxious feelings (M = 4.17, SD = 1.59) than children in the female parent group (M = 3.23, SD = 1.83), however this difference did not reach statistical significance $F(1, 11) = 1.85$, $p = .19$. During the non-anxious condition, there was no significant difference in levels of anxious feelings between children in the male vs. female parent groups, $F(1, 11) = 0.97$, $p > .05$.

Child Anxious Cognitions—The 2 (condition) × 2 (parent gender) ANOVA revealed a main effect of condition on *Child Anxious Cognitions*, such that children reported higher levels of anxious cognitions in the anxious (M = 7.08, SD = 2.22) relative to the non-anxious condition (M = 2.04, SD = 1.81), $F(1, 23) = 132.47$, $p < .001$. The effect size of this difference was very large (d = 2.47). While there was no main effect of parent gender on child anxious cognitions, $F(1, 23) = 1.68$, $p > .05$, there was a significant interaction effect of condition and parent gender on child anxious cognitions, $F(1, 23) = 5.17$, $p < .05$ (see Figure 2).

Similar to the simple effects of condition on child state anxiety and anxious feelings, analysis of the simple effects of condition on child anxious cognitions indicated that children in both parent groups displayed higher levels of anxious cognitions in the anxious vs. the non-anxious condition (male parent group: $F(1, 11) = 119.39$, $p < .001$; female parent group: $F(1, 11) = 36.56$, $p < .001$). Examination of the simple effects of parent gender on child anxious cognitions revealed that during the anxious condition, there was no significant difference in levels of anxious cognitions between children in the male vs. the female parent groups, $F(1, 23) = 0.03$, $p > .05$. However, during the non-anxious condition, children in the male parent group endorsed significantly *fewer* anxious cognitions (M = 1.08, SD = 0.10) than did children in the female parent group (M = 2.92, SD = 1.98), $F(1, 23) = 8.40$, $p < .01$, d = 1.18.

Child Desired Avoidance—The 2 (condition) × 2 (parent gender) ANOVA revealed a main effect of condition, $F(1, 23) = 17.94$, $p < .001$, on *Child Desired Avoidance*, such that children reported higher levels of desired avoidance in the anxious (M = 1.12, SD = 1.20) relative to the non-anxious condition(M = 0.16, SD = 0.62), d = 0.95. However, there was no significant main effect of parent gender on levels of child desired avoidance, $F(1, 23) = 0.03$, $p > .05$, nor was there a significant interaction of condition with parent gender on levels of child desired avoidance, $F(1, 23) = 0.76$, $p > .05$.

Child Spelling Performance—The 2 (condition) × 2 (parent gender) ANOVA revealed no significant main effect of condition, $F(1, 23) = 0.77$, $p > .05$, on child spelling performance.

Likewise, there was no significant main effect of parent gender on child spelling performance, $F(1, 23) < 0.27$, $p > .05$, and no significant interaction of condition with parent gender on child spelling performance, $F(1, 23) < 0.00$, $p > .05$.

Discussion

The present study sought to extend previous work by examining the impact of parental modeling of anxiety on child anxiety level, anxious cognitions, desired avoidance, and spelling performance among school-aged children. Further, the study tested whether the impact of parental anxious modeling on indices of anxiety among children differed according to parent gender. In order to more clearly determine the direction of effects between parental modeling of anxiety and child anxiety, both aims of the current study were tested using a novel experimental paradigm.

Main Effects of Parental Modeling of Anxiety

Consistent with our hypotheses, children reported greater levels of anxiety, anxious cognitions, and desired avoidance of the testing situation when their parents modeled anxious behavior and cognitions relative to when they modeled non-anxious behavior and cognitions. These findings are in agreement with both theoretically-derived etiological models of the transmission of behaviors, attitudes, and emotional reactions in general (Bandura, 1977), and anxiety in particular (Bandura, 1986; Barlow, 1988), from parent to child. In addition, our results are similar to prior studies that have examined the impact of maternal anxious modeling on observed anxious behavior among both infants (de Rosnay et al., 2006) and toddlers (Gerull & Rapee, 2002). Importantly though, and in accord with findings from previous quasi-experimental work (Chorpita et al., 1996; Cobham et al., 1999; Creswell et al., 2005; Creswell et al., 2006; Dadds et al., 1996; Kortlander, et al., 1997; Shortt et al., 2001; Micco & Ehrenreich, 2008; Muris et al., 1996), our study demonstrated that the impact of parental modeling of anxiety on children extends beyond the domain of child anxious behavior and may directly impact subjective feelings and cognitions among children during middle childhood. Further, our results are among the first to indicate that the effect of parental modeling of anxiety on child anxiety is not unique to mothers, but a phenomenon common to both mothers and fathers.

In contrast to our expectations, however, there was no effect of parental modeling of anxiety on child spelling performance. That is, regardless of whether parents modeled anxious or non-anxious behavior and cognitions in relation to the spelling test, children's performance was similar across conditions. Such findings are in contrast to previous work that would suggest a negative effect of parental modeling of anxiety on child performance given the inverse relationship observed between levels of child anxiety and test performance (Horn & Dollinger, 1989; Ma, 1999). Our failure to detect differences in spelling performance between conditions may be due to the nature of the sample and/or the nature of the performance task. For example, according to the Yerkes-Dodson principle (1908) and previous work examining the effect of arousal on performance (Anderson, Revelle, & Lynch, 1989), the inverse relationship between anxiety and performance may occur only at high levels. Because our sample consisted exclusively of psychologically healthy children, the level of anxiety children experienced during the anxious condition may have failed to reach the intensity necessary to impair their spelling performance. It may also be that the spelling tests administered to children lacked the degree of sensitivity that is required to identify variations in anxiety among children, yielding no significant difference in their ability across conditions. For instance, research in the area of learning and memory indicate that short-term or prospective memory tasks are particularly susceptible to the effects of anxiety, yet long-term memory tasks, such as word spelling, may be less vulnerable to stress (Harris & Cumming, 2003). In the current study, we selected a performance task commonly encountered by children in order to reduce possible reactivity to

an unfamiliar or novel task. Nevertheless, future studies that examine these and similar research questions might consider using a performance task that more precisely assesses the effects of anxiety.

Interaction Effects of Parent Anxious Modeling and Parent Gender

Perhaps of most interest, results of the current study indicated that fathers had a greater effect on child anxiety level and anxious cognitions relative to mothers. Although such findings contrast with the results of one correlational study that found a relation between parental expressed fear and child fear level to be present only for mothers (Muris, et al., 1996), they are in agreement with another study that found relations between parent anxious verbalizations and child anxious interpretations and avoidance to be larger for fathers relative to mothers (Chorpita et al., 1996). However, because the assessment of parental expressed fear in the study of Muris and colleagues (1996) was derived from a self-report item, it is possible that mothers or fathers inaccurately recalled or endorsed the degree to which they expressed fears with children. However, similar to the study of Chorpita and others (1996), expressions of parental anxiety in our study occurred in vivo, reducing the likelihood that a response bias impacted results.

In general, interaction effects indicated that the magnitude of the difference in child anxiety measures (state anxiety, anxious feelings, anxious cognitions) across conditions was greater for children who had interacted with fathers as opposed to mothers. Specifically, children who interacted with their fathers endorsed higher levels of anxiety in the anxious condition compared to children who interacted with their mothers. Further, although children who had interacted with their fathers vs. mothers endorsed higher levels of anxious symptoms in the anxious condition, they did not endorse higher levels of anxious cognitions in the anxious condition. Rather, the inverse was true: children who had interacted with their fathers reported *less* anxious cognitions in the *non-anxious* condition relative to children who had interacted with their mothers. Taken together, these data suggest that children may be more influenced by their fathers' displays of feelings and cognitions in both positively and negatively-valenced situations.

In consideration of work that has found mothers to spend more time with children (Lamb, 2000) and to more frequently serve as the primary caretaker in the family (Pleck, 1997), the result that fathers may have a greater impact on child feelings and cognitions is somewhat counterintuitive. Because female adults may more readily self-disclose (Dindia & Allen, 1992), and tend to display a higher affective intensity (Fujita, Diener, & Sandvik, 1991) relative to male adults, it is possible that children had fewer opportunities to observe their fathers' expressions of strong feelings and cognitions in daily life. Indeed, the tendency of mothers to more often hold the position of primary caretaker may further limit occasions for children to observe these behaviors in fathers. As a result, children may be more habituated to expressions (both positive and negative) of their mothers, thereby attenuating the impact of female parental modeling on children in the current study. From a clinical treatment perspective, it will be useful for future experimental research to determine whether frequent exposure and/or child successful toleration of parental negative affect moderates the impact of male and female parental anxious modeling on children.

Although the impact of parental modeling on child anxiety level and anxious cognitions differed by parent gender, it is important to note that these findings were not robust across indicators of child anxiety; there were no differences in levels of desired avoidance across conditions for children exposed to fathers in comparison to mothers. While it is possible that parent gender moderates the effect of parental modeling only on some aspects of child anxiety, our failure to observe a differential effect of male vs. female parental modeling on child desired avoidance may be an artifact of limitations inherent to our measure of avoidance. Additional

experimental research that assesses child anxiety with a variety of instruments and methods is needed to determine whether the interactive effects of parental modeling of anxiety and parent gender are universal or specific to certain domains of child anxiety.

Limitations

Several limitations of the current study warrant discussion. First, it is important to highlight that in addition to modeling anxious behaviors (e.g., pacing, rigid posture, twitching, shifting eye gaze, lip-biting), parents also modeled anxious cognitions (i.e., threat-related information about the task and perceived lack of child ability) during the experimental manipulation. Because the current study examined these mechanisms simultaneously, it was not possible to disaggregate the independent contribution of each to child anxiety level, anxious cognitions, or desired avoidance. For instance, it may be that only one of these mechanisms impacts child anxiety outcomes, that one mechanism has stronger effects relative to others, or that each mechanism has unique and specific effects on child anxiety level, anxious cognitions, and desired avoidance. However, given that anxious behaviors and cognitions are likely to occur in tandem, it was of interest to enhance the external validity of the manipulation by simulating how these phenomena operate in real life. In the future, experimental research that systematically manipulates these mechanisms both independently and conjointly will be useful in better understanding the relative contribution of each to child anxiety.

Second, although the current study provides support for the transmission of anxiety from parent to child via parental modeling, it does not discount that children may elicit anxious behaviors among parents (Hudson et al., 2009; Mills & Rubin, 1998; Whaley et al., 1999; Moore et al., 2004), nor does it counter more complex etiological models which implicate the bidirectional influence of parents and children in the development and maintenance of child anxiety (Hudson & Rapee, 2004). Findings from the present study provide support for only one possible explanation in a condition that is almost certainly multiply determined.

Third, results of the present study should be considered in view of a number of study features. Because the C-FAT was developed for the current study and subscales consist of a small number of items, the scores generated from this measure are not without error. However, subscales displayed good to excellent internal consistency across conditions and results obtained with the C-FAT were very similar to those obtained using the STAIC, providing initial support for the reliability and validity of this measure. In addition, due to the small size of the current sample, testing the interactive effects of several child characteristics (i.e., anxious temperament, child gender) with both experimental condition and parent gender was prohibitive. In light of research that has found the impact of modeling to vary as a function of child characteristics (de Rosnay et al., 2006) as well as the similarity of the model to the observer (Bandura, 1977), it will be important for studies involving larger samples to examine the combined effect of these features on child anxiety. In particular, research that investigates whether the impact of parental modeling of anxiety on child anxiety varies as a function of parent gender, child gender and/or child anxiety status may prescribe gender-specific interventions with children who are clinically anxious or at risk for clinical levels of anxiety.

Finally, results of the current study may not generalize to other populations, such as families in which children have anxiety disorders, families from more diverse backgrounds, and children of different ages. It should be noted that the current study tested changes only in transitory, normative levels of anxiety and anxious cognitions rather than changes in stable, clinical levels of anxiety. While it is possible that repeated learning experiences involving parental anxious modeling yield chronically heightened levels of anxiety among children, the current study does not provide data to support this hypothesis. Yet, demonstrating the relative magnitude of its influence, exposure to parental modeling for only 2 to 3 minutes had large effects on levels of child anxiety, anxious cognitions, and desired avoidance, albeit transitory.

Additional longitudinal research examining the relationship of parental modeling of anxiety and child anxiety over time will be useful in clarifying how such parental behaviors may contribute to the development of clinical levels of anxiety in children. As well, studies including both larger and more ethnically and developmentally heterogeneous samples will be useful in exploring the differential impact of male and female parental modeling on children across various ethnicities and at various periods of development.

Clinical Implications

Despite these limitations, the present study advances current understanding of the development of anxiety in children by providing preliminary support for parental modeling of anxiety as a posited mechanism of risk. This study is the first to examine the impact of parental modeling of anxiety on the feelings and cognitions of school-age children using an experimental paradigm. It is also the first to examine whether the effect of parental modeling of anxiety on children varies by parent gender. Results of this study indicate that parental modeling of anxiety has a powerful influence on several cognitive-behavioral indices of child anxiety, including anxious feelings, anxious cognitions, and desired avoidance. Although some interventions for child anxiety disorders consider and address parental modeling of anxiety in treatment (Ginsburg, 2009), findings from this study suggest that this behavior among parents should more often be a focus of clinical attention. Additionally, though children who interacted with parents of either gender were influenced by parental modeling, findings of the current study specifically suggest that children may be more vulnerable to the anxious and non-anxious expressions of their fathers. Such results emphasize the importance of including both mothers and fathers in treatment for child anxiety in order to address potential risk with both family members.

Acknowledgments

This research was supported by National Institute of Mental Health grant T32MH020033 awarded to Dr. Mark Riddle at the Division of Child and Adolescent Psychiatry, Johns Hopkins University School of Medicine. We gratefully acknowledge the valuable comments and assistance of Dr. Maggie Bruck. We would also like to thank Ms. Marissa Neto, Ms. Emily Becker, Ms. Dorothy Koh, Ms. Elizabeth Gordon, and Ms. Maria Perez for the generous donation of their time and effort.

References

Achenbach, TM.; Rescorla, LA. Manual for the ASEBA Adult Forms & Profiles. Burlington, VT: University of Vermont, Research Center for Children, Youth, and Families; 2003.

Achenbach, TM.; Rescorla, LA. Manual for the ASEBA School-Age Forms & Profiles. Burlington, VT: Univeristy of Vermont, Research Center for Children, Youth, and Families; 2001.

Aldridge M, Wood J. Talking about feelings: Young children's ability to express emotions. Child Abuse & Neglect 1997;21:1221–1233. [PubMed: 9429773]

American Psychological Association. Ethical principles of psychologists and code of conduct. American Psychologist 2002;57:1060–1073. [PubMed: 12613157]

Anderson KJ, Revelle W, Lynch MJ. Caffeine, impulsivity, and memory scanning: A comparison of two explanations for the Yerkes-Dodson Effect. Motivation and Emotion 1989;13:1–20.

Bandura, A. Social learning theory. New Jersey: Prentice Hall; 1977.

Bandura, A. Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall; 1986.

Barlow, DH. Anxiety and its disorders: the nature and treatment of panic and anxiety. New York, NY: Guilford Press; 1988.

Barrett PM, Rapee RM, Dadds MM, Ryan SM. Family enhancement of cognitive style in anxious and aggressive children. Journal of Abnormal Child Psychology 1996;24:187. [PubMed: 8743244]

Beck, AT.; Emery, G.; Greenberg, RL. Anxiety disorders and phobias: A cognitive perspective. New York: Basic Books; 1985.

Beidel DC, Turner SM. At risk for anxiety: I. psychopathology in the offspring of anxious parents. Journal of the American Academy of Child and Adolescent Psychiatry 1997;36:918–924. [PubMed: 9204669]

Biederman J, Rosenbaum JF, Bolduc EA, Faraone SV, Hirshfeld DR. A high risk study of young children of parents with panic disorder and agoraphobia with and without comorbid major depression. Psychiatry Research 1991;37:333–348. [PubMed: 1891513]

Birmaher B, Khetarpal S, Brent D, Cully M, Balach L, Kaufman J, et al. The Screen for Child Anxiety Related Emotional Disorders (SCARED): Scale construction and psychometric characteristics. Journal of the American Academy of Child and Adolescent Psychiatry 1997;36:545–553. [PubMed: 9100430]

Bögels S, Phares V. Fathers' role in the etiology, prevention and treatment of child anxiety: A review and a new model. Clinical Psychology Review 2008;28:539–558. [PubMed: 17854963]

Chorpita BF, Albano AM, Barlow DH. Cognitive processing in children: Relation to anxiety and family influences. Journal of Clinical Child Psychology 1996;25:170–176.

Clark, DM.; Wells, A. A cognitive model of social phobia. In: Heimberg, RG.; Liebowitz, MR.; Hope, DA.; Schneier, FR., editors. Social phobia: Diagnosis, assessment, and treatment. New York: Guilford Press; 1995. p. 69-93.

Cohen, J. Statistical power analysis for the behavioral sciences. 2nd ed.. Hillsdale, NJ: Lawrence Earlbaum Associates; 1988.

Cobham VE, Dadds MR, Spence SH. Anxious children and their parents: What do they expect? Journal of Clinical Child Psychology 1999;28:220–231. [PubMed: 10353081]

Creswell C, O'Conner TG, Brewin CR. A longitudinal investigation of maternal and child 'anxious cognitions'. Cognitive Therapy and Research 2006;30:135–147.

Creswell C, Schniering CA, Rapee RM. Threat interpretation in anxious children and their mothers: Comparison with nonclinical children and the effects of treatment. Behaviour Research and Therapy 2005;43:1375–1381. [PubMed: 16086987]

de Rosnay M, Cooper PJ, Tsigaras N, Murray L. Transmission of social anxiety from mother to infant: An experimental study using a social referencing paradigm. Behaviour Research and Therapy 2006;44:1165–1175. [PubMed: 16288978]

de Wilde A, Rapee RM. Do controlling maternal behaviors increase state anxiety in children's responses to a social threat? A pilot study. Journal of Behavior Therapy and Experimental Psychiatry 2008;39:526–537. [PubMed: 18294612]

Dindia K, Allen M. Sex differences in self-disclosure: A meta-analysis. Psychological Bulletin 1992;112:106–124. [PubMed: 1388280]

Dunlop WP, Cortina JM, Vaslow JB, Burke MJ. Meta-analysis of experiments with matched groups or repeated measures designs. Psychological Methods 1996;1:170–177.

Eley, TC.; Gregory, AM. Behavioral genetics. In: Morris, TL.; March, JS., editors. Anxiety disorders in children and adolescents. 2nd ed.. New York City, NY: The Guilford Press; 2004. p. 71-96.

Fisak B, Grills-Taquechel. Parental modeling, reinforcement, and information transfer: Risk factors in the development of child anxiety? Clinical Child and Family Psychology 2007;10:213–231.

Flavell JH, Flavell ER, Green FL. Development of children's understanding of connection between thinking and feeling. Psychological Science 2001;12:430–432. [PubMed: 11554679]

Fujita F, Diener E, Sandvik E. Gender differences in negative affect and well-being: The case for emotional intensity. Journal of Personality and Social Psychology 1991;62:427–434. [PubMed: 1941513]

Gerull FC, Rapee RM. Mothers knows best: Effects of maternal modeling on the acquisition of fear and avoidance behaviour in toddlers. Behaviour Research and Therapy 2002;40:279–287. [PubMed: 11863238]

Ginsburg GS. The child anxiety prevention study: Intervention model and primary outcomes. Journal of Consulting & Clinical Psychology 2009;77:580–587. [PubMed: 19485597]

Ginsburg GS, Schlossberg MC. Family-based treatment of childhood anxiety disorders. International Review of Psychiatry 2002;14:143–154.

Harris LM, Cumming SR. An examination of the relationship between anxiety and performance on prospective and retrospective memory tasks. Australian Journal of Psychology 2003;55:51–55.

Horn JL, Dollinger SJ. Effects of test anxiety, tests, and sleep on children's performance. Journal of School Psychology 1989;27:373–382.

Hudson JL, Doyle AM, Gar N. Child and maternal influence on parenting behavior in clinically anxious children. Journal of Clinical Child and Adolescent Psychology 2009;38:256–262. [PubMed: 19283603]

Hudson, JL.; Rapee, RM. From anxious temperament to disorder: an etiological model. In: Heimberg, RG.; Turk, CL.; Mennin, DS., editors. Generalised anxiety disorder: Advances in research and practice. New York: Guilford Publishers; 2004. p. 51-76.

Kashani JH, Vaidya AF, Soltys SM, Dandoy AC, Katz LM, Reid JC. Correlates of anxiety in psychiatrically hospitalized children and their parents. American Journal of Psychiatry 1990;147:319–323. [PubMed: 2309949]

Kortlander E, Kendall PC, Panichelli-Mindel SM. Maternal expectations and attributions about coping in anxious children. Journal of Anxiety Disorders 1997;11:297–315. [PubMed: 9220302]

Lamb ME. The history of research on father involvement: An overview. Marriage and Family Review 2000;29:23–42.

Last CG, Hersen M, Kazdin AE, Francis G, Grubb HJ. Psychiatric illness in the mothers of anxious children. American Journal of Psychiatry 1987;144:1580–1583. [PubMed: 3688283]

Lester KJ, Field AP, Oliver S, Cartright-Hatton S. Do anxious parents interpretive biases toward threat extend to their child's environment? Behavior Research and Therapy 2009;47:170–174.

Livingston R, Nugent H, Rader L, Smith GR. Family histories of depressed and severely anxious children. American Journal of Psychiatry 1985;142:1497–1499. [PubMed: 4073321]

Ma X. A meta-analysis of the relationship between anxiety toward mathematics and achievement in mathematics. Journal for Research in Mathematics Education 1999;30:520–540.

McNeil, DW.; Ries, BJ.; Turk, CL. Behavioral assessment: Self-report, physiology, and overt behavior. In: Heimberg, RG.; Liebowitz, MR.; Hope, DA.; Schneier, FR., editors. Social phobia: Diagnosis, assessment, and treatment. New York: Guilford Press; 1995. p. 202-231.

Merikangas KR, Dierker LC, Szatmari P. Psychopathology among offspring of parents with substance abuse and/or anxiety disorders: a high risk study. Journal of Child Psychology and Psychiatry 1998;39:711–720. [PubMed: 9690934]

Merikangas KR, Risch N. Genomic priorities and public health. Science 302:599–601. [PubMed: 14576422]

Micco JA, Ehrenreich JT. Children's interpretation and avoidant response biases in response to non-salient and salient situations: Relationships with mothers' threat perception and coping expectations. Journal of Anxiety Disorders 2008;22:371–385. [PubMed: 17434288]

Mills RS, Rubin KH. Are behavioural and psychological control both differentially associated with childhood aggression and social withdrawal. Canadian Journal of Behavioural Science 1998;30:132–136.

Moore PS, Whaley SE, Sigman M. Interactions between mothers and children: Impacts of maternal and child anxiety. Journal of Abnormal Psychology 2004;113:471–476. [PubMed: 15311992]

Muris P, Steerneman P, Merckelbach H, Meesters C. The role of parental fearfulness and modeling in children's fear. Behaviour Research and Therapy 1996;34:265–268. [PubMed: 8881095]

Pleck, J. Paternal involvement: Levels, sources, and consequences. In: Lamb, ME., editor. The role of the father in child development. 3rd ed.. New York: Wiley and Sons, Inc.; 1997. p. 66-103.

Pons F, Lawson J, Harris PL, de Rosnay M. Individual differences in children's emotion understanding: Effects of age and language. Scandinavian Journal of Psychology 2003;44:347–353. [PubMed: 12887556]

Rosenbaum JF, Biederman J, Bolduc EA, Hirshfeld DR, Faraone SV, Kagan J. Comorbidity of parental anxiety disorders as risk for childhood-onset anxiety in inhibited children. American Journal of Psychiatry 1992;149:475–481. [PubMed: 1554032]

Shortt AL, Barrett PM, Dadds MR, Fox TL. The influence of family and experimental context on cognition in anxious children. Journal of Abnormal Child Psychology 2001;29:585–596. [PubMed: 11761290]

Spielberger, CD. State-Trait Anxiety Inventory for Children: Preliminary manual. Palo Alto: Consulting Psychologists Press; 1973.

Taylor, SE.; Frackenpohl, H.; White, CE. EDL core vocabularies in reading, mathematics, science, and social studies: A revised core vocabulary. Austin, Texas: Steck-Vaughn; 1989.

Waxer PH. Nonverbal cues for anxiety: An examination of emotional leakage. Journal of Abnormal Psychology 1977;86:306–314. [PubMed: 874189]

Whaley SE, Pinto A, Sigman M. Characterizing interactions between anxious mothers and their children. Journal of Consulting and Clinical Psychology 1999;67:826–836. [PubMed: 10596505]

Wilkinson, GS.; Robertson, GJ. WRAT-4: Wide Range Achievement Test Professional Manual. Lutz, FL: Psychological Assessment Resources, Inc.; 2006.

Wood J, McLeod BD, Sigman M, Chu BC. Parenting and child anxiety: Theory, empirical findings, and future directions. Journal of Child Psychology and Psychiatry 2003;44:134–151. [PubMed: 12553416]

Yerkes RM, Dodson JD. The relation of strength of stimulus to rapidity of habit-formation. Journal of Comparative Neurology and Psychology 1908;18:459–482.

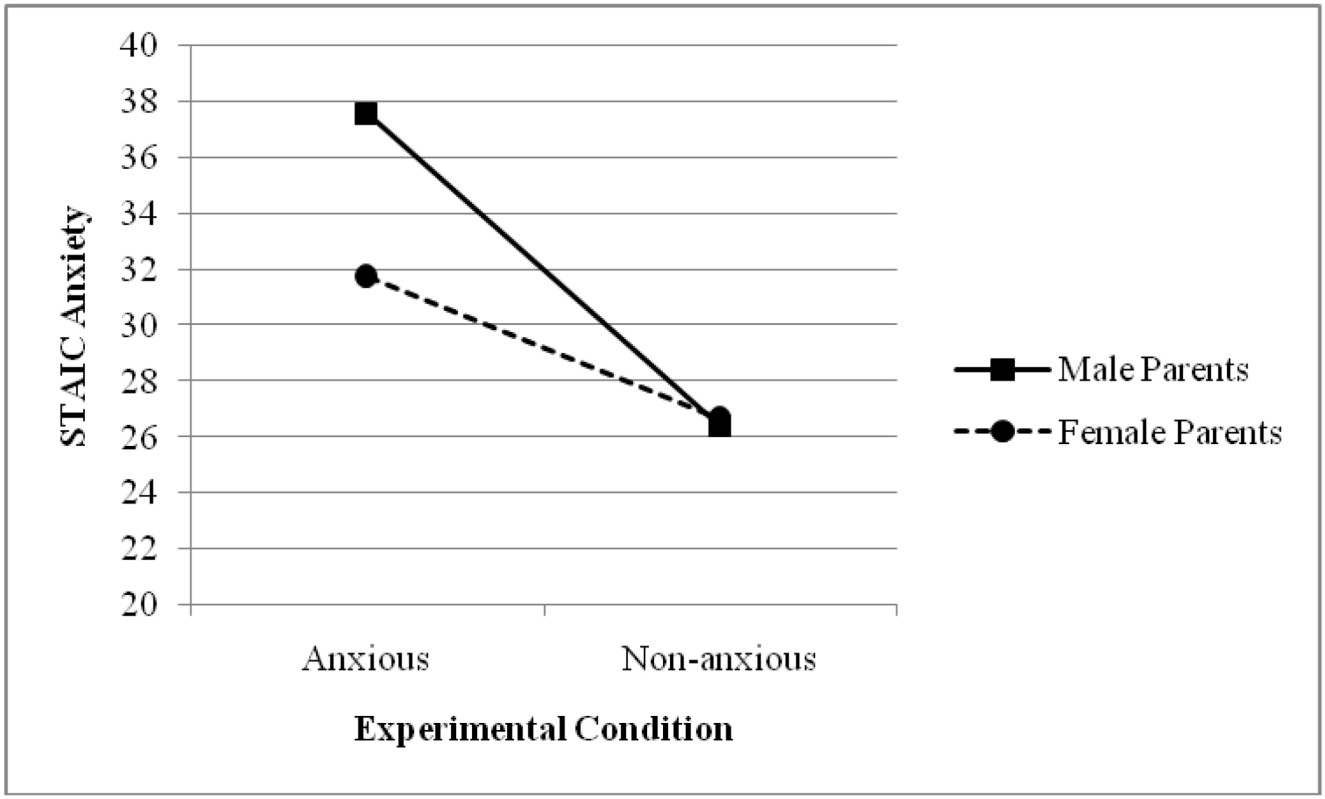

Figure 1.
Estimated marginal means for child anxiety level during anxious and non-anxious conditions by parent group.

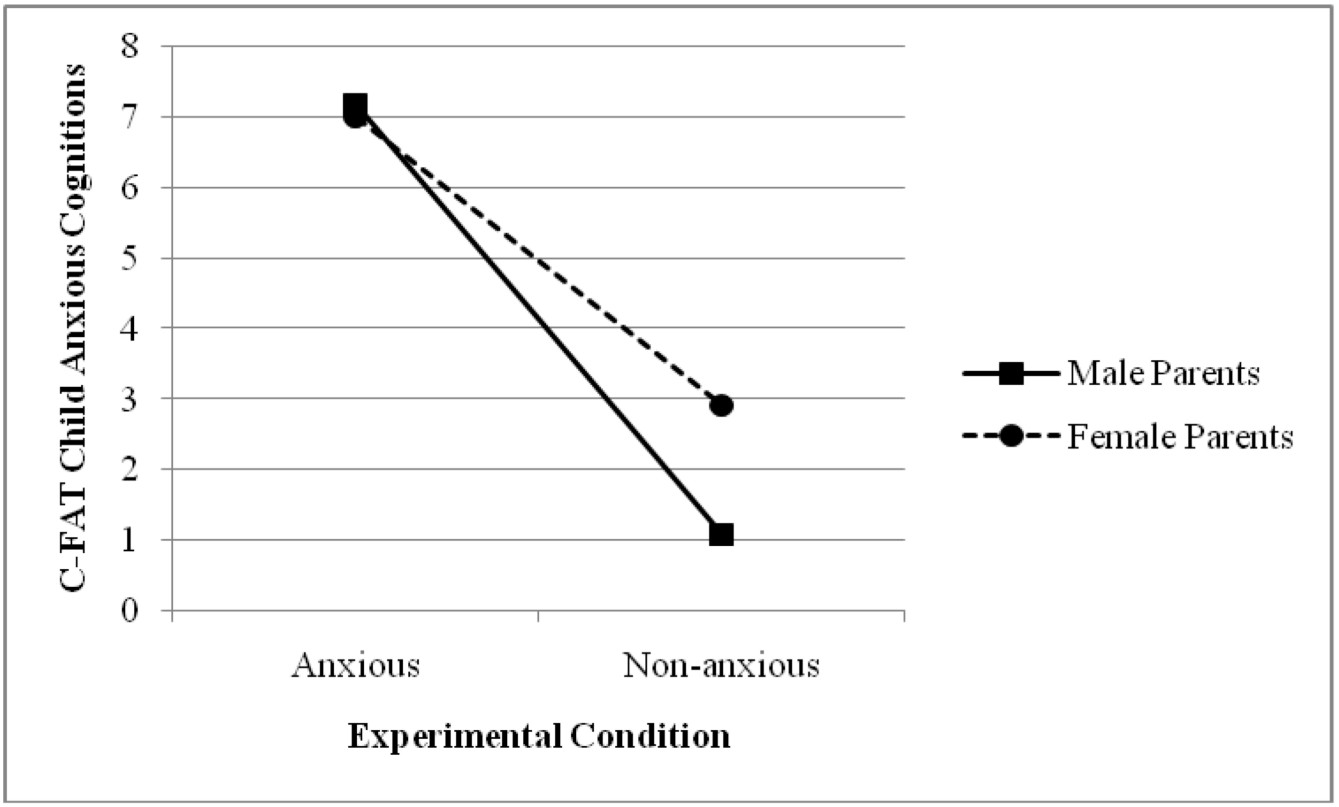

Figure 2.
Estimated marginal means for child anxious cognitions during anxious and non-anxious conditions by parent group.

Table 1

Child and Independent Observer Ratings of Parent Anxious Feelings and Cognitions By Experimental Condition

	Experimental Condition		
Variable	**Anxious *M* (*SD*)**	**Non-anxious *M* (*SD*)**	***F***
Parent Anxious Feelings			
Child Report	4.40 (1.38)	0.56 (0.77)	157.55**
Observer Report	5.68 (1.78)	1.36 (1.26)	103.21**
Parent Anxious Cognitions			
Child Report	4.88 (1.30)	0.60 (0.87)	198.71**
Observer Report	5.91 (1.35)	0.65 (0.93)	204.42**

Note.

** $p < .001$.

Table 2

Baseline Demographic and Clinical Characteristics for the Entire Sample and by Parent Group

	Entire Sample	Parent Group		
Categorical Variables	**% (n)**	**Male (n = 12) % (n)**	**Female (n = 13) % (n)**	χ^2
Family Income (> $80,000)	64.00 (16)	50.00 (6)	76.90 (10)	1.96
Marital Status (married)	96.00 (24)	91.67 (11)	100.00 (13)	1.13
Relationship (biological)	92.00 (23)	83.33 (10)	100.00 (13)	2.36
Child Gender (male)	56.00 (14)	58.33 (7)	53.85 (7)	0.05
Child Ethnicity (Caucasian)	76.00 (19)	66.67 (8)	84.62 (11)	1.10
Continuous Variables	***M* (*SD*)**	***M* (*SD*)**	***M* (*SD*)**	***F***
Parent Age	41.80 (6.55)	42.67 (6.08)	41.00 (7.10)	0.39
Child Age	9.20 (1.32)	9.50 (1.51)	9.00 (1.29)	0.80
WRAT Spelling	109.12 (13.65)	111.67 (16.02)	106.77 (11.18)	0.80
ASR Internalizing	42.88 (9.08)	41.42 (8.40)	44.23 (9.80)	0.59
ASR Externalizing	45.68 (8.30)	47.58 (7.90)	43.92 (8.58)	1.23
CBCL Internalizing	46.32 (8.28)	48.67 (8.02)	44.15 (8.21)	1.93
CBCL Externalizing	43.40 (6.02)	43.67 (5.53)	43.15 (6.66)	0.04
SCARED Total	10.12 (7.99)	12.75 (7.69)	7.69 (7.75)	2.68

Note. WRAT = Wide Range Achievement Test, ASR = Adult Self Report, CBCL = Child Behavior Check List, SCARED = Screen for Child Anxiety Related Emotional Disorders; WRAT grade-level standardized scores are displayed, ASR and CBCL *T*-scores are displayed; No comparisons were significant at $p < .05$.

Table 3

Means and Standard Deviations for Child Outcomes in Anxious and Non-Anxious Experimental Conditions By Parent Group

	Male Parent Group (n = 12)		Female Parent Group (n = 13)	
Child Outcome	**Anxious *M* (*SD*)**	**Non-anxious *M* (*SD*)**	**Anxious *M* (*SD*)**	**Non-anxious *M* (*SD*)**
STAIC	37.58 (6.22)$_a$	26.42 (4.54)$_b$	31.77 (5.67)$_c$	26.69 (4.99)$_b$
C-FAT Anx Feelings	4.17 (1.59)$_a$	1.08 (1.38)$_b$	3.23 (1.83)$_a$	1.62 (1.33)$_b$
C-FAT Anx Cognitions	7.17 (2.08)$_a$	1.08 (1.00)$_b$	7.00 (2.42)$_a$	2.92 (1.98)$_c$
C-FAT Avoidance	1.25 (1.22)$_a$	0.08 (0.29)$_b$	1.00 (1.22)$_a$	0.23 (0.83)$_b$
Spelling Performance	9.67 (2.81)$_a$	10.17 (2.92)$_a$	9.15 (3.21)$_a$	9.62 (2.63)$_a$

Note. Different subscripts within the same row indicate that values significantly differed at $p < .05$; STAIC = State-Trait Anxiety State Subscale, C-FAT = Child Feelings and Thoughts Measure, Anx = Anxious, Avoidance = Desired Avoidance.