SUFFNESS, REBECCA A., M.A. Temperament and Internalizing Problems in Middle Childhood. (2013)
Directed by Dr. Susan P. Keane 55 pp.

This study draws on a developmental psychopathology perspective to examine the cumulative influences of temperament and life stress in the family context on increases in internalizing problems from ages 4 to 7. Data from the Right Track project was used. Multiple dimensions of temperament that have commonly been linked with internalizing problems were assessed at age 4, including Fear, Shyness, Sadness. Six types of life stress in the family context were measured at age 5. Internalizing problems were measured with the CBCL at age 7. Correlational analyses were run, and in multiple regression analyses, internalizing problems at age 7 were regressed on temperament at age 4, and life stress at age 5. It was found that all temperament variables were associated with internalizing problems. Maternal psychopathology and parental stress were also associated with internalizing problems, but maternal marital status, number of siblings, socioeconomic status, and life events were not associated with internalizing problems. Cumulative measures of temperament and life stress did not more strongly predict internalizing problems than the individual variables of which they were composed. Additionally, the association between temperament and internalizing problems was not moderated by life stress. Limitations and future directions are discussed.

TEMPERAMENT AND INTERNALIZING PROBLEMS

IN MIDDLE CHILDHOOD

by

Rebecca A. Suffness

A Thesis Submitted to
the Faculty of The Graduate School at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements for the Degree
Master of Arts

Greensboro
2013

Approved by

Susan P. Keane
Committee Chair

APPROVAL PAGE

This thesis written by Rebecca A. Suffness has been approved by the following committee of the Faculty of The Graduate School at The University of North Carolina at Greensboro.

Committee Chair _____
Susan P. Keane

Committee Members _____
Susan Calkins

_____
Gabriela Stein

_____
Date of Acceptance by Committee

_____
Date of Final Oral Examination

TABLE OF CONTENTS

LIST OF TABLES

Page

CHAPTER I

INTRODUCTION

Internalizing or emotional symptoms, including anxiety and depression, are relatively common by young adulthood and create a substantial burden for society (Collins et al., 2011; Copeland, Shanahan, Costello, & Angold, 2011). Childhood temperament, or a child's typical response to the environment, has been implicated in the development of internalizing symptoms (Anthony, Lonigan, Hooe, & Phillips, 2002; Oldehinkel, Hartman, De Winter, Veenstra, & Ormel, 2004; Oldehinkel, Veenstra, Ormel, de Winter, & Verhulst, 2006). Although different dimensions of temperament co-occur within a person at any point in time, most work to date has focused on one dimension of temperament at a time. The combined influence of multiple temperamental dimensions may be important, however, in capturing risk for internalizing symptoms. In this paper, multiple dimensions of temperament were examined individually and together in predicting risk for internalizing problems.

However, children do not develop in a vacuum; contextual factors influence children's development (Kim, Conger, Elder, & Lorenz, 2003). Life stress and family context factors have been found to be influential in the emergence of internalizing symptoms in particular. For example, factors such as parenting (Bayer, Sanson, & Hemphill, 2006), socioeconomic status (South & Krueger, 2011), maternal

psychopathology (Goodman et al., 2011), and family context variables in general (Calkins, Blandon, Williford, & Keane, 2007) have been linked to the development of internalizing symptoms. Furthermore, temperament can be observed as early as during infancy and may interact with specific types of life stress to influence the emergence and severity of internalizing symptoms (Gazelle & Ladd, 2003; Hudson, Dodd, & Bovopoulos, 2011). More work is needed to understand whether and how temperament as a diathesis contributes to the emergence and severity of internalizing symptoms within the context of life stress. This study examined (a) temperament in early childhood as a risk factor for the emergence of internalizing problems during middle childhood and (b) whether temperament and life stress interact to influence the presence and severity of internalizing problems.

First, internalizing symptoms will be defined and the literature on the prevalence of internalizing symptoms with be outlined. Next, different domains and dimensions of temperament that have been implicated in the development of internalizing symptoms will be discussed. Subsequently, the relation between life stress and the emergence of internalizing symptoms and how temperament may play a role in this emergence is examined. Finally, individual differences in these relations will be outlined. Based on the review of the literature, four hypotheses regarding interconnections between temperament, life stress, and the development of internalizing problems have been tested.

Definition and Prevalence of Internalizing Symptoms

Internalizing symptoms primarily consist of depression and anxiety. Depression includes symptoms such as sad mood; loss of pleasure or interest in activities; changes in

weight, appetite, and sleep; and difficulty concentrating (American Psychiatric Association, 2000). Anxiety symptoms generally consist of worry. These worries could be limited to specific situations, such as social situations in social anxiety or, in the case of generalized anxiety, more global worries (American Psychiatric Association, 2000). Anxiety and depression are often grouped together as emotional or internalizing disorders, and this grouping is supported by factor analytic research (Krueger, McGue, & Iacono, 2001).

Retrospective community studies of the lifetime prevalence of internalizing disorders indicate that approximately 16% of adults ages 18 and older have met criteria for a major depressive episode, and 29% of adults ages 18 and older have met criteria for any anxiety disorder (Kessler et al., 2005). Retrospective studies tend to underestimate the prevalence of psychopathology, however (Moffitt et al., 2010), and internalizing disorders are already prevalent earlier in the lifespan. For example, a prospective, longitudinal community study from age 9 years old into young adulthood showed that 15% of youth had met diagnostic criteria for an emotional disorder by age 16 (9.9% for an anxiety disorder and 9.5% for a depressive disorder (Copeland et al., 2011). By age 21, 14.8% of the study participants had met diagnostic criteria for a mood disorder diagnosis (including depression) and 20.9% for an anxiety disorder diagnosis (Copeland et al., 2011). Thus, by young adulthood, having experienced an internalizing disorder is relatively common, and an additional significant percentage of people have experienced impairing symptoms without fully meeting diagnostic criteria (Copeland et al., 2011). Importantly, internalizing symptoms place a high burden on children, their families, and

societies. For example, from a financial point of view, they exert higher costs to society than all other mental disorders or neurological and substance-use disorders (Collins et al., 2011). Thus, identifying who is most at risk for the development of internalizing symptoms is critical.

Developmental Psychopathology Perspective and Understanding the Emergence of Internalizing Symptoms

There is no consensus on how exactly internalizing symptoms develop, but developmental psychopathologists theorize that certain pathways increase a person's likelihood for deviating from normative psychological development. According to the developmental psychopathology model, a person and his or her environment are viewed as inseparable, and psychopathology does not have a single cause. Instead, a combination of risk and protective factors contribute to the development of psychopathology (Sroufe, 1997).

Within this model, temperament, or a child's typical response to the environment, has been established as an important risk factor for psychopathology in a number of studies (Anthony et al., 2002; Berdan, Keane, & Calkins, 2008; Betts, Gullone, & Allen, 2009; Calkins, 2002; Davies & Windle, 2001; Oldehinkel et al., 2004). Generally speaking, a risk factor is a measurable aspect of a person that increases a person's risk for subsequently developing particular symptoms (Kraemer, Kazdin, Offord, & Kessler, 1997; Mrazek & Haggerty, 1994). Therefore, a risk factor must precede the onset of these symptoms and be associated with a higher potential of developing these symptoms, though a causal role does not necessarily have to have been identified (Mrazek &

Haggerty, 1994). Consistent with these criteria, temperament emerges very early in life, and specific temperamental traits have been associated with increased risk for future internalizing symptoms.

According to the developmental psychopathology model, multiple risk factors will typically act together and interact in the prediction of psychopathology. Thus, single dimensions of temperament may not contribute to the emergence of psychopathology in isolation (Sroufe, 1997). Instead, individual dimensions of temperament are more predictive in the context of additional factors, including other dimensions of temperament and life stress. Clearly mapping out the separate and joint roles of different dimensions of temperament may be a substantial next step toward understanding how internalizing symptoms develop.

Defining Temperament

Temperament is conceptualized as constitutionally based individual differences in *reactivity* and *self-regulation* (Putnam, Ellis, & Rothbart, 2001; Putnam & Rothbart, 2006; Rothbart & Derryberry, 1981; Siegler, DeLoache, & Eisenberg, 2003), or more simply put, a child's typical response to the environment. "*Reactivity*" refers to the typical manner in which an individual responds to the environment, including motor, attentional, and emotional responses. For example, emotional reactivity would be displayed when a child becomes upset when a favorite toy is withheld. Here, the primary focus is on typical emotional reactivity to the environment.

"*Self-regulation*" refers to the processes that regulate reactivity (Rothbart & Derryberry, 1981). In other words, self-regulation is a component of temperament that

refers to a person's ability to regulate both internal and external reactions; it is the physiological, attentional, emotional, behavioral, and cognitive processes that underlie adaptive behavior (Calkins & Fox, 2002; Calkins & Howse, 2004). Continuing with the previous example, the mental process that leads to a child displaying or not displaying negative affect in response to toy "withdrawal" would be an example of self-regulation. Thus, emotional self-regulation refers to processes involved in regulating affect in response to emotionally arousing situations.

Taken together, temperament is composed of individual differences in the way a person tends to respond to the environment and how well s/he is able to regulate this response. The different individual dimensions of temperament (such as Fear and Positive Anticipation) can be divided into broad overall domains: negative and positive temperament (Putnam et al., 2001; Putnam & Rothbart, 2006). Negative temperament, the focus of the present study, involves reactivity and self-regulation of negative affect.

Individual dimensions of temperament that fall within this domain and that have been linked to the development of internalizing symptoms in selected previous studies will be reviewed. For each dimension, associations with internalizing symptoms in past research will be discussed. Studies reviewed were chosen based on their clear findings and their representative methodological qualities. For example, longitudinal studies were included when available, and studies were chosen that best matched the constructs being investigated in this study.

Temperament and Internalizing Symptoms

Fear, Sadness, and Shyness are conceptualized as dimensions of negative temperament (Rothbart, Ahadi, Hersey, & Fisher, 2001). *Fear* is defined as the degree to which the child displays negative affect, including unease, worry, or nervousness, in anticipation of unpleasant events. A few studies have linked fear to internalizing symptoms. For example, one prospective study of 2230 Dutch preadolescents identified moderately-sized cross-sectional associations between Fear, and internalizing symptoms (Oldehinkel et al., 2004; Oldehinkel et al., 2006). Such links have also been identified longitudinally, for example in a community study of the association between fear/shyness at age 5 and internalizing symptoms at various ages up to age 17 (Leve, Kim, & Pears, 2005). Specifically, elevated levels of fear/shyness at age 5 predicted girls' internalizing symptoms at ages 5 and 7 and boys' internalizing symptoms at all time points between ages 5 and 17. Although this study does not separate fear and shyness, it lends support for the relationship between both of these dimensions of temperament and internalizing symptoms. Thus, fearfulness already appears to be related internalizing symptoms in pre-adolescence, concurrently and over time.

Shyness is defined as the degree to which the child tends to display inhibited approach and discomfort in social situations. Unlike Fear, Shyness occurs only in social situations as opposed to the general anticipation of a negative event. Associations between this wariness and internalizing symptoms have been established in past research. For example, a prospective community study of boys indicated that a shy temperament at age 1.5 strongly predicted internalizing symptoms between the ages of 2 through 10

(Feng, Shaw, & Silk, 2008). Another study using a prospective community sample found that temperamental shyness at approximately 6 years old predicted internalizing symptoms 4 years later (Eggum et al., 2011). Analysis of data from a Dutch sample found that preadolescents with internalizing symptoms were much more likely to score highly on the shyness dimension of temperament when compared to preadolescents with no psychopathology (Oldehinkel et al., 2004).

Behavioral inhibition, which is a similar construct to shyness, has also been associated with internalizing symptoms (Degnan, Almas, & Fox, 2010; Pérez-Edgar & Fox, 2005). Behaviorally inhibited children exhibit a more global fearfulness: Instead of exhibiting fear specifically in social situations, they tend to be fearful in unfamiliar situations in general (Chronis-Tuscano et al., 2009). For example, a prospective longitudinal study of children from 4 months of age to middle adolescence found that maternal reports of behavioral inhibition that were stable across time were strongly associated with internalizing symptoms (Chronis-Tuscano et al., 2009). Connections between behavioral inhibition and internalizing symptoms have also been found in older populations. For example, a large cross-sectional community study of adolescents found that behavioral inhibition was strongly positively correlated with both anxiety and depression symptoms (Sportel, Nauta, de Hullu, de Jong, & Hartman, 2011). Thus, display of negative affect in anticipation of negative events (i.e., Fear) and in social situations (i.e., Shyness and behavioral inhibition) have both been associated with internalizing symptoms in youths.

Sadness is defined as the degree to which the child displays negative affect along with lowered mood and energy related to experiencing distress and disappointment. As a temperamental trait, *Sadness* is relatively stable across time and situations and begins early in life. A person who is high on this temperamental trait has a general tendency to respond to a variety of situations with negative affect. Sadness has been linked to internalizing symptoms in a few studies. For example, a study utilizing a community sample of 290 10- to 17-year-old youth identified a strong, cross-sectional correlation between negative affect and both depression and anxiety (Anthony et al., 2002). Another study utilized a community sample of 443 preschoolers (De Pauw, Mervielde, & Van Leeuwen, 2009), finding a strong association between negative affectivity (i.e., sadness) and internalizing symptoms. Thus, displaying negative affect and lowered mood subsequent to distress or disappointment has been associated with internalizing symptoms. However, few studies have specifically identified this particular aspect of overall negative affect, and there is a noticeable lack of longitudinal studies examining the relation between the temperamental dimension of Sadness and internalizing symptoms.

Summarizing the review on negative temperament, scoring high on Fear, Shyness, and Sadness is cross-sectionally and longitudinally associated with symptoms. This project seeks to replicate these findings to some extent, but also to expand previous work. Specifically, previous work did not typically investigate the cumulative effects of temperamental dimensions, particularly within a longitudinal framework.

Cumulative Approaches to Temperament Research

Thus far, domains and dimensions of temperament were discussed separately. In reality, these dimensions of temperament do not occur in isolation or one-at-a-time, but they co-occur within a single person (Rothbart, 1989). Here, a cumulative approach is utilized to capture the co-occurrence of different dimensions of temperament. Such a cumulative approach involves considering the quantity of risk factors encountered by a person. Specifically, according to this approach, increases in the number of risk factors encountered will be associated with increases in the risk for internalizing symptoms (Sameroff, 2006). For example, one study of 329 preschoolers investigated the cumulative impact of high negative emotionality, characterized by sadness, fear, and anger, and low positive emotionality, characterized by anhedonia, listlessness, and lack of enthusiasm (Shankman et al., 2011). The results indicated that positive and negative emotionality interact to determine risk for depression, at least for females. Taken together, the cumulative approach is a legitimate and parsimonious method for investigating temperament-based risk for psychopathology. To date, few studies, have taken such an approach to examining the role of multiple dimensions of temperament in the emergence of internalizing symptoms.

In order to elucidate this new concept, the following examples detail how a cumulative model of temperament may present itself in children. Each of the individual dimensions of temperament that were examined in this study have been described, but the combinations of these forms of temperament are hypothesized to provide greater risk. For example, a fearful child will generally react to stimuli with a distinctly fearful reaction.

For fearful children, this reaction is may sometimes be conditioned such that neutral stimuli that do not lead to fear in the majority of children will instigate fear in fearful children after long-term exposure. This reaction has been described in biological terms; specifically, through the use of animal models, Davis (1992) has linked conditioned fear to activity in the amygdala. Additionally, more recent research has found evidence that this response is regulated by dopamine within the amygdala working in tandem with activation of the hypothalamic-pituitary-adrenal (HPA) axis (de Oliveira, Reimer, Reis, & Brandão, 2013). Thus, if children with this fear reactivity are also temperamentally "shy," they may fail to seek support to improve their mood when exposed to a fearful stimulus. This is supported a study that found that children were less likely to seek social support than children who were not rated as shy (Eisenberg, Shepard, Fabes, Murphy, & Guthrie, 1998). Alternatively, children who are temperamentally "sad" may be more prone to experiencing fear. For example, one study found that people with high negative affectivity were more prone to experiencing stress (Moyle, 1995). Thus, it is possible that a child with a sad temperament may be more prone to fear reactivity than a child who is not temperamentally sad. Along these lines, a child who is temperamentally sad and shy may experience more frequent negative reactions to stimuli and fail to seek social support to cope. Furthermore, a child with a sad, shy, and fearful temperament may exhibit a more intense negative reaction to neutral stimuli and be less likely to seek social support when experiencing negative affect. Thus, more at-risk levels of these dimensions of temperament would lead to a child with less ability to cope with the various difficulties that occur throughout the child's life.

Life Stress, Temperament, and Internalizing Symptoms

Along these lines, as noted previously, temperament alone does not lead to internalizing symptoms. Children's development may also be influenced by certain contextual factors in the child's life. The diathesis-stress theory suggests that stress during a person's life interacts with a person's inborn predisposition to a specific form of psychopathology to influence the emergence of that disorder (Abramson, Metalsky, & Alloy, 1989). Temperament may be one factor that contributes to the inborn predisposition, or diathesis. If this is the case, diathesis-stress theory predicts that temperament interacts with various types of life stress to influence the emergence of internalizing symptoms.

Several studies have investigated a diathesis-stress model involving temperament and various contextual factors. For example, Gazelle and Ladd (2003) specifically tested a diathesis-stress model in which the temperamental trait of anxious solitude was the diathesis and peer exclusion was the stress. Longitudinal data was utilized from a community sample of 388 children who began the study at the start of kindergarten and completed the study at the end of fourth grade. Children who were excluded by their peers and displayed elevated levels of anxious solitude were more likely to display depressive symptoms over time.

Another study investigated a diathesis-stress model in an urban, community sample of 316 children between the ages of 8 and 12 (Bush, Lengua, & Colder, 2010). The diathesis in this study involved a fearful temperament, and the authors were investigating the influence of neighborhood environment on children's internalizing

symptoms. Consistent with previous research, fearful children had higher rates of internalizing symptoms; however, there was also an interaction with neighborhood problems. Contrary to prediction, children low in fear tended to have more internalizing symptoms in the context of neighborhood problems.

Evidence for a diathesis-stress model has also been found with an outcome of depression in particular. For example, one longitudinal study of cognitive vulnerability to depression utilized a community sample of 289 children and their parents (Mezulis, Hyde, & Abramson, 2006). The study was part of the Wisconsin Study of Families and Work and utilized data from when the children were infants through age 11. Cognitive vulnerability to depression was assessed through a self-report measure completed by the children at ages 9 and 11 that utilizes scenarios to identify the degree to which children display a negative cognitive style. Within this sample, cognitive vulnerability to depression interacted with negative life events to predict self-reported depression symptoms at age 11, suggesting that a negative cognitive style did suggest a vulnerability to depression within this particular sample. Moreover, a temperament characterized by withdrawal negativity interacted with negative life events in predicting children's cognitive vulnerability to depression. Thus, the results of this study provide evidence for a diathesis-stress model of temperament interacting with life stress to predict internalizing symptoms.

Some studies, however, have not found conclusive evidence of a diathesis-stress model. For example, a study of the influence of behavioral inhibition (BI) and family environment in the development of anxiety utilized a community sample of 202

preschool children and their parents (Hudson et al., 2011). Of these 202 children, 100 were classified as low in BI and 102 were classified as high in BI; these classifications were done through observational methods. The family environment variables that were investigated in this study involved both observation and self-report and included parental overinvolvement and negativity, parental anxiety symptoms (both maternal and paternal), and mother-child attachment. As predicted, mothers of children classified as high in BI were more likely to report anxiety symptoms in their children than mothers of children classified as low in BI. Additionally, high BI was associated with an increased rate of all family environment risk factors except paternal anxiety symptoms. However, there was not an interaction between family environment and temperament (specifically, BI) for children's anxiety symptoms. Several possibilities for these disparate findings were suggested. First, it may be that family environment risk factors influence children regardless of initial levels of BI. Alternatively, the interaction may emerge later in development when the types of life stress become more diversified.

Overall, however, as suggested in the other studies reported here, there is strong evidence for a diathesis-stress model in the prediction of internalizing symptoms in children. Furthermore, it is suggested here that multiple domains of contextual risk will lead to increased stress within the diathesis-stress model. For example, one study found that risk of mood disorders in children increased when the mother had a mood disorder herself and when there was chronic stress within the family during the same period of time (Hammen et al., 1987). Similarly, a study of cognitive vulnerability for depression found that maternal depression, negative cognitions, and maternal stress all interacted to

predict a child's risk for depression (Jaenicke et al., 1987). Thus, since these studies show that multiple domains of risk are needed for negative outcomes, it is theorized that additional domains will produce additional risk of internalizing problems for children.

Study Goals and Hypotheses

The goal of this study was to examine predictors of internalizing problems between ages 4 and 7, including dimensions of temperament and life stress. Hypotheses are as follows:

H1a: High levels of individual dimensions of temperament (i.e., Fear, Sadness, and Shyness) at age 4 will be associated with increases in internalizing problems at age 7.

H1b: The following specific types of life stress in the family context at age 5 will be associated with increases in internalizing problems at age 7: number of siblings, parental marital status, socioeconomic status, number of life events, parental stress, and severity of maternal psychopathology.

H2a: Increases in the number of risky temperament dimensions at age 4 will be associated with increases in internalizing problems at age 7.

H2b: Increases in the number of family context variables in the higher risk range at age 5 will be associated with increases in internalizing problems at age 7.

H3: The association between a cumulative measure of temperament at age 4 and internalizing problems at age 7 will be moderated by a cumulative measure of life stress in the family context at age 5.

CHAPTER II

METHOD

Participants

The current sample utilized data from three cohorts of children who are part of a larger ongoing longitudinal study. The goal for recruitment was to obtain a sample of children who were at risk for developing future externalizing behavior problems that was representative of the surrounding community in terms of race and socioeconomic status (SES). All cohorts were recruited through child day care centers, the County Health Department, and the local Women, Infants, and Children program. Potential participants for Cohorts 1 and 2 were recruited at 2 years of age (Cohort 1, 1994-1996; Cohort 2, 2000-2001) and screened using the Child Behavior Checklist (CBCL; Achenbach, 1992) completed by the mother in order to oversample for externalizing behavior problems. Children were identified as being at risk for future externalizing behaviors if they received an externalizing *T* score of 60 or above. Efforts were made to obtain approximately equal numbers of males and females. A total of 307 children were selected. Cohort 3 was initially recruited when infants were 6 months of age (in 1998) for their level of frustration based on laboratory observation and parent report and followed through the toddler period (for more information, see Calkins, Dedmon, Gill, Lomax, & Johnson, 2002). From Cohort 3, children whose mothers' completed the CBCL at 2 years of age were included in the current study (n = 140). Of the entire sample (N = 447), 37%

of the children were identified as being at risk for future externalizing problems. There were no significant demographic differences between cohorts with regard to gender, χ^2 (2, N = 447) = 0.63, p = .73, race, χ^2 (2, N = 447) = 1.13, p = .57, or 2-year SES, F (2, 444) = 0.53, p = .59. Cohort 3 had significantly lower average 2-year externalizing T score (M = 50.36) compared to cohorts 1 and 2 (M = 54.49), t (445) = -4.32, p < .01.

Of the 447 original screened participants, six were dropped because they did not participate in any 2-year data collection. At 4 years of age, 399 families participated. Families lost to attrition included those who could not be located, moved out of the area, declined participation, and did not respond to phone and letter requests to participate. There were no significant differences between families who did and did not respond to phone and letter requests to participate. There were no significant differences between families, who did and did not participate in terms of gender, χ^2 (1, N = 447) = 3.27, p = .07, race, χ^2 (1, N = 447) = 0.70, p = .40, 2-year SES, t (424) = 0.81, p = .42, or 2-year externalizing T score, t (445) = -0.36, p = .72. At 5 years of age 365 families participated including four that did not participate in the 4-year assessment. Again, there were no significant differences between families, who did and did not participate in terms of gender, χ^2 (1, N = 447) = 0.76, p = .38, race, χ^2 (1, N = 447) = 0.17, p = .68, 2-year SES, t (424) = 1.93, p = .06 and 2-year externalizing T score, t (445) = -1.73, p = .09. At 7 years of age 356 families participated including 21 families that did not participate in the 5-year assessment. Again, there were no significant difference between families who did and did not participate in terms of gender, χ^2 (1, N = 447) = 2.15, p = .16, race, χ^2 (3, N = 447) = 0.61, p = .90, 2-year externalizing T score, t (445) = 1.43, p = .15. Families with lower 2-

year SES, t (432) = -2.31, $p < .05$, were less likely to continue participation at the 7-year assessment.

This focus of this study is on the 4-, 5-, and 7-year laboratory assessments and the subjects who participated in all of these visits. Complete data is available for 270 subjects that took part in all visits, of which 153 (57%) of the children were female. The children were an average of approximately 55 months or 4.58 years of age at the 4-year visit (range 3.9 to 5.63 years), approximately 70 months or 5.83 years of age at the 5-year visit (range 4.83 to 6.58 years), and approximately 91 months or 7.58 years of age at the 7-year visit (range 7.04 to 8.71 years). Sixty-seven percent of the participants were Caucasian, 27% were African American, 4.1% were biracial, and 1.9% were another race. The participants were economically diverse, with an average Hollingshead (1975) score of 43.42 (range 14-66). Additional demographic information can be found in Table 1.

Materials and Procedures

Temperament

Temperament was measured at age 4 with subscales from the short version of the Children's Behavior Questionnaire (CBQ-SF; Putnam & Rothbart, 2006). The CBQ-SF is a 94-item, parent report measure developed to assess temperament. The CBQ-SF asks parents to rate the degree to which each temperament-related statement represents their child. Ratings are based on a scale from 1 to 7, with "1" indicating "Extremely Untrue" and "7" indicating "Extremely True." There is also an additional "N/A" option to indicate that the statement is "Not Applicable." Sample items include, "Seems to be at ease with

almost any person," "Is afraid of fire," and, "Sometimes smiles or giggles playing by her/himself." The following CBQ-SF subscales will be used: Sadness (7 items), Shyness (6 items), and Fear (6 items). (See Appendix for individual items of the subscales used.) For this project, Cronbach's alpha for the CBQ-SF at the 4-year visit was 0.80. Cronbach's alpha for the CBQ-SF subscales at the 4-year visit were as follows: 0.54 for Sadness, 0.82 for Shyness, and 0.62 for Fear.

To create a cumulative temperament risk score, these three CBQ-SF subscales were dichotomized by selecting the top quartile at age 4 as being at risk, as done in previous studies (Calkins et al., 2007; Côté, Borge, Geoffroy, Rutter, & Tremblay, 2008; Sameroff, Seifer, Baldwin, & Baldwin, 1993). Of the 270 participants, 71 (26%) were classified as high risk for Fear, 61 (23%) for Sadness, and 72 (27%) for Shyness. A summed risk score was created by adding these dichotomized variables. See Table 2 for percentages of the sample with each possible category of risk factor.

Life Stress

Life stress in the family context was measured at age 5 with several variables. Maternal marital status and number of siblings were measured based on a demographic questionnaire completed by mothers at the 5-year visit. For marital status, mothers reported that they were single, divorced, separated, married, or remarried. These responses were then coded into a dichotomous variable in which the first three responses (single, divorced, and separated) were coded as not married while the latter two responses (married and remarried) were coded as married. This dichotomous variable was then used for data analysis. Regarding number of siblings, mothers were asked to list all children

other than the study participant. A variable was then created based on the number of children listed on the form.

This demographic form was also used to calculate socioeconomic status (SES). SES was calculated using the Hollingshead which uses education level and occupation to create a score that indicates social status (Hollingshead, 1975). The education and occupation scales of this index were validated using the 1970 United States Census (Hollingshead, 1975). Correlations between median years of school completed and occupational score were .84 for males and .85 for females, both of which were significant at $p < .01$ (Hollingshead, 1975). Correlations between median income earned and occupational score were .78 for males and .67 for females, both of which were significant at $p < .01$ (Hollingshead, 1975).

Maternal psychopathology was measured by maternal report on the Symptom Checklist-90-Revised (SCL-90-R; Derogatis, 1994). The SCL-90-R is a 90-item, self-report measure designed for adults that assesses symptoms of psychopathology. The SCL-90-R asks respondents to rate each item on the extent to which they have experienced that particular symptom in the past 7 days. Items are rated on a 5-point scale, with possible responses ranging from "Not at All" to "Extremely." Sample items include "Feeling critical of others" and "Feeling lonely." The SCL-90-R has adequate reliability and validity (Derogatis, 1994). Internal consistency for the subscales ranges from .77 to .90, and test-retest reliability has been found to range from .68 to .90 (Derogatis, 1994). This study utilized a T-score of the Global Severity Index. This is a measure of both the number of psychopathology symptoms reported and the resulting perceived intensity of

distress from these symptoms. For this project, Cronbach's alpha for the SCL-90-R was 0.97 at the 5-year visit.

Parenting stress was measured by maternal report on the Parenting Stress Index-Short Form (PSI-SF; Abidin, 1995). The PSI-SF is a 36-item, self-report measure designed to assess stress experienced by the reporter. The PSI-SF asks respondents to rate each item based on the extent to which they agree or disagree with the statement. Items are rated on a 5-point scale, with possible responses ranging from "Strongly Agree" to "Strongly Disagree." Sample items include "Since having a child I feel that I am almost never able to do things I like to do" and "When playing, my child doesn't often giggle or laugh." The PSI-SF has demonstrated adequate reliability; it is strongly correlated with the long form of the measure which has adequate validity (Abidin, 1995). For this project, Cronbach's alpha for the PSI-SF was 0.93 at the 5-year visit.

Number of life events was measured by maternal report the Life Events Scale (LES), an adapted version of the Life Experiences Survey (Sarason, Johnson, & Siegel, 1978). The original scale is a 57-item questionnaire that asks respondents to report on the quantity and frequency of life events that they have experienced during the past year. For this project, a 22-item scale was utilized that lists events that may have occurred in the past year and asks the respondent to report whether or not the event occurred to the respondent or anyone in the respondent's immediate family. Sample events include divorce and income increase. In this study, Cronbach's alpha for the Life Events Scale was 0.54 at the 5-year visit.

The cumulative measure of life stress was calculated in the same manner as the cumulative measure of temperament. Of the 270 participants, 53 (20%) were classified as high risk for maternal marital status (i.e., unmarried), 66 (24%) for SES, 81 (30%) for number of siblings, 72 (27%) for maternal psychopathology, 69 (26%) for parental stress, and 52 (19%) for life events. See Table 2 for percentages of the sample with each possible category of risk factor.

Internalizing Problems

Internalizing problems were measured at age 7 by maternal report using the internalizing scale of the Child Behavior Checklist for ages 4-18 (CBCL; Achenbach, 1991). The CBCL internalizing scale is comprised of three subscales: the 14-item Anxious/Depressed subscale, the 9-item Withdrawn/Depressed subscale, and the 10-item Somatic Complaints Subscale (see Appendix for individual items). The CBCL asks parents to rate statements on a scale from 0 to 2 indicating the degree to which the statement represents their child, with "0" indicating "Not True (as far as you know)," "1" indicating "Somewhat or Sometimes True," and "2" indicating "Very True or Often True." Sample items include, "Would rather be alone than with others" and "Fears he/she might think or do something bad." Overall, the CBCL has good test-retest reliability, with coefficients ranging from 0.95 to 1.00. The CBCL also has good inter-rater reliability, with coefficients ranging from 0.93 to 0.96, and good internal consistency, with coefficients ranging from 0.78 to 0.97. The CBCL has also been found to have acceptable criterion validity. For this project, Cronbach's alpha for the CBCL internalizing scale was 0.83 at the 7-year visit.

Control Measures

Race and sex were controlled in the regression model. Additionally, the CBCL (Achenbach, 1991) from the visit at age 4 was utilized to examine increases in internalizing problems from ages 4 to 7.

Procedure

Children and mothers participated in laboratory assessments at ages 4, 5, and 7, during which they completed questionnaires. These assessments were conducted on the University of North Carolina at Greensboro (UNCG) campus by trained research assistants and graduate students.

CHAPTER III

RESULTS

First, descriptive statistics and correlations among all study variables were computed (see Tables 3 and 4, respectively for detailed information). Descriptive statistics in particular were utilized to verify that the variables were normally distributed. Next, correlations were inspected to test whether individual dimensions of temperament at age 4 were associated with internalizing problems at age 7 (H1a). This hypothesis was confirmed, as Fear, Sadness, and Shyness at age 4 were all significantly correlated with internalizing problems at age 7 at $p < .01$. These correlations, while significant, were modest and reflect that temperament is only one variable that is associated with internalizing problems. Additionally, correlations were inspected to test whether specific types of life stress in the family context at age 5 were associated with internalizing problems at age 7. This hypothesis was partially confirmed; the relations between internalizing problems and maternal psychopathology as well as parental stress were significant at $p < .01$, but maternal marital status, number of siblings, socioeconomic status, and life events all demonstrated nonsignificant correlations with internalizing problems. Maternal psychopathology was the strongest predictor with $r = .48$ followed by parental stress with $r = .43$. This may be related to reporter bias, as maternal psychopathology, parental stress, and internalizing problems were all based on subjective, maternal report.

H2: The cumulative measures of temperament and life stress were both significantly associated with internalizing problems at $p < .01$ ($r = .27$ and $r = .30$, respectively). However, in order to test whether the cumulative measures were better predictors of internalizing problems at age 7 than the individual variables, regression analyses were run with the individual variables in step 1 and the cumulative measure in step 2. Significance of the change in R^2 was used to determine whether these measure were better predictors over and above the individual variables. Neither hypotheses 2a nor 2b were confirmed; R^2 was not significant for step 2 in the temperament model ($\Delta R^2 = .003$, $p = .34$) or the life stress model ($\Delta R^2 = .004$, $p = .23$).

H3: Prior to analyses, the cumulative measures of temperament risk and life stress risk were centered. For the regression analyses, internalizing problems at age 7 were regressed on the centered temperament risk variable at age 5 and the centered life stress risk variable at age 5, controlling for child sex, child race, and internalizing problems at age 4. Temperament risk was a significant predictor of internalizing problems, with $\beta = .10$, $p = .05$. Life stress risk was also a significant predictor of internalizing problems, with $\beta = .12$, $p < .05$. However, the interaction term was not significant, with $\beta = .01$, $p = .78$. Thus, hypothesis 3 was not confirmed.

CHAPTER IV

DISCUSSION

This study tested three hypotheses about the relation between temperament, life stress in the family context, and internalizing problems as well as cumulative risk measures of temperament and life stress. First, it was predicted that high levels of the individual temperamental dimensions of Fear, Sadness, and Shyness at age 4 would be associated with internalizing problems at age 7. This hypothesis was confirmed, as all three dimensions of temperament were significantly associated with internalizing problems at age 7. Similarly, it was predicted that specific types of life stress in the family context at age 5 would be associated with internalizing problems at age 7. This hypothesis was partially confirmed; maternal psychopathology and parental stress were significantly associated with internalizing problems, but maternal marital status, number of siblings, socioeconomic status, and life events all demonstrated nonsignificant correlations.

Second, it was predicted that increases in the number of risky temperament dimensions regardless of the types of temperament dimensions at age 4 and increases in the number of family context variables in the higher risk range at age 5 would be associated with an increase in internalizing problems at age 7. While both cumulative measures were significantly associated with internalizing problems at age 7, the

cumulative measures did not predict internalizing problems more strongly than the individual variables alone.

Third, it was predicted that the association between a cumulative measure of temperament at age 4 and internalizing problems at age 7 would be moderated by a cumulative measure of life stress in the family context at age 5. This hypothesis was not confirmed. Both temperament and life stress risk were significant predictors of internalizing problems. However, the two variables did not interact to predict internalizing problems, suggesting that life stress does not moderate the relation between temperament and internalizing problems.

Limitations and Future Directions

Though this sample is diverse, it is still a relatively low-risk population. For example, 65.2% of the sample came from the two highest brackets of Hollingshead's SES categories while only 7.2% came from the two lowest brackets and only 1.9% came from the very lowest bracket, where children may be most likely to experience life stress that is severe enough to result in significant consequences on mental health (see Table 1 for the specific breakdown of the various SES categories, maternal marital status, and maternal education level). Additionally, it is possible that it is the particularly high-risk population for which life stress moderates the relation between temperament and internalizing problems. Future research should examine a diathesis-stress model in a more at-risk sample. A further limitation of this study is that all measures were based on maternal report, which means that the study is subject to the same-reporter bias. Future research should examine additional reporters for some variables. For example, observational data

could be utilized to determine temperament. Additionally, while children may not be insightful enough to report on their own internalizing problems, studies conducted when children are slightly older could utilize adolescent self-report of internalizing symptoms as the outcome. Finally, resilience was not considered in this study. Future research should investigate temperamental and contextual factors that may provide a buffer to children with other risk factors for internalizing problems. For example, perhaps a temperament characterized by positive affect could be protective for children who experience some of the contextual risk factors examined in this study.

Cumulative Approaches

Cumulative approaches have several advantages. For example, it is the most parsimonious approach, making it the most easily understood. Furthermore, it treats each risk factor uniquely and as equally predictive, making it easier to calculate a person's risk based on available data. In other words, since each participant is dichotomized as being either at risk or not at risk for each contributing variable, each factor contributes to the risk score equally for someone that is either modestly at risk or highly at risk. However, while it may be easier to calculate risk with this approach, the method of treating each risk factor as equally predictive of psychopathology can be a disadvantage because this is not always the most accurate conceptualization of risk. As seen in this study, some temperamental and life stress dimensions may be more closely linked to internalizing problems than others. Furthermore, it may be the configuration of individual temperamental dimensions or life stress variables over and above their sheer number that best captures who is most at risk for psychopathology. For example, it is possible that,

due to the biological mechanisms underlying fear reactivity, fear is a key temperamental component of risk for internalizing problems.

Future research could also utilize alternative statistical techniques to examine the questions from the present study. For example, logistic regression and odds ratios could be used as an alternative method of analyzing risk. This technique attempts to identify a relation between the number of risk factors that a person is experiencing and the resulting impact on his or her risk for psychopathology. Structural equation modeling (SEM) could also be useful for examining risk. While SEM requires a large sample size and interactions can be difficult to test, SEM allows for the creation of latent variables that retains the continuous structure of the original variables (Evans, Li, & Sepanski Whipple, 2013). Cluster analysis is another potentially useful statistical technique for analyzing cumulative risk. This method can be used to identify patterns of risk factors that present particular risk for psychopathology (Evans, et al., 2013).

Distinguishing Temperament and Internalizing Symptoms

Considering that some of the temperamental dimensions described in this study resemble symptoms of depression and anxiety, it is not surprising that many of these dimensions of temperament are related to internalizing symptoms. For example, the temperament dimension of Sadness may seem similar to the sad mood that is a symptom of depression. However, as the correlations indicate, temperament and internalizing symptoms are different constructs. Temperament is a relatively stable construct and begins very early in life (Putnam, et al., 2001; Putnam & Rothbart, 2006; Rothbart & Derryberry, 1981). Indeed, profiles of temperament can even be identified in infants

(Costa & Figueiredo, 2011; Spruyt et al., 2008). Psychopathology, however, must be associated with functional impairment, and it likely begins later in life (American Psychiatric Association, 2000). For example, at present, it is not common practice to identify psychopathology presenting in infants. Psychopathology also includes symptoms that are not at all related to temperament. For example, internalizing disorders include physiological symptoms, such as changes in weight and sleep (American Psychiatric Association, 2000), neither of which are currently considered part of temperament. Additionally, some children and adults with high levels of risky forms of temperament do not qualify for a clinical diagnosis (De Pauw & Mervielde, 2010). In part, this is because temperamental traits are not necessarily maladaptive; they sometimes prove beneficial in terms of behavior regulation (De Pauw & Mervielde, 2010).

Overall, temperament may only be one of several factors contributing to the development of psychopathology. Along these lines, Kagan and Fox (2006) suggest that temperament can account for the varied reactions individuals have to the same situation and whether or not a stressful situation leads to psychopathology. Thus, temperament can both increase and decrease a person's risk for developing specific types of psychopathology.

REFERENCES

Abidin, R. R. (1995). *Manual for the Parenting Stress Index* (3rd ed.). Odessa, FL: Psychological Assessment Resources.

Abramson, L. Y., Metalsky, G. I., & Alloy, L. B. (1989). Hopelessness depression: A theory-based subtype of depression. *Psychological Review, 96*(2), 358-372.

Achenbach, T. M. (1991). *Manual for the child behavior checklist/4-18 and 1991 profile*. Burlington, VT: University of Vermont Department of Psychiatry.

Achenbach, T. M. (1992). *Manual for the child behavior checklist/2–3 & 1992 profile*. Burlington, VT: University of Vermont Department of Psychiatry.

American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders* (4th, Text Revision ed.). Washington, D.C.: Author.

Anthony, J. L., Lonigan, C. J., Hooe, E. S., & Phillips, B. M. (2002). An affect-based, hierarchical model of temperament and its relations with internalizing symptomatology. *Journal of Clinical Child and Adolescent Psychology, 31*(4), 480-490.

Bayer, J. K., Sanson, A. V., & Hemphill, S. A. (2006). Parent influences on early childhood internalizing difficulties. *Journal of Applied Developmental Psychology, 27*(6), 542-559.

Berdan, L. E., Keane, S. P., & Calkins, S. D. (2008). Temperament and externalizing behavior: Social preference and perceived acceptance as protective factors. *Developmental Psychology, 44*(4), 957-968.

Betts, J., Gullone, E., & Allen, J. S. (2009). An examination of emotion regulation, temperament, and parenting style as potential predictors of adolescent depression risk status: A correlational study. *British Journal of Developmental Psychology, 27*(2), 473-485.

Bush, N. R., Lengua, L. J., & Colder, C. R. (2010). Temperament as a moderator of the relation between neighborhood and children's adjustment. *Journal of Applied Developmental Psychology, 31*(5), 351-361.

Calkins, S. D. (2002). Does aversive behavior during toddlerhood matter?: The effects of difficult temperament on maternal perceptions and behavior. *Infant Mental Health Journal, 23*(4), 381-402.

Calkins, S. D., Blandon, A. Y., Williford, A. P., & Keane, S. P. (2007). Biological, behavioral, and relational levels of resilience in the context of risk for early childhood behavior problems. *Development and Psychopathology, 19*(3), 675-700.

Calkins, S. D., Dedmon, S. E., Gill, K. L., Lomax, L. E., & Johnson, L. M. (2002). Frustration in infancy: Implications for emotion regulation, physiological processes, and temperament. *Infancy, 3*(2), 175-197.

Calkins, S. D., & Fox, N. A. (2002). Self-regulatory processes in early personality development: A multilevel approach to the study of childhood social withdrawal and aggression. *Development and Psychopathology, 14*(3), 477-498.

Calkins, S. D., & Howse, R. B. (2004). Individual differences in self-regulation: Implications for childhood adjustment. In P. Philippot & R. S. Feldman (Eds.), *The regulation of emotion* (pp. 307-332). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Chronis-Tuscano, A., Degnan, K. A., Pine, D. S., Perez-Edgar, K., Henderson, H. A., Diaz, Y., et al. (2009). Stable early maternal report of behavioral inhibition predicts lifetime social anxiety disorder in adolescence. *Journal of the American Academy of Child & Adolescent Psychiatry, 48*(9), 928-935.

Collins, P. Y., Patel, V., Joestl, S. S., March, D., Insel, T. R., Daar, A. S., et al. (2011). Grand challenges in global mental health. *Nature, 475*(7354), 27-30.

Copeland, W., Shanahan, L., Costello, E. J., & Angold, A. (2011). Cumulative prevalence of psychiatric disorders by young adulthood: A prospective cohort analysis from the Great Smoky Mountains study. *Journal of the American Academy of Child & Adolescent Psychiatry, 50*(3), 252-261.

Costa, R., & Figueiredo, B. (2011). Infant's psychophysiological profile and temperament at 3 and 12 months. *Infant Behavior & Development, 34*(2), 270-279.

Côté, S. M., Borge, A. I., Geoffroy, M.-C., Rutter, M., & Tremblay, R. E. (2008). Nonmaternal care in infancy and emotional/behavioral difficulties at 4 years old: Moderation by family risk characteristics. *Developmental Psychology, 44*(1), 155-168.

Davies, P. T., & Windle, M. (2001). Interparental discord and adolescent adjustment trajectories: The potentiating and protective role of intrapersonal attributes. *Child Development, 72*(4), 1163-1178.

Davis, M. (1992). The role of the amygdala in fear and anxiety. *Annual Review of Neuroscience, 15*, 353-375.

de Oliveira, A. R., Reimer, A. E., Reis, F. M. C. V., & Brandão, M. L. (2013). Conditioned fear response is modulated by a combined action of the hypothalamic–pituitary–adrenal axis and dopamine activity in the basolateral amygdala. *European Neuropsychopharmacology, 23*(5), 379-389.

De Pauw, S. S. W., & Mervielde, I. (2010). Temperament, personality and developmental psychopathology: A review based on the conceptual dimensions underlying childhood traits. *Child Psychiatry and Human Development, 41*(3), 313-329.

De Pauw, S. S. W., Mervielde, I., & Van Leeuwen, K. G. (2009). How are traits related to problem behavior in preschoolers? Similarities and contrasts between temperament and personality. *Journal of Abnormal Child Psychology: An official publication of the International Society for Research in Child and Adolescent Psychopathology, 37*(3), 309-325.

Degnan, K. A., Almas, A. N., & Fox, N. A. (2010). Temperament and the environment in the etiology of childhood anxiety. *Journal of Child Psychology and Psychiatry, 51*(4), 497-517.

Derogatis, L. R. (1994). *Manual for the Symptom Checklist 90-Revised (SCL-90-R)*. Baltimore, MD: Author.

Eggum, N. D., Eisenberg, N., Reiser, M., Spinrad, T. L., Valiente, C., Sallquist, J., et al. (2011). Relations over time among children's shyness, emotionality, and internalizing problems. *Social Development*, 1-21. doi:10.1111/j.1467-9507.2011.00618.x

Eisenberg, N., Shepard, S. A., Fabes, R. A., Murphy, B. C., & Guthrie, I. K. (1998). Shyness and children's emotionality, regulation, and coping: Contemporaneous, longitudinal, and across-context relations. *Child Development, 69*(3), 767-790.

Evans, G. W., Li, D., & Sepanski Whipple, S. (2013). Cumulative Risk and Child Development. *Psychological Bulletin*.

Feng, X., Shaw, D. S., & Silk, J. S. (2008). Developmental trajectories of anxiety symptoms among boys across early and middle childhood. *Journal of Abnormal Psychology, 117*(1), 32-47.

Gazelle, H., & Ladd, G. W. (2003). Anxious solitude and peer exclusion: A diathesis-stress model of internalizing trajectories in childhood. *Child Development, 74*(1), 257-278.

Goodman, S. H., Rouse, M. H., Connell, A. M., Broth, M. R., Hall, C. M., & Heyward, D. (2011). Maternal depression and child psychopathology: A meta-analytic review. *Clinical Child and Family Psychology Review, 14*(1), 1-27.

Hammen, C. L., Gordon, D., Burge, D., Adrian, C., Jaenicke, C., & Hiroto, D. (1987). Maternal affective disorders, illness, and stress: Risk for children's psychopathology. *The American Journal of Psychiatry, 144*(6), 736-741.

Hollingshead, A. B. (1975). Four factor index of social status. Yale University.

Hudson, J. L., Dodd, H. F., & Bovopoulos, N. (2011). Temperament, family environment and anxiety in preschool children. *Journal of Abnormal Child Psychology, 39*(7), 939-951.

Jaenicke, C., Hammen, C., Zupan, B., Hiroto, D., Gordon, D., Adrian, C., et al. (1987). Cognitive vulnerability in children at risk for depression. *Journal of Abnormal Child Psychology, 15*(4), 559-572.

Kagan, J., & Fox, N. A. (2006). Biology, Culture, and Temperamental Biases. In N. Eisenberg, W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology: Vol. 3, Social, emotional, and personality development* (6th ed., pp. 167-225). Hoboken, NJ: John Wiley & Sons Inc.

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime Prevalence and Age-of-Onset Distributions of DSM-IV Disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry, 62*(6), 593-602.

Kim, K. J., Conger, R. D., Elder, G. H., Jr., & Lorenz, F. O. (2003). Reciprocal influences between stressful life events and adolescent internalizing and externalizing problems. *Child Development, 74*(1), 127-143.

Kraemer, H. C., Kazdin, A. E., Offord, D. R., & Kessler, R. C. (1997). Coming to terms with the terms of risk. *Archives of General Psychiatry, 54*(4), 337-343.

Krueger, R. F., McGue, M., & Iacono, W. G. (2001). The higher-order structure of common DSM mental disorders: Internalization, externalization, and their connections to personality. *Personality and Individual Differences, 30*(7), 1245-1259.

Leve, L. D., Kim, H. K., & Pears, K. C. (2005). Childhood Temperament and Family Environment as Predictors of Internalizing and Externalizing Trajectories from Ages 5 to 17. *Journal of Abnormal Child Psychology: An official publication of the International Society for Research in Child and Adolescent Psychopathology, 33*(5), 505-520.

Mezulis, A. H., Hyde, J. S., & Abramson, L. Y. (2006). The developmental origins of cognitive vulnerability to depression: Temperament, parenting, and negative life events in childhood as contributors to negative cognitive style. *Developmental Psychology, 42*(6), 1012-1025.

Moffitt, T. E., Caspi, A., Taylor, A., Kokaua, J., Milne, B. J., Polanczyk, G., et al. (2010). How common are common mental disorders? Evidence that lifetime prevalence rates are doubled by prospective versus retrospective ascertainment. *Psychological Medicine: A Journal of Research in Psychiatry and the Allied Sciences, 40*(6), 899-909.

Moyle, P. (1995). The role of negative affectivity in the stress process: Tests of alternative models. *Journal of Organizational Behavior, 16*(6), 647-668.

Mrazek, P. J., & Haggerty, R. J. (1994). *Reducing risks for mental disorders: Frontiers for preventive intervention research*. Washington, DC: National Academy Press.

Oldehinkel, A. J., Hartman, C. A., De Winter, A. F., Veenstra, R., & Ormel, J. (2004). Temperament profiles associated with internalizing and externalizing problems in preadolescence. *Development and Psychopathology, 16*(2), 421-440.

Oldehinkel, A. J., Veenstra, R., Ormel, J., de Winter, A. F., & Verhulst, F. C. (2006). Temperament, parenting, and depressive symptoms in a population sample of preadolescents. *Journal of Child Psychology and Psychiatry, 47*(7), 684-695.

Putnam, S. P., Ellis, L. K., & Rothbart, M. K. (2001). The structure of temperament from infancy through adolescence. In A. Eliasz & A. Angleitner (Eds.), *Advances in research on temperament* (pp. 165-182). Lengerich, Germany: Pabst Science.

Putnam, S. P., & Rothbart, M. K. (2006). Development of short and very short forms of the Children's Behavior Questionnaire. *Journal of Personality Assessment, 87*(1), 102-112.

Pérez-Edgar, K., & Fox, N. A. (2005). Temperament and Anxiety Disorders. *Child and Adolescent Psychiatric Clinics of North America, 14*(4), 681-706.

Rothbart, M. K. (1989). Temperament in childhood: A framework. In G. A. Kohnstamm, J. E. Bates & M. K. Rothbart (Eds.), *Temperament in childhood.* (pp. 59-73). Oxford England: John Wiley & Sons.

Rothbart, M. K., Ahadi, S. A., Hersey, K. L., & Fisher, P. (2001). Investigations of temperament at three to seven years: The Children's Behavior Questionnaire. *Child Development, 72*(5), 1394-1408.

Rothbart, M. K., & Derryberry, D. (1981). Development of individual differences in temperament. In M. E. Lamb & A. L. Brown (Eds.), *Advances in developmental psychology* (Vol. 1, pp. 37-86). Hillsdale, NJ: Lawrence Erlbaum Associates.

Sameroff, A. (2006). Identifying risk and protective factors for healthy child development. In A. Clarke-Stewart & J. Dunn (Eds.), *Families count: Effects on child*

and adolescent development (pp. 53-76). New York, NY: Cambridge University Press.

Sameroff, A. J., Seifer, R., Baldwin, A., & Baldwin, C. (1993). Stability of intelligence from preschool to adolescence: The influence of social and family risk factors. *Child Development, 64*(1), 80-97.

Sarason, I. G., Johnson, J. H., & Siegel, J. M. (1978). Assessing the impact of life changes: Development of the Life Experiences Survey. *Journal of Consulting and Clinical Psychology, 46*(5), 932-946.

Shankman, S. A., Klein, D. N., Torpey, D. C., Olino, T. M., Dyson, M. W., Kim, J., et al. (2011). Do positive and negative temperament traits interact in predicting risk for depression? A resting EEG study of 329 preschoolers. *Development and Psychopathology, 23*(2), 551-562.

Siegler, R., DeLoache, J., & Eisenberg, N. (2003). Emotion development. In R. Siegler, J. DeLoache & N. Eisenberg (Eds.), *How Children Develop* (1st ed., pp. 370-409). New York, NY: Worth Publishers.

South, S. C., & Krueger, R. F. (2011). Genetic and environmental influences on internalizing psychopathology vary as a function of economic status. *Psychological Medicine: A Journal of Research in Psychiatry and the Allied Sciences, 41*(1), 107-117.

Sportel, B. E., Nauta, M. H., de Hullu, E., de Jong, P. J., & Hartman, C. A. (2011). Behavioral inhibition and attentional control in adolescents: Robust relationships with anxiety and depression. *Journal of Child and Family Studies, 20*(2), 149-156.

Spruyt, K., Aitken, R. J., So, K., Charlton, M., Adamson, T. M., & Horne, R. S. C. (2008). Relationship between sleep/wake patterns, temperament and overall development in term infants over the first year of life. *Early Human Development, 84*(5), 289-296.

Sroufe, L. A. (1997). Psychopathology as an outcome of development. *Development and Psychopathology, 9*(2), 251-268.

APPENDIX A

TABLES

Table 1

Demographic Characteristics of the Sample at age 5 (n = 270)

Hollingshead Socioeconomic Status (mean = 44.96)	
SES Classification (Score Range)	*Percent*
Unskilled laborers, menial service workers (8-19)	1.9%
Machine operators, semiskilled workers (20-29)	6.3%
Skilled craftsmen, clerical, sales workers (30-39)	26.7%
Medium business, minor professional, technical (40-54)	50.0%
Major business and professional (55-66)	15.2%
Maternal Marital Status	
Marital Status	*Percent*
Single	12.6%
Married	80.0%
Divorced	5.9%
Remarried	0.4%
Maternal Education Level	
Education Level	*Percent*
Some High School	1.9%
High School Graduate	9.3%
Some College	27.0%
College Degree	48.1%
Advanced Degree	13.7%

Table 2

Percentage of Participants in Each Risk Category (n = 270)

Temperament Variables		
Category	**#**	**% of Total**
0 risk variables	121	44.8
1 risk variable	100	37.0
Fear	*30*	*11.1*
Sadness	*30*	*11.1*
Shyness	*40*	*14.8*
2 risk variables	43	15.9%
Fear and Sadness	*17*	*6.3*
Fear and Shyness	*18*	*6.7*
Sadness and Shyness	*8*	*3.0*
All 3 risk variables	6	2.2%
Contextual Risk Variables		
Category	**#**	**% of Total**
0 risk variables	79	29.3
1 risk variable	70	25.9
2 risk variables	64	23.7
3 risk variables	38	14.1
4 risk variables	15	5.6
5 risk variables	3	1.1
All 6 risk variables	1	0.4

Table 3

Descriptive Statistics

Temperament (4 year)			
Variable	*Mean (SD)*	*Skewness*	*Kurtosis*
CBQ Fear	4.08 (1.06)	-0.12	-0.34
CBQ Shyness	3.70 (1.27)	-0.05	-0.71
CBQ Sadness	4.20 (0.78)	-0.31	-0.53
Life Stress in Family Context (5 year)			
Variable	*Mean (SD)*	*Skewness*	*Kurtosis*
Number of Siblings	1.25 (0.91)	1.16	2.42
Socioeconomic Status (Hollingshead)	43.42 (10.43)	-0.37	-0.22
PSI Total Stress Score	66.88 (18.60)	0.62	0.17
Life Events Scale – Total Sum	2.37 (1.98)	1.71	5.25
SCL-90 General Severity Index T-Score	48.86 (11.34)	-0.07	-0.82
Internalizing Symptoms (7 year)			
Variable	*Mean (SD)*	*Skewness*	*Kurtosis*
CBCL Internalizing T-Score	46.84 (9.59)	0.56	0.20

Notes. Maternal marital status was not included in this table as it is a categorical variable*;* CBQ = Child Behavior Questionnaire, Short Form; PSI = Parental Stress Index; SCL-90 = Symptom Checklist-90; CBCL = Child Behavior Checklist

Table 4

Correlations Among Study Variables (n = 270)

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. CBCL Internalizing at 7	1											
2. CBQ Fear at 4	0.26**	1										
3. CBQ Sadness at 4	0.17**	0.29**	1									
4. CBQ Shyness at 4	0.22**	0.23**	0.04	1								
5. Temperament Risk[a] at 4	0.27**	0.57**	0.47**	0.48**	1							
6. Maternal Marital Status[b] at 5	0.01	0.04	0.03	0.08	0.02	1						
7. Number of Siblings at 5	-0.07	-0.03	-0.13*	0.03	-0.13*	-0.03	1					
8. Hollingshead SES at 5	-0.06	-0.03	-0.04	-0.11	-0.08	-0.12*	-0.19**	1				
9. SCL-90 Severity at 5	0.48**	0.05	0.10	0.11	0.09	0.12*	0.06	-0.19**	1			
10. PSI Total Stress at 5	0.43**	0.06	0.07	0.23**	0.13*	0.09	0.03	-0.08	0.47**	1		
11. Total Life Events at 5	0.11	-0.01	0.05	-0.13*	-0.05	0.20**	0.03	-0.08	0.28**	0.09	1	
12. Life Stress Risk[a] at 5	0.30**	0.07	0.05	0.11	0.05	0.47**	0.37**	-0.48**	0.58**	0.47**	0.43**	1

Notes. * = $p < .05$, ** = $p < .01$; [a] = cumulative risk score; [b] = either married or unmarried (i.e., divorced, separated, or single); CBCL = Child Behavior Checklist; CBQ = Child Behavior Questionnaire, Short Form; SES = socioeconomic status; SCL-90 = Symptom Checklist-90; PSI = Parental Stress Index

Table 5

Regression Analysis for Temperament Variables Predicating Child Internalizing Problems at age 7 (n = 270)

	β	R^2	ΔR^2
Step 1		0.103	
CBQ Fear @ age 4	0.19**		
CBQ Sadness @ age 4	0.10		
CBQ Shyness @ age 4	0.17**		
Step 2			0.003
Cumulative Temperament Risk	0.08		

Notes. * = $p < .05$, ** = $p < .01$; CBQ = Child Behavior Questionnaire

Table 6

Regression Analysis for Life Stress Variables Predicating Child Internalizing Problems at age 7 (n = 270)

	β	R^2	ΔR^2
Step 1		0.300	
Marital Status[a] @ age 5	-0.07		
Number of Siblings @ age 5	-0.10*		
SES @ age 5	0.00		
SCL-90 Severity @ age 5	0.37**		
PSI Total Stress @ age 5	0.27**		
Total Life Events @ age 5	0.00		
Step 2			0.004
Cumulative Temperament Risk	0.13		

Notes. * = $p \leq .05$, ** = $p < .01$; [a] = either married or unmarried (i.e., divorced, separated, or single); SES = socioeconomic status; SCL-90 = Symptom Checklist-90; PSI = Parental Stress Index

Table 7

Regression Analysis for Variables Predicating Child Internalizing Problems at age 7 (n = 265)

	β	R^2	ΔR^2
Step 1		0.395	
Child Sex	0.01		
Child Race	-0.05		
CBCL Internalizing @ age 4	0.63**		
Step 2			0.009*
Cumulative Temperament Risk (Centered)	0.10*		
Step 3			0.011*
Cumulative Life Stress Risk (Centered)	0.12*		
Step 4			0.000
Temperament X Life Stress Risk	0.01		

Note. * = $p \leq .05$, ** = $p < .01$

APPENDIX B

MEASURES

CBQ-SF

Fear
17. Is afraid of burglars or the "boogie man"
23. Is afraid of loud noises
35. *(Reverse scored)* Is not afraid of the dark
41. Is afraid of fire
63. Is afraid of the dark
68. *(Reverse scored)* Is rarely frightened by "monsters" seen on TV or at the movies

Shyness
11. *(Reverse scored)* Seems to be at ease with almost any person
37. Is sometimes shy even around people s/he has known a long time
42. Sometimes seems nervous when talking to adults s/he has just met
52. Acts shy around new people
60. *(Reverse scored)* Is comfortable asking other children to play
70. Sometimes turns away shyly from new acquaintances

Sadness
8. Cries sadly when a favorite toy gets lost or broken
20. Tends to become sad if the family's plans don't work out
27. Seems to feel depressed when unable to accomplish some task
31. Becomes upset when loved relatives or friends are getting ready to leave following a visit
54. *(Reverse scored)* Rarely cries when s/he hears a sad story
56. *(Reverse scored)* Rarely becomes upset when watching a sad event in a TV show
74. *(Reverse scored)* Rarely becomes discouraged when s/he has trouble making something work

SCL-90-R

1. Headaches
2. Nervousness or shakiness inside
3. Repeated unpleasant thoughts that won't leave your mind
4. Faintness or dizziness
5. Loss of sexual interest or pleasure
6. Feeling critical of others
7. The idea that someone else can control your thoughts
8. Feeling others are to blame for most of your troubles
9. Trouble remembering things
10. Worried about sloppiness or carelessness
11. Feeling easily annoyed or irritated
12. Pains in heart or chest
13. Feeling afraid in open spaces or on the streets
14. Feeling low in energy or slowed down
15. Thoughts of ending your life
16. Hearing voices that other people do not hear
17. Trembling
18. Feeling that most people cannot be trusted
19. Poor appetite
20. Crying easily
21. Feeling shy or uneasy with the opposite sex
22. Feelings of being trapped or caught
23. Suddenly scared for no reason
24. Temper outbursts that you could not control
25. Feeling afraid to go out of your house alone
26. Blaming yourself for things
27. Pains in lower back
28. Feeling blocked in getting things done
29. Feeling lonely
30. Feeling blue
31. Worrying too much about things
32. Feeling no interest in things
33. Feeling fearful
34. Your feelings being easily hurt
35. Other people being aware of your private thoughts
36. Feeling others do not understand you or are unsympathetic
37. Feeling that people are unfriendly or dislike you
38. Having to do things very slowly to insure correctness
39. Heart pounding or racing
40. Nausea or upset stomach
41. Feeling inferior to others

42. Soreness of your muscles
43. Feeling that you are watched or talked about by others
44. Trouble falling asleep
45. Having to check and double-check what you do
46. Difficulty making decisions
47. Feeling afraid to travel on buses, subways, or trains
48. Trouble getting your breath
49. Hot or cold spells
50. Having to avoid certain things, places, or activities because they frighten you
51. Your mind going blank
52. Numbness or tingling in parts of your body
53. A lump in your throat
54. Feeling hopeless about the future
55. Trouble concentrating
56. Feeling weak in parts of your body
57. Feeling tense or keyed up
58. Heavy feelings in your arms or legs
59. Thoughts of death or dying
60. Overeating
61. Feeling uneasy when people are watching or talking about you
62. Having thoughts that are not your own
63. Having urges to beat, injure, or harm someone
64. Awakening in the early morning
65. Having to repeat the same actions, such as touching, counting, or washing
66. Sleep that is restless or disturbed
67. Having urges to break or smash something
68. Having ideas or beliefs that others do not share
69. Feeling very self-conscious with others
70. Feeling uneasy in crowds, such as shopping or at a movie
71. Feeling everything is an effort
72. Spells of terror or panic
73. Feeling uncomfortable about eating or drinking in public
74. Getting into frequent arguments
75. Feeling nervous when you are left alone
76. Others not giving you proper credit for your achievements
77. Feeling lonely even when you are with people
78. Feeling so restless you couldn't sit still
79. Feelings of worthlessness
80. The feeling that something bad is going to happen to you
81. Shouting or throwing things
82. Feeling afraid you will faint in public
83. Feeling that people will take advantage of you if you let them
84. Having thoughts about sex that bother you a lot

85. The idea that you should be punished for your sins
86. Thoughts and images of a frightening nature
87. The idea that something serious is wrong with your body
88. Never feeling close to another person
89. Feelings of guilt
90. The idea that something is wrong with your mind

PSI-SF

1. I often have the feeling that I cannot handle things very well.
2. I find myself giving up more of my life to meet my children's needs than I ever expected.
3. I feel trapped by my responsibilities as a parent.
4. Since having this child, I have been unable to do new and different things.
5. Since having a child I feel that I am almost never able to do things I like to do.
6. I am unhappy with the last purchase of clothing I made for myself.
7. There are quite a few things that bother me about my life.
8. Having a child has caused more problems than I expected in my relationship with my spouse.
9. I feel alone and without friends.
10. When I go to a party I usually expect not to enjoy myself.
11. I am not as interested in people as I used to be.
12. I don't enjoy things as I used to.
13. My child rarely does things for me to make me feel good.
14. Most of the time I feel that my child does not like me and does not want to be close to me.
15. My child smiles at me much less than I expected.
16. When I do things for my child I get the feeling that my efforts are not appreciated very much.
17. When playing, my child doesn't often giggle or laugh.
18. My child doesn't seem to learn as quickly as most children.
19. My child doesn't seem to smile as much as most children.
20. My child is not able to do as much as I expected.
21. It takes a long time and it is very hard for my child to get used to new things.
22. I feel that I am:
    1. not a very good person
    2. a person who has some trouble being a parent
    3. an average parent
    4. a better than average parent
    5. a very good parent
23. I expected to have closer and warmer feelings for my child than I do and this bothers me.
24. Sometimes my child does things that bother me just to be mean.
25. My child seems to cry or fuss more often than most children.
26. My child generally wakes up in a bad mood.
27. I feel that my child is very moody and easily upset.
28. My child does a few things which bother me a great deal.
29. My child reacts very strongly when something happens that s/he doesn't like.
30. My child gets upset easily over the smallest things.
31. My child's sleeping or eating schedule was much harder to establish than I expected.

32. I have found that getting on my child to do something or stop doing something is:
    1. much harder than I expected
    2. somewhat harder than I expected
    3. about as hard as I expected
    4. somewhat easier than I expected
    5. much easier than I expected
33. Think carefully and count the number of things which your child does that bother you. For example: dawdles, refuses to listen, overactive, cries, interrupts, fights, whines, etc. Please circle the number which includes the number of things you counted.
    1. 10+
    2. 8-9
    3. 6-7
    4. 4-5
    5. 1-3
34. There are some things my child does that really bother me a lot.
35. My child turned out to be more of a problem than I expected.
36. My child makes more demands on me than most children.

Life Events Scale

1. Divorce
2. Marital reconciliation
3. Marriage
4. Separation
5. Pregnancy
6. Other relatives moved into household
7. Income increase substantially (20% or more)
8. Went deeply into debt
9. Moved to a new location
10. Promotion at work
11. Income decreased substantially
12. Alcohol or drug problem
13. Death of a close family friend
14. Began new job
15. Entered new school
16. Trouble with superiors at work
17. Trouble with teachers at school
18. Legal problems
19. Death of an immediate family member
20. Caring for a sick or disabled parent
21. High stress at work
22. Menopause
23. Other

CBCL Internalizing Subscales

Anxious/Depressed
Withdrawn
42. Would rather be alone than with others
65. Refuses to talk
69. Secretive, keeps things to self
75. Shy or timid
80. Stares blankly
88. Suspicious
102. Underactive, slow moving, or lacks energy
103. Unhappy, sad, or depressed
111. Withdrawn, doesn't get involved with others

Somatic Complaints
51. Feels dizzy
54. Overtired
56. Physical problems without known medical cause:
56a. Aches or pains (not stomach or headaches)
56b. Headaches
56c. Nausea, feels sick
56d. Problems with eyes (not if corrected by glasses) (describe):
56e. Rashes or other skin problems
56f. Stomachaches or cramps
56g. Vomiting, throwing up

Anxious/Depressed
12. Complains of loneliness
14. Cries a lot
31. Fears he/she might think or do something bad
32. Feels he/she has to be perfect
33. Feels or complains that no one loves him/her
34. Feels other are out to get him/her
35. Feels worthless or inferior
45. Nervous, highstrung, or tense
50. Too fearful or anxious
52. Feels too guilty
71. Self-conscious or easily embarrassed
89. Suspicious
103. Unhappy, sad, or depressed
112. Worries