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Temperament Distinguishes Persistent/Recurrent from Remitting Anxiety Disorders Across Early Childhood

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Abstract

Objective—Up to 20% of preschool-aged children meet criteria for anxiety disorders and, for a large subset, anxiety appears to persist throughout early childhood. However, little is known about which factors predict persistence/recurrence of anxiety in young children. Temperament, including behavioral inhibition (BI), negative emotionality (NE), and positive emotionality (PE), predict the onset of anxiety disorders, but to our knowledge, no study has examined whether temperament predicts the course of anxiety in young children.

Method—From a community sample of three-year olds, we identified 89 children (79.8% white, non-Hispanic; 41.6% female) who met criteria for an anxiety disorder and examined whether observed and parent-reported BI, NE, and PE at age 3 distinguished children who continued to meet criteria for an anxiety disorder from those who remitted by age 6.

Results—Higher levels of BI and lower levels of PE assessed in the laboratory, and higher parent-reported BI and shyness and lower surgency at age 3 significantly predicted persistence/recurrence of anxiety disorders from age 3 to 6.

Conclusions—These data are the first to demonstrate the influence of temperament on the course of anxiety disorders in young children. These findings can enhance assessment and treatment of anxiety by focusing intervention efforts on children who are at risk for persistent or recurring anxiety rather than children who are displaying transient, and possibly developmentally normative, anxiety.

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Keywords

anxiety disorders; temperament; preschool-age; longitudinal

Emerging research suggests that the prevalence of mental disorders in preschool-aged children is similar to the rates observed in school-age children, and that these disorders are associated with significant impairment (Bufferd, Dougherty, Carlson, & Klein, 2011; Egger & Angold, 2006; Lavigne, LeBailly, Hopkins, Gouze, & Binns, 2009; Wichstrom et al., 2012). These studies also indicate that anxiety disorders are the most common form of psychopathology in preschoolers. Indeed, up to 20% of preschool-aged children in community samples meet criteria for at least one anxiety disorder (Bufferd et al., 2011; Bufferd, Dougherty, Carlson, Rose, & Klein, 2012; Franz et al., 2013; Lavigne et al., 2009; Wichstrom et al., 2012).

For some young children, anxiety persists or recurs throughout early childhood, but for others anxiety is more transient (Battaglia et al., 2016; Bufferd et al., 2012; Mian, Wainwright, Briggs-Gowan, & Carter, 2011). For example, we previously reported that in a large community sample of preschoolers, children who met criteria for an anxiety disorder at age 3 were four times more likely to meet criteria again at age 6 compared to children who did not meet criteria for an anxiety disorder at age 3 (Bufferd et al., 2012). However, of the children meeting criteria for an anxiety disorder at age 3, only 33.7% continued to meet criteria at age 6. Many behaviors relevant to anxiety (e.g., separation anxiety, social and non-social fears) can reflect typical development in early childhood (Gullone, 2000). Thus, the anxiety in some of the remitting cases may reflect more prominent manifestations of what is essentially normative behavior. This suggests the importance of identifying characteristics that predict which cases of anxiety disorders in young children are likely to persist or recur, as it is this subgroup that should be targeted for intervention.

One factor that may impact the course of anxiety disorders is temperament. Temperament is relatively enduring (Caspi, Roberts, & Shiner, 2005; Avshalom Caspi & Roberts, 2001) and temperament and personality traits have been found to predict the course of depression, the other major class of internalizing disorders (Brown, 2007; Klein & Santiago, 2003; Wiersma et al., 2011). Therefore, temperament, particularly behavioral inhibition (BI), negative emotionality (NE), and positive emotionality (PE), is an important factor to consider in investigating the course of anxiety in children.

BI refers to a disposition to fearful, wary, and avoidant behavior with unfamiliar individuals, situations, and objects (Fox, Henderson, Marshall, Nichols, & Ghera, 2005; J. Kagan, 2012). High levels of BI in childhood are linked to later anxiety (Buss & Kiel, 2013; Clauss & Blackford, 2012; Degnan, Almas, & Fox, 2010; D.R. Hirshfeld-Becker, Micco, Simoes, & Henin, 2008) using both observational (Biederman et al., 2001; Hirshfeld-Becker et al., 2007; Hudson, Dodd, Lyneham, & Bovopoulos, 2011; Rapee, 2014) and parent-report (Chronis-Tuscano et al., 2009; Hudson & Dodd, 2012; Muris, van Brakel, Arntz, & Schouten, 2011; Wichstrom, Belsky, & Berg-Nielsen, 2013) measures. Although the link between BI and later anxiety is well established, to our knowledge there are no studies examining the role of BI in the *course* of anxiety disorders in early childhood.

High negative emotionality (NE) and low positive emotionality (PE) are higher-order facets of temperament that are also related to anxiety disorders in children (Klein, Dyson, Kujawa, & Kotov, 2012; Muris & Ollendick, 2005; Pérez-Edgar & Fox, 2005). NE reflects the tendency to experience negative emotions such as sadness, anger, and fear, and PE reflects a disposition to experience positive emotions such as pleasure, joy, and enthusiasm, as well as high reward sensitivity and engagement with the environment. NE has been linked to anxiety disorders in children (Chorpita & Daleiden, 2002; Chorpita, Plummer, & Moffitt, 2000) and adults (Brown, Chorpita, & Barlow, 1998). Although low PE has stronger links to depression than anxiety (Clark, Watson, & Mineka, 1994; Lonigan, Phillips, & Hooe, 2003), it is also associated with anxiety disorders in youth (Chorpita et al., 2000; Dougherty et al., 2011) and adults (Kashdan, 2007; Kotov, Gamez, Schmidt, & Watson, 2010; Naragon-Gainey, Watson, & Markon, 2009; Sellbom, Ben-Porath, & Bagby, 2008; Watson, Gamez, & Simms, 2005). Further, although there is overlap between these constructs (e.g., both BI and low PE are related to low approach and both BI and high NE include fear/anxiety) they are distinguishable (Durbin, Klein, Hayden, Buckley, & Moerk, 2005; Kim et al., 2011; Laptook, Klein, Olino, Dyson, & Carlson, 2010). Unlike low PE, which is evident across contexts, BI is observed primarily in novel and threatening situations (Henderson, Marshall, Fox, & Rubin, 2004; Laptook et al., 2008; Laptook et al., 2010). Unlike BI, high NE includes dysphoric qualities such as sadness and irritability and is considered a much broader and less context-specific trait. There is some evidence suggesting that NE and PE are associated with the course of anxiety in adults (Brown, 2007; Naragon-Gainey, Gallagher, & Brown, 2013); however, we are not aware of research investigating whether they are linked to the course of anxiety disorders in children.

This study examined whether BI, NE, and PE predict the persistence/recurrence of anxiety disorders during the early childhood period in a community sample. Specifically, we investigated whether laboratory observations and parent-reports of temperament predicted which three-year old children with anxiety disorders would meet criteria for an anxiety disorder (persistence/recurrence) and which would not (remission) at age 6. We seek to predict cases of anxiety that are persistent/recurrent across the preschool period, an area that has not yet been investigated; therefore, we focus on age 6 as a marker of the end of the preschool period and the beginning of middle childhood (wherein the diagnosis of pediatric anxiety is better established). We hypothesized that higher levels of BI and NE and lower levels of PE would predict persistence/recurrence of anxiety disorders.

Method

Participants

Families with a 3-year-old child living within 20 miles of Stony Brook University (a suburban community in Stony Brook, NY, United States) were identified using commercial mailing lists. Children with at least one biological parent and without significant medical disorders or developmental disabilities were eligible. 541 parents were interviewed regarding their 3-year-old child (time 1 $M_{age}=3.6$, $SD=0.3$ years), and 456 of these parents (84.3%) were interviewed again when their child turned 6 (time 2 $M_{age}=6.1$, $SD=0.4$ years). The present sample consists of the 89 children (16.5% of the initial sample) who met

criteria for any anxiety disorder at age 3 and had a follow-up evaluation at age 6. The proportion of children who met criteria for an anxiety disorder at age 3 was almost identical in the groups that were (89/456; 19.5%) and were not (17/85; 20.0%) assessed again at age 6. In addition, children who were and were not followed up did not differ on baseline demographics.

Of the 89 participants, 79.8% ($n=71$) were White, non-Hispanic; 13.5% ($n=12$) were Hispanic/Latino; 2.2% ($n=2$) were African American; 2.2% ($n=2$) were Asian; and 2.2% ($n=2$) were from other or multiple racial/ethnic groups. Most participants had married biological parents ($n=80$; 89.9% at time 1 and $n=78$; 87.6% at time 2); 37 children (41.6%) were female. Nearly half of parents graduated college ($n=37$; 45.1% mothers and $n=39$; 48.8% fathers) by time 2.

At time 1, all 89 children participated in a standardized laboratory assessment of temperament; 85 (95.5%) mothers and 68 fathers (76.4%) also completed questionnaires on their children's temperament. The study was approved by the institutional review board and written informed consent was obtained by parents after procedures were fully explained; in addition, child assent was obtained for their participation in the laboratory observation. Families were compensated for their participation. Research staff conducting the diagnostic and temperament assessments at age 3 were unaware of other variables, and diagnostic interviewers at age 6 were unaware of all age 3 data.

Measures

Child anxiety disorders (ages 3 and 6)—The Preschool Age Psychiatric Assessment (PAPA; (H.L. Egger, Ascher, & Angold, 1999) is a reliable, developmentally sensitive interview designed to assess DSM-IV-TR disorders. The PAPA uses a structured format and an interviewer-based approach, applying a priori guidelines for rating symptoms and associated impairment using a detailed glossary. Diagnoses are derived using algorithms. A separate impairment section in the PAPA was not used in the algorithms defining anxiety disorders. A 3-month primary period is used to enhance recall. Although the PAPA was designed for 2–5-year-olds, it has been used in children as old as 8 years (Luby, Si, Belden, Tandon, & Spitznagel, 2009). We used the PAPA at both age 3 and 6 to maintain comparability across assessments.

Anxiety disorders assessed included specific phobia, social phobia, agoraphobia, panic disorder, separation anxiety, generalized anxiety disorder, and selective mutism. Interviews were conducted with the primary caregiver by telephone at age 3 (97.6% mothers) and in person at age 6 (92.1% mothers); parent-report diagnostic interviews have been found to yield equivalent results when administered by telephone and in-person (Lyneham & Rapee, 2005). At the age 3 assessment, advanced graduate students in clinical psychology completed interviews; at the age 6 assessment, a master's-level psychologist completed interviews (details about both assessments have been previously reported; see (Bufferd et al., 2011; Bufferd et al., 2012))

Participants were included in the remitted group if they met criteria for any anxiety disorder at age 3 but not at the age 6 follow-up ($n=59$). Participants were included in the persistent/

recurring group if they met criteria for any anxiety disorder at age 3 and age 6 ($n=30$). The rates of diagnoses by group at each time point are presented in Table 1. To examine interrater reliability, cases to be recoded were chosen by oversampling interviews with evidence of psychopathology to ensure variability. Coders were not aware that cases with psychopathology were oversampled, and participants with anxiety disorders were randomly selected for reliability analyses.

At the age 3 assessment, a second rater from the pool of interviewers independently rated 21 audiotapes of PAPA interviews. Kappa was 1.00 for any anxiety disorder, and .99 for the summed scale of anxiety symptoms ($\alpha=.89$). At age 6, 35 audiotapes were rated: kappa was .89 for any anxiety disorder.

Laboratory-observed temperament (age 3)—Temperament was assessed at age 3 using the Laboratory Temperament Assessment Battery (Lab-TAB (Goldsmith, Reilly, Lemery, Longley, & Prescott, 1995). Each child participated in a standardized set of 12 tasks designed to elicit temperament-relevant expressions of BI, NE, and PE. Examples of tasks included “Popping Bubbles” in which the child and experimenter played with a bubble-shooting toy (to elicit PE); “Box Empty” in which the child was given a wrapped box to open under the false impression that a toy was inside for the child to keep (to elicit sadness and anger); and “Stranger Approach” in which the child was briefly left alone in the room before a male accomplice entered and slowly approached (to elicit fear and BI). Previous reports include a full description of tasks (Dougherty et al., 2013; Olino, Klein, Dyson, Rose, & Durbin, 2010). The Lab-TAB is moderately stable from age 3 to age 7 and correlates with home observer ratings of temperament (Durbin, Hayden, Klein, & Olino, 2007).

Each task was videotaped in the laboratory through a one-way mirror and later coded. Coding procedures are described elsewhere (Olinio et al., 2010). Consistent with previous studies (Durbin et al., 2005; Jerome Kagan, 1989; Pfeifer, Goldsmith, Davidson, & Rickman, 2002), BI was coded in three tasks specifically designed to assess this construct. Average standardized ratings of the following variables were computed: total number of objects touched, latency to touch objects, tentative play, referencing experimenter, time spent playing, latency to vocalize, approach toward, the stranger, avoidance of the stranger, gaze aversion, and verbal/nonverbal interaction with the stranger. All variables were coded in a consistent direction (e.g., long latencies to touch objects were coded to reflect more BI). NE and PE were coded in all 12 episodes. NE reflects the sum of the standardized total displays of facial, bodily, and vocal sadness, fear, and anger; PE reflects the sum of the standardized displays of facial, bodily, and vocal positive affect (e.g., smiling, laughter) and interest (e.g., verbal and behavioral expressions of engagement in the tasks). Means and standard deviations, coefficient alphas (α) for internal consistency, and intraclass correlations (ICCs) for interrater reliability ($n=35$) were computed: BI ($M=.68$, $SD=.21$; $\alpha=.80$; $ICC=.88$), NE ($M=.58$, $SD=.23$; $\alpha=.74$; $ICC=.82$), and PE ($M=.65$, $SD=1.68$; $\alpha=.82$; $ICC=.89$).

Parent-reported temperament (age 3)—The Children’s Behavior Questionnaire (CBQ) (Rothbart, Ahadi, Hershey, & Fisher, 2001) is a 195-item measure of temperament for preschool-aged children; children’s behavior in the previous six months are rated on a

seven-point scale ranging from 1 (extremely untrue of your child) to 7 (extremely true of your child). We used two broadband factors (Rothbart et al., 2001): surgency, which is similar to high activation PE but also includes aspects of low BI, and negative affect (NA), which is identical to NE. The CBQ surgency factor includes 51 items from 4 scales: activity level, high intensity pleasure, impulsivity, and shyness (reversed): mother report $M=235.8$, $SD=39.9$; father report, $M=237.8$, $SD=33.8$. The negative affect factor includes 62 items from 5 scales: anger-frustration, discomfort, fear, sadness, and soothability (reversed); mother report $M=259.9$, $SD=31.6$; father report $M=248.2$, $SD=32.7$ ¹. Coefficient alphas were .75 (mother) and .76 (father) for surgency and .70 (mother) and 0.76 (father) for NA. Mothers' and fathers' reports were moderately-highly correlated (.48 for NA and .78 for surgency). Due to some missing items on the CBQ, the actual ns for each scale varied.

Two measures were used to assess children's behavioral inhibition/shyness, Behavioral Inhibition Questionnaire (BIQ) (Bishop, Spence, & McDonald, 2003) and the Child Social Preference Scale (CSPS) (Coplan, Prakash, O'Neil, & Armer, 2004). The BIQ is a 30-item measure with good psychometric properties (Bishop et al., 2003; Kim et al., 2011). It assesses the frequency of children's inhibited behavior in three domains across six contexts: social novelty (unfamiliar adults and peers, and performance with others), situational novelty (unfamiliar situations, preschool/separation), and novel physical activities (activities that pose some risk of injury). The questionnaire was completed by the parent who accompanied the child to the lab visit (93.3% mothers; 5.6% fathers; 1.1% other caregiver). Items were rated on a seven-point scale, ranging from 1 (hardly ever) to 7 (almost always), and summed to create a scale ($M=107.3$, $SD=34.0$; $\alpha=.96$). The conflicted shyness subscale of the CSPS was used to assess children's shyness, a central component of BI. Seven items were rated by the parent who participated in the lab visit on a five-point scale ranging from 1 (not at all) to 5 (a lot), and summed to create a scale ($M=15.6$, $SD=6.3$; $\alpha=.90$). Given the strong association between the BIQ and the CSPS scales ($r=.81$, $p<.001$), the two scales were standardized and summed to create one combined scale for the present study.

Results

There were no differences between groups on demographic variables, including child race/ethnicity, sex, and age, and parental marital status, and education (all $ps>.25$). Children in the persistent/recurring group had a greater number of anxiety diagnoses at age 3 ($M=1.70$, $SD=.88$) than children in the remitted group ($M=1.29$, $SD=.56$), $t(87)=-2.70$, $p=.01$. In addition, children in the persistent/recurring group had higher anxiety symptom scale scores ($M=18.20$, $SD=8.79$) than children in the remitted group ($M=13.76$, $SD=6.61$), $t(87)=-4.44$, $p=.01$. Bivariate correlations among temperament variables are presented in Table 2. These analyses, and those below, used two-tailed significance tests and included standardized independent variables.

Table 3 shows differences between groups on observed temperament (Lab-TAB) and parent-reported temperament (CBQ, BIQ/CSPS) using logistic regressions with the temperament

¹We did not include the CBQ's third broadband factor, effortful control, because its associations with anxiety have been inconsistent (Thorell, Bohlin, & Rydell, 2004; White, McDermott, Degnan, Henderson, & Fox, 2011).

measures entered as independent variables (IVs) and persistence/recurrence of anxiety diagnosis entered as the dependent variable (DV). Separate models were tested for each temperament measure.

Children in the persistent/recurrent group showed significantly greater BI and less PE in the laboratory observation compared to children in the remitted group. In addition, parents rated children in the persistent/recurrent group as displaying lower levels of mother- and father-reported surgency on the CBQ and higher levels of shyness on the BIQ/CSPS, respectively, than children in the remitted group². We also ran the analyses with the CBQ surgency scale computed without the shyness sub-scale to identify whether associations between CBQ surgency and persistence/recurrence of anxiety diagnosis were driven by the shyness component; the associations between mother- and father-reported CBQ surgency and persistence/recurrence of anxiety remained significant. There were no differences in levels of Lab-TAB NE and CBQ NA between groups. Associations remained unchanged when controlling for child gender; in addition, interactions between each temperament variable and child gender were not significant.

Next, we ran three multivariate models with the significant IVs entered into the same model from each set of predictors (laboratory and parent-report). In the model with Lab-TAB BI and PE, BI uniquely predicted persistence/recurrence of anxiety [Odds ratio (OR) = 2.17, 95% Confidence Interval (CI) = 1.32–3.56, $p = .002$] but the association between PE and persistence/recurrence was reduced to a trend (OR = .63, 95% CI = .38–1.05, $p = .08$). In the model with mother-reported CBQ surgency and the composite BIQ/CSPS shyness scale, neither variable uniquely predicted persistence/recurrence. In the model with father-reported CBQ surgency and the composite BIQ/CSPS shyness scale, only BI/shyness uniquely predicted persistence/recurrence (OR = 1.47, 95% CI = 1.01–2.15, $p = .04$).

Finally, we repeated the bivariate analyses adjusting for the number of anxiety disorders at age 3 to examine whether number of anxiety diagnoses accounted for associations between temperament and persistence/recurrence; each association remained significant (Table 3). These relationships also remained significant when controlling for summed anxiety symptoms at age 3, although the association with Lab-TAB PE was reduced to a trend ($p = .09$; data available on request).

Discussion

This prospective longitudinal study examined whether early child temperament, specifically BI, NE/NA, and PE/surgency, predicted the persistence/recurrence of anxiety disorders across early childhood. We investigated whether observed and parent-reported temperament at age 3 distinguished children who again met criteria for an anxiety disorder from those who remitted by age 6. Although there is evidence that BI predicts the onset of anxiety

²We also examined temperamental predictors of dimensional anxiety scores in the 89 children who met criteria for an anxiety diagnosis at age 3. We ran multiple regression models with the temperament variable as an independent variable, the age 3 anxiety symptom scale as the covariate, and the age 6 anxiety symptom scale as the dependent variable. The findings were consistent with the results of the analyses using diagnoses as the dependent variables as reported in the paper, with the exception that Lab-TAB PE was not associated with the course of symptoms: Lab-TAB BI ($B = 1.95$, $SE = .90$, $t = 2.17$, $p = .03$); Maternal CBQ Surgency ($B = -2.50$, $SE = .92$, $t = -2.72$, $p = .008$); BIQ/CSPS scale ($B = 1.57$, $SE = .57$, $t = 2.75$, $p = .007$).

disorders in children (Clauss & Blackford, 2012; Klein et al., 2012; Pérez-Edgar & Fox, 2005), and that NE and PE are associated with the course of anxiety symptoms in adults (Brown, 2007; Naragon-Gainey et al., 2013), to our knowledge no study has examined whether temperament predicts the course of anxiety disorders in early childhood. Given that anxiety can be transient, and in some cases even developmentally typical, in early childhood (Gullone, 2000), this information is essential for considering whether intervention is warranted, and, if so, at what level of intensity.

We hypothesized that higher levels of BI and NE and lower levels of PE assessed at age 3 would predict persistence/recurrence of anxiety disorders from ages 3 to 6. As hypothesized, higher BI and lower PE assessed in the laboratory as well as mother- and father-reported lower surgency on the CBQ and parent-reported BI/shyness on the combined BIQ and CSPA, respectively, assessed at age 3 were significantly associated with persistence/recurrence of anxiety disorders at 6. Importantly, the results were consistent across laboratory observations and parent reports, despite relatively modest correlations between methods and informants. Other studies have found similar levels of agreement between laboratory observed and parent-reported behavior (Hayden, Klein, & Durbin, 2005; Kiel & Buss, 2006). Laboratory observations offer a standardized assessment of temperament across children, but may not always correspond to actual situations; parents have more opportunity to observe children's behavior across contexts and time, but may not have access to normative information by which to compare their children's behavior. Nevertheless, the modest level of agreement is consistent with previous research, and, in this study, both approaches appear to have predictive validity. Moreover, the findings persisted after adjusting for number of anxiety disorders at baseline and, with the exception of laboratory observed PE, for the level of baseline anxiety symptoms. Thus, although number of anxiety diagnoses and anxiety symptoms at baseline distinguished the persistent/recurrent and remitting groups, these findings indicate that anxiety severity cannot account for the links between early temperament and persistence/recurrence of anxiety disorders.

However, in multivariate analyses, measures of BI uniquely predicted persistence/recurrence but PE and surgency did not; these findings underscore the value of BI predicting the course of preschool anxiety disorders. However, associations between PE and persistence/recurrence in the multivariate models exhibited a trend level of significance, whereas associations with parent-report did not. This may reflect the greater association between BI and PE/surgency using parent reports compared to laboratory observations. Further investigation of the role of PE in predicting persistence/recurrence of anxiety is warranted.

Our findings are consistent with the substantial evidence that BI is linked to anxiety in young children (Buss & Kiel, 2013; Clauss & Blackford, 2012; Degnan et al., 2010). In addition, although low PE is most often linked to depression (Clark et al., 1994), these findings are consistent with evidence that low PE and surgency are also associated with anxiety in children (Chorpita et al., 2000) and adults (Kashdan, 2007; Kotov et al., 2010; Watson et al., 2005). There is some conceptual overlap between high BI and low PE, as both include low approach/engagement. However, in low PE these features are present across contexts, whereas in BI, they reflect context-specific behavior in novel and/or threatening situations (Henderson et al., 2004; Laptook et al., 2008; Laptook et al., 2010). In the present

study, correlations between BI and PE were substantial for parent-report measures, but negligible using laboratory-based measures. This may reflect the greater contextual sensitivity of laboratory measures and the fact that shyness, a core feature of BI, loads negatively on the CBQ surgency factor.

The heightened reactivity to, and avoidance of, novel people and situations associated with BI, and the diminished approach and engagement associated with low PE may both contribute to the persistence/recurrence of anxiety disorders (Naragon-Gainey et al., 2013). Regarding BI, children who are temperamentally inclined to avoid or withdraw from normative novel experiences (e.g., play dates at peers' homes; socializing with parents' friends) may be negatively reinforced by this behavior; given that avoidance/withdrawal temporarily reduces distress, the likelihood of further avoidance increases. If this process continues, children may not learn that they can manage and enjoy those situations, and may generalize their fear to other contexts, increasing the risk of persisting/recurring anxiety. For children low in PE, their experiences across domains may not be particularly rewarding. Even when, for example, these children learn a new skill or have an effective social encounter, they may not interpret these events as satisfying or pleasurable (Hamburg, 1998). Therefore, these experiences may fail to produce positive reinforcement and lead to extinction of approach behavior, possibly diminishing the acquisition of new skills and competencies, and contributing to persistent avoidance associated with anxiety disorders.

Despite the fact the NE/NA includes fear as a component, neither laboratory-assessed NE nor mother- or father-reported NA predicted persistence/recurrence of anxiety diagnoses; these findings were inconsistent with the study hypothesis and previous research on the association between NE and anxiety in children (Klein et al., 2012; Muris & Ollendick, 2005; Pérez-Edgar & Fox, 2005). However, previous studies have not specifically examined the role of NE in the course of anxiety disorders. Our findings suggest that there may be a specific link between temperamental fearfulness and persistence/recurrence of anxiety that is not evident for temperamental sadness and anger.

There has been considerable discussion of the overlap between measures of temperament and psychopathology in general (Klein, Kotov, & Bufferd, 2011), and BI and anxiety specifically (Rapee & Coplan, 2010). Concerns include common method and informant variance, and overlapping items in parent-report measures of temperament and symptoms (Klein et al., 2012; Lahey, 2004). These issues were partially mitigated in the present study by assessing temperament with both observational and parent-report measures and assessing psychopathology using a diagnostic interview. Nonetheless, there is fundamental conceptual overlap between BI and anxiety disorders. However, it is clear that the two constructs are not isomorphic, as many high BI children do not have anxiety disorders and many children with anxiety disorders do not have high BI (Dougherty et al., 2011; Nigg, 2006; Pérez-Edgar & Fox, 2005; Rapee & Coplan, 2010). In addition, anxiety is presumed to result in greater impairment and distress than BI. The present findings are consistent with the literature in indicating that only a subset of children with anxiety disorders exhibit elevated BI, and that this subgroup is at the greatest risk for persistence/recurrence. Moreover, BI predicted persistence/recurrence of anxiety disorder over and above the effects of prior anxiety diagnoses and symptoms. However, further work is necessary in order to determine whether

BI is a marker of an etiologically distinct subtype of anxiety, or if it is a marker of a broad underlying liability dimension.

Relatedly, a number of models of the relationship between temperament and psychopathology have been posited (Klein et al., 2011). The current findings are consistent with the pathoplasticity model, which hypothesizes that personality influences the course or expression of the disorder. However, as all participants in this study met criteria for an anxiety diagnosis in the initial assessment, we could not address other temperament-psychopathology models (e.g., precursor, vulnerability, spectrum, scar/consequences).

Strengths of the study include the longitudinal design, use of multiple methods (observational and parent-report) to assess children's temperament, inclusion of both mother and father reports, and use of a structured diagnostic interview to assess anxiety disorders. However, the study had several limitations. The sample was only moderate in size, precluding the possibility of testing larger and more complex models (e.g., incorporating the role of parenting, stress, and parental psychopathology, and examining mediating and moderating effects) and testing whether temperament differentially predicted the course of individual anxiety disorders. For example, BI and PE may show particularly strong associations with persistent/recurring social anxiety disorder (Chorpita et al., 2000; Clauss & Blackford, 2012). In addition, the "remitted" cases may be at risk for a recurrence of anxiety disorder; further research is necessary to better understand the prognosis and course of anxiety disorders in early childhood. Finally, the sample was fairly demographically homogeneous, which may limit the generalizability of the findings to more diverse populations.

This study demonstrated that temperamental BI and low PE predict the persistence/recurrence of anxiety disorders from ages 3 to 6. Therefore, while BI is important in the prognosis of preschool anxiety, PE may also be a target of intervention; additional empirical investigation of this point is needed. In anxious preschoolers with low BI, watchful waiting or less intensive interventions may be sufficient. However, children identified as high in BI and/or low in PE may benefit from prevention or intervention. Given the relatively high degree of developmental plasticity in early childhood, prevention and early intervention during this period may be particularly effective in mitigating difficulties acquiring developmentally appropriate competencies, and reducing chronicity and future impairment (Bufferd, Dyson, Hernandez, & Wakschlag, 2016; Lau & Rapee, 2011). Recent prevention and early intervention programs have targeted young children with temperamental vulnerabilities for anxiety (Anticich, Barrett, Silverman, Lacherez, & Gillies, 2013; Chronis-Tuscano et al., 2015; Comer et al., 2012; Donovan & March, 2014; Hirshfeld-Becker et al., 2010; Monga, Rosenbloom, Tanha, Owens, & Young, 2015; Pincus, Santucci, Ehrenreich, & Eyberg, 2008; Rapee, Kennedy, Ingram, Edwards, & Sweeney, 2010). However, it is not clear from these data whether treatment should focus on anxiety or BI, but interventions may be similar for both targets in some (Chronis-Tuscano et al., 2015; Kennedy, Rapee, & Edwards, 2009)), though not all (Rapee et al., 2010) studies. Nevertheless, our findings suggest that such prevention and intervention efforts are warranted, and are targeting a subgroup of children at high risk for persistent/recurring anxiety.

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Table 1

Rates of Anxiety Diagnoses among Remitted and Persistent/Recurring Groups at Age 3 and Age 6

	Age 3		Age 6	
	Remitted Anxiety (n=59)	Persistent/Recurring Anxiety (n=30)	Persistent/Recurring Anxiety (n=30)	Persistent/Recurring Anxiety (n=30)
Specific phobia	31(52.5%)	13(43.3%)	14(46.7%)	
Social phobia	7(11.9%)	10(33.3%)	6(20.0%)	
Agoraphobia	5(8.5%)	10(33.3%)	4(13.3%)	
Separation anxiety disorder	17(28.8%)	9(30.0%)	10(33.3%)	
Generalized anxiety disorder	13(22.0%)	5(16.7%)	3(10.0%)	
Selective mutism	3(5.1%)	4(13.3%)	3(10.0%)	
Mean number of anxiety diagnoses (SD)	1.29(.56)	1.70(.88)	1.33(.66)	

Note. The rates of anxiety disorders reflect overlap between categories (see Bufferd et al., 2011; Bufferd et al., 2012 for data on the continuity of individual anxiety disorders and comorbidity).

Table 2

Bivariate Correlations among Temperament Variables

	Lab-TAB NE	Lab-TAB PE	CBQ NA Mother	CBQ NA Father	CBQ Surgency Mother	CBQ Surgency Father	BIQ/CSPS
<i>Lab-TAB</i>							
BI	.47***	-.11	.14	-.01	-.27*	-.17	.28*
NE	--	.09	.26*	-.10	.01	.04	-.03
PE		--	.05	.14	.25*	.19	-.28*
<i>Parent report</i>							
CBQ NA: Mother			--	.48***	.05	.16	.08
CBQ NA: Father				--	.21	.30*	-.16
CBQ Surgency: Mother					--	.78***	-.80***
CBQ Surgency: Father						--	-.66***
BIQ/CSPS Shyness							--
CSPS Shyness							

* $p < .05$;

*** $p < .001$.

Note. Lab-TAB: Laboratory Temperament Assessment Battery BI: Behavioral Inhibition NE: Negative Emotionality; PE: Positive Emotionality; CBQ: Children's Behavior Questionnaire; NA: Negative Affectivity; BIQ: Behavioral Inhibition Questionnaire; CSPS: Child Social Preference Scale

Table 3

Comparisons Among Children Who Met Criteria for an Anxiety Diagnosis at Age 3 only (Remitted) or at Both Age 3 and Age 6 (Persistent/Recurring) on Age 3 Laboratory-Observed and Parent-Reported Temperament

	Remitted Anxiety (<i>n</i> =59)		Persistent/Recurring Anxiety (<i>n</i> =30)			
	M(SD)		M(SD)		B(SE)	OR(95%CI)
						Adjusted OR(95%CI)
						Chi-Square Test of Model Fit
<i>Lab-TAB</i>						
Behavioral Inhibition (BI)	.62(.18)		.78(.22)		.84(.27)	2.31(1.38–3.89)**
Negative Emotionality (NE)	.57(.22)		.61(.25)		.21(.23)	1.28(.81–2.02)
Positive Emotionality (PE)	-.39(1.73)		-1.16(1.47)		-.48(.24)	.59(.36–.97)*
<i>Parent report</i>						
CBQ Surgency: Mother	245.20(35.92)		215.44(41.22)		-.85(.28)	.46(.26–.81)**
CBQ Surgency: Father	246.57(28.20)		221.75(37.79)		-.81(.30)	.43(.23–.81)**
CBQ NA: Mother	258.23(33.50)		263.40(27.56)		.17(.24)	.91(.54–1.52)
CBQ NA: Father	248.30(32.87)		248.01(33.07)		-.01(.26)	.86(.49–1.48)
BIQ/CSPS Shyness	-.52(1.61)		1.13(2.05)		.51(.15)	1.55** (1.14–2.13)

* $p < .05$;

** $p < .01$.

Note. OR=Odds ratio. 95% CI=95% Confidence Interval. Adjusted ORs for each predictor reflects ORs adjusted for number of age 3 anxiety diagnoses. Lab-TAB: Laboratory Temperament Assessment Battery; CBQ: Children's Behavior Questionnaire; BIQ: Behavioral Inhibition Questionnaire; CPS: Children's Social Preference Scale (BIQ and CPS scales were combined). Raw means and standard deviations are presented except for the BIQ/CSPS Shyness scale.