

# Parental Emotion Socialization Strategies and Their Interaction with Child Interpretation Biases Among Children with Anxiety Disorders

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**Abstract** Children’s interpretations of events play a significant role in childhood anxiety, and research shows that the parenting environment, in particular, is an important contributor to the manner in which children interpret their experiences. This study examined associations between parental use of punitive and minimization reactions to children’s displays of negative affect, child interpretation biases (self-reports and computerized assessments), and child anxiety symptom severity in a clinical sample of children with anxiety disorders. Forty-four children between 8–12 years of age ( $M = 9.60$ ,  $SD = 1.30$ ; 52 % girls; 52 % African American) and their mothers ( $M = 38.48$ ,  $SD = 6.86$ ; 57 % married) participated in this study. Child interpretation biases were significantly associated with child-reported anxiety symptoms. Moderation analyses revealed a positive relation between self-reported interpretation biases and anxiety symptoms for children of low-minimization and low-punitive mothers. Likewise, a positive relation between computerized interpretation biases and mother-reported child anxiety symptoms was found for children of low-minimization and low-punitive mothers. However, a negative relationship between computerized interpretation biases and mother-reported child anxiety symptoms was found for children of high-

minimization and high-punitive mothers. Findings and implications are discussed in the context of how these parental reactions may be addressed and incorporated in childhood anxiety treatments.

**Keywords** Children · Parenting · Cognitive biases · Emotion socialization · Interpretation biases

## Introduction

Epidemiological studies suggest that in any given year, 8–10 % of children meet diagnostic criteria for an anxiety disorder, a condition that can lead to significant and often chronic difficulties in individual, peer, school, and family domains (Costello et al. 2005; Merikangas et al. 2010; Van Ameringen et al. 2003). Further, the financial costs of having a child with anxiety disorder are high; for instance, medical expenses are 21 times higher than those incurred by families without an anxious child (Bodden et al. 2008). As a result, significant efforts have been devoted to not only treating these debilitating disorders, but also to expanding what we know about their development.

## Interpretation Biases in Childhood Anxiety

Research using various methodologies and designs has found that the manner in which children interpret situations plays a significant role in the development and maintenance of anxiety symptoms (Creswell et al. 2005). For instance, correlational studies have found that children with (vs. without) anxiety disorders are more likely to interpret neutral or ambiguous situations in a threatening manner (i.e., interpretation biases; e.g., Taghavi et al. 2000).

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Longitudinal research has also found that child interpretation biases are associated with the maintenance of anxiety symptoms over time (see Dodd et al. 2012). Likewise, after controlling for depression symptoms, baseline threat interpretations in a community sample of 10- to 11-year-olds ( $N = 49$ ) were longitudinally associated with anxiety symptoms at 5- and 12-month follow-ups (Creswell and O'Connor 2011).

Experimental research designed to establish causal links has also found that inducing interpretation biases leads to increases in anxiety (Field et al. 2008; Field and Schorah 2007; Mathews and MacLeod 2002; Muris 2010; Waters et al. 2008; Wilson et al. 2006). One study found that providing threatening information about animals to a nonclinical sample of children ages 6–13 induced threat interpretations as well as behavioral avoidance of the animal, which persisted up to 6 months later (Field et al. 2008).

Treatment studies also provide support for the role of interpretation biases in childhood anxiety. In a sample of 43 nonclinical 10- to 11-year-olds selected for high social anxiety, those who received three sessions of positive interpretation training showed reduced trait social anxiety and reported lower anxiety about an anticipated interpersonal encounter relative to the control group (medium-to-large effect sizes on both outcomes; Vassilopoulos et al. 2009). A separate study with nonclinical children ages 6–11 found that interpretation bias modification significantly reduced interpretation biases ( $d = 1.01$ ) as well as behavioral avoidance to a stressor; child anxiety also diminished from pre- to post-intervention, although the change did not reach statistical significance ( $d = 0.21$ ; Lester et al. 2011).

### The Parenting Environment and Child Interpretation Biases

Given the centrality of interpretation biases in development and maintenance of anxiety problems, increasing attention is being paid to studying factors that may influence the emergence these biases. These efforts suggest that the parenting environment, in particular, is an important contributor to the manner in which children interpret their experiences (see Hadwin et al. 2006, for a review). Some of the early studies highlighting the importance of parenting found that children with (vs. without) anxiety were more likely to rely on avoidant coping plans to ambiguous scenarios after a family discussion about the scenario (Barrett et al. 1996; Chorpita et al. 1996). More recent theoretical models have specifically proposed parental overprotection, overcontrol, and verbalizations about possible threats as important factors in how children with anxiety perceive and cope with events (Ginsburg and Schlossberg 2002;

Hudson and Rapee 2004). One study found maternal overinvolvement predicted [attentional] biases towards angry faces, which, in turn, predicted separation anxiety symptoms among non-referred children ages 6–14 (Perez-Olivas et al. 2008). Parental displays of threatening behaviors and overprotection have been associated with interpretation biases and anxious responses in offspring (Bögels and Brechman-Toussaint 2006; Viana et al. 2012). Studies have also found moderate associations ( $r = .32$ ) between mothers' own threatening interpretations and their children's self-reported anxiety (e.g., Gifford et al. 2008). Creswell and colleagues have suggested that parental interpretation biases, in particular, may lead parents to limit their children's autonomy, which in turn may contribute to the development of children's perceptions of the world as a threatening place, thereby increasing their anxiety (Creswell et al. 2010).

### Parental Emotion Socialization and Child Interpretation Biases

Although studies of broad parenting deficits associated with interpretation biases among children are useful, theorists underscore the importance of examining parental emotion socialization, in particular (i.e., the ways in which parents' behavioral and affective responses to situations influence children's subsequent understanding, experience, expression, and regulation of emotions; Eisenberg et al. 1998). In the area of anxiety, Suveg and colleagues have found that mothers of children with an anxiety disorder used significantly fewer positive emotion words and discouraged their children's emotion discussions more than mothers of nonclinical children (Suveg et al. 2005). Moreover, theoretical and empirical literature highlight the role of parental emotion socialization strategies in the transmission of evaluative cognitions to children (Dunn et al. 1991; Eisenberg et al. 1998), and the importance of parental responses to children's displays of negative affect (e.g., validating, minimizing) for guiding how children learn to interpret situations.

The vast majority of studies in this area, albeit focused on typically developing children or those with externalizing problems, suggest that parental supportive reactions are associated with better child regulatory abilities, lower aggression, and low "venting" of anger (Eisenberg and Fabes 1994; see also Jones et al. 2002). On the other hand, non-supportive responses, which include punitive responses (e.g., send child to his/her room to cool off) and minimization responses (e.g., tell child not to make a big deal out of the situation), are associated with lower levels of adaptive child coping strategies, poorer teacher-rated child problem-solving coping and higher aggressive coping (Eisenberg et al. 1992, 1996). However, little is known

about whether extant findings on the effects of parental non-supportive responses generalize to children with anxiety disorders (the focus of the present investigation) and whether these may interact with well-established cognitive risks (interpretation biases) to influence anxiety symptoms.

The few studies available on children with internalizing problems suggest that punitive and/or minimizing reactions to children's distress may not invariably be associated with high anxiety or internalizing problems. Symptom dimensions (internalizing vs. externalizing behaviors) and the individual forms of psychopathology examined (e.g., anxiety) may all be important determinants of whether parental emotion socialization behaviors—especially those that are often considered non-supportive (i.e., punitive and minimization reactions)—are associated with adaptive or maladaptive outcomes. Suveg and colleagues found that the association between parental minimization, punitive, and distress reactions and child psychopathology was significant for externalizing symptoms but not for internalizing symptoms (Suveg et al. 2011). Moreover, the association between child emotion regulation difficulties and internalizing psychopathology was only significant in the context of *low* levels of unsupportive parenting reactions (i.e., less minimization, punitive, and distress reactions).

A separate study also found that parental minimization reactions (e.g., “you’ll be ok, this is no big deal”) were unrelated to children’s adjustment difficulties among Chinese children, suggesting that culture may also influence how these parental reactions affect children (Tao et al. 2010; see also Brown et al. 2015). A more recent study also found that parents of children with (vs. without) an anxiety disorder did not differ in their use of minimization and punitive responses (Hurrell et al. 2015). And although minimization and punitive responses were associated with some child emotion regulation difficulties across the entire sample, the interaction between emotion socialization and group status (children with vs. without an anxiety disorder) as a predictor of emotion regulation difficulties was not examined (Hurrell et al. 2015). Thus, it is not possible to evaluate whether minimization and punitive reactions predicted child emotion regulation difficulties for the anxious group in particular. Notably, this investigation also did not include examination of interpretation biases. Using data from a randomized control trial of the unified protocol for emotional disorders in youth, a preliminary study also found that among youth with anxiety and depressive disorders, *higher* use of parental punitive and/or minimization responses to children’s negative affect was associated with lower anxiety at post-treatment (Remmes 2012). While clearly warranting empirical testing, the author hypothesized that in the context of clinical anxiety, parental minimization reactions might serve a different function,

perhaps motivating some children to more fully engage in treatment.

Clearly, more research is needed to examine whether parental minimization and punitive responses (1) are associated with children’s interpretation biases, and (2) moderate the relationship between children’s interpretation biases and child anxiety severity. Briefly, a moderator variable is one that affects the magnitude of the association between independent and dependent variables (Baron and Kenny 1986). In testing moderation, the goal of the researcher is to examine the conditions (i.e., when or for whom) under which an established association between two variables weakens or strengthens—in essence, moderation analyses speak to how externally valid associations between variables are. Moreover, moderation involves testing the association between an independent and dependent variables at different values of the moderator (i.e., tests of simple effects; see Marsh et al. 2011).

We propose that the association between interpretation biases and child anxiety symptoms may be weaker under conditions of increased parental minimization and/or punitive reactions. For instance, if an anxious child who is afraid of meeting new children in the playground is told repeatedly by his/her parents “there is nothing to be afraid of here, just go and say hi” (i.e., minimization), such child may learn to interpret this situation as non-threatening. As a result, the association between interpretation biases and anxiety may be weaker in this child compared to a child who does not experience such parental responses.

## The Present Study

Given the mixed findings reviewed earlier regarding the association between these two types of parental reactions and child psychopathology among children with clinical anxiety, the purpose of this study was to examine relationships between parental use of punitive and minimizing reactions in response to children’s display of negative affect, child interpretation biases, and child anxiety symptom severity in a sample of children with anxiety disorders. To build upon the methodologies of previous studies, this investigation utilized a dual-measurement approach to the assessment of interpretation biases: self-reports and a computerized assessment of interpretation biases. We hypothesized that child interpretation biases would be moderately associated with both self- and parent-reported child anxiety (Creswell et al. 2005; Gifford et al. 2008). We also hypothesized that parental minimization and punitive reactions would be moderately associated with child interpretation biases. Finally, we hypothesized that parental use of minimization and punitive reactions would moderate the association

between child interpretation biases and anxiety symptoms, such that the magnitude of the association would be greater for children of parents who displayed lower levels of punitive and minimization reactions.

## Method

### Participants

Forty-four children between 8–12 years of age and their mothers participated in this study. Forty-eight percent were boys ( $M = 9.96$  years,  $SD = 1.30$ ), and 52 % were girls ( $M = 9.24$  years,  $SD = 1.30$ ). Their mothers' age ranged from 26 to 50 years ( $M = 38.48$  years,  $SD = 6.86$ ; 57 % married). Fifty-four percent of the mothers were African American and 46 % were White. Fifty-two percent of the children were African American, 39 % were White, and 9 % were of mixed race. The mean annual income of families ranged from \$50,000 to \$60,000, although 34 % reported an annual income of <\$30,000. Thirty percent of mothers had some college education, 18 % a 2-year college degree, 16 % a 4-year college degree, and 20 % had at least a master's degree. Fifty-one percent of mothers worked full-time.

Children met *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text revision; DSM-IV-TR; American Psychiatric Association 2000) criteria for at least one anxiety disorder diagnosis based on results from semi-structured interviews conducted (separately) with both the child and the mother. Specific phobias were the most common anxiety disorder (43 %), followed by generalized anxiety disorder (20 %), social phobia (20 %), separation disorder (11 %), post-traumatic stress disorder (2 %), and obsessive compulsive disorder (2 %). The majority of the sample (75 %) had comorbid diagnoses, with specific phobias and attention deficit/hyperactivity disorder as the most common comorbidity. Children were excluded from the study if they had (1) a physical disability impairing ability to use a computer, (2) borderline or extremely low intellectual functioning (estimated full scale IQ < 80; see "Procedure"), (3) below average reading comprehension (standard score < 85; see "Procedure"), (4) psychosis, and/or (5) suicidality.

### Measures

#### *Diagnostic Instrument Administered to Children and Their Mothers*

*Anxiety Disorders Interview Schedule-IV: Children and Parent Versions (ADIS-IV: C/P; Silverman and Albano 1996)* The ADIS-IV: C/P is a semi-structured diagnostic

interview that assesses anxiety disorders and other childhood disorders, including the affective and the externalizing disorders according to *DSM-IV-TR* criteria (APA 2000). It is considered the gold-standard for assessing the presence and severity of childhood anxiety disorders. A clinician severity rating ranging from 0 to 8 is assigned to each disorder and ratings of 4 or higher indicate that *DSM-IV-TR* diagnostic criteria have been met. Studies report test–retest reliability for composite parent–child diagnoses in the excellent range (Silverman et al. 2001).

Assessors were trained to use the ADIS-IV: C/P by observing videotaped samples of interviews conducted by the first author. Inter-rater agreement of Axis I diagnoses was assessed in ten percent of the interview protocols and found to be in the excellent range ( $\kappa > 0.85$ ).

Mothers and children were interviewed separately using the parent and child versions, respectively, of the ADIS-IV: C/P. The assessor assigned diagnoses taking into account the perspective from both sources regarding the severity and interference of the disorder. All current diagnoses were included and ranked in order of severity. Discrepancies between the child and parent regarding primary diagnoses of the same severity rating were resolved during supervision sessions with assessors. In these cases, videotapes were reviewed and the first author made a final determination regarding the final diagnosis (Albano and Silverman 1996).

#### *Child Anxiety Symptoms*

*Revised Children's Manifest Anxiety Scale (RCMAS; Reynolds and Richmond 1978)* The RCMAS is a 37-item self-report scale designed to assess trait anxiety in children. Twenty-eight items are summed to yield a total anxiety score. Children respond by selecting either 'yes' or 'no' for each item. The total score ranges from 0 to 28 and is computed by summing the 'yes' scores. The psychometric properties of the RCMAS are well established (Reynolds and Richmond 1985). The RCMAS total anxiety score ( $\alpha = .82$ ) was used in the present study as an index of manifest anxiety symptoms.

*Child Behavior Checklist (CBCL; Achenbach 1991)* The CBCL is a parent-completed measure designed to assess behaviors of youth between the ages of 2–18 along internalizing and externalizing domains. T-Scores and clinical cutoffs are calculated using normative data. The CBCL has been widely used and shown good reliability and validity (Achenbach 1991). Consistent with other investigations (e.g., Southam-Gerow et al. 2006), the CBCL Anxious/Depressed scale ( $\alpha = .72$ ) was used in this study as an index of parent-rated child anxiety.



### Parental Minimization and Punitive Reactions to Children's Negative Emotions

*Coping with Children's Negative Emotions Scale (CCNES; Fabes et al. 1990)* The CCNES is parent-completed measure of parental emotion socialization strategies. It consists of 12 vignettes of everyday situations involving children's negative emotions. Each vignette has six possible parental responses, and parents rate each response in terms of the degree to which they are likely to respond in the same manner (1 = *very unlikely* to 7 = *very likely*). The CCNES yields the following six subscales (12-items each): (1) distress reactions, (2) punitive reactions, (3) expressive encouragement, (4) emotion-focused reactions, (5) problem-focused reactions, and (6) minimization reactions. The CCNES has been widely-used and is psychometrically sound (Fabes et al. 2002; Herbert et al. 2013). In this study, and in line with hypotheses, the punitive reactions (e.g., "If my child becomes angry because he/she is sick or hurt and can't go to his/her friend's birthday party, I would send my child to his/her room to cool off;"  $\alpha = .82$ ) and minimization reactions (e.g., "If my child is afraid of injections and becomes quite shaky and teary while waiting for his/her turn to get a shot, I would tell my child not to make big deal of the shot;"  $\alpha = .86$ ) subscales were used.<sup>1</sup>

### Interpretation Biases

*Children's Negative Cognitive Errors Questionnaire (CNCEQ; Leitenberg et al. 1986)* The CNCEQ is a widely used 24-item self-report measure that assesses the degree to which children interpret events in an overly negative manner. The CNCEQ yields a "total cognitive distortion score" and also the following four subscales for each type of cognitive distortion: catastrophizing, overgeneralization, personalizing, and selective abstraction (Leitenberg et al. 1986). Each item consists of a hypothetical vignette followed by a negative interpretation of the vignette. The child is asked to rate on a 5-point scale the degree to which he or she would interpret the situation in the same way (1 = *not at all like I would think* to 5 = *almost exactly like I would think*). Research has documented good test-retest reliability and internal consistency for the CNCEQ scores (Leitenberg et al. 1986). In this study, the CNCEQ total score ( $\alpha = .91$ ) was used for all analyses as a self-report measure of interpretation biases.

<sup>1</sup> We focused on the punitive and minimization subscales of the CCNES given mixed findings regarding their association to internalizing symptoms among children with clinical anxiety. That said, we explored relationships with the four remaining CCNES scales. No significant associations or moderator effects were found.

*Computerized Assessment of Interpretation Biases* Children completed a modified version of the Word-Sentence Association Paradigm (WSAP; Beard et al. 2011) as a computer-based assessment of interpretation biases. The task was programmed using DirectRT version 2012 (Jarvis 2012) and displayed on a 17-in. wide-screen laptop computer screen. To enhance external validity, computerized scenarios were representative of day-to-day situations faced by children (Barrett et al. 1996). There were a total of 20 trials in the modified task. For each trial, a fixation cross appeared in the center of the computer screen for 500 ms. Next, an ambiguous sentence (e.g., your friend yawns during a conversation with you) appeared along with two words that represent either a threatening (e.g., boring) or benign (e.g., tired) interpretation of the sentence. Children were instructed to choose which of the two words best fit with the sentence by pressing the corresponding key on the keypad as quickly and accurately as possible. The stimuli remained on the computer screen until the child responds, upon which the next trial began immediately. The proportion of threatening (and benign) interpretations made by participants were assessed. Children performed the computerized task individually in a quiet and well-lit room. They sat on a height-adjustable chair, with their heads approximately 60 cm from the center of the screen.

### Procedure

Families were recruited to participate in a larger study on thoughts, feelings, and temperament in children through local advertisements, child-oriented events, and flyers. To ensure that an adequate number of participants had high anxiety, recruitment materials specifically encouraged families experiencing difficulties with child anxiety to participate. Interested mothers initially contacted or were contacted by study personnel via telephone. A description of the study was provided and a brief screen was conducted to assess for child exclusionary criteria. An initial 3-h session was scheduled with eligible families.

Upon arrival to the initial session, informed consent from mothers and informed assent from children were obtained. To ascertain intellectual functioning and reading ability exclusionary criteria, subtests from well-established intelligence and achievement tests were administered (i.e., the Block Design and Vocabulary subtests of the Wechsler Intelligence Scale for Children—Fourth Edition [WISC-IV], and the Reading Comprehension and Oral Reading Fluency subtests of the Wechsler Individual Achievement Test—Third Edition [WIAT-III]). After eligibility status was determined, self-report questionnaires were completed by both the mothers and the child, and then clinical interviews (ADIS-C/P) were conducted by trained, Ph.D.-level

graduate clinicians. At the end of the first session, a second 2-h session was scheduled for the following week.

During the second session, children completed the computerized interpretation bias task. Upon completion of the second session, the mother and child were fully debriefed. Information regarding the results of the diagnostic evaluation, recommended evidence-based treatments, and contact information of local mental health providers were made available to families. Families received \$25 per session for their participation, and children were also able to choose a small toy after each session. Families were also provided with written results of the diagnostic evaluation, referral options, and other relevant resources (e.g., books). All procedures were approved by the institutional review board.

### Data Analytic Approach

First, correlational analyses were used to examine associations among child interpretation biases, self- and mother-reported child anxiety symptoms. Correlational analyses were also used to identify covariates for subsequent analyses all variables. Next, *t*-tests and ANOVAs were conducted to examine whether there were main or interactive effects of demographic variables (i.e., parent and child gender, age, race) on study variables. A Holm's (1979) modified Bonferroni correction was used to control for increases in the probability of making a Type I error as a result of conducting multiple comparisons (Jaccard and Guilamo-Ramos 2002). In this step-down procedure, the critical *p* value (i.e.,  $\alpha = .05$ ) is divided by *k*, where *k* is the number of tests. Then, all obtained *p*-values are ranked from least to greatest magnitude; the smallest *p*-value (i.e., the most significant) is compared to  $.05/k$  and, if the result is significant, the next smallest *p*-value obtained is compared to  $.05/(k - 1)$ . If the result is significant, the next *p*-value in the rank is compared to  $.05/(k - 2)$  and so on. The procedure continues until a non-significant result is observed. All results after that are considered non-significant.

Finally, a series of linear regressions was conducted with each maternal minimization and punitive reactions as potential moderator of the associations between child interpretation biases and child anxiety. The PROCESS macro was used to compute regression analyses with centered means and bias-corrected bootstrapping of 5000 re-samples (Hayes 2012). Two separate dependent variables were examined: children's self-reported anxiety (i.e., RCMAS) and mother-reported child anxiety (CBCL anxiety/depression scale). Each model included demographic covariates (see Results), child interpretation biases (i.e., self-reported or computerized task), and maternal reaction (i.e., minimizing or punitive reactions). Given analyses were conducted in PROCESS, the interaction term was automatically computed.

Eight children had missing data for the computerized interpretation bias task. Accordingly, we used the following procedures to determine if missing data could be imputed. First, we examined whether missing data were missing completely at random (MCAR)—a prerequisite for several imputation methods (Heitjan and Basu 1996)—using Little's MCAR test (Little and Rubin 1989). Little's MCAR test is a missing-value analysis that compares estimated mean and variance values of data from partially-complete cases with fully-complete cases. The null hypothesis is that data are MCAR. Results of Little's MCAR test based on our sample of complete and non-complete data revealed that the missing data in our sample were MCAR, as evidenced by a non-significant test result:  $\chi^2(4) = 5.16, p = .271$ . Since our missing data were MCAR, we utilized the SPSS Missing Value Analysis (MVA) module to impute data for missing cells (SPSS2011). The SPSS MVA module examines missing data patterns and imputes missing values for data that are MCAR through a maximum likelihood method based on expectation maximization algorithms (see Rubin et al. 2007 for details on the expectation maximization and maximum likelihood procedures).

### Post-Hoc Statistical Power Analysis

We conducted a post hoc statistical power analysis using G\*Power 3.1 (Faul et al. 2007) to examine the statistical power of our hierarchical linear regression equations. The *N* = 44 and six independent variables (three control variables, an interpretation bias variable, a maternal reaction variable, and the interaction between interpretation bias and maternal reaction) were used as the baseline model. Power was assessed in relation to standard effect size estimates: small ( $f^2 = .02$ ), medium ( $f^2 = .15$ ), and large ( $f^2 = .35$ ). The *p*-value was set .05. Based on these criteria, statistical power for regression analyses was .13 for detecting a small effect, .66 for detecting a medium effect, and .95 to detect a large effect. Given extant findings of medium-to-large effects on the association between interpretation biases and anxiety in both children (Lester et al. 2011) and adults (Beard 2011), this study was adequately powered to detect effect medium-to-large effects but underpowered to detect small-size effects.

## Results

### Preliminary Analyses and Descriptive Statistics

There were three cases identified as univariate outliers (*z*-score  $\geq 3.3$ ), which were subsequently corrected to one

unit larger or smaller than the next most extreme score in the distribution (Tabachnick and Fidell 2007). Multivariate outliers were also examined, though there were no cases with a combination of scores that had an unusually large influence on the multivariate analyses (Tabachnick and Fidell 2007). Means, standard deviations, ranges, and correlations among variables are presented in Table 1.

Children's self-reported interpretation biases as measured by the CNCEQ were positively associated with self-reported anxiety on the RCMAS, but not mother-reported child anxiety on the CBCL. Self-reported interpretation biases were not associated with either maternal minimization or punitive reactions. Children's computerized interpretation biases were positively associated with self-reported anxiety on the RCMAS, but not mother-reported child anxiety on the CBCL. Computerized interpretation biases were not associated with either maternal minimization or punitive reactions. Maternal and child race were associated with mother-reported child anxiety ( $F[1, 42] = 7.87, p = .008$  and  $F[2, 41] = 4.12, p = .023$ , respectively), such that African American mothers ( $M = 5.79, SD = 3.79$ ) rated their children significantly lower on the CBCL Anxious/Depressed scale compared to White mothers ( $M = 9.15, SD = 4.15$ ), and African American children ( $M = 5.70, SD = 3.84$ ) scored significantly lower on the CBCL Anxious/Depressed scale than White children ( $M = 9.29, SD = 4.15$ ). There were no differences between maternal ratings of mixed race children ( $M = 8.25, SD = 4.03$ ) and African American or White children, respectively, on the CBCL Anxious/Depressed scale. Thus, among potential demographic covariates, maternal and child race were included as covariates in analyses using the CBCL Anxious/Depressed scale as outcome variable.

### Self-Reported Interpretation Biases and Child Anxiety Severity: Moderation by Minimization and Punitive Reactions

Statistics for the regression analyses examining the interactions between children's self-reported interpretation biases and maternal emotion socialization reactions are presented in Table 2. The first set of regressions examined the moderating effect of maternal minimization reactions in the relationship between children's self-reported interpretation biases and child anxiety. There was not a significant moderating effect of maternal minimization for the relationship between children's self-reported interpretation biases and mother-reported child anxiety. However, a significant moderating effect of maternal minimization emerged in the relationship between interpretation biases and child self-reported anxiety on the RCMAS ( $b = -0.10, SE = 0.04, p = .017$ ). The overall model and the interaction term accounted for 26 and 12 %, respectively, of the variance in children's self-reported anxiety. Significance tests for the simple slopes indicated that for children exposed to lower levels of maternal minimization, there was a positive association between children's interpretation biases and self-reported anxiety symptoms,  $b = 0.23, SE = 0.06, p < .001$ . However, for children exposed to higher levels of maternal minimization, the relationship between children's interpretation biases and self-reported anxiety was not significant,  $b = 0.04, SE = 0.06, p = .500$  (see Fig. 1a).

The second set of regressions examined the moderating effect of maternal punitive reactions in the relationship between children's self-reported interpretation biases and child anxiety. There was not a significant moderating effect of maternal punitive reactions for the relationship between children's self-reported interpretation biases and self-

**Table 1** Bivariate correlations among variables of interest

Variable	M	SD	Range	1	2	3	4	5	6
1. Self-reported interpretation biases	55.45	19.34	28–102	–					
2. Computerized interpretation biases	0.26	0.12	.00–.55	.27 <sup>^</sup>	–				
3. Parental minimization reactions	2.72	1.00	1.00–4.85	.04	–.12	–			
4. Parental punitive reactions	2.29	0.94	1.00–5.10	.10	–.21	.61**	–		
5. RCMAS	13.23	6.53	2.00–26.00	.38*	.37*	–.00	–.16	–	
6. CBCL	63.02	8.75	50–84	.16	.05	–.10	–.01	.22	–

$N = 44$ . Self-reported interpretation biases = CNCEQ; parental minimization reactions = CCNES minimization reactions; parental punitive reactions = CCNES punitive reactions RCMAS = Revised Children's Manifest Anxiety Scale; CBCL = Child Behavior Checklist – Anxious/Depressed Scale

<sup>^</sup>  $p < .10$ ; \*  $p < .05$ ; \*\*  $p < .001$

**Table 2** Children's self-reported interpretation biases and maternal reactions predicting self- and mother-reported child anxiety

Variable	Child anxiety outcome variables	
	RCMAS <i>b</i> ( <i>SE</i> )	CBCL <i>b</i> ( <i>SE</i> )
<i>Maternal minimization reactions</i>		
Child race	–	1.85 (1.68)
Maternal race	–	2.22 (1.70)
Self-reported interpretation biases	0.40 (0.12)**	0.31 (0.16)^
Maternal minimization reactions	5.54 (2.45)*	3.60 (3.34)
Interpretation biases × minimization	–0.10 (0.04)*	–0.07 (0.05)
<i>F</i>	4.59*	2.92*
<i>R</i> <sup>2</sup>	.26*	.28*
$\Delta R^2$ due to interaction	.12*	.04
<i>Maternal punitive reactions</i>		
Child race	–	1.46 (1.58)
Parent race	–	1.84 (1.59)
Self-reported interpretation biases	0.21 (0.12)	0.52 (0.15)**
Maternal punitive reactions	1.01 (3.57)	12.22 (2.22)*
Interpretation biases × punitive	–0.04 (0.06)^	–0.20 (0.07)**
<i>F</i>	3.12*	4.52**
<i>R</i> <sup>2</sup>	.19	.37**
$\Delta R^2$ due to interaction	.01	.14**

*N* = 44. – = Covariate was not included in the regression. All coefficients are unstandardized. RCMAS = Revised Children's Manifest Anxiety Scale; CBCL = Child Behavior Checklist – Anxiety/Depression Scale

^ *p* < .10; \* *p* < .05; \*\* *p* < .01; \*\*\* *p* < .001

reported child anxiety. However, a significant moderating effect of maternal punitive reactions emerged in the relationship between self-reported interpretation biases and mother-reported child anxiety ( $b = -0.20$ ,  $SE = 0.07$ ,  $p < .01$ ). The overall model and the interaction term accounted for 37 and 14 %, respectively, of the variance in mother-reported child anxiety. Simple slopes analysis indicated that for children exposed to lower levels of maternal punitive reactions, there was a positive association between children's interpretation biases and mother-reported child anxiety symptoms,  $b = 0.25$ ,  $SE = 0.08$ ,  $p = .002$ . However, for children exposed to higher levels of maternal punitive reactions, the relationship between children's interpretation biases and mother-reported child anxiety was not significant,  $b = -0.13$ ,  $SE = 0.10$ ,  $p = .223$  (see Fig. 1b).

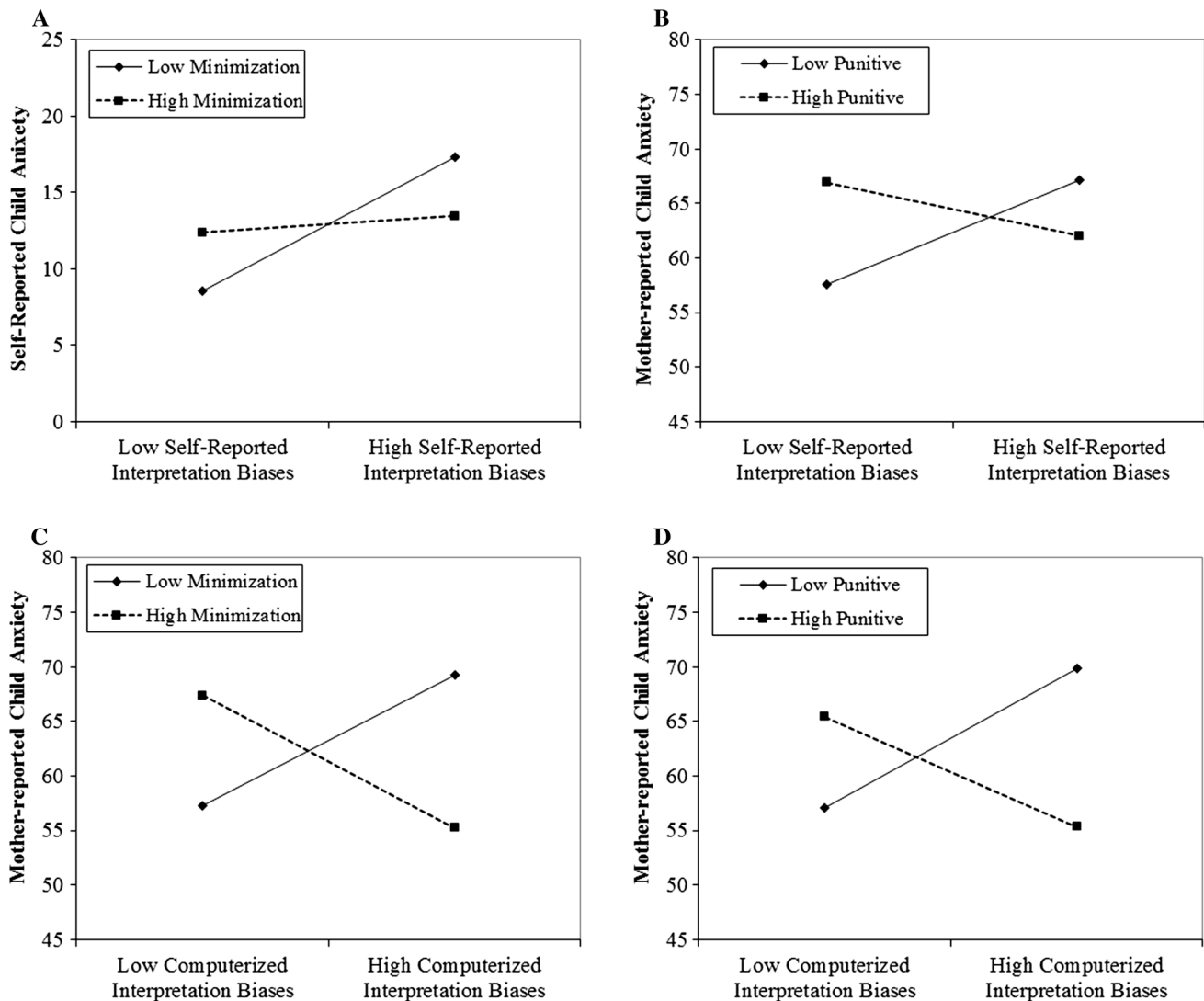
### Computerized Assessment of Interpretation Biases and Child Anxiety Severity: Moderation by Minimization and Punitive Reactions

Statistics for the regression analyses examining the interactions between children's interpretation biases, assessed via the computerized interpretation bias task, and maternal emotion socialization reactions are presented in Table 3.

The first set of regressions examined the moderating effect of maternal minimization reactions in the relationship between children's computerized interpretation biases and child anxiety. There was not a significant moderating effect of maternal minimization in the relationship between children's computerized interpretation biases and self-reported child anxiety. However, a significant moderating effect of maternal minimization emerged in the relationship between computerized interpretation biases and mother-reported child anxiety ( $b = -50.87$ ,  $SE = 13.57$ ,  $p < .001$ ). The overall model and the interaction term accounted for 40 and 22 %, respectively, of the variance in mother-reported child anxiety. Significance tests for the simple slopes indicated that for children exposed to lower levels of maternal minimization, there was a positive association between computerized interpretation biases and mother-reported child anxiety symptoms,  $b = 50.30$ ,  $SE = 15.49$ ,  $p = .002$ . For children exposed to higher levels of maternal minimization, the relationship between computerized interpretation biases and mother-reported anxiety was negative,  $b = -51.00$ ,  $SE = 17.15$ ,  $p = .005$  (see Fig. 1c).

The second set of regressions examined the moderating effect of maternal punitive reactions in the relationship between children's computerized interpretation biases and child anxiety. There was not a significant moderating effect





**Fig. 1** **a** The moderating effect of maternal minimization reactions on the relation between self-reported interpretation biases and self-reported child anxiety on the RCMA; **b** The moderating effect of maternal punitive reactions on the relation between self-reported interpretation biases and mother-reported child anxiety on the CBCL;

**c** The moderating effect of maternal minimization reactions on the relation between computerized interpretation biases and mother-reported child anxiety on the CBCL; **d** The moderating effect of maternal punitive reactions on the relation between computerized interpretation biases and mother-reported child anxiety on the CBCL

of maternal punitive reactions for the relationship between children's computerized interpretation biases and self-reported child anxiety. However, a significant moderating effect of maternal punitive reactions emerged in the relationship between computerized interpretation biases and mother-reported child anxiety ( $b = -50.79$ ,  $SE = 12.76$ ,  $p < .001$ ). The overall model and the interaction term accounted for 42 and 24 %, respectively, of the variance in mother-reported child anxiety. Simple slopes analyses indicated that for children exposed to lower levels of maternal punitive reactions, there was a positive association between children's interpretation biases and mother-reported child anxiety symptoms,  $b = 53.25$ ,  $SE = 15.36$ ,  $p < .01$ . For children exposed to higher levels of maternal

punitive reactions, the relationship between children's interpretation biases and mother-reported child anxiety was negative,  $b = -42.21$ ,  $SE = 14.77$ ,  $p < .01$  (see Fig. 1d).

## Discussion

A sizable body of literature has documented the important role of interpretation biases in childhood anxiety disorders, yet much less is known about the development of these biases in children. In particular, there is limited research investigating the specific parenting-related processes (e.g., emotion-related socialization behaviors) that may influence interpretation biases in childhood. This study examined (1)

**Table 3** Children's computerized interpretation biases and maternal reactions predicting self- and mother-reported child anxiety

Variable	Child anxiety outcome variables	
	RCMAS <i>b</i> ( <i>SE</i> )	CBCL <i>b</i> ( <i>SE</i> )
<i>Maternal minimization reactions</i>		
Child race	–	1.34 (1.54)
Maternal race	–	3.30 (1.57)*
Computerized interpretation biases	10.85 (32.20)	138.05 (37.06)**
Maternal minimization reactions	–0.43 (3.09)	12.24 (3.59)**
Interpretation biases × minimization	2.72 (11.75)	–50.87 (13.57)**
<i>F</i>	1.67	5.16**
<i>R</i> <sup>2</sup>	.11	.40**
Δ <i>R</i> <sup>2</sup> due to interaction	.00	.22**
<i>Maternal punitive reactions</i>		
Child race	–	1.25 (2.30)
Parent race	–	4.96 (3.00)
Computerized interpretation biases	18.97 (27.46)	122.03 (31.01)
Maternal punitive reactions	–0.45 (2.74)	11.55 (3.11)**
Interpretation biases × punitive	–0.94 (11.26)	–50.79 (12.76)**
<i>F</i>	1.78	5.54**
<i>R</i> <sup>2</sup>	.12	.42**
Δ <i>R</i> <sup>2</sup> due to interaction	.00	.24***

*N* = 44. – = Covariate was not included in the regression. All coefficients are unstandardized. RCADS = Revised Children's Anxiety and Depression Scale; RCMAS = Revised Children's Manifest Anxiety Scale; CBCL = Child Behavior Checklist – Anxiety/Depression Scale

<sup>^</sup> *p* < .10; \* *p* < .05; \*\* *p* < .01; \*\*\* *p* < .001

associations between interpretation biases, maternal emotion socialization behaviors, and anxiety symptoms, and (2) the moderating role of maternal minimization and punitive reactions in the relationship between child interpretation biases and anxiety symptoms in a sample of children with anxiety disorders. Consistent with previous findings (Gifford et al. 2008; Maric et al. 2011), and in line with our predictions, child interpretation biases were positively associated with child-reported anxiety symptoms. These significant associations were found for both self-report and computerized assessments of interpretation biases. Our findings provide further support for the notion that children with anxiety disorders have a tendency to perceive threat in their environment, which is associated with increased anxiety (Hadwin et al. 2006).

Contrary to predictions, child interpretation biases, assessed with either self-report or computerized tasks, were not associated with mother-reported child anxiety. Moreover, mother-reported and self-reported child anxiety were not significantly associated. These findings are not surprising, as parent–child agreement regarding child internalizing (vs. externalizing) symptoms is quite low (Achenbach et al. 1987; Comer and Kendall 2004; Grills and Ollendick 2002). Indeed, studies have found that parent–child agreement about the child's anxiety problems can

be extremely low, with an average kappa = 0.16 for younger children and kappa = 0.05 for older children (Choudhury et al. 2003). In this study, children's self-reported anxiety scores were consistent with, and even higher than, those found in studies of clinic-referred children with anxiety disorders (Hogendoorn et al. 2014; Pina et al. 2001); yet, mother-reported child anxiety symptoms were somewhat lower than in other studies with clinical samples (e.g., Southam-Gerow et al. 2006). The non-treatment-seeking nature of our sample may explain the differential results in child- vs. mother-reported child anxiety.

Our analyses also revealed that maternal minimization reactions significantly moderated the relationship between child self-reports of interpretation biases and anxiety symptoms (RCMAS) and between computerized interpretation biases and mother-reported child anxiety (CBCL). Consistent with hypotheses, among children of *low*-minimization mothers, there was a positive association between child interpretation biases and *self-reported* anxiety (solid line in Fig. 1a); among children of *high*-minimization mothers, the association was non-significant (dashed line in Fig. 1a). In a similar vein, an observational study examining interactions among a non-clinical sample of mother–child dyads found that greater socioemotional competence was positively associated with maternal minimization and

neutral reactions in response to child negative affect (Denham 1993). These findings provide preliminary support for the notion that parental use of minimization strategies in response to the distress of anxious children may not be unequivocally maladaptive. Indeed, results suggest that maternal minimization strategies in response to child distress may actually serve to dampen the impact of interpretation biases on anxiety disorder symptoms. Specifically, parental minimization reactions may, over time, help anxious children to interpret ambiguous situations in a way that reduces anxiety-related distress.

Surprisingly, for children of *high*-minimization mothers, there was a negative association between *computerized* interpretation biases and *mother-reported* child anxiety (dashed line in Fig. 1c). This finding (lower maternal ratings on the CBCL Anxious/Depressed subscale for children with high vs. low computerized biases) may be explained by differences in the manifestation of anxiety symptoms among children with high vs. low interpretation biases. Specifically, anxious children with high interpretation biases may be primarily concerned with the cognitive symptoms of anxiety. When mothers consistently minimize or avoid discussion of these concerns (Suveg et al. 2005), children may learn over time not to express their fears (e.g., they may perceive that their mothers do not take them seriously), which may result in lower maternal ratings of child anxiety. In contrast, anxious children with low interpretation biases may be primarily concerned with the physiological and/or behavioral symptoms of anxiety; their reactions may be more noticeable and thereby result in higher maternal ratings of child anxiety. More research is clearly warranted, however, as the negative relationship between computerized interpretation biases and anxiety among children of high-minimization mothers was only found for mother-reported child anxiety (vs. child self-reports).

Findings also revealed a moderating effect of maternal punitive reactions in the relation between self-reported and computerized assessments of interpretation biases, respectively, and *mother-reported* child anxiety. Specifically, for children of *low*-punitive mothers, there was a positive association between both self-reported and computerized interpretation biases and mother-reported child anxiety symptoms (solid line in Fig. 1b, d). Notably, for children of *high*-punitive mothers, there was a negative association between children's computerized interpretation biases and mother-reported child anxiety symptoms (dashed line in Fig. 1d). This negative relationship was unexpected and it may also be explained, in part, by the relative presence of cognitive vs. physical and behavioral symptoms of anxiety in children with high interpretation biases. Specifically, the expression of cognitive symptoms (e.g., worries about going crazy) when the child confronts a feared situation

may be less noticeable to high-punitive mothers relative to physiological and behavioral signs of distress, which may be perceived as direct evidence that the child is experiencing anxiety. It is also possible that some parental punitive reactions in response to anxious children's signs of distress may inadvertently "force" approach to feared situations (e.g., "you are going the birthday party, or you will not play videogames tomorrow") among children with high levels of interpretation biases. At the same time, prior studies have shown that parents of children with (vs. without) clinical anxiety display greater over-involvement and overprotective behaviors (as opposed to punitive responses), and that such reactions contribute to elevated anxiety (Drake and Ginsburg 2012). Given that moderator findings with the punitive subscale of the CCNES were specific to mother reports of child anxiety, it is also possible that high-punitive mothers may simply underreport their children's true levels of anxiety, as they are by definition more likely to disapprove of such symptoms. This could explain the lower ratings on the CBCL given by high-punitive mothers to children who exhibited high levels of biases. Further research is clearly warranted to examine the specific circumstances and types of parental socialization behaviors that might influence interpretation biases and approach behaviors in children with anxiety disorders.

This study is not, of course, without limitations. Although the use of a sample of children with anxiety disorders is a clear strength of the present study, caution is warranted in generalizing findings to other populations. The sample size also precluded us from examining racial differences and from conducting separate analyses for each anxiety disorder; larger studies with greater representation of each anxiety disorder would be a welcome extension to our investigation. Moreover, given that the study did not include a comparison or control group, future investigations would benefit from comparing parental emotion socialization behaviors and interpretation biases among groups of children with nonclinical, subclinical, and clinical levels of anxiety. The cross-sectional nature of our dataset is also a limitation, as the true direction of associations found in this study cannot be established with certainty. Although our model found support for parental punitive and minimization reactions moderating the association between child interpretation biases and child anxiety, it is likely that these associations are reciprocal in nature (see Sameroff 2009) and that child factors (e.g., temperament) also influence how parents react to children's displays of distress. Longitudinal investigations examining the development of interpretation biases and parental emotion socialization strategies over time are needed to reach a more comprehensive understanding of these relationships.

Additionally, maternal reactions to children's displays of negative affect were measured via a self-report measure, and as such, responses may reflect overall parental tendencies rather than their responses to overt child behaviors directly observed in this study. Thus, future research should utilize a combination of self-report measures and behavioral observation techniques to assess both maternal (and paternal) reactions to children's distress, as well as measures that extend beyond parental (affect-laden) behavior and include assessment of parents' own affective responses in response to children's displays of negative affect. In this way, researchers can more effectively guard against potential method-variance effects and identify the type and quality of parenting reactions across both behavioral and emotional dimensions that may be best-suited for the myriad situations in which children experience distress, rather than broad categories of reactions (i.e., punitive or minimizing). For example, a minimizing response such as "it's not a big deal" may be far more conducive to adaptive child behaviors than a response such as, "stop being so dramatic," which would likely make the child feel invalidated. Lastly, consistent with previous investigations (Beard and Amir 2009), children were allowed unlimited time to judge the relatedness of the words and sentences in the computerized task of interpretation biases. Future studies could focus on reaction time data with children by emphasizing the need for speeded responses and limiting the time children have to evaluate the stimuli. Such methods may assess more automatic or "online" cognitive biases.

To date, research has been devoted to examining direct relations between children's interpretation biases and internalizing symptoms, yet little attention has been paid to examining higher-order interactions between children's interpretation biases and other potentially important individual difference factors (e.g., parental reactions and behaviors to children's distress). Results from the present study suggest that parental emotion socialization behaviors in response to children's displays of negative affect are an important consideration when examining when and for whom interpretation biases are associated with anxiety. Findings suggest that the well-established association between interpretation biases and child anxiety is present among children of mothers who display low (vs. high) minimization and punitive reactions. Thus, our results suggest that punitive or minimizing reactions to children's distress may operate differently in children with anxiety disorders, perhaps weakening the influence that interpretation biases have on child anxiety symptoms.

Although meta-analyses have generally failed to find significant differences in cognitive behavioral therapy (CBT) with and without parent involvement for childhood

anxiety disorders (e.g., Silverman et al. 2008; Thulin et al. 2014), treatment studies specifically examining the role of parent involvement have demonstrated that certain parental reactions have the potential to enhance (e.g., reducing parent over-involvement; Wood et al. 2006) or worsen (e.g., parent encouragement of avoidance; Barrett et al. 1996) anxiety treatment outcomes. Therefore, in addition to traditional CBT with children, supplemental parent training interventions may be helpful for cases in which interpretation biases appear to be a prominent maintaining factor of the child's anxiety. For instance, parents who tend to provide excessive reassurance to their anxious children may be instructed to appropriately minimize child distress, thereby challenging the child's interpretations (e.g., "mom is right, this is not as bad as I thought"). Likewise, interventions may focus on teaching specific parenting reactions to use in anxiety- and distress-provoking situations (such as firmly encouraging approach behaviors and avoiding rescuing the child) to maximize the reduction of anxiety in children. Emotion socialization parent training programs have demonstrated some effectiveness for improving outcomes among young children and children with externalizing disorders (e.g., Herbert et al. 2013). To date, there is limited research examining similar techniques in families with children with anxiety disorders; yet, a recent randomized controlled trial of a brief family intervention addressing both parent and child factors yielded promising outcomes for reducing the 1-year incidence of anxiety disorders (Ginsburg et al. 2015). In this context, our findings call for additional efforts to examining the effectiveness of specific parent training techniques that incorporate the construct of emotion socialization to optimize outcomes in children with anxiety disorders.

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#### Compliance with Ethical Standards

**Conflict of Interest** Andres G. Viana, Laura J. Dixon, Erin N. Stevens and Chad Ebesutani declare that they have no conflicts of interest to declare.

**Ethical Approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed Consent** Informed consent was obtained from all individual participants included in the study.

**Animal Rights** No animal studies were carried out by the authors for this article.



## References

- Achenbach, T. M. (1991). *Manual for the child behavior checklist/4–18 and 1991 profile*. Burlington, VT: University of Vermont, Department of Psychiatry.
- Achenbach, T. M., McConaughy, S. H., & Howell, C. T. (1987). Child/adolescent behavioral and emotional problems: implications of cross-informant correlations for situational specificity. *Psychological Bulletin*, *11*, 213–232.
- Albano, A. M., & Silverman, W. K. (1996). *Anxiety disorders interview schedule for DSM-IV child version: clinician manual*. San Antonio, TX: Psychological Corporation.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text revision). Washington, DC: Author.
- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology*, *51*, 1173–1182.
- Barrett, P. M., Rapee, R. M., Dadds, M. M., & Ryan, S. M. (1996). Family enhancement of cognitive style in anxious and aggressive children. *Journal of Abnormal Child Psychology*, *24*, 187–203.
- Beard, C. (2011). Cognitive bias modification (CBM) for anxiety: Current evidence and future directions. *Expert Review of Neurotherapeutics*, *11*, 299–311.
- Beard, C., & Amir, N. (2009). Interpretation in social anxiety: When meaning precedes ambiguity. *Cognitive Therapy and Research*, *33*, 406–415.
- Beard, C., Weisberg, R. B., & Amir, N. (2011). Combined cognitive bias modification treatment for social anxiety disorder: A pilot trial. *Depression and Anxiety*, *28*, 981–988.
- Bodden, D. H. M., Dirksen, C. D., & Bögels, S. M. (2008). Societal burden of clinically anxious youth referred for treatment: a cost-of-illness study. *Journal of Abnormal Child Psychology*, *36*, 487–497.
- Bögels, S., & Brechman-Toussaint, M. (2006). Family issues in child anxiety: Attachment, family functioning, parental rearing and beliefs. *Clinical Psychology Review*, *26*, 834–856.
- Brown, G. L., Craig, A. B., & Halberstadt, A. G. (2015). Parent gender differences in emotion socialization behaviors vary by ethnicity and child gender. *Parenting: Science and Practice*, *15*, 135–157.
- Chorpita, B. F., Albano, A. M., & Barlow, D. H. (1996). Cognitive processing in children: Relation to anxiety and family influences. *Journal of Child Clinical Psychology*, *25*, 170–176.
- Choudhury, M. S., Pimentel, S. S., & Kendall, P. C. (2003). Childhood anxiety disorders: Parent–child (dis)agreement using a structured interview for the DSM–IV. *Journal of the American Academy of Child & Adolescent Psychiatry*, *42*, 957–964.
- Comer, J. S., & Kendall, P. C. (2004). A symptom-level examination of parent–child agreement in the diagnosis of anxious youths. *Journal of the American Academy of Child and Adolescent Psychiatry*, *43*, 878–886.
- Costello, E. J., Egger, H. L., & Angold, A. (2005). 10-Year research update review: The epidemiology of child and adolescent psychiatric disorders: I. Methods and public health burden. *Journal of the American Academy Child and Adolescent Psychiatry*, *44*, 972–986.
- Creswell, C., Cooper, P., & Murray, L. (2010). Intergenerational transmission of anxious information processing bias. In J. A. Hadwin & A. P. Field (Eds.), *Information processing and anxiety: A developmental perspective* (pp. 279–296). Chichester: Wiley.
- Creswell, C., & O'Connor, T. G. (2011). Interpretation bias and anxiety in childhood: Stability, specificity and longitudinal associations. *Behavioural and Cognitive Psychotherapy*, *39*, 191–204.
- Creswell, C., Schniering, C. A., & Rapee, R. M. (2005). Threat interpretation in anxious children and their mothers: Comparison with nonclinical children and the effects of treatment. *Behaviour Research and Therapy*, *43*, 1375–1381.
- Denham, S. A. (1993). Maternal emotional responsiveness and toddlers' social–emotional competence. *Child Psychology & Psychiatry & Allied Disciplines*, *34*, 715–728. doi:10.1111/j.1469-7610.1993.tb01066.x.
- Dodd, H. F., Hudson, J., Morris, T., & Wise, C. (2012). Interpretation bias in preschool children at risk for anxiety: A prospective study. *Journal of Abnormal Psychology*, *121*, 28–38.
- Drake, K. L., & Ginsburg, G. S. (2012). Family factors in the development, treatment, and prevention of childhood anxiety disorders. *Clinical Child and Family Psychology Review*, *15*, 144–162. doi:10.1007/s10567-011-0109-0.
- Dunn, J., Brown, J., Slomkowski, C., Tesla, C., & Youngblade, L. M. (1991). Young children's understanding of other people's feelings and beliefs: Individual differences and their antecedents. *Child Development*, *62*, 1352–1366.
- Eisenberg, N., Cumberland, A., & Spinrad, T. (1998). Parental socialization of emotion. *Psychological Inquiry*, *9*, 241–273.
- Eisenberg, N., & Fabes, R. (1994). Mothers' reactions to children's negative emotions: Relations to children's temperament and anger behavior. *Merrill-Palmer Quarterly*, *40*, 138–156.
- Eisenberg, N., Fabes, R. A., Carlo, G., & Karbon, M. (1992). Vicarious emotional responsiveness and social competence. In N. Eisenberg & R. A. Fabes (Eds.), *New directions in child development* (pp. 57–74). San Francisco: Jossey-Bass.
- Eisenberg, N., Fabes, R. A., & Murphy, B. C. (1996). Parents' reactions to children's negative emotions: Relations to children's social competence and comforting behavior. *Child Development*, *67*, 2227–2247.
- Fabes, R. A., Eisenberg, N., & Bernzweig, J. (1990). The coping with children's negative emotions scale. Unpublished manuscript.
- Fabes, R. A., Poulin, R. E., Eisenberg, N., & Madden-Derdich, D. A. (2002). The Coping with Children's Negative Emotions Scale (CCNES): Psychometric properties and relations with children's emotional competence. *Marriage and Family Review*, *34*, 285–310.
- Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G\*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*, 175–191.
- Field, A. P., Lawson, J., & Banerjee, R. (2008). The verbal threat information pathway to fear in children: The longitudinal effects on fear cognitions and the immediate effects on avoidance behavior. *Journal of Abnormal Psychology*, *117*, 214–224.
- Field, A. P., & Schorah, H. (2007). The verbal information pathway to fear and heart rate changes in children. *Journal of Child Psychology and Psychiatry*, *48*, 1088–1093. doi:10.1111/j.1469-7610.2007.01772.x.
- Gifford, S., Reynolds, S., Bell, S., & Wilson, C. (2008). Threat interpretation bias in anxious children and their mothers. *Cognition and Emotion*, *22*, 497–508.
- Ginsburg, G. S., Drake, K. L., Tein, J. Y., Teetsel, R., & Riddle, M. A. (2015). Preventing onset of anxiety disorder in offspring of anxious parents: A randomized controlled trial of a family-based intervention. *American Journal of Psychiatry*. doi: 10.1176/appi.ajp.2015.14091178. (Advance online publication).
- Ginsburg, G. S., & Schlossberg, M. C. (2002). Family-based treatment of childhood anxiety disorders. *International Review of Psychiatry*, *14*, 143–154.
- Grills, A. E., & Ollendick, T. H. (2002). Issues in parent–child agreement: The case of structured diagnostic interviews. *Clinical Child and Family Psychology Review*, *5*, 57–83.



- Hadwin, J. A., Garner, M., & Perez-Olivas, G. (2006). The development of information processing biases in childhood anxiety: A review and exploration of its origins in parenting. *Clinical Psychology Review, 26*, 876–894.
- Hayes, A. F. (2012). PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling [White paper]. Retrieved from <http://www.afhayes.com/public/process2012.pdf>.
- Heitjan, D. F., & Basu, S. (1996). Distinguishing “missing at random” and “missing completely at random”. *The American Statistician, 50*, 207–213.
- Herbert, S. D., Harvey, E. A., Roberts, J. L., Wichowski, K., & Lugo-Candelas, C. I. (2013). A randomized controlled trial of a parent training and emotion socialization program for families of hyperactive preschool-aged children. *Behavior Therapy, 44*, 302–316. doi:10.1016/j.beth.2012.10.004.
- Hogendoorn, S. M., Wolters, L. H., Haan, E., Lindauer, R. L., Tillema, A., Vervoort, L., et al. (2014). Advancing an understanding of the Anxiety Control Questionnaire for Children (ACQ-C) in clinically anxious and non-anxious youth: Psychometric properties, incremental prediction and developmental differences. *Journal of Psychopathology and Behavioral Assessment, 36*, 288–299. doi:10.1007/s10862-013-9386-x.
- Holm, S. (1979). A simple sequentially rejective multiple test procedure. *Scandinavian Journal of Statistics, 6*, 65–70.
- Hudson, J. L., & Rapee, R. M. (2004). From anxious temperament to disorder: An etiological model. In R. G. Heimberg, C. L. Turk, & D. S. Mennin (Eds.), *Generalized anxiety disorder: Advances in research and practice* (pp. 51–74). New York: Guilford.
- Hurrell, K. E., Hudson, J. L., & Schniering, C. A. (2015). Parental reactions to children’s negative emotions: Relationships with emotion regulation in children with an anxiety disorder. *Journal of Anxiety Disorders, 29*, 72–82.
- Jaccard, J., & Guilamo-Ramos, V. (2002). Analysis of variance frameworks in clinical child and adolescent psychology: Issues and recommendations. *Journal of Clinical Child and Adolescent Psychology, 31*, 130–146.
- Jarvis, B. G. (2012). DirectRT (Ver. 2012). [Computer Software]. New York: NY: Empirisoft.
- Jones, S., Eisenberg, N., Fabes, R. A., & MacKinnon, D. (2002). Parents’ reactions to elementary school children’s negative emotions: Relations to social and emotional functioning at school. *Merrill-Palmer Quarterly, 48*, 133–159.
- Leitenberg, H., Yost, L., & Carroll-Wilson, M. (1986). Negative cognitive errors in children: Questionnaire development, normative data, and comparisons between children with and without self-reported symptoms of depression, low self-esteem and evaluation anxiety. *Journal of Consulting and Clinical Psychology, 54*, 528–536.
- Lester, K. J., Field, A. P., & Muris, P. (2011). Experimental modification of interpretation bias regarding social and animal fear in children. *Journal of Anxiety Disorders, 25*, 697–705.
- Little, R. J., & Rubin, D. B. (1989). The analysis of social science data with missing values. *Sociological Methods & Research, 18*, 292–326.
- Maric, M., Heyne, D. A., van Widenfelt, B. M., & Westenberg, P. M. (2011). Distorted cognitive processing in youth: The structure of negative cognitive errors and their associations with anxiety. *Cognitive Therapy and Research, 35*, 11–20.
- Marsh, H. W., Hau, K. T., Wen, Z., Nagengast, B., & Morin, A. J. S. (2011). Moderation. In T. D. Little (Ed.), *Oxford handbook of quantitative methods*. New York: Oxford University Press.
- Mathews, A., & MacLeod, C. (2002). Induced processing biases have causal effects on anxiety. *Cognition and Emotion, 16*, 331–354.
- Merikangas, K., He, J., Burstein, M., Swanson, S. A., Avenevoli, S., Cui, L., et al. (2010). Lifetime prevalence of mental disorders in U.S. adolescents: Results from the National Comorbidity Survey Replication-Adolescent Supplement (NCS-A). *Journal of the American Academy of Child and Adolescent Psychiatry, 49*, 980–989. doi:10.1016/j.jaac.2010.05.017.
- Muris, P. (2010). Anxiety-related reasoning biases in children and adolescents. In J. Hadwin & A. Field (Eds.), *Information-processing biases and anxiety: A developmental perspective* (pp. 21–46). Chichester, UK: Wiley.
- Perez-Olivas, G., Stevenson, J., & Hadwin, J. A. (2008). Do anxiety-related attentional biases mediate the link between maternal over involvement and separation anxiety in children? *Cognition and Emotion, 22*, 509–521.
- Pina, A., Silverman, W. K., Saavedra, L., & Weems, C. (2001). An analysis of the RCMAS lie scale in a clinic sample of anxious children. *Journal of Anxiety Disorders, 15*, 443–457.
- Remmes, C. S. (2012). *Parental distress responding to adolescent negative emotionality: Influence on anxiety and depression symptom severity and treatment outcome* (Doctoral dissertation, University of Miami). Retrieved from [http://scholarlyrepository.miami.edu/cgi/viewcontent.cgi?article=1376&context=oa\\_theses](http://scholarlyrepository.miami.edu/cgi/viewcontent.cgi?article=1376&context=oa_theses).
- Reynolds, C. R., & Richmond, B. O. (1978). What I think and feel: A revised measure of children’s manifest anxiety. *Journal of Abnormal Child Psychology, 6*, 271–280.
- Reynolds, C. R., & Richmond, B. O. (1985). *Revised Children’s Manifest Anxiety Scale manual*. Los Angeles, CA: Western Psychological Services.
- Rubin, L. H., Witkiewitz, K., Andre, J. S., & Reilly, S. (2007). Methods for handling missing data in the behavioral neurosciences: Don’t throw the baby rat out with the bath water. *Journal of Undergraduate Neuroscience Education, 5*(2), A71–A77.
- Sameroff, A. (Ed.). (2009). *The transactional model of development: How children and contexts shape each other*. Washington, DC: American Psychological Association.
- Silverman, W. K., & Albano, A. (1996). *The anxiety disorders interview schedule for children for DSM-IV [Child and Parent Versions]*. San Antonio, TX: Psychological Corporation.
- Silverman, W. K., Pina, A. A., & Viswesvaran, C. (2008). Evidence-based psychosocial treatments for phobic and anxiety disorders in children and adolescents. *Journal of Clinical Child and Adolescent Psychology, 37*, 105–130. doi:10.1080/15374410701817907.
- Silverman, W. K., Saavedra, L. M., & Pina, A. A. (2001). Test-retest reliability of anxiety symptoms and diagnoses using the Anxiety Disorders Interview Schedule for DSM-IV: Child and Parent Versions. *Journal of the American Academy of Child and Adolescent Psychiatry, 40*, 937–944.
- Southam-Gerow, M. A., Silverman, W. K., & Kendall, P. C. (2006). Client similarities and differences in two childhood anxiety disorders research clinics. *Journal of Clinical Child and Adolescent Psychology, 35*, 528–538.
- SPSS, Inc. (2011). *S.P.S.S. 20.0 base user’s guide*. Chicago: Prentice Hall.
- Suveg, C., Shaffer, A., Morelen, D., & Thomassin, K. (2011). Links between maternal and child psychopathology symptoms: Mediation through child emotion regulation and moderation through maternal behavior. *Child Psychiatry and Human Development, 42*, 507–520.
- Suveg, C., Zeman, J., Flanner-Schroeder, E., & Cassano, M. (2005). Emotion socialization in families of children with an anxiety disorder. *Journal of Abnormal Child Psychology, 33*, 145–155.
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Baltimore, MD: Allyn and Bacon.
- Taghavi, M. R., Moradi, A. R., Neshat-Doost, H. T., Yule, W., & Dalgleish, T. (2000). Interpretation of ambiguous emotional

- information in clinically anxious children and adolescents. *Cognition and Emotion*, *14*, 809–822.
- Tao, A., Zhou, Q., & Wang, Y. (2010). Parental reactions to children's negative emotions: Prospective relations to Chinese children's psychological adjustment. *Journal of Family Psychology*, *24*, 135–144.
- Thulin, U., Svirsky, L., Serlachius, E., Andersson, G., & Öst, L. (2014). The effect of parent involvement in the treatment of anxiety disorders in children: A meta-analysis. *Cognitive Behaviour Therapy*, *43*, 185–200. doi:[10.1080/16506073.2014.923928](https://doi.org/10.1080/16506073.2014.923928).
- Van Ameringen, M., Mancini, C., & Farvolden, P. (2003). The impact of anxiety disorders on educational achievement. *Journal of Anxiety Disorders*, *17*, 561–571.
- Vassilopoulos, S., Banerjee, R., & Prantzalou, C. (2009). Experimental modification of interpretation bias in socially anxious children: Changes in interpretation, anticipated interpersonal anxiety, and social anxiety symptoms. *Behaviour Research and Therapy*, *47*, 1085–1089.
- Viana, A. G., Ebesutani, C., Young, J., Tull, M. T., & Gratz, K. L. (2012). Childhood exposure to parental threatening behaviors and anxiety symptoms in a community sample of young adults: The mediating role of cognitive biases. *Cognitive Therapy and Research*, *36*, 670–680.
- Waters, A. M., Craske, M. G., Bergman, R. L., & Treanor, M. (2008). Threat interpretation bias as a vulnerability factor in childhood anxiety disorders. *Behaviour Research and Therapy*, *46*, 39–47.
- Wilson, E. J., MacLeod, C., Mathews, A., & Rutherford, E. M. (2006). The causal role of interpretive bias in anxiety reactivity. *Journal of Abnormal Psychology*, *115*, 103–111.
- Wood, J. J., Piacentini, J. C., Southam-Gerow, M., Chu, B. C., & Sigman, M. (2006). Family cognitive behavioral therapy for child anxiety disorders. *Journal of the American Academy of Child and Adolescent Psychiatry*, *45*, 314–321. doi:[10.1097/01.chi.0000196425.88341.b0](https://doi.org/10.1097/01.chi.0000196425.88341.b0).