THE ROLE OF TEMPERAMENT IN SYMPTOMS OF DEPRESSION AND

ANXIETY AMONG CHILDREN AND ADOLESCENTS

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ABSTRACT OF THE DISSERTATION

The Role of Temperament in Symptoms of Depression and Anxiety

Among Children and Adolescents

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Symptoms of depression and symptoms of anxiety are reported at various levels of severity among children and adolescents. Various risk or vulnerability factors may contribute to the etiology of symptoms of depression and anxiety in childhood and adolescence. However, what renders some children and adolescents more likely to experience symptoms of depression and/or anxiety, and at different levels of severity, remains to be explored. Moreover, it is important to address the specificity of vulnerability factors in determining risk for depression and anxiety, which are often reported to co-occur. Temperament and its components have been posited to be vulnerability factors and to have a temporal association with the onset of symptoms of psychopathology during childhood and adolescence. In this study, temperament constructs of Negative Emotionality, Affiliativeness, and Effortful Control were examined in their association with symptoms of depression and anxiety, among children

and adolescents. Negative Emotionality was consistently found to be associated with higher levels of symptoms of depression, and separately with symptoms of anxiety, particularly among older children and adolescents. Affiliativeness and Effortful Control were found to be associated with higher levels of symptoms of depression only. In summary, older ages of children/adolescents, higher levels of Negative Emotionality, higher levels of Affiliativeness, and lower levels of Effortful Control were associated with higher levels of symptoms of depression. Higher levels of Negative Emotionality were associated with higher levels of symptoms of anxiety, particularly among older children and adolescents. Therefore, Negative Emotionality may be a non-specific vulnerability factor for the association with depression and anxiety symptoms, while Affiliativeness and Effortful Control may be specific vulnerability factors for the association with symptoms of depression only. Implications of the current findings, limitations of the study, and future directions are discussed.

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Introduction

The focus of this study was to explore the relationship between temperament constructs and symptoms of depression and anxiety among children and adolescents. Although temperament has been studied for decades (Rothbart & Ahadi, 1994; Thomas & Chess, 1977; Thomas, Chess, Birch, Hertzig, & Korn, 1963), its relation to psychopathology, and more specifically to symptoms of depression and anxiety among children and adolescents, deserves closer examination. Understanding this relationship may help to determine methods of intervention and prevention with regard to depression and/or anxiety.

First, prevalence rates and symptoms of depression among children and adolescents, followed by a similar overview regarding anxiety, will be presented. Then, background on the study of temperament, and more specifically the temperament constructs of Negative Emotionality (NE), Affiliativeness (A), and Effortful Control (EC), will be presented. These temperament constructs will then be discussed as vulnerability factors in relation to symptoms of depression and anxiety among children and adolescents.

Symptoms of Depression among Children and Adolescents

Among children and adolescents ages 9 to 16, a three-month prevalence rate ranging between 0.5% and 3.7% for a diagnosis of any depressive disorder was reported (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003). In total, the three-month prevalence rate for any depressive disorder was reported to be 2.2%, with a higher prevalence rate for girls than boys (2.8% vs. 1.6%). In a lifetime prevalence study of mental health disorders among adolescents 13 - 18 years of age, Merikangas and

colleagues (2010) found an overall prevalence rate of 11.7% for major depressive disorder or dysthymia. The prevalence of all mood disorders was reported to increase uniformly with age, and females were consistently reported to have higher prevalence rates than males for unipolar mood disorders.

On average, schoolchildren are believed to experience lower rates of depression than adolescents, and prepubertal boys have reported a slightly higher rate of depressed mood than prepubertal girls (Kessler, Avenevoli, & Merikangas, 2001; Merikangas et al., 2010). Lewinsohn, Clarke, Seeley, and Rohde (1994) found the average age of onset to be approximately 15, and an average episode to last about 6 months. Adolescence presents as a particularly critical period for understanding the development of depression for two reasons (Avenevoli et al., 2008; Rohde et al., 2009). First, though sex differences are not reliably found during childhood, during adolescence the emergence of sex differences is impressive with girls reporting higher levels of both depressive symptoms (Angold, Erkanli, Silberg, Eaves, & Costello 2002; Twenge & Nolen-Hoeksema, 2002) and depressive disorders (Costello et al., 2003; Hankin, Abramson, Moffitt, Silva, McGee, & Angell, 1998). Second, middle and late adolescence presents as a particularly sensitive period for the surge in depression rates (e.g., six-fold increase, see Hankin et al., 1998), in general. Although these epidemiological shifts are observed during adolescence and have consistently been reported in literature, current research has yet to provide evidence that fully explains these phenomena.

There has been some debate over the idea of "subthreshold" or "subsyndromal" depressive symptoms, which are symptoms identified as being below the threshold of a clinical diagnosis. Subthreshold symptoms are reported in both clinical interviews and

self-report measures, which may help to account for higher reports of depressive symptoms among studies of self-reported depression symptoms and diagnostic interview classifications. This is further explained by an over-reporting of mild mood difficulties or by the fact that many young people may suffer from subthreshold depression (Kessler et al., 2001). Furthermore, the debate raises concerns about whether depressive symptoms may fall on a continuum and therefore represent a single biopsychological process by which the difference between threshold and subthreshold symptoms vary only in the degree or severity rather than kind (Lewinsohn et al., 2000). In fact, in a study by Lewinsohn and colleagues, those who experienced subsyndromal depression experienced more difficulties in psychosocial functioning, compared to their nonaffected counterparts (those who did not experience any symptoms) (Lewinsohn, Rohde, & Seeley, 1998). Whatever the view may be, considering that elevated depressive symptoms are identified as the strongest risk for future diagnoses of major depressive disorder (Georgiades, Lewinsohn, Monroe, & Seeley, 2006; Pine, Cohen, Cohen, & Brook, 1999), it is essential to study when and what leads to the onset and elevations in symptoms of depression, or the severity of those symptoms (Lewinsohn et al., 2000; Rohde et al., 2009). Thorough research examining the cross-sectional and longitudinal aspects of the onset, maintenance, and treatment of depressive symptoms can lead to the design of prevention and intervention programs. Such research can then help inform when to implement such a program and whom to target (Rohde et al., 2009).

Symptoms of Anxiety among Children and Adolescents

Research on child and adolescent anxiety disorders has demonstrated an increasing trend (Degnan, Almas, & Fox, 2010; Merikangas et al., 2010). Three-month

prevalence rates for children ages 9 through 16 have been reported to range between 0.9% and 4.6% for any anxiety disorder (Costello et al., 2003). In total, a three-month prevalence rate of 2.4% is reported for children between the ages of 9 and 16, with girls reporting a higher rate (2.9%) than boys (2.0%). Among adolescents, anxiety disorders are believed to be the most common class of disorders in *The Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM-4-TR;* American Psychiatric Association, 2000), and research has demonstrated that anxiety disorders are highly persistent during adolescence (Kessler et al., 2012). The National Comorbidity Survey – Adolescent Supplement reported lifetime prevalence rates for any anxiety disorder among adolescents 13 – 18 years of age to be 31.9%, with a range between 1% and 21.6% for specific anxiety disorders (Merikangas et al., 2010). Females were consistently reported to have higher prevalence rates for specifics disorders, as well as an overall prevalence rate for any anxiety disorder (38% vs. 26.1%). Several anxiety disorders, such as Generalized Anxiety Disorder and Social Anxiety, are believed to persist across the individual's development, with an approximate onset reported to be between 8 and 15.5 years of age (American Psychiatric Association, 2013; Elizabeth, King, & Ollendick, 2004). Separation Anxiety Disorder is believed to resolve before adolescence, while Specific Phobias and Social Anxiety often begin at an early age and may or may not resolve with age (Degnan et al., 2010; Kessler et al., 2012; Rapee, Schiering, & Hudson, 2009). This high persistence of anxiety disorder diagnoses may be due to either the chronicity or recurrence of the disorder (Kessler et al., 2012).

Subsequently, the shape of significant age differences for anxiety disorders is complicated as some disorders are inversely related to age, others are positively related,

and yet others are highest at intermediate ages (Kessler et al., 2012). Thus, it is difficult

to find a clear average age of onset for anxiety disorders in general (Degnan et al., 2010).

Despite this difficulty, it is clear from research findings that anxiety in childhood predicts

later anxiety in adulthood (whether it is the same or different anxiety disorder/symptom),

and that it may also be a marker for other forms of psychopathology later in life (Rapee et

al., 2009).

Comorbidity of Depression and Anxiety

The strongest comorbid relationship between anxiety and other forms of

psychopathology exists between anxiety and depression (Rapee et al., 2009). In fact, it is

believed that up to 75% of young people who are depressed also have a history of at least

one anxiety disorder (Lewinsohn et al., 1998; Mathew, Pettit, Lewinsohn, Seeley, &

Roberts, 2011). A high level of overlap is also reported for concurrent anxiety and

depression, with anxious children posited to be at 8 to 29 times the risk for additional

depressive symptoms (Rapee et al., 2009). For this reason, it is important to examine the

relationship between temperament constructs and symptoms of only depression, and

separately the relationship between temperament constructs and symptoms of only

anxiety. Furthermore, this approach may help to elucidate the specificity of the

relationship between temperament constructs and specifically the symptoms of

depression, or specifically the symptoms of anxiety.

Temperament and Psychopathology

Considering that individual differences may play a role in rendering some

children and adolescents more vulnerable to developing symptoms of depression and/or

symptoms of anxiety, it is essential to examine temperament and its relation to child and

adolescent symptoms of depression and/or anxiety. Rothbart and Derryberry (1981) believed that temperament reflects stable and individual differences in the way one reacts and self-regulates the stimuli and changes that may be encountered in their environment. In fact, the relationship between temperament and psychopathology is believed to be temporal, with temperament representing biological individual differences (present at birth or soon thereafter), while psychopathology develops as a result of the transaction between the biological presentation and the individual's environment (emerges over time) (Thomas & Chess, 1977).

The Study of Temperament

Although research on temperament and personality development has produced many findings detailing various temperament constructs and dimensions in the last half of this century, there remains a paucity of consensus on the precise definition of temperament and a unified conceptual model or framework for use in empirical studies. One of the pioneering efforts on temperament research was spearheaded by Thomas and Chess, starting in the 1960s. The New York Longitudinal Study (NYLS; Thomas & Chess, 1977; Thomas et al., 1963) referred to temperament as a 'behavioral style,' by which they meant that they focused on the *how* of behavior (i.e., how intensely the child cries), instead of *what* and *why* of behavior (i.e., what a child does while crying, or why a child cries). As a result, the authors derived three constellations of temperament ("difficult," "easy," and "slow-to-warn up") based on a total of nine temperament categories: (1) *activity level;* (2) *regularity of biologic functions;* (3) *approach/withdrawal*; (4) *ease or difficulty of adaptability*; (5) *sensory threshold*; (6) *quality of mood*; (7) *intensity of mood expression*; (8) *ease or difficulty of distractibility*;

and (9) *a double category of length of attention span, and degree of persistence with a difficult task* (Chess & Thomas, 1991). Their fundamental assumption was that, while there were individual differences in temperament at birth, the upbringing environment exercised influence on the developing child.

Progressing beyond a "stylistic" definition, Rothbart and colleagues emphasized a fundamental focus on temperamental differences between individuals to be largely determined by the responsiveness of psychobiological processes (Rothbart & Ahadi, 1994; Rothbart & Derryberry, 1981). In fact, Rothbart and Derryberry (1981) defined temperament as constitutionally based individual differences in emotion, attentional reactivity, and self-regulation that are in turn influenced over time by heredity and experience. By including general constructs of *reactivity* (physiological excitability of neural systems) and *self-regulation* (process enabling the modulation of the automatic and involuntary reactivity) in addition to *emotionality*, Rothbart and colleagues believed that this broad definition of temperament allowed for the inclusion of a number of other lists of temperament dimensions (Rothbart & Ahadi, 1994). For example, this new definition incorporated Buss and Plomin's (1984) emotionality, activity, sociability (EAS) constructs, as well as Kagan's (1998) construct of behavioral inhibition, and Goldsmith and Campos' (1986) emotionality dimensions (Rothbart & Derryberry, 2002).

In the 1970s and 80s, researchers shifted their focus towards developing measures of temperament, incorporating various definitions and scale constructs. Since temperament can be studied from as early as infancy, measures were developed for caregivers, teachers, and youth (once the children were able to report on their own temperament). Uniquely, Rothbart and colleagues developed their scales incorporating

research on animal temperament, human behavioral genetics, as well as Thomas and Chess' dimensions. Rothbart and colleagues considered the importance of the infant distress-processes and the development of the infant self-regulatory mechanisms when formulating their definitions and scales. In addition, Rothbart and colleagues believed that it is precisely these interactions between the infant's development and his/her environment that may lead to various pathways of child, adolescent, and adult psychopathology.

Rothbart and colleagues focused on studying *arousal, emotion,* and *self-regulation* as the three essential dimensions of temperament (Capaldi & Rothbart, 1992). *Arousal* is defined as a dimension of temperament examining the reactivity, and sensory and motor reactions to stimulation, including internal and external sensitivity to low-intensity stimulation, symptoms and behaviors related to somatic arousal (e.g., physical reactions often associated with tension, stress, or excitement and motor activation measured by repetitive and stereotyped behavioral patterns often related to somatic arousal such as leg jiggling) (Derryberry & Rothbart, 1988). *Emotion* is divided into *Negative Emotionality* and *positive emotionality*. *Negative Emotionality* includes distress to novelty (fear), general distress proneness (including irritability), and behavioral inhibition to novelty and challenge (shyness). *Positive emotionality* comprises sensation seeking, emphasizing social and physical thrill seeking (high-intensity) as well as simpler, less stimulating forms of enjoyment (outdoors or nature). *Self-Regulation* is defined as the ability to modulate or control activity when that activity was not appropriate (Capaldi & Rothbart, 1992).

Considering that individual biological differences are evident as early as birth, the study of temperament has focused largely on examining temperament in the early years of life (Capaldi & Rothbart, 1992; Chess & Thomas, 1977). Thus, when Rothbart and Capaldi set out to develop a measure of temperament for adolescents, they considered the constraints of developmental change and ecological validity in having different measures across different ages. However, they believed that by inevitably changing the scale items (e.g., asking adults about work, while asking adolescents about school), the similar dimensions being assessed at different ages may allow for the factor structure of the dimensions to be compared over time. Thus, in 2001, Ellis and Rothbart produced a new measure to assess child and adolescent temperament (Ellis & Rothbart, 2001).

Measurement of Temperament

The Early Adolescent Temperament Questionnaire – Revised (EATQ-R) is a revised version of the original EATQ (EATQ: Capaldi & Rothbart, 1992) that is used to measure temperament among children and adolescents. The revised questionnaire updates the EATQ to better assess aspects of temperament related to self-regulation in children and adolescents, and includes 10 scales measuring temperament and 2 scales measuring aggression and depressive mood that are embedded within the instrument (Ellis & Rothbart, 2001). Using an oblique rotation procedure, Ellis and Rothbart found four clear factors within the temperament scales of the EATQ-R: (1) *Effortful Control*, (2) *Surgency*, (3) *Affiliativeness*, and (4) *Negative Affectivity*.

Effortful Control factor includes the scales of Attention, Activation Control, and Inhibitory Control. A higher score on the Attention scale reflects greater capacity to focus attention as well to shift attention, while a higher score on the Activation Control scale

indicates greater capacity to perform an action when there is a strong tendency to avoid it. The Inhibitory Control scale measures the capacity to plan, and to suppress inappropriate responses.

Surgency factor includes the scales of High Intensity Pleasure, Low Levels of Shyness, and Low Levels of Fear. On the High Intensity Pleasure/Surgency scale, a higher score reflects greater pleasure derived from activities involving high intensity or novelty. A higher score on the Shyness scale indicates greater behavioral inhibition to novelty and challenge, especially in social situations. A higher score on the Fear scale indicates more unpleasant affect related to anticipation of distress.

Affiliativeness factor includes scales of Affiliation, Perceptual Sensitivity, and Pleasure Sensitivity. A higher score on the Affiliation scale represents greater desire for warmth and closeness with others, independent of shyness or extraversion. The Perceptual Sensitivity scale indicates that a higher score reflects more detection or perceptual awareness of slight, low-intensity stimulation in the environment. The Pleasure Sensitivity scale measures the amount of pleasure related to activities or stimuli involving low intensity, rate, complexity, novelty, and incongruity.

Negative Affectivity factor includes the scale Frustration and Fear. On the Frustration scale, a higher score reflects more negative affect related to interruption of ongoing tasks or goal blocking. The Fear scale reflects unpleasant affect related to anticipation of distress; the higher the score, the more fear.

According to Ellis and Rothbart, multiple regression analyses revealed that low Effortful Control, high Surgency, and low Affiliativeness best predicted aggression scores; low Effortful Control, high Affiliativeness, high Negative Affectivity, and gender

(being female) best predicted depressive mood scores (Ellis & Rothbart, 2001). The Aggression scale was described as being associated with hostile and aggressive actions, including person- and object-directed physical violence, direct and indirect verbal aggression, and hostile reactivity, while, the Depressive Mood scale reflected more unpleasant affect and lowered mood, loss of enjoyment and interest in activities (Ellis & Rothbart, 2001).

Constructs of Temperament for this Study

Research examining temperament using either the self-report or parent-report versions of the EATQ-R has demonstrated a variety of ways of defining, measuring, and reporting the scales or factors of the EATQ-R. While some studies report measuring and using the scales and factors/constructs as described originally in Ellis and Rothbart (2001), others reconfigure factors and use scales differently for their purposes. For instance, Anto and Jayan (2013) used the EATQ-R scales and four factors as described by Ellis and Rothbart (2001) and reported similar scale alpha levels as Ellis and Rothbart, but did not report on the alpha levels for the factors. Whittle et al., (2013) and Vijayakumar, Whittle, Dennison, Yucel, Simmons, & Allen, (2013) reported only on the Effortful Control and Negative Emotionality factors, using the same versions as originally described. However, Hardy, Bean, and Olsen (2014) defined self-regulation using 10 items from the Activation Control, and Inhibitory Control scales of the EATQ-R, but not the full 16 items of the Effortful Control factor. Furthermore, while the Negative Affectivity was described using the Fear and Frustration scales by Robins, Donnellan, Widaman, & Conger, (2010) it was defined as Fear, Frustration, and Shyness by Festen and colleagues (2011).

In addition, while some studies report on the alpha levels for the scales and/or factor/constructs (Anto & Jayan, 2013; Hardy et al., 2014; Vasey et al., 2013), other studies do not report nor evaluate their measures based on those values (Vijayakumar et al., 2013; Whittle et al., 2013). In addition, while Negative Affectivity and Negative Emotionality seem to be used interchangeably, Effortful Control is used mostly universally; the measure of Surgency, Positive Emotionality/Affectivity, or Extraversion is described differently in various studies.

Thus, in summary, although some consensus exists in terms of describing the scales or factors that are measured by the self-report or parent-report versions of the EATQ-R, there is considerable variability with regard to how temperament is defined and measured in children and adolescents. Therefore, the following section presents the specific definitions of the three temperament constructs examined in this study: Negative Emotionality, Affiliativeness, and Effortful Control. These three constructs were chosen for this study as they reflect possible vulnerability factors for the etiology of depression and anxiety, particularly among youth in mid to late childhood and early adolescence.. Furthermore, according to previously cited literature, the temperamental factors of Negative Emotionality, Affiliativeness, and Effortful Control are at times examined and reported separately, but this study examines them all concurrently and relative to each other with an eye toward their particular contributions to understanding both anxiety and depression.

Negative Emotionality (NE): Negative Emotionality is believed to be conceptually related to a construct of neuroticism, and may involve the tendency towards fear, anger, sadness, low soothability and general sense of discomfort (Compas, Connor-Smith, &

Jaser, 2004). Rothbart has found that a negative loading from the soothability-falling reactivity, and positive loadings for shyness, discomfort, fear, anger-frustration, and sadness, measure the concept of Negative Emotionality (Rothbart, 2004). It is believed to be related to the Behavioral Inhibition System (BIS: Gray, 1991) which processes information related to any type of threat or punishment. Considering that BIS sensitivity is believed to lead to heightened emotional and physiological arousal, and furthermore vigilance, it is hypothesized that it therefore results in restricted behavior. Negative Emotionality can also be described as relating to the emotionality dimension of Buss and Plomin's model of temperament (Buss & Plomin, 1984) of Emotionality-Activity-Sociability-Impulsivity. In addition, it is believed to be similar to the concept of "difficult temperament" by Thomas and Chess, and possibly Behavioral Inhibition (Kagan & Snidman, 1991). In the present study, Negative Emotionality was defined and measured using the Frustration, Fear, and Shyness scales of the EATQ-R, as referenced and described by Festen et al. (2011). (Please see Table 1 for specific scales comprising the three constructs in this study using the EATQ-R).

Affiliativeness (A): Affiliativeness as a construct was defined as behaviors involving a desire for closeness with others that was posited to be independent of measures of shyness and extraversion (Putnam, Ellis, & Rothbart, 2001). Putnam and colleagues described it as "cuddliness" among infants and young children (2001), and Rothbart and Ellis (2001) also included items that indicated pleasure or enjoyment related to low stimulus intensity, rate, complexity, novelty, and incongruity. Furthermore, Evans and Rothbart (2009) hypothesized that the need for affiliation, or a desire for warmth and closeness to others, is a trait that emerges in early adolescence and therefore included in

the EATQ-R a measure based on earlier work on the Adult Temperament Questionnaire (ATQ). In fact, in the ATQ, Affiliativeness was defined by three scales: emotional empathy – affective response congruent with what others are perceived to feel (e.g., "*I am rarely bothered by the apparent suffering of strangers"*), empathic guilt – distress in response to negatively affecting other people (e.g., "*Whenever I believe that I have hurt someone's feelings, I feel guilty"*), and social closeness – feelings of warmth, closeness, interest, and involvement with others (e.g., "*There are some people that I feel very close to"*) (Evans & Rothbart, 2007, 2009). In two separate but related studies, Evans and Rothbart (2007) reported that the measure of Affiliativeness on the ATQ was found to converge with the Big Five factor of Agreeableness ($r = .52$ and.69), in college student and community samples, respectively In addition, Affiliativeness was also related to three separate scales on the Cloninger's temperament and character inventory (TCI) of Cooperation ($r = .52$), Reward Dependence ($r = .47$), and Self-Transcendence ($r = .29$) (Evans & Rothbart, 2007). In the present study, Affiliativeness was defined and measured using the Affiliation, Perceptual Sensitivity, and Pleasure Sensitivity scales of the EATQ-R.

Effortful Control (EC): Effortful Control or constraint-attentional control (originally labeled as *anterior attention network*) is believed to involve the control of emotions and behaviors, task persistence, attentional focus, and self-regulation, which all modulate the expression of positive or Negative Emotionality (Rothbart, Ahadi, & Evans, 2000). According to Rothbart's research, Effortful Control is defined by positive loadings from such scales as inhibitory control, activation control, and attentional focusing (Rothbart, 2004). It is a network believed to be related to executive functioning, is active

in detection tasks such as detecting errors, and in planning (Rothbart, Ahadi, & Evans, 2000). Buss and Plomin's concept of Emotionality-Activity-Sociability-Impulsivity, consisting of components such as self-control, persistence, and planfulness, describes a very similar construct (Compas et al., 2004). Effortful Control is also believed to be related to the traits such as persistence and distractibility that Thomas and Chess described, as well as the trait of conscientiousness as described by the Big Five personality traits research (Shiner, 1998). In the present study, Effortful Control was defined and measured using the Attention, Activation Control, and Inhibitory Control scales of the EATQ-R.

Temperament as a vulnerability factor

A large body of research has accumulated examining temperamental characteristics (or their components) and the association to symptoms of child and adolescent psychopathology, most specifically to internalizing (Buckner, Mezzacappa, & Beardslee, 2009; Muris, Merckelbach, Wessel, & van de Ven, 1999; Muris, Meesters, & Spinder, 2003) and to externalizing disorders (Ellis, Rothbart, & Posner, 2004). Studies that have examined the association between Effortful Control (defined as temperamental regulation involving voluntary control of emotion and attention, serving to modulate emotional reactivity) and child/adolescent measures, demonstrate mixed results. Some state few or modest associations (Oosterlaan & Sergeant, 1996), while others state emerging evidence for both high and low levels of Effortful Control associated with problems (Dennis, Brotman, Huang, & Gouley, 2007; Ellis et al, 2004). For example, while some research posits that higher Effortful Control predicts fewer internalizing problems (Buckner et al., 2009; Eisenberg et al., 2003; Eisenberg et al., 2004), other

research shows that higher Effortful Control predicts greater internalizing problems (Murray & Kochanska, 2002), and furthermore that both self- and mother-reported Effortful Control contributed significantly to predicting problem behavior scores (i.e., externalizing symptoms) (Ellis et al., 2004).

Dennis and colleagues (2007) studied 75 children ages 4-6 who were enrolled in a preventive intervention trial for preschoolers at risk for psychopathology. Using a laboratory measure of Effortful Control, and parent questionnaires over at least three time points, Effortful Control was not related to internalizing or externalizing problems, and sex did not moderate the relation between Effortful Control and child outcomes (Dennis et al., 2007). However, upon closer examination, the associations between sub-components of Effortful Control were moderated by child age. More specifically, the high Suppress/Initiate and the high Motor Control (taken separately) subcomponents of Effortful Control were each significantly associated with lower internalizing scores at the age of 4, but this was reversed at later ages (Dennis et al., 2007). It may therefore be important to examine not only the constructs but also their components or even the combination of several constructs. For example, Muris (2006), examined neuroticism and Effortful Control among 173 adolescents, ages 12-15. Overlap between neuroticism and psychopathological symptoms was found, whereas Effortful Control represented a separate construct. As expected, higher levels of neuroticism and (separately) lower levels of Effortful Control were associated with higher levels of psychopathology for internalizing, externalizing, and combined symptoms (Muris, 2006). Results indicated that neuroticism and Effortful Control both were unique and significant predictors of psychopathological symptoms.

In a study of children and adolescents ages 7 – 18 from the general population, Austin and Chorpita (2004) found support for the relationship between temperament and psychopathology. More specifically, negative affectivity (more easily upset by things, experiences more negative affect) was related to both depression and anxiety (Austin & Chorpita, 2004; as well as Brown, Chorpita, & Barlow, 1998; Chorpita, Daleiden, Moffitt, Yim & Umemoto, 2000; Daleiden, Chorpita, & Luu, 2000). More specifically, high negative affectivity was associated with greater depression, and high negative affectivity was associated with greater anxiety. In the meantime, positive affectivity (e.g., experiencing positive affect and positive mood) was only related to symptoms of depression, such that lower positive affectivity was associated with greater depression (Austin & Chorpita, 2004; Brown et al., 1998; Chorpita et al., 2000; Daleiden et al., 2000).

Problems in emotion regulation, defined as one's ability to modulate one or a set of emotions (e.g., when we feel them, how we experience them, how we express them, and the capacity to control and influence which emotions we feel), are often described as relating to behavioral problems and psychopathology. Anto and Jayan (2013) examined Affiliativeness among 2041 adolescent females, aged 13 to 17 years old using the EATQ-R and found Affiliativeness significantly contributed to increases in levels of emotion dysregulation, over the variance accounted for by Negative Affect and Effortful Control. Finally, in their own review of the measure, Ellis and Rothbart reported that low Effortful Control, high Affiliativeness, high Negative Affectivity, and gender (being female) best predicted depressive mood scores (Ellis & Rothbart, 2001).

The Present Study

Although accumulating evidence supports the link between temperamental constructs or subconstructs and symptoms of depression or symptoms of anxiety, or both, the factors that determine whether psychopathology will be expressed, to what degree of severity, when (at what age), and in what form (anxiety, depression, or both), are not yet well understood nor studied. The present study, therefore, will examine the associations between the three constructs of temperament, Negative Emotionality (NE), Affiliativeness (A), and Effortful Control (EC) (identified and measured by the EATQ-R, Ellis & Rothbart, 2001), and concurrent symptoms of depression (CDI) and symptoms of anxiety (MASC).

Therefore, based on existing literature, the specific research questions and hypotheses are as follows:

Q1: Is temperament associated with symptoms of depression?

Q1a: Is NE associated with symptoms of depression?

Q1b: Is A associated with symptoms of depression?

Q1c: Is EC associated with symptoms of depression?

H1: Temperament is hypothesized to be associated with symptoms of depression.

H1a: NE is hypothesized to be positively associated with symptoms of depression.

H1b: A is hypothesized to be positively associated with symptoms of depression.

H1c: EC is hypothesized to be associated with symptoms of depression, but the strength and direction of the association may be a function of age.

Q2: Is temperament associated with symptoms of anxiety?

Q2a: Is NE associated with symptoms of depression?

Q2b: Is A associated with symptoms of depression?

Q2c: Is EC associated with symptoms of depression?

H2: Temperament is hypothesized to be associated with symptoms of anxiety.

H2a: NE is hypothesized to be positively associated with symptoms of anxiety.

H2b: A is not hypothesized to be associated with symptoms of anxiety.

H2c: EC is hypothesized to be associated with symptoms of anxiety, but the strength and direction of the association may be a function of age.

Q3: Research question: Is there evidence of specificity in terms of the temperamental association with symptoms of depression vs. symptoms of anxiety?

Method

Participants

In collaboration with several school districts in the Central New Jersey community, letters were sent to families inviting them to participate in this study if they had a child currently enrolled in or heading into the 3rd, 6th, or 9th grades. Schools and families of students were informed that this study would examine the factors that make some youth more likely than others to develop clinically significant levels of depression. Furthermore, the families were informed that the study would examine environmental, psychological, and genetic factors. Finally, families were told in the informed consent that the knowledge gained from such studies may help researchers and clinicians to develop effective treatment for youth suffering from depressive disorders and to develop effective prevention programs for youth at risk for developing depression.

Schools and individual families were informed that participation in the study was voluntary. Families contacted the Laboratory at Rutgers University, and an initial phone-call only with the mother, and a subsequent laboratory visit for the mother and youth pair were scheduled. Children and adolescents between the ages of 7 and 16, together with their mothers, participated in this study after signing consent and assent forms. There were a total of 316 children and adolescents, with 173 females and 143 males, and 277 mothers. Most of the families had one youth who participated in the study, but there were also 31 families with two siblings and 4 families with three siblings. For these 35 families, one child among the siblings was chosen at random to be the participant; data from the other children were not included in the study. Each of the questionnaires was assessed for missing data at the entire questionnaire (per participant) and item

nonresponse levels, and those participants who had missing data for the entire

questionnaire (either or more than one of the CDI, MASC, or EATQ-R) were eliminated

from the analyses. The final *N* for this study was 266 children and adolescents. Missing

data for the final sample ranged from a low of 0% for CDI, to 11.3% for MASC, and

13.8% for the EATQ-R. The missing data was determined to be missing at random and

therefore a stochastic imputation method of Expectation Maximization (EM) was used to

impute the data used in this study (Schlomer, Bauman, & Card, 2010). The average age

for the entire youth sample was 11.67 (*SD* = 2.43), among third graders 8.47 (*SD* = .79),

among sixth graders 11.32 (*SD* = .61), and among ninth graders 14.35 (*SD* = .64). There

were 72 third graders (38 females), 96 sixth graders (57 females), and 98 ninth graders

(51 females). The participants in the study represented the following ethnic groups:

56.8% Caucasian, 16.2% Asian, 14.7% African American/Black, 7.9% Hispanic, and

4.5% Multiracial. See Table 2 for details.

Measures

     Temperament: *Youth Self-Report Temperament Measure:* Based on the work of

Ellis and Rothbart (2001, and the APA presentation), the revised Early Adolescent

Temperament Questionnaire (EATQ, Capaldi & Rothbart, 1992) was used to define the

temperament constructs for this study. Table 1 summarizes which subscales from the

EATQ-R were used to define each of the constructs. The subscales were derived from

Ellis and Rothbart's (2001) work with a sample of children ages 10-16. A total of sixty-

five items are rated on a 5-point Likert scale ranging from 1 = *almost always untrue* to 5

= *almost always true.* The Cronbach's alpha coefficients for the three constructs

examined in this study were found to be: Negative Emotionality = .80, Affiliativeness =

.76, and Effortful Control = .73.

Symptoms of Depression: *Youth Self-Report of Symptoms of Depression:* The

Children's Depressive Inventory (CDI: Kovacs & Beck, 1977; Kovacs, 1981) is a self-

report inventory devised to measure depression in children and adolescents ages 7 - 17. It

is a 27-item questionnaire designed to assess cognitive, behavioral, and neurovegetative

signs of depression in children. Each item consists of three statements from which the

child is instructed to choose the one that best describes him or her over the past 2 weeks.

Each item is designed to assess a specific symptom of depression (e.g., crying, suicidal

ideation, ability to concentrate on schoolwork, etc.) Items are rated on a 3-point Likert

scale ranging from 0 – 2, representing mild or limited symptomatology, to severe or

maladaptive symptomatology, and total scores therefore ranging from 0 to 54. Higher

scores indicate higher level of depressive symptomatology. Validity analyses from

previous studies showed that the CDI distinguished schoolchildren with general

emotional distress (Saylor, Finch, Spirito, & Bennett, 1984) and depressed children, from

non-affected/non-depressed children (Rotundo & Hensley, 1985). In a study of test-retest

reliability, Finch, Saylor, Edwards, and McIntosh (1987) reported internal consistency

estimates (Cronbach's coefficient alpha) ranging from .82 to .66 and .67 for intervals

ranging from 2 to 4 to 6 weeks, in a community sample. The CDI is the most widely used

self-report measure of depression among children and adolescents. The Cronbach's alpha

coefficient for the CDI was found to be .87 in the present study.

Symptoms of Anxiety: *Youth Self-Report of Symptoms of Anxiety:*

Multidimensional Anxiety Scale for Children (MASC; March, Parker, Sullivan, Stallings,

& Conners, 1997). The MASC is a 39-item self-report measure of anxious symptoms in youth. The items are distributed across four major factors, three of which can be parsed into two subfactors each. Main and subfactors include: (1) physical symptoms (tense/restless and somatic/autonomic), (2) social anxiety (humiliation/rejection and public performance fears), (3) harm avoidance (perfectionism and anxious coping), and (4) separation anxiety. Children and adolescents are asked to indicate how true each item has been for them in the past week on a scale of 0 (*never*), 1 (*rarely*), 2 (*sometimes*), or 3 (*often*). Total scores range from 0 to 117, with higher scores indicating higher symptoms of anxiety. In an examination of its psychometric properties (March et al., 1997), the MASC demonstrated good test-retest reliability ($r = .93$) and internal consistency ($\alpha = .87$ to .89). Further, it showed convergent validity with other self-report measures of anxious symptoms ($r = .63$) and divergent validity with self-reports of depressive symptoms ($r = .19$) and parent reports of hyperactive symptoms ($r = .07$)). The Cronbach's alpha coefficient for the MASC total was found to be .88 in the present study.

Procedure

After the initial phone-call with only the mother, the rest of the study procedures were conducted at a laboratory at Rutgers University, with youth and mother pairs completing questionnaires. During this assessment, demographic information was obtained, and youth were asked to fill out self-report measures of temperament (EATQ-R), symptoms of depression (CDI), and symptoms of anxiety (MASC). The entire laboratory visit for mother and child pair lasted an average of 2.5 hours and the entire study sample completed the cross-sectional assessment over a period of 1.5 years.

Results

Descriptive Statistics

The minimum, median, maximum, mean, and standard deviation values were obtained for the measures of symptoms of depression, symptoms of anxiety, Negative Emotionality, Affiliativeness, and Effortful Control, and are presented by child grade, gender, and ethnic group (Table 3).

Psychometrics of the Temperament Constructs

Based on the work of Ellis and Rothbart (2001), the constructs of Negative Emotionality, Affiliativeness, and Effortful Control were defined using the scales and specific EATQ-R items outlined in Table 1. After conducting reliability analyses on each scale and comparing the alpha coefficients of each scale used to the scale alpha coefficients reported by Ellis and Rothbart, scales comprising each of the constructs were examined. These analyses demonstrated that the constructs were reliable and the alpha coefficients for the constructs of Negative Emotionality, Affiliativeness, and Effortful Control are reported in Table 1.

Correlations

The intercorrelations among the Negative Emotionality, Affiliativeness, Effortful Control, child's age, symptoms of depression, and symptoms of anxiety, were examined in the study (Table 4).

Negative Emotionality and Affiliativeness were found to be positively correlated, while Negative Emotionality and Effortful Control were found to be negatively correlated. Affiliativeness and Effortful Control were not correlated at a statistically significant level. This means that higher scores on Negative Emotionality were associated

with higher levels of Affiliativeness, and with lower levels of Effortful Control. Effortful Control was also found to be negatively correlated with the child's age. This means that participants at older ages reported lower levels of Effortful Control. Child's age was not correlated with Negative Emotionality or with Affiliativeness at a statistically significant level.

Negative Emotionality was found to be positively correlated to symptoms of depression, while Effortful Control was found to be negatively correlated to symptoms of depression. Affiliativeness was not found to be correlated to symptoms of depression at a statistically significant level. This means that higher levels of symptoms of depression were associated with higher scores on Negative Emotionality and lower levels of Effortful Control.

Negative Emotionality and Affiliativeness were both found to be separately positively correlated to symptoms of anxiety. Effortful Control was not found to be correlated to symptoms of anxiety at a statistically significant level. Finally, as expected, symptoms of depression and symptoms of anxiety were found to be positively correlated to each other.

Analyses of Variance

One-way between subjects ANOVAs were conducted to compare the symptoms of depression, symptoms of anxiety, Negative Emotionality, Affiliativeness, and Effortful Control scores, among grade, gender, and ethnic groups. Statistically significant differences were found for grade, gender, and ethnic group. (Please see Table 5.)

Grade. There was a statistically significant difference between grade groups as determined by one-way ANOVA ($F(2, 263) = 9.76$, $p = .000$) in levels of symptoms of

depression. A Tukey post-hoc test revealed that the levels of symptoms of depression were statistically significantly lower among third graders (6.88 ± 6.33, p = .005) as compared to the ninth graders (9.93 ± 6.90), as well as lower among 6th graders (6.20 ± 5.30, p = .001) as compared to the ninth graders. There were no statistically significant differences between the levels of symptoms of depression among third graders and sixth graders (p = .764).

There was a statistically significant difference between grade groups as determined by one-way ANOVA (F(2, 263) = 3.33, p = .037) in levels of symptoms of anxiety. A Tukey post-hoc test revealed that the levels of symptoms of anxiety were statistically significantly higher among third graders (45.75 ± 14.78, p = .029) as compared to the sixth graders (39.55 ± 14.41). There were no statistically significant differences between the levels of symptoms of anxiety among third graders and ninth graders (p = .407), nor among sixth and ninth graders (p = .340).

There was a statistically significant difference between grade groups as determined by one-way ANOVA (F(2, 263) = 5.64, p = .004) in levels of Negative Emotionality. A Tukey post-hoc test revealed that the levels of Negative Emotionality were statistically significantly higher among third graders (9.33 ± 2.20, p = .004) as compared to the sixth graders (8.35 ± 1.90), and compared to the ninth graders (8.53 ± 1.83, p = .024). There were no statistically significant differences between the levels of Negative Emotionality among sixth and ninth graders (p = .799).

There was a statistically significant difference between grade groups as determined by one-way ANOVA (F(2, 263) = 3.48, p = .032) in levels of Affiliativeness. A Tukey post-hoc test revealed that the levels of Affiliativeness were statistically

significantly higher among ninth graders (21.49 ± 3.65, *p* = .035) as compared to the sixth graders (20.08 ± 3.93). There were no statistically significant differences between the levels of Affiliativeness among the third and sixth graders (*p* = .915), nor among third and ninth graders (*p* = .139).

There was a statistically significant difference between grade groups as determined by one-way ANOVA (*F*(2, 263) = 10.46, *p* = .000) in levels of Effortful Control. A Tukey post-hoc test revealed that the levels of Effortful Control were statistically significantly higher among third graders (10.63 ± 1.60, *p* = .000) as compared to the ninth graders (9.48 ± 1.48), and higher among sixth graders (10.063 ± 1.80, *p* = .035) as compared to the ninth graders. There were no statistically significant differences between the levels of Effortful Control among the third and sixth graders (*p* = .068).

Gender. There was a statistically significant difference between gender groups as determined by one-way ANOVA (*F*(1, 264) = 4.29, *p* = .039) in levels of Negative Emotionality. A Tukey post-hoc test was not conducted due to having only two groups. However, the levels of Negative Emotionality were lower among males (8.40 ± 2.14) as compared to females (8.91 ± 1.85). There were no other statistically significant differences among measures between the gender groups.

Ethnic Group. There was a statistically significant difference between ethnic groups as determined by one-way ANOVA (*F*(4, 261) = 1.68, *p* = .005) in levels of Negative Emotionality. However, post hoc comparisons using the Tukey HSD test did not indicate statistically significant differences across ethnicity categories.

Regression Analyses

Multiple regression analyses were conducted to see if age or gender of the child/adolescent and temperament constructs were associated with the reported levels of symptoms of depression, and separately with symptoms of anxiety. More specifically, using the enter method, age was entered in Step 1, the three temperament constructs of Negative Emotionality, Affiliativeness, and Effortful Control were entered in Step 2, and the interactions terms for age X each of the three temperament constructs were entered in Step 3. For gender, using the enter method, gender was entered in Step 1, the three temperament constructs of Negative Emotionality, Affiliativeness, and Effortful Control were entered in Step 2, and the interactions terms for gender X each of the three temperament constructs were entered in Step 3.

Symptoms of Depression: Age. A multiple regression was conducted to see if age, temperament constructs, and their interactions were associated with symptoms of depression. Using the enter method, in Step 1 age by itself was found to explain a very small portion of the variance in the symptoms of depression ($F(1, 264) = 10.92$, $p < .01$, $R^2 = .04$, $R^2_{Adjusted} = .04$). The analysis shows that age was statistically significant in the association with symptoms of depression (Beta = .20, $t(264) = 3.31$, $p < .01$). In Step 2 age, Negative Emotionality, Affiliativeness, and Effortful Control explained slightly more of the variance in the symptoms of depression ($F(4, 261) = 15.68$, $p < .001$, $R^2 = .19$, $R^2_{Adjusted} = .18$). More specifically, the analysis shows that age (Beta = .12, $t(264) = 2.08$, $p < .05$), Negative Emotionality (Beta = .15, $t(264) = 2.57$, p < .05), Affiliativeness (Beta = .12, $t(264) = 2.00$, $p < .05$), and Effortful Control (Beta = .-.30, $t(264) = -4.83$, $p < .001$) were all statistically significant in the association with symptoms of depression. In Step 3 age, temperament constructs, and their interactions explained about the same

amount of variance in the symptoms of depression as in Step 2 ($F(7, 258) = 9.45$, $p <$ .001, $R^2 = .20$, $R^2_{Adjusted} = .18$). However, none of the components of the model (neither age, nor temperament constructs, nor the interactions) were statistically significant in the association with symptoms of depression. Overall, older age children/adolescents, higher levels of Negative Emotionality, higher levels of Affiliativeness, and lower levels of Effortful Control were associated with higher levels of symptoms of depression, among children and adolescents.

Symptoms of Depression: Gender. A multiple regression was conducted to see if gender, temperament constructs, and their interactions were associated with symptoms of depression. Using the enter method, in Step 1 gender by itself was not found to explain the variance in the symptoms of depression ($F(1, 264) = .001$, *ns*, $R^2 = .000$, $R^2_{Adjusted} = -$.004). In Step 2 gender, Negative Emotionality, Affiliativeness, and Effortful Control explained slightly more of the variance in the symptoms of depression ($F(4, 261) =$ 14.37, $p < .001$, $R^2 = .18$, $R^2_{Adjusted} = .17$). More specifically, the analysis shows that Negative Emotionality (Beta = .13, t(264) = 2.16, $p < .05$), Affiliativeness (Beta = .14, t(264) = 2.39, $p < .05$), and Effortful Control (Beta = -.36, t(264) = -6.34, $p < .001$) were statistically significant in the association with symptoms of depression, while gender was not (Beta = -.009, t(264) = -.16, *ns*). In Step 3 gender, temperament constructs, and their interactions explained about the same amount of variance in the symptoms of depression as in Step 2 ($F(7, 258) = 8.71$, $p < .001$, $R^2 = .19$, $R^2_{Adjusted} = .17$). In Step 3 only Effortful Control (Beta = -.71, t(264) = -3.51, $p < .01$) was significant. However, none of the other components of the model (neither gender, nor the other temperament constructs, nor any of the interactions) were statistically significant in the association with symptoms of

depression. Overall, higher levels of Negative Emotionality, higher levels of Affiliativeness, and lower levels of Effortful Control were associated with higher levels of symptoms of depression, among children and adolescents.

Symptoms of Anxiety: Age. A multiple regression was conducted to see if age, temperament constructs, and their interactions were associated with symptoms of anxiety. Using the enter method, in Step 1 age by itself was not found to explain the variance in the symptoms of anxiety ($F(1, 264) = 1.60$, *ns*, $R^2 = .006$, $R^2_{Adjusted} = .002$). The analysis shows that age was not statistically significant in the association with symptoms of anxiety (Beta = -.08, $t(264) = -1.26$, *ns*). In Step 2 age, Negative Emotionality, Affiliativeness, and Effortful Control were found to explain more of the variance in the symptoms of anxiety ($F(4, 261) = 35.02$, $p < .001$, $R^2 = .35$, $R^2_{Adjusted} = .34$). More specifically, the analysis shows that Negative Emotionality was statistically significant in the association with symptoms of anxiety (Beta = .59, $t(264) = 11.12$, $p < .001$), while age (Beta = .007, $t(264) = .13$, *ns*), Affiliativeness (Beta = .032, $t(264) = .62$, *ns*), and Effortful Control (Beta = .036, $t(264) = .69$, *ns*) were not significant. In Step 3, age, temperament constructs, and their interactions explained about the same amount of variance in the symptoms of anxiety as in Step 2 ($F(7, 258) = 21.15$, $p < .001$, $R^2 = .37$, $R^2_{Adjusted} = .35$). In Step 3 only the interaction between age and Negative Emotionality (Beta = .76, $t(264) = 2.48$, $p < .05$) was significant. None of the other components of the model (neither age, nor temperament constructs, nor any of the other interactions) were statistically significant in the association with symptoms of anxiety. Examination of the simple slopes (Preacher, Curran, & Bauer, 2006) in symptoms of anxiety across levels of Negative Emotionality by age showed that the association between Negative

Emotionality and symptoms of anxiety was more strongly positive among older children and adolescents than among younger children (see Figure 1).

Symptoms of Anxiety: Gender. A multiple regression was conducted to see if gender, temperament constructs, and their interactions were associated with symptoms of anxiety. Using the enter method, in Step 1 gender by itself was not found to explain the variance in the symptoms of anxiety ($F(1, 264) = 1.52$, ns, $R^2 = .006$, $R^2_{Adjusted} = .002$). The analysis shows that gender was not statistically significant in the association with symptoms of anxiety (Beta = .076, t(264) = .1.23, *ns*). In Step 2 gender, Negative Emotionality, Affiliativeness, and Effortful Control were found to explain more of the variance in the symptoms of anxiety ($F(4, 261) = 35.02$, $p < .001$, $R^2 = .35$, $R^2_{Adjusted} = .34$). More specifically, the analysis shows that Negative Emotionality was statistically significant in the association with symptoms of anxiety (Beta = .59, t(264) = 11.26, $p < .001$), while gender (Beta = .00, t(264) = .01, *ns*), Affiliativeness (Beta = .03, t(264) = .65, *ns*), and Effortful Control (Beta = .03, t(264) = .68, *ns*) were not significant. In Step 3, gender, temperament constructs, and their interactions explained about the same amount of variance in the symptoms of anxiety as in Step 2 ($F(7, 258) = 20.21$, $p < .001$, $R^2 = .35$, $R^2_{Adjusted} = .34$). In Step 3 only Negative Emotionality (Beta = .42, t(264) = 2.57, $p < .05$) was significant. However, none of the other components of the model (neither gender, nor other temperament constructs, nor any of the interactions) were statistically significant in the association with symptoms of anxiety. Overall, higher levels of Negative Emotionality were associated with higher levels of symptoms of depression, among children and adolescents.

Discussion

This study examined the relationship between temperament and psychopathology by focusing on constructs of temperament and their associations with concurrent symptoms of depression, and concurrent symptoms of anxiety.

Symptoms of Depression: Consistently and as hypothesized, older age children/adolescents, higher levels of Negative Emotionality, higher levels of Affiliativeness, and lower levels of Effortful Control were associated with higher levels of symptoms of depression.

Symptoms of Anxiety: Consistently and as hypothesized, higher levels of Negative Emotionality were associated with greater symptoms of anxiety, and this association grew stronger with increasing age (cross-sectionally).

Results indicating positive associations between Negative Emotionality and symptoms of depression, as well as with symptoms of anxiety, are consistent with previously reported findings between Negative Emotionality and internalizing disorders (Austin & Chorpita, 2004; Brown, Chorpita, & Barlow, 1998; Chorpita, Daleiden, Moffitt, Yim & Umemoto, 2000; Daleiden, Chorpita, & Luu, 2000; Dougherty, Klein, Durbin, Hayden, & Olino, 2010). Considering that the definition of Negative Emotionality involves the tendency towards experiencing fear, anger, sadness, low soothability and general sense of discomfort (Compas, Connor-Smith, & Jaser, 2004), it may be the case that high levels of such discomfort may be contributing to experiencing symptoms of depression or symptoms of anxiety, even concurrently. Furthermore, Negative Emotionality may be the non-specific temperamental trait that is associated with both symptoms of depression and symptoms of anxiety.

While Negative Emotionality was found to be the non-specific, Affiliativeness and Effortful Control (in addition to Negative Emotionality) were found to be the specific vulnerability factors for the association with symptoms of depression only. This answers the question of specificity of temperamental vulnerability, despite the strength of the comorbidity between anxiety and depression reported in literature (Rapee et al., 2009). Furthermore, high scores on Affiliativeness may indicate high agreeableness with, and high empathy towards others. Concurrently, those who report lower Effortful Control scores may indicate lower ability or tendency to shift their attention, and have control over their behaviors. Taken together, the combination of high negative emotions, strong tendency to have emotional connection with others, and difficulty in shifting attention and focus may create conditions under which higher levels of symptoms of depression are more likely to occur.

The negative correlation between Negative Emotionality and Effortful Control found in this study is supported by Muris' study (2006), where he found both neuroticism and Effortful Control to be independent predictors of psychopathology, with neuroticism having a positive and Effortful Control having a negative association with psychopathology (Muris, 2006). Furthermore, the inverse relationship between Negative Emotionality and Effortful Control in this study may also help to explain the findings that higher levels of Negative Emotionality and lower levels of Effortful Control are associated with clinical levels of symptoms of depression, as well as symptoms of depression or anxiety conditions.

Age was shown to be positively correlated with symptoms of depression which is supported by literature stating that depression levels increase with age (Merikangas et al.,

2010), it was also found to be associated with higher levels of symptoms of depression by itself as well as in relation to the three temperamental constructs. This indicates that age alone, or in combination with temperament, is important in differentiating between lower and higher levels of symptoms of depression, specifically. Moreover, age moderated the association between Negative Emotionality with symptoms of anxiety, such that older children/adolescents showed stronger positive relations between Negative Emotionality and symptoms of anxiety than did younger children/adolescents. This may indicate that as children and adolescents grow older the association between their reported levels of Negative Emotionality and their reported symptoms of anxiety, may increase in its strength. This result and interaction would need to be replicated in a sample followed longitudinally, however.

One surprising finding in this study is that gender was not associated with symptoms of depression, a finding commonly reported in the literature (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Merikangas et al., 2010). This may also account for why the findings of this study did not reflect prior research showing a relationship between Affiliativeness and gender (Anto & Jayan, 2013; Ellis & Rothbart, 2001). It is also possible that gender may be more strongly associated with higher levels of symptoms of depression among post-pubescent ages. Considering that the participants in this study were primarily children and pre-pubescent adolescents that may be the reason for a lack of association between gender and symptoms of depression.

Limitations and Implications

While some findings of this study are consistent with previous literature, several important limitations need to be mentioned. Limitations of this study include the

concurrent nature of the assessment of temperament and psychopathology, while the relationship is theorized to be temporal, with temperament staying relatively stable and psychopathology evolving over time. The population of this study is considered a community sample and certainly may not have represented both lower and higher ends of the levels of the symptoms of depression, and symptoms of anxiety. Additionally, the limitations of using self-report measures by children and adolescents ages 7 to 16 may contribute to over- or under-reporting on both temperament and psychopathology measures.

In the future, concurrent and longitudinal prospective research should focus on examining children of various ages, across different non-clinical, community, as well as clinical settings representing different populations. Community samples should explicitly screen for and include sufficient numbers of youth with various levels of reported symptoms to allow for more robust comparisons than were possible in this study. Research should incorporate self-report, caregiver-report, and interview-based measures of temperament and psychopathology. Furthermore, longitudinal research may explore the consistency or evolving nature of temperament, as well as the temporal relationship between temperament and evolving nature of psychopathology across time. Finally, an exploration of temperament at the level of smaller components of the constructs may elucidate some inconsistent findings that currently exist among studies, such as the findings regarding Effortful Control and age.

Overall, the results of this study support the view that three related but distinct temperament constructs can be measured in children and adolescents. The measures in this study would benefit from further examination by comparison with observational and

caregiver-report, measures, across settings such as school, home, and pediatric check-ups. That said, the findings of this study are largely supported by previous findings. Therefore, the conclusions drawn from this study may contribute to the creation of intervention and/or prevention programs for children identified at risk for experiencing any symptoms, or an increase in symptom severity levels, by focusing on Negative Emotionality as a non-specific, and Affiliativeness and Effortful Control as more specific factors. Thus, the hope would be that by identifying the levels of Negative Emotionality, Affiliativeness, and Effortful Control as reported, observed, or otherwise measured by any given child or adolescent, trained professionals may be able to identify children at lower or higher risk, and implement the best fit strategies. In fact, if replicated, the potential treatment implications of the specificity findings from this study could lead to more specificity in prevention and intervention strategies. For example, if a child/adolescent reports scores on temperamental measures that show vulnerability just to anxiety, then the proper and most effective prevention or intervention strategies would focus on anxiety symptoms (e.g., assessing specific anxiety, hierarchy of situations/objects, exposure and response prevention, etc.). Alternatively, if a child/adolescent reports scores on temperamental measure that show vulnerability to both anxiety and depression, then the proper and most effective prevention or intervention strategies would involve a combination of strategies focusing on behavioral activation as well as exposure and response prevention. The same professionals, in turn, can then help the children and adolescents to recognize their own individual differences and risk levels, learn about existing methods of coping, as well as identify precursors to psychopathology and seek proper and most effective treatment.

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Table 1

Temperament Constructs (NE, A, EC), EATQ-R Scales, Construct Alpha Coefficients, and EATQ-R Items scores

Temperament Construct	EATQ-R Scales	Construct Alpha Coefficients	EATQ-R Items scored (reverse scores indicated by a "-" sign)
Negative Emotionality (NE)	Frustration		Mean of 7 items: 25, 36, 47, 56, 60, 62, 64
	Fear	0.80	Mean of 6 items: 32, 35, 40, 46, 51, 57
	Shyness		Mean of 4 items: 8, 15, 45, -53
Affiliativeness (A)	Affiliation		Mean of 5 items: 17, 27, 31, 44, 54
	Perceptual Sensitivity	0.76	Mean of 4 items: 6, 12, 21, 24
	Pleasure Sensitivity		Mean of 5 items: 4, 16, 23, 33, 65
Effortful Control (EC)	Activation Control		Mean of 5 items: -7, -18, 30, 39, -49
	Attention	0.73	Mean of 6 items: 1, -34, -38, 41, 59, -61
	Inhibitory Control		Mean of 5 items: -10, 14, -26, 43, 63

Table 2

Descriptive and frequency data for participants in study

		Min	Med	Max	Mean	S.D.
AGE						
	$N = 266$	7	12	16	11.67	2.43
by Grade						
	3rd grade	7	8	13	8.47	0.79
	6th grade	10	11	13	11.32	0.61
	9th grade	12	14	16	14.35	0.64
by Gender						
	Males	8	11	16	11.72	2.48
	Females	7	12	15	11.62	2.40
		n	% *N*			
GRADE						
	3rd Grade	72	27.07%			
	6th Grade	96	36.09%			
	9th Grade	98	36.84%			
GENDER						
	Male	120	45.11%			
	Female	146	54.89%			
ETHNIC GROUP						
	Asian	43	16.17%			
	African American/Black	39	14.66%			
	Caucasian	151	56.77%			
	Hispanic	21	7.89%			
	Multiracial	12	4.51%			

Note. Min = Minimum. Med = Median. Max = Maximum. Mean = Mean. S.D. = Standard Deviation. N = Entire Sample. *n* = number of participants in each described group.

Table 3

CDI, MASC, EATQ-R Constructs Descriptive Data overall and by Gender, Grade, and Ethnic Group

			Min	Med	Max	Mean	S.D.
OVERALL MEASURES	(N = 266)						
		CDI	0.00	6.00	35.00	7.76	6.41
		MASC	6.00	42.00	97.00	42.38	15.61
		NE	3.93	8.51	14.00	8.68	2.00
		A	7.00	20.61	30.00	20.67	3.98
		EC	5.40	9.78	14.30	10.00	1.69
GENDER							
	MALES (n = 120)						
		CDI	0.00	6.00	29.00	7.74	6.16
		MASC	6.00	42.00	97.00	41.08	15.51
		NE	3.93	8.32	14.00	8.40	2.14
		A	7.00	21.00	30.00	20.61	4.15
		EC	5.40	9.70	13.80	9.97	1.54
	FEMALES (n = 146)						
		CDI	0.00	6.00	35.00	7.77	6.62
		MASC	9.00	44.00	87.00	43.45	15.67
		NE	4.69	8.60	13.71	8.91	1.85
		A	11.20	20.60	30.00	20.71	3.85
		EC	5.46	9.85	14.30	10.03	1.81
GRADE							
	3rd GRADE (n = 72)						
		CDI	0.00	5.00	27.00	6.88	6.33
		MASC	18.00	46.00	81.00	45.75	14.78
		NE	3.93	9.44	13.71	9.33	2.20
		A	11.20	20.00	30.00	20.32	4.34
		EC	7.40	10.45	14.17	10.63	1.60
	6th GRADE (n = 96)						
		CDI	0.00	5.00	23.00	6.20	5.29
		MASC	9.00	38.94	75.00	39.55	14.41
		NE	4.02	8.39	11.58	8.35	1.90
		A	7.00	19.80	27.90	20.08	3.93
		EC	5.46	9.87	14.30	10.06	1.80
	9th GRADE (n = 98)						
		CDI	0.00	8.00	35.00	9.93	6.90
		MASC	6.00	43.00	97.00	42.67	16.91
		NE	4.00	8.40	14.00	8.52	1.83
		A	12.80	21.50	30.00	21.49	3.65
		EC	5.40	9.31	13.33	9.48	1.48

ETHNIC GROUP			Min	Med	Max	Mean	S.D.
	ASIAN (*n* = 43)						
		CDI	0.00	6.00	24.00	7.00	5.13
		MASC	18.00	47.00	75.00	46.69	12.96
		NE	6.00	9.29	13.56	9.12	1.81
		A	15.00	20.80	28.40	21.25	3.24
		EC	5.57	10.40	13.53	10.41	1.75
	AFRICAN AMERICAN/BLACK (*n* = 39)						
		CDI	0.00	5.00	17.00	6.08	4.51
		MASC	9.00	46.00	81.00	44.83	16.49
		NE	4.52	9.15	13.33	9.15	1.93
		A	7.00	19.40	28.80	19.40	4.35
		EC	5.97	10.00	12.90	9.87	1.43
	CAUCASIAN (*n* = 151)						
		CDI	0.00	7.00	35.00	8.26	7.04
		MASC	6.00	41.00	97.00	40.19	16.31
		NE	3.93	8.24	14.00	8.30	2.05
		A	9.20	21.00	30.00	20.77	3.93
		EC	5.40	9.67	14.30	9.86	1.72
	HISPANIC/LATINO (*n* = 21)						
		CDI	1.00	6.00	23.00	9.19	7.17
		MASC	22.00	44.0	71.00	43.87	13.42
		NE	7.20	9.40	12.74	9.66	1.66
		A	13.00	21.40	28.60	20.93	4.29
		EC	7.37	10.30	14.17	10.58	1.83
	MULTIRACIAL (*n* = 12)						
		CDI	2.00	6.00	19.00	7.08	5.28
		MASC	26.00	39.00	66.00	43.96	13.00
		NE	5.83	8.49	10.94	8.54	1.68
		A	13.20	21.30	29.20	20.93	5.00
		EC	8.17	9.24	12.57	9.69	1.42

Note. Min = Minimum. Med = Median. Max = Maximum. Mean = Mean. S.D. = Standard Deviation.

Table 4

Pearson correlations between CDI, MASC, EATQ-R constructs NE, A, and EC, and child age

	1	2	3	4	5
1.CDI	--				
2.MASC	0.25**	--			
3.NE	0.21**	0.58**	--		
4.A	0.07	0.19**	0.34**	--	
5.EC	-0.38**	-0.05	-0.17**	0.10	--
6.AGE	0.20**	-0.08	-0.12	0.07	-0.26**

*Note. *p < .05. **p < .01.*

Table 5

Analyses of Variance

	Measures	*df*	*F*	*p*
GRADE				
	CDI	2, 263	9.76	.000***
	MASC	2, 263	3.33	.037*
	NE	2, 263	5.64	.004**
	A	2, 263	3.48	.032*
	EC	2, 263	10.46	.000***
GENDER				
	CDI	1, 264	0.001	.974
	MASC	1, 264	1.52	.218
	NE	1, 264	4.29	.039*
	A	1, 264	.05	.830
	EC	1, 264	.10	.751
ETHNIC GROUP				
	CDI	4, 261	1.36	.250
	MASC	4, 261	1.91	.110
	NE	4, 261	3.87	.005**
	A	4, 261	1.29	.273
	EC	4, 261	1.68	.155

Note. $* p < 0.05.$ $** p < 0.01.$ $*** p < .001.$ ($N = 266$).

Table 6

Regression for Symptoms of Depression (with Age)

	R^2	Unstandardized Coefficients		Standardized Coefficients		
		B	*SE*	*β*	*t*	*p*
Step 1	.04					
Age		.53	.16	.20	3.31	.001**
Step 2	.19					
Age		.32	.16	.12	2.08	.039*
NE		.45	.19	.15	2.57	.011*
A		.19	.09	.12	2.00	.046*
EC		-1.23	.22	-.33	-5.49	.000***
Step 3	.20					
Age		-.46	1.34	-.18	-.34	.731
NE		-.51	.87	-.16	-.59	.557
A		-.21	.45	-.13	-.45	.651
EC		-.39	1.12	-.10	-.35	.725
Age by NE		.09	.08	.42	1.22	.224
Age by A		.03	.04	.39	.88	.378
Age by EC		-.07	.09	-.32	-.79	.432

Note. N = 266.   * *p* < .05. ** *p* < .01.   *** *p* < .001.

Table 7

Regression for Symptoms of Anxiety (with Age)

			Unstandardized Coefficients		Standardized Coefficients		
		R^2	*B*	*SE*	*β*	*t*	*p*
Step 1		.01					
	Age		-.50	.39	-.08	-1.26	.208
Step 2		.35					
	Age		.04	.34	.01	.13	.898
	NE		4.61	.41	.60	11.12	.000***
	A		.13	.20	.03	.62	.536
	EC		.34	.49	.04	.69	.493
Step 3		.37					
	Age		-3.45	2.91	-.54	-1.19	.237
	NE		-.01	1.90	-.001	-.003	.998
	A		.76	.98	.19	.77	.443
	EC		-.95	2.44	-.10	-.39	.696
Age by NE			.40	.16	.76	2.48	.014*
Age by A			-.05	.08	-.24	-.61	.542
Age by EC			.09	.20	.17	.46	.644

Note. N = 266.　　* *p* < .05.　** *p* < .01.　*** *p* < .001.

Table 8

Regression for Symptoms of Depression (with Gender)

	R²	Unstandardized Coefficients		Standardized Coefficients		
		B	*SE*	*β*	*t*	*p*
Step 1	.00					
Gender		.03	.79	.002	.03	.974
Step 2	.18					
Gender		-.11	.73	-.01	-.16	.877
NE		.41	.19	.13	2.16	.032*
A		.22	.09	.14	2.39	.018*
EC		-1.37	.22	-.36	-6.34	.000***
Step 3	.19					
Gender		-9.63	6.51	-.75	-1.48	.140
NE		.25	.59	.08	.43	.667
A		.18	.29	.11	.60	.551
EC		-2.69	.77	-.71	-3.51	.001**
Gender by NE		.09	.38	.08	.23	.819
Gender by A		.04	.19	.07	.19	.851
Gender by EC		.81	.45	.73	1.80	.073

Note. $N = 266$.   * $p < .05$.   ** $p < .01$.   *** $p < .001$.

Table 9

*Regression for Symptoms of Anxiety (with Gender)*

	R^2	Unstandardized Coefficients		Standardized Coefficients		
		B	*SE*	*β*	*t*	*p*
Step 1	.01					
Gender		2.37	1.92	.08	1.23	.218
Step 2	.35					
Gender		.01	1.58	.00	.01	.995
NE		4.59	.41	.59	11.26	.000***
A		.13	.20	.03	.65	.514
EC		.32	.47	.03	.68	.498
Step 3	.35					
Gender		-12.86	14.17	-.41	-.91	.365
NE		3.29	1.28	.42	2.57	.011*
A		-.26	.64	-.07	-.41	.686
EC		.32	1.67	.03	.19	.849
Gender by NE		.88	.82	.32	1.07	..284
Gender by A		.25	.40	.20	.63	.530
Gender by EC		.00	.98	.00	.00	1.000

Note. N = 266.   * $p < .05$. ** $p < .01$. *** $p < .001$.

Figure 1.

Symptoms of Anxiety based on Negative Emotionality and Age Interaction

Symptoms of Anxiety based on Negative Emotionality and Age Interaction
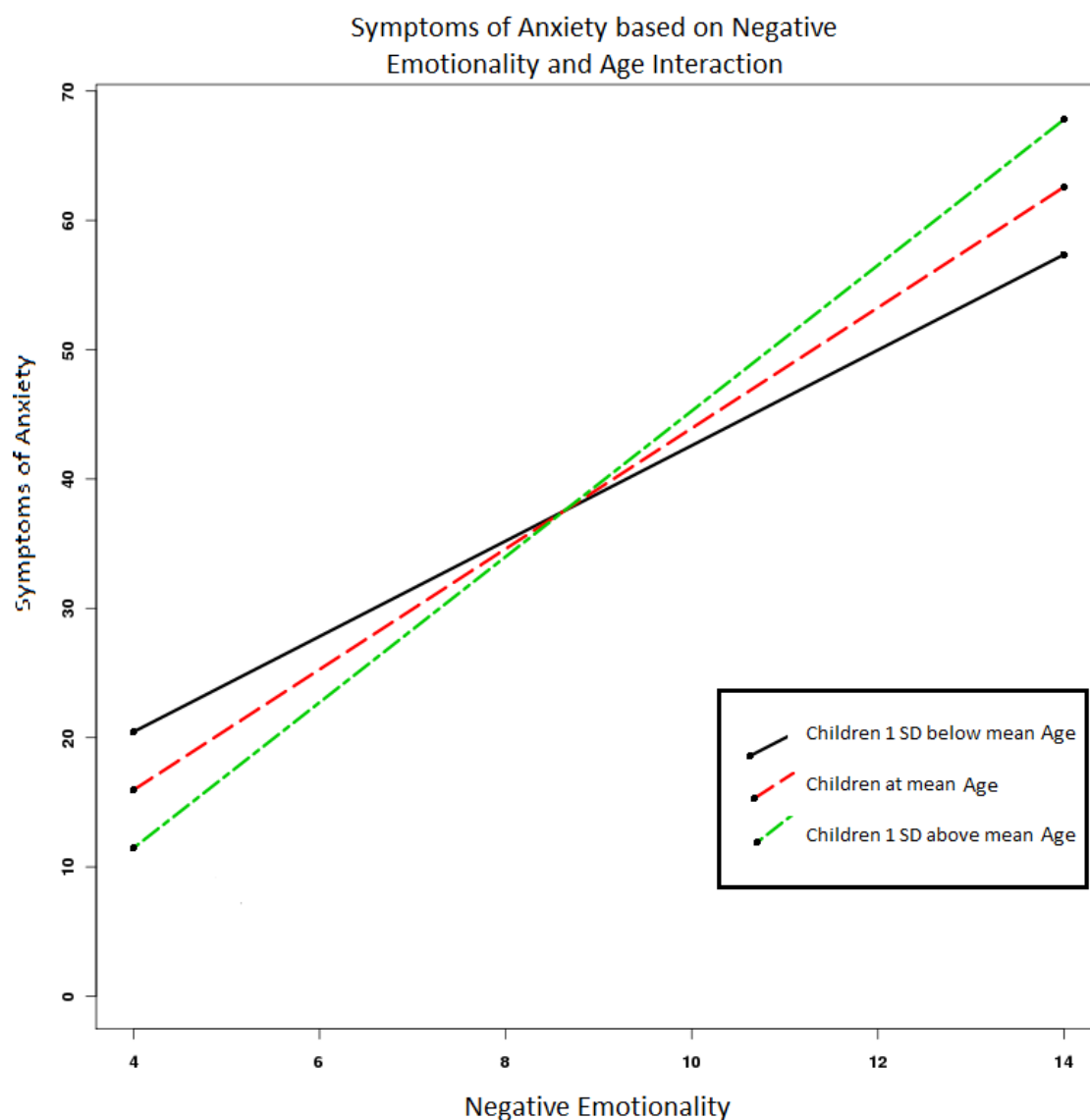
Note: Figure generated using the web-based R program for plotting simple intercepts, simple slopes, and regions of significance for multiple regression 2-way interactions available at http://quantpsy.org/interact/mlr2.htm, from Preacher, Curran, & Bauer, 2006. Preacher, K. J., Curran, P. J., & Bauer, D. J. (2006). Computational tools for probing interaction effects in multiple linear regression, multilevel modeling, and latent curve analysis. *Journal of Educational and Behavioral Statistics*, *31*, 437-448.