Published in final edited form as:

J Clin Child Adolesc Psychol. 2013 ; 42(5): 577–589. doi:10.1080/15374416.2012.759225.

Preschool Anxiety Disorders: Comprehensive Assessment of Clinical, Demographic, Temperamental, Familial, and Life Stress Correlates

Lea R. Dougherty, Ph.D.^a, Marissa R. Tolep, M.A.^a, Sara J. Bufferd, Ph.D.^b, Thomas M. Olino, Ph.D.^c, Margaret Dyson, M.A.^b, Jennifer Traditi, B.A.^b, Suzanne Rose, M. A.^b, Gabrielle A. Carlson, M.D.^d, and Daniel N. Klein, Ph.D.^b

Lea R. Dougherty: ldougher@umd.edu; Marissa R. Tolep: mtolep@umd.edu; Sara J. Bufferd: sbufferd@notes.cc.sunysb.edu; Thomas M. Olino: olinotm@upmc.edu; Jennifer Traditi: Jennifer.traditi09@stjohns.edu; Suzanne Rose: srose1interview@optonline.net; Gabrielle A. Carlson: gabrielle.carlson@stonybrook.edu; Daniel N. Klein: dklein@notes.cc.sunysb.edu

^aUniversity of Maryland College Park, Department of Psychology, Bio Psy Building, College Park, Maryland 20742

^bStony Brook University, Department of Psychology, Stony Brook, NY 19742

^cWestern Psychiatric Institute and Clinic, University of Pittsburgh School of Medicine, Pittsburgh, PA

^dStony Brook University School of Medicine, Department of Psychiatry, Stony Brook, NY 19742

Abstract

This study examined correlates of preschoolers' anxiety disorders using a comprehensive, multi-method design. Participants included a community sample of 541 three-year-old children, of whom 106 (19.6%) met criteria for at least one anxiety disorder. Child and parental psychopathology and life stress were assessed with clinical interviews. Child temperament and parenting behavior were assessed with laboratory observations. Mothers and fathers reported on their parenting styles. Compared to preschoolers with no anxiety disorder, preschoolers with an anxiety disorder were more likely to meet criteria for comorbid depressive and oppositional defiant disorders and to exhibit greater temperamental behavioral inhibition and lower positive affectivity, and more sleep problems. Children with anxiety disorders also experienced more stressful life events in the previous six months, and their mothers had a higher rate of current anxiety disorders. Compared to children with other anxiety disorders, children with only specific phobia exhibited a somewhat different pattern of associations than children with other anxiety disorders. Overall, the findings suggest that many of the correlates observed in older youth with anxiety disorders are also observed in preschoolers.

Keywords

preschool; anxiety disorders; temperament; parenting

Anxiety disorders are one of the most common mental disorders, highly comorbid with each other and with other disorders, and associated with substantial impairment across the lifespan (Beesdo, Knappe, & Pine, 2009; Kessler et al., 2005; Rapee, Schniering, & Hudson,

Correspondence should be directed to Lea R. Dougherty at the Department of Psychology, University of Maryland, College Park, MD, 20742; Tel. 301-405-5464; Fax 301- 314-9566; ldougher@umd.edu.

Authors report no conflicts of interest.

2009). Individuals with anxiety disorders are at increased risk for developing subsequent anxiety, depressive and substance use disorders (Bittner et al., 2007). Evidence suggests that anxiety disorders often emerge early in life (Beesdo et al., 2009; Kessler et al., 2005). However, little is known about anxiety disorders during early childhood, as research has predominantly examined anxiety disorders in school-age children and adolescents. Further knowledge about anxiety disorders in early childhood is critical for improving early identification and informing efforts to intervene early and effectively during the preschool years (e.g., Hirshfeld-Becker et al., 2010).

It is only recently that developmentally-sensitive, structured diagnostic interviews with parents for the assessment of preschool psychopathology have become available (e.g., Egger et al., 2006). Accumulating evidence supports the reliability and validity of structured diagnostic interviews in young children (e.g., Birmaher et al., 2008; Egger et al., 2006; Lavigne, LeBailly, Hopkins, Gouze, & Bins, 2009). This emerging research provides evidence that psychiatric disorders in preschoolers have similar prevalence rates to those observed in school-age children, show a similar structure as observed in older individuals, and are associated with significant impairment (e.g., for a review see Egger & Angold, 2006; also see Bufferd, Dougherty, Carlson, & Klein, 2011; Lavigne et al., 2009; Sterba, Egger, & Angold, 2007). These studies also suggest that anxiety disorders are one of the most common forms of psychopathology in preschoolers, and a recent study found that anxiety symptoms during early childhood predicted later anxiety symptoms in kindergarten and second grade, highlighting the stability and clinical significance of early anxiety (Mian, Wainright, Briggs-Gowan, & Carter, 2011). Likewise, Hudson, Dodd, Lyneham and Bovopoulos (2011) reported that anxiety disorders in four year-old children predicted anxiety disorders at age six years.

Most contemporary theoretical models of anxiety development propose multiple bidirectional influences on childhood anxiety, including internal (biological/genetic, cognitive/affective) and external (familial, social-environmental) risk factors, and within- and cross-level interactions of these factors in various contexts (for reviews see Murray, Creswell, & Cooper, 2009; South-Gerow & Chorpita, 2007; Weems & Stickle, 2005). Consistent with this framework, empirical evidence in school-age children and adolescents provide strong support that anxiety disorders are likely multiply determined by a diverse array of individual and contextual-level factors. First, family aggregation and genetic studies indicate increased risk for anxiety in the offspring of parents with anxiety and depressive disorders (for a review see Beesdo et al., 2009). The intergenerational transmission of risk may reflect both genetic factors, as well as disruptions in parenting, particularly as anxious and depressed parents may exhibit greater parental control and rejection, which may limit the child's sense of competency and reinforce the child's anxious/avoidant behaviors (e.g., Goodman & Gotlib, 1999; Wood, McLeod, Sigman, Hwang, & Chu, 2003).

Second, developmental psychopathology research has provided considerable support for associations between child temperament and anxiety disorders, both concurrently and prospectively (Degnan, Almas, & Fox, 2010; Fox, Henderson, Marshall, Nichols, & Ghera, 2005; Hirshfeld-Becker et al., 2003; Tacket, 2006). The majority of this research has investigated the role of behavioral inhibition (BI), which overlaps with the fearfulness facet of negative affectivity (NA), and is characterized by fear and a tendency to withdraw from novel and unfamiliar objects, situations or people, and risk for subsequent anxiety disorders, particularly social anxiety (Degnan et al., 2010; Hirshfeld-Becker et al., 2003). In contrast, much less research has examined associations between positive affectivity (PA) and anxiety disorders. Theorists (e.g., Clark & Watson, 1999) have generally hypothesized that low PA is specific to depression; however, studies in older youth and adults have reported

associations between low PA and anxiety, particularly social phobia (for a review see Anderson & Hope, 2008).

Third, demographic and social-environmental characteristics may directly or in combination with other vulnerability factors (e.g., child temperament, genetic/familial risk) increase risk for anxiety disorders. Evidence suggests that anxiety disorders in older children are associated with female gender and several social-environmental factors including exposure to life stress, socio-economic disadvantage, parenting, and learning processes, such as classical conditioning, modeling and verbal transfer of information (for reviews see Beesdo et al., 2009; Murray et al., 2009; Rapee et al., 2009). This work has particularly emphasized the role of parent-child relationships and parenting styles characterized by rejection and control, as well as broader parental socialization factors, such as limiting the use of daycare and exposure to challenging social contexts, in contributing to child anxiety (McLeod et al., 2007; Rapee & Szollos, 2003; van der Bruggen, Stams, & Bögels, 2008).

To our knowledge, only three studies have investigated correlates of anxiety disorders in early childhood (Hudson, Dodd, & Bovopoulos, 2011; Shamir-Essakow, Ungerer, & Rapee, 2005; Wolfson, Fields, & Rose, 1987). Hudson and colleagues (2011) reported that in a sample of 202 preschool children selected on high and low BI status, the presence of a clinical anxiety diagnosis in preschoolers was associated with child BI and maternal anxiety; no significant effects of family environmental factors, such as parenting or attachment style, on preschool anxiety disorders were observed. Shamir-Essakow and colleagues (2005) reported that in a sample of 104 preschoolers selected on high and low BI status, total number of anxiety disorders, as assessed using a parent-reported clinical interview, was associated with observed BI, maternal trait anxiety, and insecure attachment styles. Lastly, in a sample of 47 4–6 year-old children, Wolfson and colleagues (1987) reported an association between preschoolers' anxiety diagnoses, based on a psychiatric screening with parents, and difficult temperament. There has also been a series of seminal studies conducted by Scheeringa and colleagues (e.g., Scheeringa, Peebles, Cook, & Zeanah, 2001) examining the reliability and validity of post-traumatic stress disorder (PTSD) in preschool-age children. Although this work has been highly informative, it is limited to PTSD and a few comorbid conditions in clinical samples. Thus, further studies of anxiety disorders in early childhood are needed to explore the validity and clinical significance of preschool anxiety disorders beyond PTSD.

A number of studies have examined correlates of anxious (Edwards, Rapee, & Kennedy, 2010; Marakovitz, Wagmiller, Mian, Briggs-Gowan, & Carter, 2011; Willoughby, Angold, & Egger, 2008) and internalizing symptoms (Hastings et al., 2008; Morrissey, 2009; Manassis, Bradley, Goldberg, Hood, & Swinson, 1995; Robinson & Cartwright-Hatton, 2008) during early childhood. These studies suggest that several of the correlates of anxiety in older children, including BI and NA, maternal affective symptoms, sleep problems, negative life events, more frequent changes in childcare, and a range of parenting styles, including high control, low support, authoritarian, and permissive parenting, are associated with preschoolers' anxiety or internalizing symptomatology.

Although the few studies of anxiety disorders in preschoolers and the larger literature on anxiety symptoms provide a foundation for understanding preschool anxiety disorders, they have several important limitations. First, the studies examining anxiety disorders in preschool-age children used relatively small or selected samples and did not use standardized measures designed specifically for assessing psychiatric disorders during early childhood. Second, the majority of the studies used parent rating scales to assess children's anxious or internalizing symptoms rather than anxiety disorder diagnoses that take into account the nature, severity and duration of symptoms and associated impairment. Third,

with one notable exception (Hudson et al., 2011), these studies did not examine associations between anxiety disorders and multiple factors simultaneously using a multivariate approach or incorporate multiple methods and informants. Finally, no study has taken preschoolers' psychiatric comorbidity into account, which is important given the high rates of comorbidity during this developmental period (Egger & Angold, 2006).

We previously reported on the rates of DSM-IV-TR psychiatric disorders (American Psychiatric Association, 2000), including anxiety and depressive disorders, oppositional defiant disorder (ODD), and attention-deficit/hyperactivity disorder (ADHD) in a large community sample of 541 preschool-age children (Bufferd et al., 2011) and their relations with empirically-derived temperament dimensions (Dougherty et al., 2011). This paper extends our previous work and contributes to the extant literature by examining the correlates of preschool anxiety disorders assessed with a developmentally appropriate clinical interview with parents. As this is part of an on-going longitudinal study, the current study aims to provide cross-sectional data on the validity of preschool anxiety disorders using the construct validation framework proposed by Robins and Guze (1970) for psychiatric disorders. This includes testing whether clinical characteristics, laboratory measures, and familial aggregation provide convergent validity consistent with etiological models of anxiety. Given the cross-sectional nature of this assessment, however, we cannot infer directionality of associations or determine whether the correlates observed are risks, concomitants or consequences of the disorder. These critical questions will be addressed in future papers examining the developmental trajectories of preschool anxiety disorders over time.

For the current report, preschoolers with and without anxiety disorders were compared across multiple domains, including demographic and clinical characteristics, temperament, parental psychopathology, parenting, and life stress. Multiple methods were employed, including questionnaires, semi-structured interviews, and laboratory observations. Based on theoretical models of anxiety development (for reviews see Murray et al., 2009; South-Gerow & Chorpita, 2007; Weems & Stickle, 2005) and research with preschoolers with anxiety symptomatology, we hypothesized that preschoolers with anxiety disorders would exhibit greater temperamental BI and NA and lower levels of PA, and would come from environments characterized by problematic parenting, parental anxiety and depressive disorders, high levels of life stress, and less time spent in non-parental care settings.

In addition, we had three exploratory aims. First, given the high rates of comorbidity in preschool psychopathology, we explored which significant bivariate correlates made a significant unique contribution in multivariate analyses, after accounting for comorbid diagnoses. Second, we explored whether the patterns of association differ by temperament and/or gender. With respect to temperament, we examined whether interactions between child temperament and social-contextual factors, including parental psychopathology, parenting and life stress, contribute to child anxiety disorders, as emerging research suggests that children with temperamental vulnerabilities (i.e., BI and NA) are at greater risk for anxiety symptomatology in the context of environmental adversity (Crockenberg & Leerkes, 2006; Degnan, Henderson, Fox, & Rubin, 2008; Marakovitz et al., 2011). We did not anticipate findings to differ by gender as the literature reviewed above suggests that patterns of association and moderation differ minimally for boys and girls.

Lastly, recent dimensional models of adult psychopathology suggest a distinction between fear (phobic)- and anxiety (distress)-related anxiety disorders (Vaidyanathan, Nelson, & Patrick, 2012; Watson, 2005). Support for a distinction between a fear factor, as exemplified by specific phobias, and an anxiety/distress factor has been documented using personality, diagnostic and neurobiological data (Davis et al., 2010; Vaidyanathan et al., 2012). In

addition, findings suggest that fear and anxiety are mediated by different neurobiological pathways and respond differently to anxiolytic medication (Davis et al., 2010). Therefore, we explored whether similar distinctions were evident in young children with anxiety disorders and examined whether findings differed between children with a specific phobia diagnosis only, which is the exemplar of fear-related disorders, and children with other anxiety disorders but no specific phobias.

Method

Participants

Families with a 3-year-old child living within 20 contiguous miles of Stony Brook, NY were eligible to participate in a study of temperament and psychopathology (Dougherty et al., 2011). Potential participants were identified via a commercial mailing list, and eligible families had a child between three and four years of age with no significant medical conditions or developmental disabilities, and at least one English-speaking biological parent. Of the 815 families who were identified as eligible, 66.4% ($n = 541$) entered the study and provided diagnostic information about the child. There were no significant differences between families who did and did not participate on various demographic variables. The study was approved by the human subjects review committee, and informed consent was obtained from parents. Parents received \$10 or \$30 for completing questionnaires, \$50 for completing clinical interviews, and \$100 for completing laboratory visits.

Parents of 541 children (45.7% female) were interviewed with the Preschool Age Psychiatric Assessment (PAPA; Egger, Ascher, & Angold, 1999). Children's mean age was 3.6 years ($SD = 0.3$). The mean ages of mothers and fathers were 35.9 years ($SD = 4.4$) and 38.3 years ($SD = 5.4$), respectively. Most participants came from two-parent (94.8%), middle-class families, as measured by Hollingshead's Four Factor Index of Social Status ($M = 45.0$; $SD = 11.0$) (Hollingshead, 1975), which provides an index of a family's socioeconomic status based on both parents' levels of education and occupation. Participants were mostly White/non-Hispanic (86.9%), and 9.1% were Hispanic.

Families who completed assessments were compared to those who did not on all variables reported in the paper, and three significant differences emerged. Mothers who completed self-reports of parenting had children who were significantly younger in age, $t(539) = -3.12$, $p = .002$. Fathers who completed self-reports of parenting were significantly more likely to be married $\chi^2(1, N = 541) = 18.40$, $p < .001$, and more likely to have a co-parent with a lifetime anxiety disorder, $\chi^2(1, N = 536) = 4.97$, $p = .026$.

Child Psychopathology and Functioning

Parents (98.0% mothers) were interviewed using the PAPA. The PAPA uses a structured format and an interviewer-based approach. The interviewer asks all required questions, but also confirms the parent's understanding of the question, elicits examples, and adheres to guidelines for rating all items. Most symptoms are assessed for the three months prior to the interview to maximize recall. Adequate test-retest reliability for diagnoses has been reported using independent interviews (kappas: 0.49–0.74; Egger et al., 2006).

The PAPA was used to derive DSM-IV diagnoses for the following diagnostic groups: any anxiety disorder (specific phobia, separation anxiety, social phobia, generalized anxiety, agoraphobia, selective mutism, and panic); any depressive disorder (major depression, dysthymia, and depression not otherwise specified); ODD, and ADHD. We also created dimensional symptom scales by summing the items included in each diagnostic category. Of the children, 19.6% ($n = 106$) met diagnostic criteria for at least one anxiety disorder, 1.8% ($n = 10$) for any depressive disorder, 9.4% ($n = 51$) for ODD, and 2.0% ($n = 11$) for ADHD.

(Bufferd et al., 2011). With respect to specific anxiety disorders, 9.1% ($n = 49$) of the children met diagnostic criteria for specific phobia, 5.4% ($n = 29$) for separation anxiety disorder, 4.4% ($n = 24$) for social phobia, 3.9% ($n = 21$) for generalized anxiety disorder, 3.5% ($n = 19$) for agoraphobia, 1.5% ($n = 8$) for selective mutism, and 0.2% ($n = 1$) for panic disorder. Of the children who met criteria for at least one anxiety disorder, 20.8% ($n = 22$) met criteria for two anxiety disorders, and 10.4% ($n = 11$) met criteria for three or more anxiety disorders. We compared children with one anxiety disorder ($n = 73$) to children with more than one anxiety disorder ($n = 33$) on all variables, and no significant differences were observed. Given the low frequency of children meeting diagnostic criteria for some of the individual anxiety disorders, and the considerable comorbidity between the anxiety disorders, we opted to examine the data at the level of whether or not the child met criteria for at least one anxiety disorder. None of the children with an anxiety disorder were taking psychotropic medication at the time of the interview. Four children (3.8%) with an anxiety disorder had received treatment.

Interviews were conducted by advanced graduate students in clinical psychology who received training on the administration of the PAPA from a member of the PAPA development team. Interviews lasted 1–2 hours and were conducted by telephone, as previous studies have demonstrated that face-to-face and telephone interviews yield similar results (Lyneham & Rapee, 2005). A second rater independently rated audiotapes of 21 PAPAs. Kappas for inter-rater reliability were 1.00 for all diagnoses. ICCs for the symptom scales were: depression (.85), anxiety (1.00), ADHD (.99), and ODD (.99). Internal consistency (Cronbach's α) values of the symptom scales were: depression (.75), anxiety (.83), ADHD (.89), and ODD (.84).

The PAPA also assesses 41 stressful and traumatic events affecting the child, as well as a number of sleep-related problems (e.g., nightmares, difficult to rouse) in the past three months. For the study, we summed the total number of stressful life events occurring in the past six months ($ICC = .93$, $n = 21$) to yield an aggregate measure of life stress. In addition, 7 sleep difficulties that did not overlap with any item used to derive diagnoses, dichotomously rated as absent or present, were summed to create a total sleep problems score ($ICC = 0.99$, $n = 21$).

Child Temperament

Children visited the laboratory for a 2-hour observational assessment of temperament that included a standardized set of 12 episodes from the Laboratory Temperament Assessment Battery (Lab-TAB; Goldsmith et al., 1995). Lab-TAB episodes are designed to elicit a variety of temperament-relevant emotions and behaviors (e.g., playing with novel and exciting toys; receiving a nicely wrapped “gift” that turns out to be an empty box; being left alone in a room and a stranger enters). Episodes were videotaped through a one-way mirror for observational coding. The experimenter and coders were blind to the PAPA interviews.

Given the substantial support for the relation between early temperament and anxiety disorders (Degnan et al., 2010; Rapee et al., 2009), we assessed BI, NA, and PA. Our coding system is described in detail elsewhere (Olino et al., 2010). BI was coded only in the three episodes designed to assess this behavior. Specific behaviors, such as latency to touch objects, tentative play, gaze aversion, latency to vocalize, and approach to and avoidance of a stranger were coded for each epoch, which spanned 20–30 seconds depending on the particular episode. Within each epoch, a maximum intensity rating of facial, bodily, and vocal fear was also coded. Except for latencies, behaviors were coded on three- or four-point scales. BI was computed as the average of the standardized ratings across epochs and episodes. BI exhibited good internal consistency ($\alpha = .80$) and inter-rater reliability ($ICC = .88$; $n = 28$). NA was the average of the standardized ratings of facial, vocal, and bodily

sadness, fear, and anger across all episodes. PA was the sum of the standardized ratings of facial, vocal, and bodily positive affect across all episodes. Composite NA and PA scores had adequate internal consistency ($\alpha = .74$ and $.87$, respectively) and inter-rater reliability (ICC $= .82$ and $.92$, respectively; $n = 35$). NA correlated $-.01$ ($n.s.$) with PA and $.40$ ($p < .001$) with BI; the correlation between PA and BI was $-.08$ ($p = .05$).

Parent Psychopathology

Children's biological parents were interviewed using the Structured Clinical Interview for DSM-IV, Non-patient version (SCID-NP; First, Spitzer, Gibbon, & Williams, 1996). The SCID is a widely used semi-structured diagnostic interview that has been documented to have good reliability and validity. If a parent could not be interviewed, we obtained information from the co-parent using the family history method (Andreasen, Endicott, Spitzer, & Winokur, 1977). The interviews were conducted by telephone by two Masters-level clinicians. Of the 541 children, we had diagnostic information on 537 mothers and 530 fathers. Direct SCID interviews were obtained from 536 mothers and 446 fathers. Based on audiotapes of 30 assessments, interrater reliability (indexed by kappa) for lifetime anxiety and depressive disorder diagnoses were $.91$ and $.93$, respectively. Rates of parental lifetime psychopathology are provided in Table 1.

Parenting Behavior

Of the 541 families who completed the PAPA interview, 524 children (96.9%) and their parents (93.5% mothers) returned for a second laboratory session that included a modified version of the Teaching Tasks battery (Egeland et al., 1995). The battery included six standardized tasks (e.g., book-reading, block-building) designed to elicit different parent and child behaviors and interaction styles. For coding, a series of variables were rated on five-point scales for each task, and ratings were averaged across tasks. The battery was coded by undergraduate psychology students, trained by a clinical psychology graduate student and the first author until 80% accuracy was reached. Weekly coding meetings were held, and when discrepancies were noted, the interactions were coded again by the graduate student and/or the first author who decided on the final value. Coders were unaware of child and parent diagnostic status and Lab-TAB data. We selected three indices of parental behavior with particular relevance for anxiety disorders (McLeod et al., 2007): parental support ($\alpha = .88$), hostility ($\alpha = .76$), and intrusiveness ($\alpha = .61$). Based on videotapes of 55 assessments coded independently by two raters, interrater ICCs, were $.85$, $.83$, and $.70$, respectively.

Mothers ($n = 494$) and fathers ($n = 400$) also completed the Parenting Styles and Dimensions Questionnaire (PSDQ; Robinson, Mandleco, Olsen, & Hart, 2001) to assess perceived parenting style. The PSDQ is a 37-item questionnaire with established reliability and validity. Parents rated each item on a 5-point scale ranging from 1 (*never*) to 5 (*always*). The questionnaire measures three parenting styles: authoritative (high control, high warmth), authoritarian (high control, low warmth), and permissive (low control, high warmth). Factors demonstrated adequate internal consistency: authoritative ($\alpha = .82$), authoritarian ($\alpha = .75$), and permissive ($\alpha = .74$).

Data Analyses

Pearson χ^2 (or Fisher's exact test when N 's were small) and independent samples t -tests were conducted between children with and without anxiety disorders on all variables in each of the following domains: demographics, non-parental childcare, child comorbid psychopathology and sleep problems, child temperament, parental psychopathology, observed parenting behaviors, parents' perceived parenting styles, and stressful life events. As these are relatively novel data, we report findings both with and without correction for multiple comparisons, although we emphasize the former in interpreting the findings. To

adjust for multiple comparisons within each domain, we used the Benjamini and Hochberg (1995) procedure. Benjamini-Hochberg adjusted p values are reported in Table 1 and in the text for analyses not presented in Table 1.

To determine the unique associations of variables with preschool anxiety disorders, logistic regression analyses were performed using preschool anxiety disorder group as the dependent variable and variables that distinguished the two groups in the bivariate analyses (uncorrected $p < 0.05$) as independent variables. Lastly, we estimated a series of logistic regressions to test the interactive effects of temperament and gender.

Results

Demographics

Children with and without anxiety disorders did not significantly differ on age, gender, ethnicity, parental marital status, Hollingshead's Four-Factor Index of Social Status, or school status (Table 1). Children with an anxiety disorder diagnosis were significantly less likely to have a parent who graduated from college ($\chi^2(1, N=539) = 5.36, p = .021, OR = 0.60$), and children with an anxiety disorder spent significantly fewer hours per week in daycare ($t(191.40) = -2.01, p = .046$, Cohen's $d = -0.20$) compared to children with no anxiety disorder. After correcting for multiple comparisons, however, these associations were no longer significant.

Child Psychopathology and Functioning

Children with and without an anxiety disorder were compared on any depressive disorder, ODD and ADHD diagnoses, and sleep problems (Table 1). Children with an anxiety disorder were more likely to have a comorbid depressive disorder ($p = .005$, Fisher's exact test, $OR = 6.47$) and ODD ($\chi^2(1, N=541) = 4.96, p = .026, OR = 2.03$), and had more sleep problems ($t(141.82) = 2.44, p = .016$, Cohen's $d = 0.28$). These associations remained significant after correcting for multiple comparisons.

Child Temperament

Children with and without an anxiety disorder were compared on three temperament factors (BI, NA, PA) (Table 1). Children with an anxiety disorder exhibited greater BI ($t(539) = 2.26, p = .024$, Cohen's $d = 0.24$) and less PA ($t(539) = -3.14, p = .002$, Cohen's $d = -0.33$). These associations remained significant after correcting for multiple comparisons. No significant differences were observed in NA. As certain facets of NA may be more specifically linked to anxiety disorders (i.e., fear), we compared the two groups of children on observations of fear, sadness, and anger. Children with an anxiety disorder exhibited significantly more sadness than children with no anxiety disorder ($t(539) = 2.24, p = .025$, Cohen's $d = 0.23$). No significant differences were observed for fear or anger (Cohen's $d = 0.16$ and 0.03 , respectively).

Parental Psychopathology

No significant differences were observed between groups on either parental lifetime anxiety or lifetime depressive disorder diagnoses (Table 1). When maternal and paternal psychopathology were examined separately, children with an anxiety disorder were significantly more likely to have mothers who experienced an anxiety disorder in the past month (21.7% vs. 13.0%, $\chi^2(1, N = 536) = 5.09, p = .024, OR = 1.85$). This relation remained significant after correcting for multiple comparisons ($p < .025$). No other significant differences were observed for maternal or paternal lifetime or current psychopathology.

Parenting

Parents (93.5% were mothers) of children with an anxiety disorder were observed to be significantly less supportive of their child in the laboratory than parents of children without an anxiety disorder ($t(522) = -2.11, p = .035$, Cohen's $d = -0.22$); there were no significant differences in observed hostile or intrusive parenting behaviors. Mothers of children with an anxiety disorder rated themselves as more authoritarian ($t(122.12) = 2.07, p = .041$, Cohen's $d = 0.25$) and more permissive ($t(492) = 1.97, p = .049$, Cohen's $d = 0.22$) than mothers of children with no anxiety disorder (Table 1). Fathers of children with an anxiety disorder rated themselves as more permissive ($t(398) = 2.34, p = .020$; Cohen's $d = 0.31$). The associations between children's anxiety disorders and parenting behaviors did not remain significant after correcting for multiple comparisons.

Life Stressors

Children with an anxiety disorder experienced more life stressors in the prior 6 months ($t(538) = 2.41, p = .016$, Cohen's $d = 0.23$) than children with no anxiety disorder (Table 1). This relation remained significant after correcting for multiple comparisons.

Multivariate Analyses

Variables that significantly distinguished children with and without an anxiety disorder diagnosis at a p -value of 0.05 or less were entered into a simultaneous multiple logistic regression analysis to determine which variables had unique associations with anxiety disorders after controlling for child comorbid psychiatric disorders.¹ Tolerance values for all variables in the model exceeded 0.70, indicating an acceptable degree of multicollinearity among the variables (Menard, 2002). As seen in Table 2, five variables made significant unique contributions to the model: greater child sleep problems, fewer hours per week in daycare, lower levels of observed child PA, greater number of life stressors experienced in the 6 months prior, and comorbid depressive disorder. Results were similar when PAPA symptom scales were included, rather than diagnoses.

Moderation Models—There were no significant interactions between child temperament and parenting, parental psychopathology, or life stress, and no evidence of moderation by gender in predicting child anxiety disorders.

Specific Phobia vs. Other Anxiety Disorder Diagnoses—Of children with anxiety disorders, 32 had only specific phobias, 57 had other anxiety disorders but no specific phobia, and 17 had both a specific phobia and another anxiety disorder. We ran multiple linear regressions for each variable in Table 1 as the dependent variable. The two independent variables in each model were: specific phobia diagnosis (absent or present) and other anxiety disorder diagnosis (absent or present), which allowed us to retain children with both specific phobia and other anxiety disorders to maximize power. After correcting for multiple comparisons, a diagnosis of specific phobia was associated with more life stressors in the six months prior ($b = .35, SE = .16, p = .024$). This association was not observed for the other anxiety disorders. The other anxiety disorders were associated with higher BI ($b = .06, SE = .03, p = .012$), lower PA ($b = -.08, SE = .03, p = .006$), higher sadness ($b = .09, SE = .04, p = .02$), and a higher rate of parents with a lifetime history of depression ($b = .15, SE = .06, p = .020$). These associations were not observed for a diagnosis of specific phobia.

¹We did not include paternal reports of permissiveness in the model, as its inclusion reduced the sample from 466 to 376 children. When we included paternal reports of permissiveness in the model, the results were similar and paternal permissiveness was not significant ($OR = 1.07, 95\% CI = .98 - 1.18, p = .114$).

Discussion

This study examined correlates of anxiety disorders in preschool-age children and found significant bivariate associations with demographic, child, familial, and contextual characteristics. After correcting for multiple comparisons within domains, the most robust correlates included child comorbid depression and ODD, child sleep problems, child temperamental BI and low PA, maternal current anxiety disorder diagnosis, and exposure to life stress. In the exploratory multivariate analysis, five variables made significant unique contributions to preschool anxiety disorders: child comorbid depression, child sleep problems, child low temperamental PA, less time spent in daycare, and stressful life events. These findings were generally consistent with theoretical models of anxiety development, and provide important empirical support validating the construct validity of preschool anxiety disorders.

Preschool Anxiety, Comorbidity, and Parental Psychopathology

Preschoolers with an anxiety disorder diagnosis were more likely to meet criteria for comorbid depression and ODD, which is consistent with other studies of preschool samples (Birmaher et al., 2009; Lavigne et al., 1996; 2009). These effects remained significant after correcting for multiple comparisons. Moreover, comorbid depression, as indexed by a depressive disorder diagnosis or depressive symptom scores, remained a significant correlate in the multivariate analysis. This pattern of comorbidity, as well as the overlap among the individual anxiety disorders, is similar to that observed in older youth (for a review see Rapee et al., 2009), and associations between anxiety and depression in adults. The finding with respect to comorbid depression requires replication as only 10 children met criteria for a depressive disorder; nevertheless, symptom scale scores yielded similar results.

A substantial body of research has supported the familial aggregation of anxiety disorders (for reviews see Beesdo et al., 2009; Rapee et al., 2009). We found that preschoolers with an anxiety disorder diagnosis were more likely to have a mother with a current anxiety disorder diagnosis; the effect of current maternal anxiety remained significant after correcting for multiple comparisons but it did not make a unique contribution in the multivariate analysis. No significant associations were observed for rates of anxiety disorders in fathers. The familial transmission of anxiety likely reflects both genetic and environmental factors. The stronger association between current maternal anxiety and preschoolers' anxiety disorder diagnoses is consistent with mechanisms of social learning, such as parental modeling of anxious or avoidant behaviors or attitudes, as well as with the possibility that cases of current anxiety are more persistent and severe.

Child Temperament

We found that preschoolers with anxiety disorders exhibited both higher levels of BI and lower levels of PA in the laboratory. Both BI and PA remained significant correlates after correcting for multiple comparisons. There were no significant differences in the composite score of NA, but preschoolers with anxiety disorders exhibited higher levels of sadness in the laboratory and no significant differences in fear and anger. The finding that sadness and not fearfulness was associated with children's anxiety was unexpected but may point to the close relationship between anxiety and depression (see below for further discussion of this finding).

Moreover, PA, and not BI, remained significant in the multivariate analysis. Differences in findings between the extant literature supporting associations with BI and NA and our findings may be due to methodological differences. For instance, even though BI was assessed using an approach that was similar to Kagan's (1989) traditional paradigms for

assessing BI, there are modest differences, particularly with respect to the coding of BI, which is detailed below. In addition, our laboratory-based assessment of temperament has been shown in an independent sample to demonstrate concurrent validity with home observations, as well as moderate stability from age 3 to age 7 (Durbin et al. 2007); however, fear evidenced the lowest stability over time, suggesting that observations of fear may vary more with the nature of the task at each assessment compared to other traits. Moreover, correlations of laboratory and home observations with parent-reports are fairly modest (Durbin et al., 2007). Therefore, parent-reports and teacher-reports of children's fearfulness, which capture the child's behavior in multiple contexts over time, may provide additional information and yield different results.

High BI and low PA share the feature of low approach/engagement. Nevertheless, we have previously shown in this sample and in an independent sample (Laptook et al., 2008; 2010) that the methods employed here successfully distinguish the two constructs. Both high BI and low PA are associated with low approach in novel laboratory contexts, but only low PA is distinguished by low approach in non-novel situations. Unfortunately, low PA and high BI are not always distinguished methodologically or conceptually in studies assessing temperament in young children, as laboratory measures of BI frequently include markers of PA, such as smiling. Moreover, PA is rarely examined in studies of anxiety and temperament. Therefore, it is possible that if BI and PA were both measured in previous studies, anxiety disorders would have been associated with both temperament constructs. The present findings require replication, but they raise the possibility that PA plays an important role in anxiety disorders, at least in young children. It is also possible that young children's fears and anxieties interfere with their ability to experience pleasure, particularly in novel laboratory contexts. Associations between low PA, high BI, and anxiety in early childhood may also provide insight into the origins of the developmental pathways between anxiety and depression.

Parenting Behavior

Parenting behavior shapes children's emotional and behavioral development in many ways during early childhood. In preschoolers, anxiety or internalizing symptoms have been associated with several types of problematic parenting behaviors (Edwards et al., 2010; Hastings et al., 2008; Robinson & Cartwright-Hatton, 2008). Consistent with these studies, we found that preschoolers with an anxiety disorder were more likely to have parents (typically mothers) who were observed as less supportive during a parent-child interaction. Both mothers and fathers of preschoolers with an anxiety disorder also rated themselves as more permissive, and mothers rated themselves as more authoritarian (i.e., strict, controlling parenting). These findings support associations between parenting and child anxiety disorders, using both observational and parent-report measures and contribute to the scant research on paternal parenting and children's anxiety. Nevertheless, it is important to note that the findings with respect to parenting should be interpreted with caution and require replication, as these associations did not persist after correcting for multiple comparisons.

Sleep Problems

We found that preschoolers with an anxiety disorder had more sleep problems than those without an anxiety disorder. Sleep problems remained a significant correlate after correcting for multiple comparisons and emerged as a significant unique correlate in the multivariate analyses. Associations between sleep problems and anxiety have been documented in older youth (Alfano et al., 2007; Forbes et al., 2007) and similar associations were reported in a sample of preschool-age children (Willoughby et al., 2008). Longitudinal studies provide evidence that sleep problems early in life are a unique predictor of the development of anxiety during adolescence (e.g., Ong, Wickramaratne, & Weissman, 2006). In addition,

anxious arousal appears to contribute to difficulties initiating and maintaining sleep (Tang & Harvey, 2004). It is important to identify the specific sleep disruptions observed in preschoolers with anxiety disorders and the mechanisms underlying the co-occurrence of anxiety and sleep problems, as this would aid in the development of interventions for anxious children and their families.

Social-Environmental Factors

Several social-environmental factors were related to preschoolers' anxiety disorders, including less parental education, more stressful life events in the previous six months, and fewer hours spent in daycare. After correcting for multiple comparisons, only the association between preschool anxiety disorders and stressful life events remained significant. Nevertheless, both stressful life events and hours spent in daycare emerged as significant unique correlates in the multivariate analysis. Stressful life events may reflect the presence of suboptimal environments for children. Studies in older youth have reported associations between anxiety disorders and low SES (e.g., Cronk, Slutske, Madden, Bucholz, & Heath, 2004) and more negative life events (e.g., Rapee & Szollos, 2003). One longitudinal study reported that the impact of negative life events predicted anxious symptoms a year later in preschoolers (Edwards et al., 2010).

In the multivariate analyses, less time spent in daycare emerged as a unique correlate of preschool anxiety disorders. Similarly, Rapee and Szollos (2003) found that 7–16 year old children with social phobia were more likely to have spent less time in daycare during early childhood. Identifying the reasons for this association is important: anxious preschoolers may be more likely to avoid social contexts or resist parental separation, or parental characteristics (e.g., overprotection) may contribute to less daycare attendance in anxious children. Parents' decisions regarding use of daycare may limit the child's exposure to positive peer experiences and opportunities to develop coping skills that may protect against the development of anxiety. For example, exposure to childcare was beneficial in decreasing inhibited behavior in early childhood in high-risk infants (Fox et al., 2001). Nevertheless, findings with respect to hours spent in daycare should be interpreted with caution, as this association did not persist after correcting for multiple comparisons.

Consistent with previous research, we did not observe gender differences in preschoolers with an anxiety disorder (Egger & Angold, 2006). Female gender has been related to risk for anxiety in older youth (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003), yet studies examining gender differences in anxiety across development are limited. More research examining the emergence of gender differences in anxiety disorders is warranted.

Moderating Role of Temperament and Gender

Despite the theoretical foundation and emerging support for the moderating role of temperament, and to a lesser extent gender, in contributing to children's anxiety symptoms (for a review see Degnan et al., 2010; Marakovitz et al., 2011), our findings did not differ by temperament or gender. Consistent with our findings, Hudson et al. (2011) reported no significant interactive effects between temperamental BI and family environmental factors as they relate to preschool anxiety disorders. Nevertheless, these questions are an important area of research, and we plan to continue investigating moderators as we examine the developmental progression of preschool anxiety disorders.

Specific Phobia vs. Other Anxiety Disorders

Given the heterogeneity among anxiety disorders, we explored whether specific phobia and other anxiety disorders had different correlates. After correcting for multiple comparisons, we found that specific phobia was associated with a greater number of life stressors in the

six months prior. In contrast, other anxiety disorders were associated with higher levels of BI and sadness, lower levels of PA, and parental history of depression. These findings are somewhat consistent with recent models of psychopathology that distinguish between fear- and distress-related anxiety disorders (Watson, 2005). Specific phobia is considered the prototype for fear disorders, as it is characterized by phasic or circumscribed fear to specific objects and/or contexts whereas other anxiety disorders are characterized by a more diffuse or sustained anxiety/distress (Davis, Walker, Miles, & Grillon, 2010). In so far as the other anxiety disorders in this study overlap with the distress disorders, it is interesting that they were associated with sadness and parental depression, as the distress-related anxiety disorders are closely intertwined with depression, and may have similar genetic influences (Watson, 2005). Our analyses were exploratory but suggest future avenues for differentiating anxiety disorders, even in very young children.

This study has several significant strengths. To our knowledge, this is the first study to examine correlates of anxiety disorders and account for psychiatric comorbidity in a large, unselected community sample of preschoolers using a multi-informant, multi-method approach. Given that the majority of children with mental health disorders are not referred for services (Lavigne et al., 2009) (e.g., only 3.8% of children with an anxiety disorder had received treatment in the current sample), the use of a community sample may permit greater generalization of results. In addition, we used the PAPA, which is one of the only psychiatric interviews designed for use with young children and that has demonstrated test-retest reliability.

The present study also had several limitations. First, data on child psychopathology was derived from parent reports. Although primary caregivers are the most knowledgeable of the child, validating caregiver reports is important. Hence, it is noteworthy that we demonstrated associations between caregiver-reported anxiety diagnoses and theoretically relevant variables derived from laboratory observations. Second, the sample was largely white and middle class. Further work is needed to examine anxiety disorders in more diverse populations. Third, our participants were recruited from the community and cannot be generalized to clinical populations. Fourth, many statistical tests were conducted, which may have yielded some false positives. Even though we report the results of adjusting for multiple tests, replication of our findings is necessary. Fifth, because of the high comorbidity and the few children meeting diagnostic criteria for some of the individual anxiety disorders, we were unable to examine correlates of each specific anxiety disorder. Lastly, the cross-sectional nature of the present study limits our interpretation about the directionality of the observed relations.

Implications for Research, Policy, and Practice

The present study adds to the nascent research characterizing psychopathology during early childhood. Our findings are particularly noteworthy given the difficulty of distinguishing some anxiety disorders from normative behavior during early childhood. Given the uncertainty of these boundaries, it is even more notable to find a meaningful set of significant associations that are consistent with theoretical models of the development of anxiety and parallel relations observed in older youth and adults. These results suggest that a number of child, familial and environmental factors may be appropriate targets for early intervention or may be used to select high-risk preschoolers for targeted prevention programs.

Acknowledgments

This work was supported by the following grants: NIMH grants RO1 MH069942 (DNK) and a GCRC Grant no. M01-RR10710 to Stony Brook University from the National Center for Research Resources.

References

- Alfano CA, Ginsburg GS, Kingery J. Sleep-related problems among children and adolescents with anxiety disorders. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2007; 46:224–232. [PubMed: 17242626]
- American Psychiatric Association. *Diagnostic and statistical manual of mental disorders*. 4. Washington, DC: Author; 2000.
- Anderson ER, Hope DA. A review of the tripartite model for understanding the link between anxiety and depression in youth. *Clinical Psychology Review*. 2008; 28:275–287. [PubMed: 17582665]
- Andreasen NC, Endicott J, Spitzer RL, Winokur G. The family history method using diagnostic criteria. Reliability and validity. *Archives of General Psychiatry*. 1977; 34:1229–1235. [PubMed: 911222]
- Beesdo K, Knappe S, Pine DS. Anxiety and anxiety disorders in children and adolescents: Developmental issues and implications for DSM-V. *Psychiatric Clinics of North America*. 2009; 32:483–524. [PubMed: 19716988]
- Benjamini Y, Hochberg Y. Controlling the false discovery rate: A practical and powerful approach to multiple testing. *Journal of the Royal Statistical Society Series B (Methodological)*. 1995; 57:289–300.
- Birmaher B, Ehmann M, Axelson DA, Goldstein BI, Monk K, Kalas C, et al. Schedule for affective disorders and schizophrenia for school-age children (K-SADS-PL) for the assessment of preschool children – A preliminary psychometric study. *Journal of Psychiatric Research*. 2009; 43:680–686. [PubMed: 19000625]
- Bittner A, Egger HL, Erkanli A, Costello EJ, Foley DL, Angold A. What do childhood anxiety disorders predict? *Journal of Child Psychology and Psychiatry*. 2007; 48:1174–1183. [PubMed: 18093022]
- Bufferd SJ, Dougherty LR, Carlson GA, Klein DN. Parent-Reported Mental Health in Preschoolers: Findings Using a Diagnostic Interview. *Comprehensive Psychiatry*. 2011; 52:359–369. [PubMed: 21683173]
- Cicchetti D, Curtis WJ. Multilevel perspectives on pathways to resilient functioning. *Development & Psychopathology*. 2009; 19:627–629. [PubMed: 17972420]
- Clark, LA.; Watson, D. Temperament: A new paradigm for trait psychology. In: Pervin, LA.; John, OP., editors. *Handbook of personality*. 2. New York: Guilford Press; 1999. p. 399–423.
- Costello EJ, Mustillo S, Erkanli A, Keeler G, Angold A. Prevalence and development of psychiatric disorders in childhood and adolescence. *Archives of General Psychiatry*. 2003; 60:837–844. [PubMed: 12912767]
- Crockenberg S, Leerkes E. Infant and maternal behavior moderate reactivity to novelty to predict anxious behaviors at 2.5 years. *Development & Psychopathology*. 2006; 18:17–34. [PubMed: 16478550]
- Cronk NJ, Slutske WS, Madden PAF, Bucholz KK, Heath AC. Risk for separation anxiety disorder among girls: Paternal absence, socioeconomic disadvantage, and genetic vulnerability. *Journal of Abnormal Psychology*. 2004; 113:237–247. [PubMed: 15122944]
- Davis M, Walker D, Miles L, Grillon C. Phasic vs sustained fear in rats and humans: Role of extended amygdala in fear vs anxiety. *Neuropsychopharmacology Reviews*. 2010; 35:105–135. [PubMed: 19693004]
- Degnan KA, Almas AN, Fox NA. Temperament and the environment in the etiology of childhood anxiety. *Journal of Child Psychology & Psychiatry*. 2010; 51:497–517. [PubMed: 20158575]
- Degnan KA, Henderson HA, Fox NA, Rubin KH. Predicting social wariness in middle childhood: The moderating roles of childcare history, maternal personality and maternal behavior. *Social Development*. 2008; 17:471–487. [PubMed: 20463856]
- Dougherty LR, Bufferd SJ, Carlson GA, Dyson M, Olinio TM, Durbin CE, Klein DN. Preschoolers' observed temperament and psychiatric disorders assessed with a parent diagnostic interview. *Journal of Clinical Child & Adolescent Psychology*. 2011; 40:295–306. [PubMed: 21391025]

- Edwards SL, Rapee RM, Kennedy S. Prediction of anxiety symptoms in preschool-aged children: Examination of maternal and paternal perspectives. *Journal of Child Psychology and Psychiatry*. 2010; 51:313–321. [PubMed: 19769584]
- Egeland, B.; Weinfield, N.; Hiester, M.; Lawrence, C.; Pierce, S.; Chippendale, K. Teaching tasks administration and scoring manual. University of Minnesota; 1995.
- Egger, HL.; Ascher, BH.; Angold, A. The Preschool Age Psychiatric Assessment: Version 1.1. Durham, NC: Center for Developmental Epidemiology, Department of Psychiatry and Behavioral Sciences, Duke University Medical Center; 1999.
- Egger HL, Angold A. Common emotional and behavioral disorders in preschool children: Presentation, nosology, and epidemiology. *Journal of Child Psychology and Psychiatry*. 2006; 47:313–337. [PubMed: 16492262]
- Egger HL, Erkanli A, Keeler G, Potts E, Walter BK, Angold A. Test-retest reliability of the Preschool Age Psychiatric Assessment (PAPA). *Journal of American Academy of Child and Adolescent Psychiatry*. 2006; 45:538–549.
- First, MB.; Gibbon, M.; Spitzer, RL.; Williams, JBW. Structured clinical interview for DSM-IV Axis I disorders: Non-patient edition (SCID-I, Version 2.0). New York: Biometrics Research, New York State Psychiatric Institute; 1996.
- Forbes EE, Bertocci MA, Gregory AM, Ryan ND, Axelson DA, et al. Objective sleep in pediatric anxiety disorders and major depressive disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2007; 47:148–155. [PubMed: 18176336]
- Fox NA, Henderson HA, Marshall PJ, Nichols KE, Ghera MM. Behavioral inhibition: Linking biology and behavior within a developmental framework. *Annual Review of Psychology*. 2005; 56:235–262.
- Fox NA, Henderson HA, Rubin KH, Calkins SD, Schmidt LA. Continuity and discontinuity of behavioral inhibition and exuberance: Psychophysiological and behavioral influences across the first four years of life. *Child Development*. 2001; 72:1–21. [PubMed: 11280472]
- Goldsmith, HH.; Reilly, J.; Lemery, K.; Longley, S.; Prescott, A. Unpublished manuscript. 1995. Laboratory Temperament Assessment Battery: Preschool Version.
- Goodman SH, Gotlib IH. Risk for psychopathology in the children of depressed mothers: A developmental model for understanding mechanisms of transmission. *Psychological Review*. 1999; 106:458–490. [PubMed: 10467895]
- Hastings PD, Sullivan C, McShane KE, Coplan RJ, Utendale WT, Vyncke JD. Parental socialization, vagal regulation, and preschoolers' anxious difficulties: Direct mothers and moderated fathers. *Child Development*. 2008; 79:45–64. [PubMed: 18269508]
- Hirshfeld-Becker DR, Biederman J, Calltharp S, Rosenbaum ED, Faraone SV, Rosenbaum JF. Behavioral inhibition and disinhibition as hypothesized precursors to psychopathology: Implications for pediatric bipolar disorder. *Biological Psychiatry*. 2003; 53:985–999. [PubMed: 12788244]
- Hirshfeld-Becker DR, Masek B, Henin A, Blakely L, Pollock-Wurman R, McQuade J, et al. Cognitive behavioral therapy for 4- to 7-year-old children with anxiety disorders: A randomized clinical trial. *Journal of Consulting and Clinical Psychology*. 2010; 78:498–510. [PubMed: 20658807]
- Hollingshead, AB. Four factor index of social status. New Haven, Connecticut: Yale University; 1975.
- Hudson JL, Dodd HF, Bovopoulos N. Temperament, family environment and anxiety in preschool children. *Journal of Abnormal Child Psychology*. 2011; 39:939–951. [PubMed: 21479669]
- Hudson JL, Dodd HF, Lyneham HJ, Bovopoulos N. Temperament and family environment in the development of anxiety disorder: Two-year follow-up. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2011; 50:1255–1264. [PubMed: 22115146]
- Kagan J. Temperamental contributions to social behavior. *American Psychologist*. 1989; 44:668–674.
- Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the national comorbidity survey replication. *Archives of General Psychiatry*. 2005; 62:593–602. [PubMed: 15939837]
- Laptook RS, Klein DN, Durbin CE, Hayden EP, Olin TM, Carlson G. Differentiation between low positive affectivity and behavioral inhibition in preschool-age children: A comparison of

behavioral approach in novel and non-novel contexts. *Journal of Personality and Individual Differences*. 2008; 44:758–767.

- Laptook RS, Klein DN, Olino TM, Dyson MW, Carlson G. Low positive affectivity and behavioral inhibition in preschool-age children: A replication and extension of previous findings. *Personality and Individual Differences*. 2010; 48:547–551. [PubMed: 20224804]
- Lavigne JV, Gibbons RD, Christoffel KK, Arend R, Rosenbaum D, Binns H, et al. Prevalence rates and correlates of psychiatric disorders among preschool children. *Journal of the American Academy of Child & Adolescent Psychiatry*. 1996; 35:204–214. [PubMed: 8720630]
- Lavigne JV, LeBailly SA, Hopkins J, Gouze KR, Bins HJ. The prevalence of ADHD, ODD, depression, and anxiety in a community sample of 4-year-olds. *Journal of Clinical Child and Adolescent Psychology*. 2009; 38:315–328. [PubMed: 19437293]
- Lyneham HJ, Rapee RM. Agreement between telephone and in-person delivery of a structured interview for anxiety disorders in children. *Journal of American Academy of Child and Adolescent Psychiatry*. 2005; 44:274–282.
- Manassis K, Bradley S, Goldberg S, Hood J, Swinson RP. Behavioral inhibition, attachment and anxiety in children of mothers with anxiety disorders. *Canadian Journal of Psychiatry*. 1995; 40:87–92.
- Marakovitz SE, Wagmiller RL, Mian ND, Briggs-Gowan MJ, Carter AS. Lost toy? Monsters under the bed? Contributions and family factors to early internalizing problems in boys and girls. *Journal of Clinical Child & Adolescent Psychology*. 2011; 40:233–244. [PubMed: 21391020]
- McLeod BD, Wood JJ, Weisz JR. Examining the association between parenting and childhood anxiety: A meta-analysis. *Clinical Psychology Review*. 2007; 27:155–172. [PubMed: 17112647]
- Menard, S. *Applied logistic regression analysis*. 2. Thousand Oaks, California: Sage Publications; 2002.
- Mian ND, Wainwright L, Briggs-Gowan MJ, Carter AS. An ecological risk model for early childhood anxiety: The importance of early child symptoms and temperament. *Journal of Abnormal Child Psychology*. 2011; 39:501–512. [PubMed: 21153696]
- Morrissey TW. Multiple child-care arrangements and young children's behavioral outcomes. *Child Development*. 2009; 80:59–76. [PubMed: 19236393]
- Murray L, Creswell C, Cooper P. The development of anxiety disorders in childhood: An integrative review. *Psychological Medicine*. 2009; 39:1413–1423. [PubMed: 19215631]
- Olino TM, Klein DN, Dyson MW, Rose SA, Durbin CE. Temperamental emotionality in preschool-aged children and depressive disorders in parents: Associations in a large community sample. *Journal of Abnormal Psychology*. 2010; 119:468–478. [PubMed: 20677836]
- Ong HS, Wickramaratne P, Min T, Weissman MM. Early childhood sleep and eating problems as predictors of adolescent and adult mood and anxiety disorders. *Journal of Affective Disorders*. 2006; 96:1–8. [PubMed: 16844230]
- Rapee RM, Schniering CA, Hudson JL. Anxiety disorders during childhood and adolescence: Origins and treatment. *Annual Review of Clinical Psychology*. 2009; 5:311–341.
- Rapee RM, Szollos AA. Developmental antecedents of clinical anxiety in childhood. *Behavior Change*. 2003; 19:146–157.
- Robins E, Guze SB. Establishment of diagnostic validity in psychiatric illness: Its application to schizophrenia. *American Journal of Psychiatry*. 1970; 126:983–987. [PubMed: 5409569]
- Robinson R, Cartwright-Hatton S. Maternal disciplinary style with preschool children: Associations with children's and mothers' trait anxiety. *Behavioural and Cognitive Psychotherapy*. 2008; 36:49–59.
- Robinson, CC.; Mandelco, B.; Frost Olsen, S.; Hart, CH. The parenting styles and dimensions questionnaire (PSDQ). In: Perlmutter, BF.; Touliatos, J.; Holden, GW., editors. *Handbook of family measurement techniques*. Vol. 2: Instruments and index. Thousand Oaks, CA: Sage; 2001. p. 190
- Scheeringa MS, Peebles CD, Cook CA, Zeanah CH. Toward establishing procedural, criterion and discriminant validity for PTSD in early childhood. *Journal of the American Academy of Child & Adolescent Psychiatry*. 2001; 40:52–60. [PubMed: 11195563]

- Shamir-Essakow G, Ungerer JA, Rapee RM. Attachment, behavioral inhibition, and anxiety in preschool children. *Journal of Abnormal Child Psychology*. 2005; 33:131–143. [PubMed: 15839492]
- Southam-Gerow, M.; Chorpita, BF. Anxiety in children. In: Mash, EJ.; Barkley, RA., editors. *Assessment of child disorders*. 4. New York: Guilford; 2007. p. 347-397.
- Tackett JL. Evaluating models of the personality–psychopathology relationship in children and adolescents. *Clinical Psychology Review*. 2006; 26:584–599. [PubMed: 16820251]
- Tang NK, Harvey AG. Effects of cognitive arousal and physiological arousal on sleep perception. *Sleep*. 2004; 27:69–78. [PubMed: 14998240]
- Vaidyanathan U, Nelson LD, Patrick CJ. Clarifying domains of internalizing psychopathology using neurophysiology. *Psychological Medicine*. 2012; 42:447–459. [PubMed: 21854683]
- van der Bruggen CO, Stams GJJM, Bögels SM. Research review: The relation between child and parent anxiety and parental control: A meta-analytic review. *Journal of Child Psychology and Psychiatry*. 2008; 49:1257–1269. [PubMed: 18355216]
- Watson D. Rethinking the mood and anxiety disorders: A quantitative hierarchical model for DSM-V. *Journal of Abnormal Psychology*. 2005; 114:532–536.
- Weems CF, Stickle TR. Anxiety disorders in childhood: Casting a nomological net. *Clinical Child and Family Psychology Review*. 2005; 8:107–134. [PubMed: 15984083]
- Willoughby MT, Angold A, Egger HL. Parent-reported attention-deficit/hyperactivity disorder symptomatology and sleep problems in a preschool-age pediatric clinic sample. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2008; 47:1086–1094. [PubMed: 18664997]
- Wolfson J, Fields JH, Rose SA. Symptoms, temperament, resiliency, and control in anxiety-disordered preschool children. *Journal of the American Academy of Child & Adolescent Psychiatry*. 1987; 26:16–22. [PubMed: 3583994]
- Wood J, McLeod B, Sigman M, Hwang W, Chu B. Parenting and childhood anxiety: Theory, empirical findings, and future directions. *Journal of Child Psychology and Psychiatry*. 2003; 44:134–151. [PubMed: 12553416]

Table 1**Characteristics of Preschoolers with an Anxiety Disorder Versus No Anxiety Disorder**

	No anxiety disorder diagnosis (n = 435)	At least one anxiety disorder diagnosis (n = 106)	<i>p</i>	<i>N per group: No anxiety disorder/ Any anxiety disorder</i>
<i>Demographics</i>				
Child age in years	3.62 ± 0.27	3.64 ± 0.27	0.485	435/106
Child gender, % female	200 (46%)	47 (44%)	0.762	435/106
Child race/ethnicity, % Caucasian	384 (88.3%)	86 (81.1%)	0.181	435/106
Parental marital status, % married or cohabitating	416 (95.6%)	97 (91.5%)	0.086	435/106
Maternal age in years	36.12 ± 4.33	35.7 ± 4.97	0.380	432/106
Paternal age in years	38.41 ± 5.29	37.83 ± 5.94	0.328	432/106
1 parent college graduate, %	304 (70.2%)	62 (58.5%)	0.021	433/106
Hollingshead social status	45.42 ± 10.99	43.42 ± 11.06	0.094	435/106
<i>Childcare or school status</i>				
Hours per week in preschool	5.07 ± 6.22	5.50 ± 5.85	0.302	432/105
Hours per week in daycare	5.32 ± 12.48	2.98 ± 9.76	0.046	430/104
Total number school/daycare transitions	1.29 ± 1.38	1.02 ± 1.04	0.166	432/106
<i>Child psychopathology</i>				
Depressive disorder ^{a, b}	4 (0.9%)	6 (5.7%)	0.005	435/106
Oppositional behavior disorder ^b	35 (8%)	16 (15.1%)	0.026	435/106
Attention deficit hyperactivity disorder ^a	8 (1.8%)	3 (2.8%)	0.458	435/106
Child sleep problems ^b	.94 ± .85	1.20 ± 1.03	0.016	435/106
<i>Child Temperament</i>				
Behavioral inhibition ^b	-.02 ± .38	.08 ± .48	0.024	435/106
Negative affectivity	-.02 ± .53	.09 ± .67	0.069	435/106
Positive affectivity ^b	.05 ± .79	-.20 ± .79	0.002	435/106
<i>Parental Psychopathology</i>				
Parental lifetime anxiety disorder	185 (42.8%)	52 (49.1%)	0.247	432/106
Parental lifetime depressive disorder	169 (39.1%)	49 (46.2%)	0.182	432/106
<i>Observed Parenting Behavior</i>				
Observed parental hostility	1.19 ± 0.32	1.23 ± 0.43	0.424	418/106
Observed parental support	4.48 ± 0.57	4.34 ± 0.70	0.035	418/106
Observed parental intrusiveness	1.47 ± 0.42	1.50 ± 0.47	0.441	418/106
<i>Perceived Parenting Style</i>				
Maternal PSDQ authoritative	61.32 ± 6.49	60.61 ± 7.24	0.348	401/93
Maternal PSDQ authoritarian	19.75 ± 4.11	20.9 ± 5.03	0.041	400/93
Maternal PSDQ permissive	10.64 ± 3.16	11.37 ± 3.37	0.049	401/93
Paternal PSDQ authoritative	56.54 ± 8.18	56.59 ± 8.55	0.961	326/74
Paternal PSDQ authoritarian	20.31 ± 4.60	20.97 ± 4.88	0.267	326/74
Paternal PSDQ permissive	11.06 ± 3.15	12.01 ± 3.21	0.020	326/74
<i>Life Stress</i>				

	No anxiety disorder diagnosis (n = 435)	At least one anxiety disorder diagnosis (n = 106)	<i>p</i>	<i>N per group: No anxiety disorder/ Any anxiety disorder</i>
Number of stressful life events in the 6 months prior ^b	0.67 ± 0.93	0.93 ± 1.33	0.016	434/106

Notes: 93.5% of parents who participated in the observational assessment of parenting behaviors were mothers; Temperament variable means and standard deviations are reported as z-scores; PSDQ = Parenting Styles and Dimensions Questionnaire.

^a = Fisher's exact test;;

^b = Remained significant after Benjamini and Hochberg's (1995) procedure to correct for multiple comparisons within domains was employed. Benjamini and Hochberg-adjusted *p*-values for statistical significance were as follows: demographic variables *p* < 0.006; child psychopathology *p* < 0.038; child temperament *p* < 0.033; parental psychopathology *p* < 0.025; observed parenting behavior *p* < 0.017; maternal PSDQ *p* < 0.033; paternal PSDQ *p* < 0.017; and stressful life events *p* < 0.05 (no adjustment necessary).

Table 2**Multivariate Analyses: Unique Correlates of Preschool Anxiety Disorders**

	OR	95% CI
Parental education	.69	0.40–1.18
Hours per week in daycare	0.50 [*]	0.28–0.90
Child sleep problems	1.45 ^{**}	1.10–1.91
Behavioral inhibition	2.69 ⁺	0.84–8.67
Positive affectivity	0.25 [*]	0.09–0.74
Maternal current anxiety disorder	1.47	0.74–2.90
Observed parental support	0.77	0.52–1.13
Maternal PSDQ authoritarian	1.03	0.97–1.09
Maternal PSDQ permissive	1.00	0.92–1.08
Number of stressful life events in 6 months prior	1.25 [*]	1.01–1.54
Child depressive disorder	7.86 [*]	1.39–44.59
Child oppositional defiant disorder	0.97	0.40–2.39
Child attention-deficit/hyperactivity disorder	1.13	0.22–5.89

Notes. OR = odds ratio; CI = confidence interval; PSDQ = Parenting Styles and Dimensions Questionnaire.

⁺
 $p < .10$,

^{*}
 $p < .05$,

^{**}
 $p < .01$.