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Temperament in Mothers with Borderline Personality Disorder and in Their Young Children Aged 4-7

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I am submitting herewith a thesis written by Christina Gabriela Mena entitled "Temperament in Mothers with Borderline Personality Disorder and in Their Young Children Aged 4-7." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts, with a major in Psychology.

Jenny Macfie, Major Professor

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Jennifer Bolden, L. Christian Elledge

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**Temperament in Mothers with Borderline Personality Disorder
and in Their Young Children Aged 4-7**

A Thesis Presented for the
Master of Arts
Degree
The University of Tennessee, Knoxville

Christina Gabriela Mena
December 2013

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Abstract

In this study we sampled mothers with Borderline Personality Disorder (BPD) and their young children ages 4-7 ($n = 36$), as well as normative comparisons ($n = 34$). We assessed temperament in both mothers and their children. Mothers reported on their own and on their children's temperament. Controlling for maternal current major depressive disorder and education, mothers with BPD reported more negative affectivity, less effortful control, and less positive affect than did normative comparison mothers. Children whose mothers had BPD had more negative affectivity (fear and frustration) and less effortful control, but not less smiling and laughter. When controlling for maternal lifetime history of major depressive disorder in addition to the aforementioned covariates, group differences in the mother sample did not change. The additional control of a maternal lifetime history of MDD in group differences analyses in the child sample resulted in the children of mothers with BPD having more sadness than the children of normative comparison mothers. However, the children of mothers with BPD no longer had significantly higher inhibitory control than the children of normative comparison mothers. In addition, mothers' temperamental traits were all positively correlated with their children's corresponding ones. Furthermore, each self-reported maternal borderline feature (affective instability, identity disturbance, self-harm, and negative relationships) significantly positively correlated with mothers' negative affectivity and significantly negatively correlated with mother's effortful control and positive affect. In addition, each maternal borderline feature significantly positively correlated with children's negative affectivity on all scales except discomfort and significantly negatively correlated with children's effortful control. No maternal borderline feature significantly negatively correlated with children's smiling and laughter. Results are discussed as increasing our understanding of the intergenerational transmission of BPD through temperament.

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Chapter 1. Introduction and Literature Review

Borderline Personality Disorder (BPD) is characterized by unstable affect and marked by impulsivity, fear of abandonment, identity disturbance, volatile relationships, and self-destructive behaviors (American Psychiatric Association, 2013). There is a large heritable component to BPD (Torgersen et al., 2000) thought to consist of temperamental variables such as low effortful control (high impulsivity), high negative affectivity, and low positive affectivity (Posner et al., 2003; Siever & Davis, 1991; Conklin, Bradley, & Westen, 2006). BPD is theorized to develop from an interaction between these inherited temperamental factors and an emotionally invalidating childhood environment (Linehan, 1993). Given the genetic and environmental vulnerability of developing BPD symptoms, the offspring of mothers with BPD are a group at high risk of developing BPD themselves (White, Gunderson, Zanarini, & Hudson, 2003). Despite the severity and prevalence of this disorder, however, few studies on the offspring of mothers with BPD have been conducted, with a gap in the existing literature specifically investigating whether the young offspring of mothers with BPD share the same temperamental traits.

The study of temperament is important because it is known to be in part transmitted inter-generationally in normative samples and because it may contribute to the high risk offspring of mothers with BPD developing BPD in adolescence or early adulthood. It is important to examine deviations in early development in offspring of mothers with a disorder to inform precursors and developmental pathways to the disorder (Seifer & Dickstein, 2000). Early childhood is a particularly appropriate time to assess temperament in the offspring of women with BPD because temperamental traits such as effortful control develop rapidly and show an increasing convergence across parent-observer ratings during the early preschool years (Kochanska,

Murray, & Harlan, 2000; Rothbart, Sheese, & Posner, 2007). Rothbart and colleagues also theorize that temperamental traits observed both in infancy and adulthood are present by early childhood (Rothbart, Ahadi, Hershey, & Fisher, 2001). The current study proposes to assess differences in temperament between mothers with BPD and their 4-7 year old children and normative comparison mothers and their 4-7 year old children. It also assesses the relationship between mothers' and children's temperament in the sample as a whole.

Heritability of BPD

There are different pathways to BPD, with temperament contributing to an individual's genetic vulnerability to the disorder. Research has measured the heritability of BPD by diagnosing the disorder in both monozygotic and dizygotic twin pairs and comparing that to its prevalence in a normal twin population. One study found a significantly higher concordance rate of 35% in MZ twin pairs, compared to 7% for DZ twin pairs, providing evidence for genetic effects on BPD (Torgersen et al., 2000). To estimate the effect of genes and shared environment and determine the heritability of BPD, structural equation modeling was utilized to find the best fitting model of transmission. The study found levels of heritability at .69 for subthreshold BPD and .80 for definite BPD, suggesting that BPD is indeed highly heritable (Torgersen et al., 2000). Additionally, a 4- to 20- fold increase of BPD was found in relatives of BPD probands compared to the general population (for a review see: White et al., 2003). Given the high heritability of BPD, the offspring of women with BPD would also be at high risk. In addition to environmental factors including child maltreatment and separation from parents, some of this risk is thought to consist of the intergenerational transmission of temperamental variables such as low effortful control, high negative affectivity, and low positive affectivity (Posner et al., 2003; Siever & Davis, 1991; Conklin et al., 2006).

Temperament

There has been an evolution over time in how theorists conceptualize temperament. Rothbart developed the temperamental scales used in the current study guided by the theoretical perspectives of earlier temperament theorists including Thomas, Chess, Buss, and Plomin (Rothbart et al., 2001). Although Thomas and Chess recognized the importance of environmental influences on a child's psychological development, they wanted to further investigate the contribution of a child's temperament, on their development (Chess & Thomas, 1984). In order to study temperament, they initiated the New York Longitudinal Study (NYLS) of parents and children in 1956. Though the full-term longitudinal study followed individuals from 3 months of age to adulthood, the development of nine temperamental categories were based on the analysis of interviews with mothers of 2-6 month old infants (Thomas, Chess, & Birch, 1968; Thomas, Chess, Birch, Herzig, & Korn, 1963). The nine specific temperamental traits assessed in the NYLS study were activity level, quality of mood, approach/withdrawal, intensity of reaction, sensory threshold, rhythmicity, distractibility, attention span/persistence, and adaptability (NYLS; Thomas & Chess, 1977).

Around the same time the NYLS began, Solomon Diamond proposed that the study of human temperament should only be based on those temperamental traits shared with non-human primates: fearfulness, aggressiveness, affiliativeness, and impulsiveness (Diamond, 1957). Buss and Plomin expanded upon Diamond's theory to develop their own criteria for temperamental traits. They agreed that temperamental traits should be those shared with non-human primates, and further proposed that they must appear before the first two years of life, be heritable (according to twin studies), and show continuity into adulthood (Buss & Plomin, 1975, 1984). Buss and Plomin's original approach to temperament dimensions included emotionality, activity,

sociability, and impulsivity (EASI), which they used to develop the EASI inventory (Buss & Plomin, 1975). Partially due to their finding that impulsivity did not emerge until a child was of school age, and therefore did not meet their criteria of appearing within the first two years of life, they decided to remove this dimension from their subsequent measure, the EAS Survey for Children (Buss & Plomin, 1984). Rowe and Plomin worked to combine selected scales from both the NYLS scales and EASI scales, to include temperamental dimensions of emotionality, soothability, activity level, attention span, and sociability in their Colorado Childhood Temperament Inventory (Rowe and Plomin, 1977).

These earlier conceptualizations of temperament focused only on how an individual's characteristic style of behavioral response differed, such as whether an individual showed approach or withdrawal in novel situations, what level of activity they exhibited, or how long their attention span was (Buss & Plomin, 1975; Thomas & Chess, 1977). In contrast, Allport proposed that temperament was the characteristic emotional nature of an individual. He focused on an individual's mood and emotion specifically examining an individual's susceptibility and reactivity to emotional stimuli (Allport, 1961). More contemporary temperament theorists have since taken into consideration an individual's affective style of response such as their emotional reactivity (Derryberry & Rothbart, 1997; Rothbart & Bates, 1998), and have worked towards separate measures of temperament for positive and negative emotions (Diener & Emmons, 1984; Watson, Clark, & Tellegen, 1988). Rothbart and colleagues similarly differentiate between positive and negative affectivity, but have moved forward from simply measuring an individual's reactive processes, to also include an individual's self-regulating capabilities such as those used during attentional focusing, fearful reactions, and inhibitory control (Rothbart, Ahadi, & Evans, 2000).

Rothbart theorizes that temperament is biologically based, defining the term as: "individual differences in emotional, motor, and attentional reactivity measured by latency, intensity, and recovery of response, and self-regulation processes such as effortful control that modulate reactivity" (Rothbart, 2007, p. 207). Though biologically based, Rothbart also theorizes that life experiences and the environment influence the development of temperament into later personality. Thomas and Chess had previously differentiated personality from temperament by stating that whereas personality traits described what type of behavior an individual exhibited (what), as well as their motivations for it (why), temperament referred to what type of behavioral *style* (how) an individual utilized (Thomas & Chess, 1977). Rothbart describes personality as including an individual's developing ideas about the self, others, and the world around them as well as their attitudes, values, and ways of coping (Rothbart, 2007).

The current study will use Rothbart's theory-driven temperament measures for both adults and children (ATQ-Short Form, Evans & Rothbart, 2007, Rothbart et al., 2000; CBQ-Short Form, Putnam & Rothbart, 2006). Factor analysis on all child temperament subscales using data from 3-12 month old children found that three broader dimensions of temperament emerged into which all subscales cluster. These three broader factors of temperament were termed negative affectivity, effortful control, and extraversion/surgency (Rothbart et al., 2001). The child temperament measure includes 15 different subscales divided amongst these three broad dimensions. The broad dimensions and their corresponding subscales are: negative affectivity including fear, anger/frustration, sadness, discomfort, and soothability subscales; effortful control including attentional focusing, inhibitory control, perceptual sensitivity, and low-intensity pleasure subscales; and extraversion/surgency including activity, shyness, high-

intensity pleasure, smiling and laughter, impulsivity, and positive anticipation subscales (CBQ, Putnam & Rothbart, 2006).

The adult temperament measure similarly has 13 total subscales divided amongst the same three broad dimensions, with an additional fourth dimension known as orienting sensitivity. These broad dimensions and their corresponding subscales are: negative affectivity including fear, frustration, sadness, and discomfort subscales; effortful control including attentional control, inhibitory control, and activation control subscales; extraversion/surgency including sociability, positive affect, and high intensity pleasure subscales; and orienting sensitivity including neutral perceptual sensitivity, affective perceptual sensitivity, and associative sensitivity subscales (ATQ, Evans & Rothbart, 2007, Rothbart et al., 2000).

The fourth broad dimension, orienting sensitivity, is only assessed in adults and is therefore omitted from the current study due to its focus on comparing mothers with their young children. Thus the three broad dimensions that will be assessed in the current study are negative affectivity, effortful control, and extraversion/surgency. Only temperamental subscales that are present in both child and adult temperament measures will be examined for comparison purposes, with slight variations in terminology between the adult temperament and young children's temperament subscales.

Temperament and BPD

Key symptoms of BPD possibly related to temperament include a fear of abandonment, intense anger, and affective instability marked by intense short-lived periods of dysphoria, irritability, or anxiety (American Psychiatric Association, 2013). Increased displays of negative emotions in individuals with BPD may in part stem from temperamental vulnerabilities. Indeed, research has shown that individuals with BPD are associated with temperamental variables such

as high negative affectivity, demonstrating higher levels of sadness and anger after hearing emotion-inducing stories (Jacob et al., 2009), a stronger increase in fear when watching an emotional movie clip (Arntz, Klokman, & Sieswerda, 2005), and higher levels of anger and hostility (Gardner, Leibenluft, O'Leary, & Cowdry, 1991), than do healthy controls.

Additionally, individuals with BPD show symptoms of an unstable sense of self, unstable relationships, impulsive self-destructive behaviors, and difficulty regulating their emotions (American Psychiatric Association, 2013). The pervasive instability in these individuals could be explained by having a temperamental disposition for low effortful control. Studies have indeed shown that a BPD diagnosis was significantly negatively correlated with the temperamental trait of control (Bornovalova, Gratz, Delany-Brumsey, Paulson, & Lejeuz, 2006), and low effortful control was correlated with problems with interpersonal functioning and personality organization, suggesting that low levels of effortful control may contribute to difficulties for individuals with this diagnosis (Hoermann, Clarkin, Hull & Levy, 2005).

The inhibitory control subscale of effortful control has also been measured using both general and emotional go-no-go paradigm tasks to measure behavioral inhibition. General go-no-go paradigm tasks require individuals to make simple motor responses to one cue while inhibiting the response in the presence of another cue. The emotional go-no-go paradigm task is an adaption of the general task in which affective stimuli replace neutral stimuli. Using these measures, longer reaction times and a higher number of commission errors (incorrectly responding to non-target stimuli) are associated with lower levels of inhibition. One study found no difference in reaction times between individuals with BPD and healthy controls during the general go-no-go paradigm. However, the BPD group's reaction times were longer during the emotional go-no-go paradigm and they had more commission errors than healthy controls during

both paradigms. These results suggest that individuals with BPD exhibit some inhibitory control deficits, especially when confronted with emotional stimuli (Song, Fu, Kong, Gue, & Sun, 2009). In regards to their ability to maintain their attention, varied results have been found. In one study, BPD patients displayed deficient executive functioning as compared to healthy controls in the domains of cognitive planning, sustained *attention* and working memory (Gvirts et al., 2012). In contrast, another study found that working memory in BPD patients was much worse than in healthy controls but that their sustained attention as measured by the Conners' Continuous Performance Test (CPT) was not (Lazzaretti et al., 2012).

In line with high levels of negative affectivity, BPD individuals also have lower levels of positive affectivity. One study found that BPD patients reported more negative emotions and fewer positive emotions when compared to patients without BPD (Ebner-Priemer et al., 2007). Research has also found that BPD individuals reported positive states as measured by the Positive Affect Scale (PAS) less frequently than reported by comparison subjects with other personality disorders (Reed, Fitzmaurice, & Zannarini, 2012). Lastly, a study investigating the similarities in negative and positive affect in individuals with BPD compared to those with Dysthymic Disorder found that both groups showed high levels of negative affect and low levels of positive affect (Conklin et al., 2006).

Cloninger's Temperament and Character Inventory (TCI) has been used in several studies to measure four temperament dimensions that differ from Rothbart's three dimensional model. These dimensions are termed novelty seeking, harm avoidance, reward dependence, and persistence. The dimension harm avoidance in part measures an individual's level of fear, worry, and tendency to be cautious (Cloninger, Svrakic, Przybeck, 1993), which is similar in nature to Rothbart's fear subscale. Novelty seeking refers to an individual's tendency to respond to novelty

reward cues with action behaviors, exploratory activity, impulsive decision making, and quick loss of temper, which is similar in nature to low levels of effortful control. Reward dependence is an inherited tendency to maintain behaviors that have been previously reinforced, and includes dependence on the approval of others (Cloninger et al., 1993), though it is not closely related to Rothbart's scales. Using the TCI, individuals with BPD have consistently been found to score high on the temperament measures of harm avoidance and novelty seeking (Fossati et al., 2001; Joyce et al., 2003; Joyce, Light, Rowe, Cloninger, & Kennedy, 2010), as well as high in novelty seeking and harm avoidance and low in reward dependence (Svrakic, Whitehead, Przybeck, & Cloninger, 1993; Cloninger et al., 1993). A study using the German version of the Junior Temperament and Character Inventory similarly found higher novelty seeking and harm avoidance scores and lower reward dependence scores in adolescents with BPD aged 13-19 compared to both clinical and healthy control groups, suggesting that a "borderline temperament" is already present by adolescence (Kaess et al., 2013). Given the similarities between Cloninger's and Rothbart's dimensions, these findings suggest that we would expect to find high levels of the negative affectivity fear subscale and low levels of effortful control in individuals with BPD using Rothbart's temperament measures.

Overall, the literature suggests that individuals with BPD possess different temperamental traits than do healthy controls, including higher levels of negative affectivity (fear, sadness, anger), lower levels of effortful control (inhibitory control and possibly attentional control), and lower levels of positive affectivity. Based upon this empirical evidence, the current study will focus on these temperament subscales that are most closely linked with symptoms of BPD. The current study will additionally examine the discomfort subscale of negative affectivity in individuals with BPD as this component has not been largely addressed in the literature. The

current study also aims to address the conflicting literature on the attentional control in BPD individuals. This is important to the study of BPD because attentional control is involved in self-regulation and has been found to have a reciprocal relationship with negative affectivity, such that individuals low in self-reported attentional control tend to be high in negative affectivity (Derryberry & Rothbart, 1988).

Intergenerational Transmission of Temperament

Given that individuals with BPD struggle in part due to heritable temperamental vulnerabilities, it is important to assess if their high risk offspring have similar temperaments to their mothers. There is no known prior research for the intergenerational transmission of temperament between mothers with BPD and their offspring. However, there is empirical evidence that children have similar temperaments to their mothers in normative and clinical samples (Kochanska, Clark, & Goldman, 1997; Muris, Steerneman, Merckelbach & Meesters, 1996; Bridgett et al., 2011; Coffman, Levitt, Guacci-Franco, & Silver, 1992). Research has found significant correlations between mother and child temperament ratings when mothers rated both themselves and their children as well as when children provided self-reports of their temperament or observer ratings were used.

In past research, using a modified infant version of the Colorado Childhood Temperament Inventory (Rowe & Plomin, 1977) and EASI Temperament Survey (Buss & Plomin, 1975), infant and adult ratings of temperament were measured, respectively. Significant correlations were found between maternal self-reported temperamental characteristics and their ratings of their own infants' temperament for all the temperamental factors of emotionality, activity, sociability, and impulsivity in a normative sample (Field, Vega-Lahr, Scafidi, & Goldstein, 1987). Specifically, emotionality is referred to as a predisposition to get easily

distressed and upset (Zentner & Bates, 2008), which is similar in nature to the propensity for high negative affectivity, and impulsivity is similar to having low levels of effortful control. In another study, maternal self-reported temperamental characteristics were related to their ratings of their own toddlers' temperament at 12, 18, and 24 months of age. Furthermore, their temperaments were more strongly related as the toddler became older, suggesting that a toddler's temperament tends to become more similar to that of its mother with increasing age (Matheny, Wilson, & Thoben, 1987).

When specifically examining negative affect and emotional instability in mothers and their offspring, a postpartum depression study found that depressed mothers self-reported higher levels of emotionality (lability in mood states) and rated their infants as having higher levels of emotionality than non-depressed mothers and their infants (Field et al., 1985). Another postpartum study found that using the observational Bayley Scales of Infant Development (Bayley, 1969), examiners' ratings of negative emotionality were also higher for the infants of depressed mothers than the infants of non-depressed mothers (Whiffen & Gotlib, 1989). These studies suggest that both mother and examiner ratings indicate higher negative emotionality in infants of postpartum depressed mothers.

A mother's negative emotionality also predicted her preschool age child's negative emotion word use and increases in her child's arguing and fighting over a year period. Furthermore, these preschool children whose mothers have high negative emotionality displayed higher levels of problem behaviors when their mothers self-reported higher levels of negative emotional expressiveness (Slatcher & Trentacosta, 2012). Additionally, mothers who were high on negative emotionality, displayed more negative affect when interacting with their children. Based on coded behavioral observations of parent-child interactions, these children were found

to be angrier whether parenting was controlled for or not (Kochanska et al., 1997). Fear, a component of negative affectivity, was also found in the children of fearful mothers. One study had mothers, fathers, and their outpatient children aged 9-12 each fill out their own fear questionnaire. The children's fearfulness was related to their mothers' fearfulness only, with mothers who expressed their fears more having children with higher fear (Muris et al., 1996).

Lastly, a study using Cloninger's Temperament and Character Inventory and Junior Temperament and Character Inventory found significant correlations between mothers and their 6-18 year-old children's temperamental dimensions of both harm avoidance and reward dependence. Mothers self-reported their temperament while a composite temperament score was used for their children based off multiple informants' reports (mother, father, self, and teacher) in order to improve validity (Rettew, Stanger, McKee, Doyle, & Hudziak, 2006). Previous studies have already found individuals with BPD to have high harm avoidance and novelty seeking scores and low reward dependence, meaning Rettew et al.'s study provides evidence for the intergenerational transmission of at least two of these temperamental dimensions characteristic of BPD.

There is also empirical evidence for the intergenerational transmission of the broad temperamental factor, effortful control. One longitudinal study had mothers complete the same short form Adult Temperament Questionnaire (ATQ; Evans & Rothbart, 2007; Rothbart et al., 2000) that will be used in the current study as a measure of their own level of effortful control. Mothers additionally completed an Infant Behavior Questionnaire-Revised (IBQ-R; Gartstein & Rothbart, 2003) to report their infants' orienting/regulation (equivalent of effortful control) at 4, 6, 8, 10, and 12 months of age. When these same children reached 18 months of age, their mothers completed an Early Childhood Behavior Questionnaire (ECBQ; Putnam, Gartstein, &

Rothbart, 2006) as a measure of their toddlers' effortful control. Maternal effortful control was positively associated with their infant's orienting/regulation at 4, 8, and 10 months postpartum, and both maternal effortful control and also infant orienting/regulation were positively associated with toddler effortful control (Bridgett et al., 2011). These findings provide evidence for the intergenerational transmission of the temperamental trait, effortful control, as well as its stability from infancy to toddlerhood. Furthermore, a component of effortful control, inhibitory control, was investigated in a family study of ADHD. Using motor response inhibition as a measure of inhibitory control in an endophenotype model of ADHD, there was an inhibitory control deficit found in children with ADHD as well as their parents. The children's inhibitory control ability was significantly predicted by the ability of their parents, particularly their fathers, due to a shared genetic risk (Goos, Crosbie, Payne, & Schachar, 2009).

Though research has been more limited on the intergenerational transmission of the positive affect component of extraversion/surgency, there are studies that suggest it is another component of temperament that is similar in parents and their offspring. Significant correlations between parent and infant behaviors provided evidence that mothers themselves who showed more positive affect had infants who also had more positive affect. Significant correlations were also found between maternal and infant temperament factors, such that mothers who were more likely to approach new situations and had more positive mood had infants who were more sociable (Coffman et al., 1992). The adult personality trait of neuroticism is similar in meaning to models referring to negative affectivity (Rothbart & Ahadi, 1994), and positive affectivity forms the temperamental core of the extraversion personality dimension (Clark, Watson, Mineka, 1994). Both mothers' and fathers' higher extraversion as measured by an adaptation of the NEO Personality Inventory (NEO-PI; Costa & McCrae, 1985; Pulver, Allik, Pulkkinen, &

Hamalainen, 1995) significantly correlated with their parent-reported infant's higher positive affectivity using Rothbart's Infant Behavior Questionnaire (IBQ, Rothbart, 1981). Both mothers' and fathers' higher neuroticism also correlated with their infant's higher negative affectivity. At a 5-year follow-up, as measured by the Children's Behavior Questionnaire (CBQ, Rothbart et al., 2001), both mothers' and fathers' higher neuroticism correlated significantly with higher parent-reported child negative affectivity (Komsa et al., 2008).

Given the empirical evidence reviewed in normative and clinical samples, it would follow then that the children of mothers with BPD may also have temperaments similar to their mothers'. While there have been studies demonstrating the intergenerational transmission of overall temperament, all three of Rothbart's broad dimensions, and specific subscales of fear, anger, inhibitory control, and positive affect, there is a gap in the literature specifically assessing the intergenerational transmission of the negative affectivity subscales of sadness and discomfort as well as the effortful control subscale of attentional control/focusing which the current study will investigate in BPD mothers and their children. Given that we expect higher levels of negative affectivity, and lower levels of effortful control and positive affectivity in adults with BPD, and there is empirical evidence suggesting the intergenerational transmission of temperament, we would also expect the temperament of children of mothers with BPD to differ from that of the children of healthy control mothers in the aforementioned ways.

The current study will utilize a parent-report measure of child temperament (CBQ-Short Form, Putnam & Rothbart, 2006). The validity of parental report has been a source of debate for many years. Comparing experimenter behavioral observations with maternal-report of child temperament using the Carey Infant Temperament Questionnaire (ITQ; Carey, 1970), Vaughn et al. found that infant behavior was not associated with mothers' reports on the ITQ, and the

temperament of the child based on the ITQ related more to characteristics of the mother such as anxiety and hostility (Vaughn, Taraldson, Crichton, & Egeland, 1981). This finding that the ITQ better measured maternal characteristics and perceptions of infant temperament than observable infant behavior spurred a debate that continues to this day on the validity of parental report of temperament. Sameroff et al. similarly compared both observational and maternal reports of child temperament using the ITQ and found that ITQ ratings correlated more frequently with maternal characteristics including mental health status than with observed infant behaviors (Sameroff, Seifer, & Elias, 1982). However, according to Goldsmith and Hewitt, not all temperament measures are constructed equally, with some showing more validity than others due to multiple revisions over the years. They suggest that Rothbart's measures are a very good example of such validity (Goldsmith & Hewitt, 2003). The reason given for this validity is that the Rothbart scales are focused on assessing very specific and discrete observed behaviors, which are less prone to being influenced by mothers' own mental health than are more global assessments. Additionally, while laboratory observations may address parental biases, they may only capture child behaviors at one point in time and do not include difficult to observe situations a parent may witness on a more consistent basis.

Risk to Offspring of Mothers with BPD

Previous studies have investigated the negative impact of maternal BPD on their offspring. While some studies examined the children of mothers with BPD spanning several different developmental stages, other studies focused on specific developmental periods including infancy, early childhood, and adolescence. One study comparing the families of mothers with BPD with the families of mothers with other personality disorders found that the offspring of mothers with BPD, aged 4-18, were more likely to have changed households,

attended multiple schools, been removed from their home, and been exposed to parental drug or alcohol abuse or suicide attempts than children of mothers with other personality disorders.

These children also had more frequent and more severe psychopathology compared to controls (Feldman, Zelkowitz, Weiss, & Vogel, 1995). Additionally, the children of mothers with BPD have a higher prevalence of psychiatric diagnoses such as ADHD and disruptive disorders than the children of mothers with nonborderline personality disorders (Weiss et al., 1996).

There have also been studies conducted investigating the effects of having a mother with BPD in specific developmental periods. Studies examining early effects have observed the interaction between mothers with BPD and their infant offspring. Mothers with BPD were found to be intrusively insensitive and their 2 month old infants showed more dazed looks and more looks away from their mother than the infants of mothers without BPD (Crandell, Patrick, & Hobson, 2003). A study examining the interactions between mothers with BPD and their 3-36 month old infants found that mothers were less sensitive, and their infants less interactive with them than were normative comparisons (Newman, Stevenson, Bergman, & Boyce, 2007).

Furthermore, a study coding the interactions of the Strange Situation found that 85% of mothers with BPD showed disrupted affective communication with their 12-18 month old infants. This was much higher than the 47% of depressed mothers and 42% of control mothers who showed disruptive affective communication with their infants (Hobson et al., 2009). Additionally, 80% of 12 month old infants of mothers with BPD showed disorganized attachment, suggesting these infants had found no strategy to form a relationship with a mother who was either very frightening to them or who seem very frightened herself (Hobson, Patrick, Crandell, Garcia-Perez, & Lee, 2005). A more recent study suggested that mothers who endorsed clinically relevant levels of borderline symptoms were less likely to respond to their infants'

distress with positive affect than were mothers who only endorsed minimal borderline symptoms, controlling for maternal depression. Moreover, they were more likely to respond insensitively as infant distress persisted (Kiel, Gratz, Moore, Latzman, & Tull, 2011). Maternal touching, game playing, and imitation of infant behavior were also reduced in mothers with BPD compared to mothers with MDD and healthy controls (White, Flanagan, Martin, & Silvermann, 2011).

These research studies provide evidence of BPD symptomology being associated with early disruptions in interactions between mothers and their infants, subsequently contributing to the development of insecure attachments that often occur with inconsistent care-giving. Early disrupted attachment may inhibit the proper development of emotional regulation and self-control, which could increase a child's risk for developing BPD (Fonagy & Bateman, 2008).

Beyond the infancy period, one study was conducted specifically investigating the young preschool-aged children of mothers with BPD. Using the same sample of children that will be included in the current study, these children were asked to complete the beginnings of stories told to them to create narratives about parent-child interactions. They told stories that represented the caregiver-child relationship with more role reversal, negative parent-child relationship expectations, and fear of abandonment. Additionally, the children of mothers with BPD themselves appeared more shameful and emotionally dysregulated than normative comparisons (Macfie & Swan, 2009), which may indicate the early development of the emotional instability that is central to individuals with BPD. Lastly, one study investigated the adolescent children aged 11-18 of mothers with BPD. These adolescents perceived their mothers as being overly protective. They also exhibited a higher rate of attention, delinquency, and aggression problems than controls, as well as having more anxiety, depression, and low self-esteem than children of

depressed mothers, children of mothers with other personality disorders, and controls. Important to the current study because it is related to temperament, these adolescent children of mothers with BPD were also found to have higher scores on harm avoidance than comparison groups (Barnow, Spitzer, Grabe, Kessler, & Freyberger, 2006). As previously discussed, high levels of harm avoidance have frequently been found in adults with BPD.

It is likely that individuals who spend much of their time around a person with BPD, such as their children, are exposed to the substantial stresses and strains associated with the impact of BPD on the family (Lenzenweger & Cicchetti, 2005). The empirical studies reviewed provide evidence that the children of mothers with BPD are a group at high risk for negative psychosocial outcomes. These studies have also indicated the persistence of emotional and behavioral deficits in these children compared to those of mothers without BPD, depressed mothers, and mothers with other personality disorders by demonstrating its effects from infancy all the way through late adolescence. However, despite an understanding of the negative outcomes of these offspring, there is currently a deficit of studies investigating the role inherited predispositions (i.e. temperament) play as precursors to BPD symptoms in this high risk sample.

Current Study

Research studies reviewed above investigated the negative effects of maternal BPD on offspring outcomes and emerging psychopathology, as well as temperamental traits associated with BPD including high negative affectivity, low effortful control, and low positive affectivity. Though previous studies have also examined the intergenerational transmission of temperament in clinical and normative groups of mothers and their children, there is a gap in the existing literature specifically investigating the temperament in the high-risk offspring of mothers with BPD. Furthermore, early childhood is a particularly good time to assess temperament in the

offspring of women with BPD because earlier detection of symptom risk can allow for preventive interventions to minimize exposure to other risk factors. Although the inherited temperamental vulnerability cannot itself be prevented, temperament may interact with more malleable environmental influences such as negative parenting in the development of psychopathology. Additionally, early childhood is an optimal time to assess temperamental traits such as effortful control because it develops largely during the preschool years (Rothbart et al., 2007). Furthermore, it is important to study temperament in young children because temperamental variations in affect and effortful control are frequently observed before personality abnormalities are evident (Paris, 2000; Posner et al., 2003). Adults with BPD report having experienced several BPD symptoms in childhood (Reich & Zanarini, 2001), and a longitudinal study of parents and children found that BPD symptoms in adulthood correlated with maternal temperament ratings of their child's emotionality at 30 months (Carlson, Egeland, Sroufe, 2009). In fact, a large community study of preschoolers found that the same pattern of relations between temperament and psychopathology (depressive, anxiety, and disruptive disorders) in older youth and adults was already seen as early as 3 years of age. This indicates that these relations show continuity from childhood to adulthood (Dougherty et al., 2011), and can inform the developmental pathways to disorder. More empirical studies are needed to support theories of childhood temperament predisposing young individuals to the affective instability and impulsivity associated with BPD (Crawford, Cohen, Chen, Anglin, & Ehrensaft, 2009).

The current study used both categorical and continuous measures of BPD to assess temperament in mothers with BPD and their offspring aged 4-7 and in normative comparisons. Additionally, this study assessed the relationship between mothers' and children's temperament

in the sample as a whole. Controlling for maternal major depressive disorder (MDD), which is the disorder most often co-morbid with BPD (Zanarini et al., 1998), it was hypothesized that: (1) mothers with BPD would have temperaments with higher levels of negative affectivity (fear, frustration, sadness, discomfort), and lower levels of effortful control (inhibitory control, attentional control) and extraversion/surgency (positive affect) than would normative comparison mothers ; (2) children of mothers with BPD would have higher levels of negative affectivity (fear, anger/frustration, sadness, discomfort), and lower levels of effortful control (inhibitory control, attentional focusing) and extraversion/surgency ('smiling and laughter') than would normative comparison children; (3) mothers' temperamental traits of negative affectivity (fear, frustration, sadness, discomfort), effortful control (inhibitory control, attentional control) and extraversion/surgency (positive affect) would significantly positively correlate with their children's negative affectivity (fear, anger/frustration, sadness, discomfort), effortful control (inhibitory control, attentional focusing) and extraversion/surgency ('smiling and laughter') respectively; and (4) maternal self-reported borderline features of affective instability, identity disturbance, negative relationships, and self-harm/impulsivity, would significantly positively correlate with their own and their children's negative affectivity and significantly negatively correlate with their own and their children's effortful control and extraversion/surgency.

Chapter 2. Method

Participants

Demographic information was collected using a maternal interview (MHFC, 1995). The sample consisted of 70 children age 4-7 years ($M = 5$ years, 4 months, $SD = 10.7$ months) and their mothers: 36 children whose mothers had BPD, 34 children whose mothers did not have BPD. The low-socio-economic status sample was predominantly Caucasian (93%, $n = 65$), 4% ($n = 3$) bi-racial, and 3% ($n = 2$) African American. Across racial/ethnic background, 9% ($n = 6$) of children were of Hispanic ethnicity. Fifty-one percent were female. Groups were matched on SES (low), age, gender, ethnicity, presence of partner, and number of adults and children in the home, but not on mothers' education. Maternal education correlated significantly with some of the dependent variables, so it was controlled for in subsequent analyses. See Table 1 for descriptive statistics and tests of group differences.

Both clinical and comparison mothers were recruited from rural and urban areas in a five county region in the Southeastern United States. Brochures advertising the study were distributed to therapists, physicians, and other healthcare professionals during presentations on BPD. Local hospitals, clinics, and therapists in private practice then distributed these brochures to female patients that were thought to meet criteria for BPD and who had a child between ages 4-7. Mothers then called if they were interested in participating in a study on parent-child relationships, after being referred by their therapist or other healthcare professional. Mothers with BPD were also recruited from flyers posted throughout the community.

Comparison mothers were recruited with brochures distributed at local Boys and Girls Clubs and preschools when they dropped off or picked up their children. Comparison mothers

were also recruited from flyers. All participants were given compensation for their participation: mothers with gift cards, children with small toys.

Procedures

Home Visit: A home visit was scheduled where research assistants met with the mother at her home or another convenient location if requested. The visit consisted of administering informed consent forms, a maternal self-report screening measure to assess for preliminary BPD diagnosis, and collecting demographic information. After the home visit, mothers were contacted to schedule a laboratory visit at the university.

Laboratory Visit: During the laboratory visit mothers were further assessed for a BPD diagnosis with a structured clinical interview. Mothers also completed both self and parent-report questionnaires on their symptomatology and on their own and their children's temperament.

Measures

Psychiatric Diagnosis and Borderline Features

The Structured Clinical Interview for DSM-IV Axis I Disorders (First, Gibbon, Spitzer, & Williams, 2002)- The Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I) is a semi-structured interview for the major DSM-IV Axis I diagnoses. In the current study, the presence of both current and lifetime history of maternal Major Depressive Disorder was determined using this instrument. Studies have found inter-rater reliability for the diagnosis of Major Depressive Disorder to range from $k = .66$ (Lobbestael, Leurgans, & Arntz, 2011) to $k = .80$ (Zanarini, Skodol, Bender, Dolan, Sanislow, et. al., 2000). Studies have also demonstrated superior validity of the SCID over standard clinical interviews (Fennig, Craig, Lavelle, Kovasznay, 1994; Kranzler, Kadden, Babor, & Tennen, 1996). In the current study, there were four mothers diagnosed with current Major Depressive Disorder (MDD), and 22 mothers who

reported a lifetime history of the disorder, all of whom were also diagnosed with BPD. There was a significant difference between BPD and non-BPD groups in regards to depression, $t = 2.03, p = .05$ for current MDD and $t = 7.20, p < .001$ for lifetime history of MDD, with 5.7% of mothers in the overall sample having current MDD and 31.4% of mothers in the overall sample having a lifetime history of the disorder.

The Structured Clinical Interview for DSM-IV Axis II Disorders (SCID II, First, Gibbon, Spitzer, Williams & Benjamin, 1997)- The Structured Clinical Interview for DSM-IV Axis II Disorders (SCID-II) is a semi-structured interview for making DSM-IV Axis II Personality Disorder diagnoses. After screening by self-report for maternal BPD during the home visit, the laboratory visit included assessment for BPD using the SCID-II. Studies have found high inter-rater reliability ($k=.91$) for the diagnosis of BPD using the SCID-II (Maffei, Fossati, Agostoni, Barraco, Bagnato, et. al., 1997; Lobbetael, Leurgans, & Arntz, 2011). Although the DSM-IV version of the SCID-II does not have validity data, studies on the previous version found that its validity varied by diagnosis with a diagnostic power of .85 or greater for five personality disorders (Skodol, Rosnick, Kellman, & Oldham, 1988).

The Personality Assessment Inventory (PAI, Morey, 1991)- The Personality Assessment Inventory (PAI) is a self-report measure used to assess personality and psychopathology. It has 22 non-overlapping scales, one of which is the Borderline Features Scale (PAI-BOR, Morey, 1991). The 24-item PAI borderline features scale was used in this study as a continuous measure of borderline features for all mothers. It includes a total borderline feature score and subscales of affective instability, identity disturbance, negative relationships, and self-harm/impulsivity. Results were endorsed using a Likert scale of *false*, *slightly true*, *mainly true*, or *very true*. Sample questions from each subscale include: affective instability (My mood can shift quite

suddenly), identity disturbance (My attitude about myself changes a lot), negative relationships (I've made some real mistakes in the people I've picked as friends), and self-harm/impulsivity (When I'm upset I typically do something to hurt myself). There is support for convergent validity between the PAI borderline scale and structured interviews for BPD (Kurtz & Morey, 2001; Stein, Pinsker-Aspen, & Hilsenroth, 2007), as well as invariance across sex and age for the this scale (De Moor, Distel, Trull, & Boomsma, 2009). In the current sample, mothers' BPD diagnosis correlated significantly with total borderline features, $r = .83, p < .000$, affective instability $r = .82, p < .000$, identity disturbance, $r = .78, p < .000$, negative relationships, $r = .73, p < .000$, and with self-harm, $r = .67, p < .000$. Cronbach's alpha, measuring internal consistency for the mother's PAI borderline subscales, was $\alpha = .93$ for affective instability, $\alpha = .84$ for identity disturbance, $\alpha = .87$ for negative relationships, $\alpha = .85$ for self harm/impulsivity, and $\alpha = .96$ for all four subscales.

Temperament

The three broad dimensions of temperament that were assessed in the current study are negative affectivity, effortful control, and extraversion/surgency. Additionally, only temperamental subscales that are present in both child and adult temperament measures were examined for comparison purposes, with slight variations in terminology between the adult temperament and children's temperament subscales (italicized). The current study examined four of the broad factor, negative affectivity's, common subscales: fear, *anger/frustration*, sadness, and discomfort. Fear is negative affect related to anticipated pain, distress, or potential threat; *anger/frustration* is negative affect related to the interruption of ongoing tasks or goal blocking; sadness is negative affect and lowered mood and energy related to exposure to suffering, disappointment, and object loss; and discomfort is negative affect related to sensory qualities of

stimulation, including intensity, rate, or complexity of light, movement, sound, or texture (Rothbart et al., 2000).

The second broad category, effortful control, is the degree of control an individual has over their impulses and emotions. It also encompasses a person's ability to focus and shift their attention. The current study focused on the two effortful control subscales that are similar across adult and child measures: attentional *control*/attentional *focusing* and inhibitory control. Attentional *control*/attentional *focusing* is the capacity to maintain attention on tasks as well as to shift attention when desired, and inhibitory control is the capacity to plan future action and to suppress inappropriate responses (Rothbart et al., 2000).

Lastly, from the third broad category that was used in the current study, extraversion/surgency, focus will be placed on only one subscale, *positive affect/smiling and laughter*. *Positive affect* in adults is the latency, threshold, intensity, duration, and frequency of experiencing pleasure, and *smiling and laughter* in young children is positive affect in response to changes in stimulus intensity, rate, complexity, and incongruity (Rothbart et al., 2000).

Adult Temperament Questionnaire- The Adult Temperament Questionnaire short form (ATQ; Evans & Rothbart, 2007; Rothbart et al., 2000) is a 77-item self-report measure of temperament. Results were endorsed using a seven-point Likert scale ranging from 1 (extremely untrue of you) to 7 (extremely true of you). A sample question from this measure is: When I hear of an unhappy event, I immediately feel sad. Cronbach's alpha, measuring internal consistency for this measure, was $\alpha = .74$ for frustration, $\alpha = .76$ for fear, $\alpha = .53$ for sadness, $\alpha = .67$ for discomfort, and $\alpha = .86$ for a negative affect composite. Cronbach's alpha was $\alpha = .44$ for inhibitory control, $\alpha = .79$ for attentional control, and $\alpha = .54$ for positive affect. Although no alphas were below .60 in a study examining the internal consistency of the ATQ short form, their

Cronbach's alphas were also lowest on similar subscales with $\alpha = .62$ for sadness, $\alpha = .60$ for inhibitory control, and $\alpha = .62$ for positive affect (Evans & Rothbart, 2007).

Child Behavior Questionnaire- The Child Behavior Questionnaire short form (CBQ, Putnam & Rothbart, 2006) is a 94-item parent-report measure of temperament in children aged 3-7. A sample question from the measure is: When angry about something, s/he tends to stay upset for ten minutes or longer. The CBQ uses the same Likert scale as the ATQ. There is evidence for convergent validity of the standard CBQ. It also shows parental agreement on the scales to be substantial, and the scales demonstrate adequate internal consistency (Rothbart, Ahadi, Hershey, & Fisher, 2001). The CBQ short form demonstrated satisfactory internal consistency and criterion validity and exhibited longitudinal stability and cross-informant agreement comparable to the standard CBQ. Internal consistency was somewhat lower in African American and low-income samples for some scales (Putnam & Rothbart, 2006). A temperament study using the CBQ had Cronbach's alphas that ranged from 0.61 to 0.94 for all the scales (Putnam, Rothbart, & Gartstein, 2008). In the current study, Cronbach's alpha, measuring internal consistency for this measure, was $\alpha = .84$ for anger-frustration, $\alpha = .71$ for fear, $\alpha = .65$ for sadness, $\alpha = .74$ for discomfort, and $\alpha = .87$ for a negative affect composite. Cronbach's alpha was $\alpha = .77$ for inhibitory control, $\alpha = .69$ for attentional focusing, and $\alpha = .63$ for smiling and laughter.

Chapter 3. Results

Preliminary Analyses

Prior to hypothesis testing, analyses were conducted to test if there were any group differences on demographic variables. There was one significant demographic difference between groups such that mothers with BPD were less likely to have completed high school or received their GED than comparison mothers. Furthermore, maternal education correlated significantly with some of the dependent variables (temperament), and was therefore entered as a covariate in subsequent analyses. As major depressive disorder (MDD) is the disorder most often co-morbid with BPD (Zanarini et al., 1998), both current maternal MDD and a lifetime history of maternal MDD were also controlled for in analyses. See Table 1 for descriptive statistics.

Power Analysis: Using standardized Cohen's d effect sizes of .20, .50, and .80 for a small, medium, and large effect respectively (Cohen, 1992), and an alpha level of .05, the power to detect a significant difference between groups if it is present was calculated for the current study's sample size of $N = 70$. Using this sample size, there was a power of .13 to detect a small effect size of .20, a power of .54 to detect a medium effect size of .50, and a power of .91 to detect a large effect size of .80. In order to have detected a small effect size (.20), assuming a power of .80 and $\alpha = .05$, this study would have needed a sample size of $N = 778$. Additionally, this study would have needed a sample size of $N = 128$ to detect a medium effect size (.50) and a sample size of $N = 52$ to detect a large effect size (.80).

Hypothesis Testing

Hypothesis (1): To test Hypothesis 1 an ANCOVA was used to examine mean level differences in temperament in the mother sample as a function of group membership (BPD group versus normative group). In full support of hypothesis 1, when controlling for maternal education

level and only *current* maternal MDD, mothers with BPD reported more negative affectivity (frustration: $F(1, 66) = 33.1, p < .001$; fear: $F(1, 66) = 41.2, p < .001$; sadness: $F(1, 66) = 13.5, p < .001$; discomfort: $F(1, 66) = 9.5, p < .01$), less effortful control (inhibitory control: $F(1, 66) = 7.3, p < .01$; attentional control: $F(1, 66) = 52.6, p < .001$), and less extraversion/surgency (positive affect: $F(1, 66) = 10.8, p < .01$) than did normative comparison mothers. Also in full support of hypothesis 1, when controlling for maternal education level, current maternal MDD, as well as a lifetime history of maternal MDD, group differences in the mother sample did not change. Mothers with BPD reported more negative affectivity (frustration: $F(1, 65) = 20.0, p < .001$; fear: $F(1, 65) = 49.5, p < .001$; sadness: $F(1, 65) = 8.7, p < .01$; discomfort: $F(1, 65) = 9.8, p < .01$), less effortful control (inhibitory control: $F(1, 65) = 4.1, p < .05$; attentional control: $F(1, 65) = 35.8, p < .001$), and less extraversion/surgency (positive affect: $F(1, 65) = 24.6, p < .001$) than did normative comparison mothers. See Table 2 for group means, standard deviations, and univariate F-tests.

Hypothesis (2): To test Hypothesis 2, an ANCOVA was used to examine mean level differences in temperament in the child sample as a function of group membership (BPD group versus normative group). In partial support of Hypothesis 2, when controlling for *current* maternal MDD and education level, children whose mothers had BPD were reported to have more negative affectivity on some scales (frustration: $F(1, 66) = 5.8, p < .05$ and fear: $F(1, 66) = 6.0, p < .05$, but not sadness: $F(1, 66) = 1.4, p > .10$, or discomfort: $F(1, 66) = .25, p > .10$) than were the children of normative comparison mothers. They were also reported to have less effortful control (inhibitory control: $F(1, 66) = 5.5, p < .05$; attentional focusing: $F(1, 66) = 5.8, p < .05$), but not less extraversion/surgency (smiling and laughter: $F(1, 66) = .16, p > .10$) than did the children of normative comparison mothers. Again in partial support of Hypothesis 2,

when controlling for a lifetime history of maternal MDD in addition to current MDD and education level, children whose mothers had BPD were reported to have more negative affectivity on some scales (frustration: $F(1, 65) = 4.4, p < .05$; fear: $F(1, 65) = 10.6, p < .01$; and sadness: $F(1, 65) = 6.5, p < .05$, but not discomfort: $F(1, 65) = .77, p > .10$) than were the children of normative comparison mothers. They were also reported to have less effortful control on the attentional focusing subscale, $F(1, 65) = 5.3, p < .05$, but not on the inhibitory control subscale, $F(1, 65) = 2.7, p > .10$. Lastly, the children of mothers with BPD were not reported to have less extraversion/surgency (smiling and laughter: $F(1, 65) = .17, p > .10$) than did the children of normative comparison mothers. Overall, the additional control of a maternal lifetime history of MDD in group differences analyses in the child sample resulted in the children of mothers with BPD having more sadness than the children of normative comparison mothers. However, the children of mothers with BPD no longer had significantly higher inhibitory control than the children of normative comparison mothers. See Table 3 for group means, standard deviations, and univariate F-tests.

Hypothesis (3): A two-tailed Pearson correlation was computed to examine the association between mother and child's corresponding temperamental variables across the sample as a whole. In full support of Hypothesis 3, mothers' temperamental traits were all significantly correlated with their children's corresponding temperamental traits. Maternal negative affect variables significantly positively correlated with their children's negative affect variables (anger/frustration: $r = .44, p < .001$; fear: $r = .43, p < .001$; sadness: $r = .44, p < .001$; and discomfort: $r = .26, p < .05$). Additionally, maternal effortful control variables significantly positively correlated with their children's effortful control variables (inhibitory control: $r = .36, p < .01$ and attentional control/focusing: $r = .41, p < .001$). Lastly, maternal positive affect

significantly positively correlated with their children's smiling and laughter, $r = .28, p < .05$. See Table 4 for full correlation data.

Hypothesis (4): A two-tailed Pearson correlation was computed to examine the association between mothers' borderline features and both their own as well as their children's temperamental variables. Each maternal borderline feature (affective instability, identity disturbance, self-harm/impulsivity, and negative relationships) was significantly positively correlated with maternal negative affectivity subscales and significantly negatively correlated with maternal effortful control subscales and positive affect. A composite of all four maternal borderline features (maternal borderline total) also significantly positively correlated with maternal negative affectivity (frustration: $r = .66, p < .001$; fear: $r = .73, p < .001$; sadness: $r = .65, p < .001$; discomfort: $r = .42, p < .001$). Additionally, this composite significantly negatively correlated with maternal effortful control (inhibitory control: $r = -.51, p < .001$; attentional control: $r = -.73, p < .001$) and positive affect, $r = -.56, p < .001$. See Table 5 for full correlation data.

Each maternal borderline feature was significantly negatively correlated with children's effortful control (inhibitory control, attentional focusing) and significantly positively correlated with children's negative affectivity (anger/frustration, fear, and sadness scales). However, only the maternal borderline features of 'identity disturbance' and 'negative relationships' were significantly positively correlated with the children's discomfort scale. 'Smiling and laughter' did not significantly negatively correlate with any maternal borderline feature. A composite of all four maternal borderline features (maternal borderline total) also significantly positively correlated with child negative affectivity (frustration: $r = .48, p < .001$; fear: $r = .43, p < .001$; sadness: $r = .43, p < .001$; discomfort: $r = .25, p < .05$). Additionally, this composite significantly

negatively correlated with child effortful control (inhibitory control: $r = -.41, p < .001$; attentional control: $r = -.44, p < .001$), but not 'smiling and laughter', $r = -.08, p > .10$. See Table 6 for full correlation data.

Chapter 4. Discussion

The current study assessed temperament in mothers with BPD and their offspring as compared to normative comparisons as well as the relationship between temperament in mothers and children in the sample as a whole using both categorical and continuous measures of BPD. As major depressive disorder (MDD) is often co-morbid with a BPD diagnosis, maternal *current* MDD was controlled for in all group differences analyses. However, additionally controlling for a lifetime history of maternal MDD (LMDD) may capture influences on group differences that extend beyond a current diagnosis. LMDD was therefore also included as a covariate in additional analyses.

Mothers with BPD and their children do indeed have different temperaments than do normative comparisons. When education level and *current* MDD alone were controlled for, as well as when lifetime MDD was added as a covariate, mothers with BPD self-reported significantly higher levels of negative affectivity, lower levels of effortful control, and lower levels of positive affect on all subscales than did normative comparisons. Controlling for maternal education level and current MDD, mothers with BPD reported that their children had significantly higher levels of negative affectivity on two of the four subscales (frustration and fear, but not sadness or discomfort) and lower levels of effortful control on all subscales, but not lower levels of 'smiling and laughter' than did normative comparisons. However, including maternal lifetime history of MDD as a covariate in group differences analyses in the child sample resulted in the children of mothers with BPD having more sadness as well as no longer having significantly higher inhibitory control than the children of normative comparison mothers.

In addition, mothers' temperamental traits were all significantly positively correlated with their children's corresponding traits across the sample as a whole. Maternal negative affect variables positively correlated with their children's negative affect, maternal effortful control variables positively correlated with their children's negative affect, and maternal positive affect positively correlated with their children's smiling and laughter. Furthermore, all maternal borderline features were significantly positively correlated with maternal negative affectivity subscales and significantly negatively correlated with maternal effortful control subscales and positive affect. Each maternal borderline feature was also positively associated with children's negative affectivity on all subscales except for discomfort which only correlated with maternal borderline features of 'identity disturbance' and 'negative relationships'. Additionally, each maternal borderline feature was negatively associated with children's effortful control subscales. Lastly, no maternal borderline feature correlated with children's smiling and laughter.

Implications

The results of the current study are important because children with similar temperaments to mothers with BPD may be at risk for developing the disorder themselves. It has previously been found that children high in negative affectivity, low in effortful control, and low in positive affectivity are at an increased risk for poorer socio-emotional development and behavior problems. For example, children high in negative affectivity experience stronger stress reactions than children with lower negative affectivity when experiencing the same environmental stressor (Rothbart, 2004). Children with high negative affectivity and low positive affectivity are also more likely to develop behavior problems (Dougherty, Klein, Durbin, Hayden & Olino, 2010; Eisenberg et al., 1996). Additionally, the negative affectivity subscales, anger and discomfort, are related to antisocial traits (Rothbart, Ahadi, & Hershey, 1994).

Effortful control is the ability to use attentional resources and inhibit behavioral responses to regulate behavior and emotions. Individuals with low effortful control may have a deficit in the ability to self-regulate, and this deficit is at the core of many clinical disorders (Cole, Michel, & Teti, 1994). Low effortful control has also been consistently found to be a predictor of externalizing problems (Rothbart, 2007). In contrast, individuals with a high level of effortful control and low negative affectivity have been associated with increased social competence (Liew, Eisenberg & Reiser, 2004), by allowing for the regulation of one's attention and behavior to act more prosocially. Effortful control has also been found to positively predict the development of conscience (Kochanska et al., 2000), as well as empathy, guilt and low aggressiveness (Rothbart, 2007). The attentional control component of effortful control may allow for the cognitive flexibility needed to regulate attention to others' negative feelings (empathy) and understand responsibility for one's own actions (conscience).

Consistent with findings from the current study, previous research has already found adults with BPD have higher negative affect, lower effortful control, and lower positive affect than normative comparisons. The pattern of findings appears to extend to children of mothers with BPD. In the current study, children of mothers with BPD were reported to have higher negative affect and lower effortful control compared to normative comparison children, suggesting that they have a similar vulnerable temperament that could contribute to the eventual development of the disorder.

The results from the current study also contribute to our knowledge of the intergenerational transmission of vulnerable temperament to the offspring of mothers with BPD by early childhood as mothers with BPD were found to have a similar temperament as their children across all corresponding temperamental variables. This again suggests that their children

are at an increased likelihood of developing BPD symptoms. Additionally, finding significant associations between maternal borderline features and most child temperament variables provides important information that even the children of mothers with sub-threshold BPD could be at an increased risk for BPD.

Individuals who go on to develop BPD may carry a temperamental diathesis that makes them more vulnerable to stress and adverse life events (Paris, 2005), therefore one also has to consider the environmental stressors in addition to genetic risk factors that may lead to the development of BPD. According to Thomas and Chess's 'goodness of fit' model, parenting is an environmental influence that interacts with a child's temperament to determine psychological outcomes. Children whose temperamental traits are high in frustration and low in effortful control may be more vulnerable to the adverse effects of negative parenting, with negative parenting behaviors actually predicting increases in these temperamental characteristics (Kiff, Lengua, & Zalewski, 2011). Children with higher negative affectivity may also be more susceptible to developing behavior problems when exposed to negative parenting than children with lower negative affectivity (Karreman, de Haas, van Tuijl, van Aken, & Dekovic, 2010; Morris et al., 2002). Moreover, parenting a child with a temperament high in negative affectivity and low in positive affectivity may be less rewarding for parents, which may decrease the frequency of positive parent-child interactions. These decreased positive interactions may then lead children to exhibit higher levels of behavior problems (Harnish, Dodge, & Valente, 1995). Children with difficult temperaments may put a strain on even the healthiest of parents, let alone those with their own emotional, interpersonal, or socioeconomic difficulties (Graybar & Boutilier, 2002), such as mothers with BPD. Given that mothers with BPD and their children both have higher negative affect and lower effortful control in the current study, they may be

more likely to experience negative parent-child interactions that may increase the risk of the child developing psychopathology.

Although children with temperamental vulnerabilities are at increased risk for negative adjustment outcomes when exposed to negative parenting, risks may be attenuated when parents are positive and sensitive to their emotions (Morris et al., 2002). In line with this, one study found children with a low level of effortful control were most at risk for having externalizing problems, however, positive parenting seemed to lower this risk (Karreman, van Tuijl, van Aken, & Dekovic, 2009). This suggests the potential benefit of parenting interventions that could focus on behavioral parent training as well as skills training for the parent themselves. Alternatively, a psychodynamic and attachment based parent-child dyadic therapy may be also be beneficial. Parent-Child Interaction Therapy (PCIT) is an empirically supported behavioral parent training program that works to improve the quality of the parent-child relationship and teach more effective and sensitive interaction patterns (Callahan, Stevens, & Eyberg, 2010). Another behavioral component of parent training could involve providing Dialectical Behavioral Therapy (DBT) to mothers with BPD in which they undergo skills training to learn how to cope with their own emotion dysregulation and increase their mindfulness (Linehan, 1993). Learning these skills may provide mothers with the increased emotional stability needed to sensitively parent their children. Furthermore, 80% of infants of mothers with BPD were found to have a disorganized attachment (Hobson et al., 2005). In addition to skills and parent training, the preschool children of mothers with BPD may benefit from a psychodynamic and attachment-based therapy in which mother and child meet together with a therapist for dyadic psychotherapy. This type of therapeutic setting allows for parents to learn about their child's feelings and needs while feeling supported by the therapist, allowing for the development of a

more secure parent-child relationship (Lieberman, 1992). Individual therapy with children themselves may also focus on treatment goals such as improving the ability to self-regulate and control behaviors (Cole et al., 1994). Additionally, a meta-analysis found evidence that preventive interventions containing cognitive, behavioral, and psychoeducational components were effective in preventing mental disorders and psychological symptoms in the offspring of mentally ill parents (Siegenthaler & Munder, 2012). Given the similarity in temperament between mothers with BPD and their children already present at an early age in the current sample, it may be beneficial to provide parent training and individual therapy to reduce the likelihood of the child developing psychopathology.

Though children of mothers with BPD did not differ in levels of smiling and laughter when compared to children of normative comparison mothers, nor did their level of smiling and laughter correlate with maternal borderline features, it may be that their children are emotionally dysregulated given their higher levels of negative affect and lower levels of effortful control. Emotionally dysregulated children are often unable to regulate their emotional responses to environmental and interpersonal negative stimuli and respond by overreacting with obvious displays of anger, crying, or aggression. These displays of negative affect may be more prominent and easily noted by their parents, whereas a difference in their level of smiling and laughter (positive affect) may be less evident. In contrast, mothers with BPD seem to be more aware of their own low levels of positive affect.

Strengths of Study

The current study has several strengths including a relatively large sample size of BPD participants and their offspring compared to previous studies. This is noteworthy due to the challenge of recruiting BPD participants who have children in specific age ranges. Additionally,

to date there have only been a few studies that have investigated mothers with BPD and their offspring, with the present study adding to this limited literature. Moreover, though previous studies have investigated temperament in individuals with BPD as well as the intergenerational transmission (IGT) of temperament in normative and other clinical groups, the current study fills a knowledge gap specifically examining the IGT of temperament in a high risk BPD offspring sample.

The current study also controlled for both maternal current major depressive disorder and maternal lifetime history of major depressive disorder in analyses due to a high comorbidity rate of major depression and a BPD diagnosis. Controlling for this concurrent and lifetime diagnosis reduced the number of other contributing factors that may have led to group differences. Furthermore, this study used both a categorical diagnosis of BPD through use of a semi-structured interview and a continuous self-report measure of borderline features in order to examine correlations between mothers and children in the sample as a whole. Though categorical diagnoses are useful in clinical practice, using a continuous measure is informative of the differences in temperament that may be present in mothers with sub-threshold BPD and their children. This study also used teacher reports of children's behavior rather than mothers which provides valuable information of the child in a different setting. Lastly, findings suggest there was a large effect size as significant results were found despite low power to detect small or medium-sized effects with a small sample size.

Limitations

Although there are several strengths to this study, there are also some limitations. The sample was mostly Caucasian and low SES, which limits generalizability to other racial and socioeconomic populations. This study is also cross sectional rather than longitudinal limiting

our ability to assess the stability of temperament over time. The sample size is both a strength and a limitation of this study. Although it is a relatively large sample size compared to previous studies of mothers with BPD and their children, the small sample size still reduces the power to detect effects.

Additionally, temperament variables were all measured using parental-reported questionnaire data. The use of multiple raters or more objective observational coding of laboratory tasks measuring temperament may have provided a more complete view of children's temperament across different settings. Furthermore, this study did not include fathers' reports on their children's temperament. Though children's temperament is both inherited from and environmentally influenced by both parents, this study only utilized mother report as they are often more readily available for laboratory visits and are often the child's primary caregiver.

The current study investigated whether mothers with BPD were accurate reporters of their children's temperament. This was determined by examining the relation between maternal-reported child temperament using the CBQ and teacher report of child adaptive functioning and behavioral problems using the Teacher Report Form (TRF, Achenbach, 1991). When looking specifically at the CBQ's broad dimension, effortful control, previous research has found significant correlations between maternal report of children's effortful control and the teacher reported problem behavior broad-band scale of externalizing problems, but not internalizing problems (Valiente et al., 2006). Across our current sample, effortful control was indeed significantly correlated with externalizing problems, but in contrast to Valiente et al.'s study, effortful control was also correlated with internalizing problems. However, when examining groups separately, the relation between effortful control and externalizing problems did not maintain significance for the normative comparison group and was only marginally significant

for the BPD group perhaps because of small cell sizes. Furthermore, when examining groups separately, the relation between effortful control and internalizing problems was only marginally significant in the normative comparison group and insignificant in the BPD group.

In another study looking at specific subscales of negative affectivity and effortful control as well as smiling and laughter, significant correlations were found between parent-reported child attentional focusing, inhibitory control, anger-irritability, and smiling and laughter on the CBQ, and teacher-reported externalizing problems using the TRF. However, only anger-irritability and smiling and laughter correlated with internalizing problems (Zhou, Lengua, & Wang, 2009). In contrast to the Zhou et al. study, across the current sample effortful control subscales (attentional focusing and inhibitory control) were correlated with externalizing problems, but not anger-irritability or smiling and laughter. Whereas the previous study found anger-irritability and smiling and laughter to be correlated with internalizing problems, the current study only found attentional focusing to significantly correlate with internalizing problems across the sample as a whole. In the current sample, when separated by group, associations between attentional focusing and externalizing problems were marginally significant in the comparison group and insignificant in the BPD group. Furthermore, inhibitory control was insignificantly correlated with externalizing problems in the comparison group and marginally significant in the BPD group. When separated by group, associations between attentional focusing and internalizing problems were significant in the comparison group but insignificant in the BPD group.

Though maternal and teacher report were only significantly correlated in this study on some subscales, the comparison of not only cross informant but also cross measure may weaken correlations. Previous studies that found significant correlations between parent temperament

and teacher behavioral measures had larger sample sizes ($N = 181$, Valiente et al., 2006; $N = 322$, Zhou et al., 2009) that may have allowed for the detection of weak correlations ($r = .10 - .30$). The current study's small sample size ($N = 70$) may have reduced the power to detect these small effects. Further evidence that the sample size may have affected the ability to detect effects is that when separated by group, significance was often lost or marginal, with neither the BPD group nor the comparison group's reports of temperament being highly correlated with teacher report of behavioral problems. This suggests that it was not necessarily the presence of a maternal mental disorder that led to weak or insignificant correlations. Overall, mother report when compared to teachers was only correlated for the effortful control variables, and would suggest that mothers in the current sample are not accurate reporters of their children's affective temperament. However, it has been suggested that no one informant is a more accurate reporter of children's temperament, but rather that each provides unique information about a child's display of temperament in different settings. Additionally, Rothbart's measure assesses temperament using very specific and discrete observed behaviors rather than global assessments. This increases the validity of the measure by reducing the influence of maternal mental health.

Lastly, although Cronbach's alphas were all above .60 for the Child Behavior Questionnaire's (CBQ) temperamental subscales, several subscales for the Adult Temperament Questionnaire (ATQ) had Cronbach's alphas below .60 including sadness, inhibitory control, and positive affect. These particular temperamental subscales of the ATQ had a lower internal consistency in our sample, suggesting that mothers may not have reported in a consistent manner on these subscales.

Future Directions

More research needs to be conducted on the intergenerational transmission of BPD and potential risk factors that may lead to the development of BPD symptoms in the offspring of mothers with this disorder. An important contribution to the literature would be to compare mothers with BPD and their adolescent offspring. Adolescents would be able to provide self-reports of their temperament in addition to maternal reports for comparison purposes.

Additionally, although longitudinal studies are challenging given complications of maintaining extended contact with unstable BPD participant populations, they could build upon this cross-sectional study to help inform the stability of temperament across the lifespan. Furthermore, although this study controlled for the possible effects of having a concurrent diagnosis of maternal major depressive disorder, future studies could alternatively use a clinical comparison group of depressed mothers to better examine the effects of differing psychopathology.

Conclusion

It is important to study temperament in a high-risk sample of mothers with BPD and their young children given the genetic and environmental vulnerability of their offspring developing BPD themselves in adolescence or early adulthood. Investigating temperamental differences in affect and effortful control may inform precursors and developmental pathways to the disorder. The children of mothers with BPD were reported to have more negative affect and less effortful control than the children of normative mothers on some subscales. Children across the current study's sample as a whole were also reported to have similar negative affect, effortful control, and positive affect as their mothers, providing support for the intergenerational transmission of temperament. Given evidence of this temperamental composition contributing to some of the difficulties adults with BPD experience, as well as poorer socio-emotional development and

behavioral problems already present in childhood, earlier detection of symptom risk may allow for preventive interventions to minimize exposure to other risk factors such as the negative parenting often seen in mothers with BPD. Future longitudinal studies could contribute to our knowledge of the stability of intergenerationally transmitted BPD risk. Research including other clinical comparison groups could also provide information on the specific ways in which temperament presents itself in different disorders.

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Appendix

Table 1. *Demographic differences between BPD and normative comparison group*

Variable	Whole sample	BPD	Comparison	<i>t</i>
	<i>N</i> = 70 <i>M</i> (<i>SD</i>)	<i>n</i> = 36 <i>M</i> (<i>SD</i>)	<i>n</i> = 34 <i>M</i> (<i>SD</i>)	
Child Age (years)	5.37 (0.89)	5.35 (0.93)	5.38 (0.87)	0.12
Maternal Age (years)	32.41 (5.04)	32.28 (4.84)	32.56 (5.32)	0.23
Family Yearly Income (\$)	31,835 (27,855)	29,372 (19,294)	34,443 (34,841)	0.76
# Adults in Home	1.83 (0.78)	1.86 (0.80)	1.79 (0.77)	-0.36
# Children in Home	2.47 (1.16)	2.61 (1.25)	2.32 (1.07)	-1.03
				χ^2
Child Gender (female)	51%	53%	50%	0.05
Child Minority Ethnic Background	7%	8%	6%	0.16
Mother Graduated High School or GED	89%	81%	97%	4.71*
Mother Has Partner	76%	72%	79%	0.49

**p* < .05

Table 2. *Group differences in maternal temperament: group means, standard deviations and univariate F-tests*

Maternal Temperament	Mothers with BPD n = 36 M (SD)	Comparison Mothers n = 34 M (SD)	F (df) Covariates: Education and CMDD	F (df) Covariates: Education, CMDD, & LMDD
Negative Affect			(1, 66)	(1, 65)
Frustration	4.77 (.98)	3.25 (.91)	33.14***	19.98***
Fear	4.90 (1.04)	3.16 (.92)	41.21***	49.51***
Sadness	4.92 (1.00)	3.97 (.72)	13.53***	8.71**
Discomfort	4.60 (1.23)	3.73 (1.08)	9.51**	9.83**
Effortful Control				
Inhibitory Control	3.74 (.91)	4.56 (1.01)	7.30**	4.06*
Attentional Control	2.85 (1.03)	4.86 (1.00)	52.62***	35.78***
Extraversion/Surgency				
Positive Affect	3.97 (1.17)	5.02 (.92)	10.79**	24.64***

* $p < .05$; ** $p < .01$; *** $p < .001$

CMDD= Current maternal Major Depressive Disorder

LMDD= Lifetime maternal Major Depressive Disorder

Table 3. *Group differences in child temperament: group means, standard deviations, and univariate F-tests*

Child Temperament	Children of Mothers with BPD n = 36 M (SD)	Children of Comparison Mothers n = 34 M (SD)	F (df) Covariates: Education and CMDD	F (df) Covariates: Education, CMDD & LMDD
Negative Affect			(1, 66)	(1, 65)
Anger/Frustration	5.44 (1.20)	4.52 (1.37)	5.80*	4.43*
Fear	4.57 (1.27)	3.68 (1.19)	5.97*	10.64**
Sadness	4.68 (1.13)	4.28 (.74)	1.44	6.50*
Discomfort	4.68 (1.27)	4.33 (1.22)	.25	.77
Effortful Control				
Inhibitory Control	3.99 (1.05)	4.73 (1.23)	5.54*	2.69
Attentional Focusing	4.03 (1.08)	4.77 (1.23)	5.76*	5.32*
Extraversion/Surgency				
Smiling and Laughter	6.02 (.75)	6.03 (.59)	.16	.17

* $p < .05$; ** $p < .01$

CMDD= Current maternal Major Depressive Disorder

LMDD= Lifetime maternal Major Depressive Disorder

Table 4. *Correlations between maternal and child temperament*

Child Temperament	Maternal Temperament						
	Frustration	Fear	Sadness	Discomfort	Inhibitory Control	Attentional Control	Positive Affect
Anger/Frustration	.44***	.31**	.14	.21 [†]	-.28*	-.62***	-.36**
Fear	.21 [†]	.43***	.24*	.35**	-.16	-.38***	-.42***
Sadness	.31**	.36**	.44***	.21 [†]	-.13	-.37**	-.27*
Discomfort	.29*	.23 [†]	.27*	.26*	-.02	-.29*	-.27*
Inhibitory Control	-.33**	-.23 [†]	-.01	-.10	.36**	.43***	.43***
Attentional Focusing	-.34**	-.23 [†]	-.06	-.01	.35**	.41***	.48***
Smiling and Laughter	-.08	-.18	-.07	-.14	.21 [†]	.24*	.28*

[†] $p < .10$; * $p < .05$; ** $p < .01$; *** $p \leq .001$

Table 5. *Correlations between maternal borderline features and maternal temperament*

Maternal Temperament	Maternal Borderline Total	Maternal Affective Instability	Maternal Identity Disturbance	Maternal Self Harm/Impulsivity	Maternal Negative Relationships
Frustration	.66***	.67***	.65***	.50***	.55***
Fear	.73***	.71***	.64***	.58***	.68***
Sadness	.65***	.64***	.64***	.55***	.51***
Discomfort	.42***	.36**	.39***	.39***	.39***
Inhibitory Control	-.51***	-.41***	-.51***	-.52***	-.42***
Attentional Control	-.73***	-.71***	-.69***	-.64***	-.59***
Positive Affect	-.56***	-.57***	-.47***	-.51***	-.48***

** $p < .01$; *** $p \leq .001$

Table 6. *Correlations between maternal borderline features and child temperament*

Child Temperament	Maternal Borderline Total	Maternal Affective Instability	Maternal Identity Disturbance	Maternal Self Harm/Impulsivity	Maternal Negative Relationships
Anger/Frustration	.48***	.44***	.44***	.37**	.46***
Fear	.43***	.43***	.36**	.45***	.33**
Sadness	.43***	.46***	.40***	.31**	.37**
Discomfort	.25*	.20	.26*	.20	.25*
Inhibitory Control	-.41***	-.41***	-.32**	-.39***	-.38***
Attentional Focusing	-.44***	-.44***	-.39***	-.37**	-.38***
Smiling/Laughter	-.08	-.09	-.02	-.15	-.06

* $p < .05$; ** $p \leq .01$; *** $p \leq .001$

Vita

Christina Mena was born in Toronto, Canada and grew up in Wyomissing, Pennsylvania until she attended Pennsylvania State University for undergraduate studies. While completing her undergraduate studies, she was involved in several research laboratories including working with Dr. Pamela Cole and Dr. Kenneth Levy. She graduated with Bachelor of Science degrees in Psychology and Animal Bioscience in 2007. After graduating, she worked for three and a half years with a school age childcare program through a Fairfax County elementary school in Virginia. Christina began her graduate studies in the University of Tennessee's Clinical Psychology Ph.D. program in Fall of 2011, working under her advisor Dr. Jenny Macfie. Christina completed her Master of Arts degree in Psychology in 2013.