

The Effect of Maternal Borderline Personality Disorder and Child Temperament
on Mother-Child Synchrony

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Christina Gabriela Mena
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Abstract

Maternal borderline personality disorder (BPD) and difficult child temperament have individually been associated with reduced quality of mother-child interactions. The current study examined synchrony (a dyadic construct measuring quality of interaction) during a coded observational task in a sample of mothers with BPD and their young children ages 4-7 ($n = 36$) compared to normative comparisons ($n = 34$). These mothers' self-reported borderline features were also used to examine dyad synchrony across the sample as a whole. We also examined the association between child temperament and synchrony as well as the potential moderating effect child temperament has on the relationship between a BPD diagnosis or high borderline features and mother-child synchrony. Analyses were conducted both with original subscales of the Personality Assessment Inventory-Borderline Features (PAI-BOR) scale for maternal borderline features and the Child Behavior Questionnaire-Short Form (CBQ-SF) for child temperament as well as with subscales for these two measures factor analyzed with the current sample. Contrary to expectations, there were no group differences in synchrony. Using factor analyzed PAI-BOR subscales, maternal 'negative relationships' significantly negatively correlated with synchrony, and maternal total borderline features as well as 'affective instability' negatively correlated with synchrony with marginal significance. 'Impulsivity' and 'reckless spending' did not significantly correlate with synchrony. Similarly, when using original PAI-BOR subscales, maternal negative relationships, identity disturbance, and total borderline features significantly negatively correlated with synchrony, and affective instability marginally negatively correlated. Again, self-harm/impulsivity did not correlate with synchrony. Furthermore, child temperament was not correlated with synchrony when using factor analyzed CBQ-SF subscales. However, attentional focusing was positively correlated with synchrony when using original CBQ-SF subscales. Child temperament did not play a moderating role between maternal group status and synchrony using either set of subscales. Child temperament also did not play a moderating role between borderline features and synchrony when using original PAI-BOR and CBQ-SF subscales. However, when using factor analyzed PAI-BOR and CBQ-SF subscales, child temperament did act as a moderator such that mothers' negative relationships were negatively associated with synchrony at low but not high levels of child 'effortful control'. Clinical implications, limitations, and future directions are discussed.

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Chapter 1. Introduction

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). This disorder has a prevalence rate of 5.9% in a large community sample, and causes severe mental and physical disability, especially in women (Grant et al., 2008). Given this prevalence rate, there are likely many mothers whose functioning is affected by this disorder (Stepp, Whalen, Pilkonis, Hipwell, & Levine, 2012) and who may have difficulty having an effective relationship with their children (Newman & Stevenson, 2005). Therefore, mothers with BPD may have more difficulty having interactions with their children that are synchronous, or characterized by mutual responsiveness, reciprocity, harmony, engagement, focus, and shared affect than would normative comparisons. The study of synchrony is important as it is different from other similar constructs of maternal parenting behavior (e.g. sensitivity, affective communication, positive affect) that have previously been studied in mothers with BPD and their infants. It is a dyadic construct that reflects both mother and child contributions simultaneously rather than each separately. Thus, observing synchrony is not about capturing synchronous *behaviors*, but rather about capturing the reciprocal, co-constructed, dynamic nature of mother-child interactions (Harrist & Waugh, 2002).

A difficult child temperament has also been associated with less synchronous mother-child interactions (Feldman, 2003; Lindsey, Cromeens, & Caldera, 2010; Skuban, Shaw, Gardner, Supplee, & Nichols, 2006). Given that research suggests mothers with BPD struggle to maintain positive interactions with their infants due to their own emotional and relational deficits (reviewed below), child temperament may moderate the relationship between maternal BPD and mother-child synchrony such that mothers with BPD who also have temperamentally difficult

children will be even less likely to have synchronous interactions than mothers with BPD who have more adaptable children.

The current study aims to answer the following questions: Do mothers with BPD engage in less synchronous interactions with their young children than normative comparison mothers? Are maternal borderline features in the sample as a whole associated with less synchrony? Is child temperament related to mother-child synchrony? Does temperament moderate the relationship between maternal BPD or borderline features and mother-child synchrony?

Theoretical Framework

Due to the dyadic nature of synchrony it is important to consider both mother *and* child characteristics that influence mother-child interactions. Belsky's process model of the determinants of parenting proposes that parental (psychological resources of the parent and personality), child (temperament), and contextual factors (stress and support) work together to directly and indirectly influence individual differences in parental functioning (Belsky, 1984).

Based on Belsky's process model, maternal BPD is one parental factor that could influence the ability to interact with a child. BPD is theorized to develop from an interaction between inherited temperamental factors and an emotionally invalidating childhood environment (Linehan, 1993). Indeed, individuals with BPD have temperaments high in negative affectivity and low in effortful control (Mena, Macfie, & Strimpfel, in press; Posner et al., 2003; Siever & Davis, 1991). Their childhoods also often involve an invalidating environment, as individuals with BPD recall traumatic early caretaker experiences of abuse (Ogata et al., 1990). These temperamental vulnerabilities coupled with disruptions in their own early attachment relationships likely make it difficult for mothers with BPD to have an effective relationship with their children (Newman & Stevenson, 2005).

Belsky's model also proposes that child temperament works together with parental psychopathology to influence mother-child interactions (Belsky, 1984). Rothbart, a contemporary temperament theorist, states that temperament is constitutionally 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). Temperament is indeed the child characteristic that has been studied the most in regards to its influence on parental functioning, particularly temperament that makes parenting more or less challenging (Bates, 1980). For example, a child's temperament will evoke certain responses from their caregivers. If he/she is an adaptable child, it is easier for a parent to develop a positive reciprocal relationship with him/her. If in contrast, the child is difficult and emotionally reactive, a parent may similarly react with negativity and hostility towards him/her (Millon & Davis, 1995). This suggests that a child with a difficult temperament may hinder the mother-child dyad's capacity to engage in highly synchronous interactions, which may be especially true in cases with less accommodating mothers, such as those with psychopathology.

Review of Literature

Borderline Personality Disorder and Mother-Child Interactions

In addition to inherited vulnerable temperamental traits, offspring of mothers with BPD may experience parenting lacking in synchrony that increases their risk of developing BPD themselves. Indeed, recent longitudinal studies support the intergenerational transmission of BPD (Barnow et al., 2013; Reinelt et al., 2013; Stepp, Olino, Klein, Seeley, & Lewinsohn, 2013). There have been a few studies, reviewed below, that investigate the effects of BPD on parent-infant interactions. However, none have examined young children and none have

examined synchrony, or synchrony in the context of temperament, which the current study aims to address.

The existing literature has found disrupted parent-child interactions between mothers with BPD and their infants when examining constructs measuring individualized parent and child behaviors. In one study, it was found that mothers with BPD were intrusively insensitive, and their infants showed more looks away from their mother than normative comparisons (Crandell, Patrick, & Hobson, 2003). Similarly, there is evidence that mothers with BPD were less sensitive, and their infants less responsive and interactive with them than were normative comparisons (Newman, Stevenson, Bergman, & Boyce, 2007). Furthermore, mothers with BPD show more disrupted affective communication with their infants (Hobson et al., 2009) and less smiling, touching, and game playing than depressed mothers and healthy controls. Their infants also display reduced smiling during interactions with them compared to healthy controls (White, Flanagan, Martin, & Silvermann, 2011). Moreover, even mothers who endorse clinically relevant levels of borderline symptoms without meeting full diagnostic criteria for BPD responded to infant distress with less positive affect and were more insensitive as infant distress persisted than mothers who only endorsed minimal borderline symptoms, controlling for maternal depression (Kiel, Gratz, Moore, Latzman, & Tull, 2011).

The studies reviewed above provide evidence that mothers with BPD or borderline symptoms show less sensitivity, positive affect, engagement, and physical contact with their infants, and their infants showed less engagement, responsiveness, and positive affect with their mothers. However, it is important to note that these behaviors were measured separately for mothers with BPD and their infants and therefore do not capture the reciprocal mother-child interaction in ways the synchrony construct would.

Synchrony

Synchrony is one specific construct of parent-child interaction that may be negatively impacted by maternal BPD. A high-quality interaction of a synchronous dyad would be characterized by coordinated, balanced interactions in which both partners take turns offering and following the other's lead in responding to one another (Keown & Woodward, 2002). In other words, it goes beyond the adjustment of one partner to the other to include the dynamic adaptation of both members of the dyad.

Historically, the majority of empirical studies that examined synchrony have involved mother-infant dyads, and have examined their mutual attention and matching of activity level. Although the infant is able to contribute to the mother-child interaction, the caregiver is mostly assumed to carry the burden of maintaining synchronous interactions at this developmental stage. As children enter toddlerhood, they become more active partners during interactions with caregivers due to their increased mobility, cognitive/verbal capabilities, and autonomy. However, despite this increasing balance in participation, it is not until early childhood that children attain a level of communication skill and cognitive ability to allow them to contribute to the parent-child interaction as near-equals. For example, young children are better able to make bids for attention, decide whether to engage or withdraw during interactions, and influence the balance of turn-taking and mutual following of the other's lead (Harrist & Waugh, 2002).

The existing literature on mother-child synchrony investigating both normative and clinical samples most similar in age to our 4-7 year old sample provides evidence for synchrony predicting children's adjustment outcomes. In normative samples of preschool children, those who engaged in higher levels of synchrony in mother-child interactions were better liked by peers (Lindsey, Mize, & Pettit, 1997; Mize & Pettit, 1997) and viewed as more socially

competent by their teachers than those who were in less synchronous dyads (Harrist, Pettit, Dodge, & Bates, 1994). Synchrony is also related to lower levels of child aggression in early childhood (Ambrose & Menna, 2013; Harrist et al., 1994; Mize & Pettit, 1997; Pasiak & Menna, 2015). In clinical samples of preschoolers, synchrony was associated with better functioning in hyperactive/inattentive children (Healey, Gopin, Grossman, Campbell, & Halperin, 2010), and those who had less synchronous interactions with their mothers were 8 times more likely to be hyperactive than comparison children (Keown & Woodward, 2002). These studies in both normative and clinical samples provide evidence for the deleterious outcomes associated with less synchronous mother-child interactions as well as the association with positive outcomes for children who are part of a more synchronous dyad.

Synchrony in Mothers with Major Depressive Disorder

Given the evidence reviewed above, it is important to study the factors that influence the degree of synchrony in mother-child interactions, such as characteristics from both mother (psychopathology) and child (temperament). Although research on synchrony has largely been investigated in normative samples of mothers and children, several studies have examined this construct in mothers with major depressive disorder (MDD) and their children and found that higher maternal depressive symptoms are associated with less synchronous mother-child interactions (Albright & Tamis-LeMonda, 2002; Feldman, 2003; Field, Healy, Goldstein, & Guthertz, 1990; Lundy, 2002). Both mothers with MDD and mothers with BPD similarly display high negative affectivity, low maternal sensitivity, and intrusiveness during mother-child interactions (Cohn, Campbell, Matias, & Hopkins, 1990; Cohn, Matias, Tronick, Connell, & Lyons-Ruth, 1986; Crandell et al., 2003; Kiel et al., 2011; Murray, Fiori-Cowley, Hooper, & Cooper, 1996), which may contribute to synchrony. Given similar presentations between MDD

and BPD in interactions with their offspring, it is likely that mothers with BPD would also engage in less synchronous interactions with their young children, although this has not yet been examined.

It is important to examine synchrony in a BPD offspring sample because negative effects have been found above and beyond those of maternal depression in previous studies investigating the effect of maternal BPD on the quality of mother-child interactions, while controlling for maternal depression or utilizing a depressed comparison group (Hobson et al., 2009; Kiel et al., 2011; White et al., 2011; Zalewski et al., 2014). This suggests that maternal BPD has predictive abilities beyond those of maternal MDD alone on mother-child interactions. Moreover, whereas maternal depression may only be present for a portion of a child's life, by definition BPD is a more longstanding issue of personality that will impact a child more chronically than maternal depressive symptoms alone may.

Despite similarities and frequent comorbidity between MDD and BPD, mothers with BPD would likely have more difficulty having synchronous mother-child interactions than mothers with MDD alone. In addition to frequently being intense, hostile, inconsistent, and self-oriented in their relations with others (Hobson, Patrick, Crandell, García-Pérez, & Lee, 2005), both mothers with BPD (Posner et al., 2003; Siever & Davis, 1991) as well as their children (Mena et al., in press) have vulnerable temperaments high in negative affectivity and low in effortful control. These relational and emotional deficits, as well as temperamental vulnerabilities, would likely make it even more difficult for both mothers with BPD and their children to appropriately adjust their behavior in relation to the other in order to maintain synchrony.

Child Temperament and Mother-Child Interactions

There is substantial empirical evidence that child negative emotionality and difficult temperament, both similar in nature to negative affectivity, are associated with negative parenting behaviors (Braungart-Rieker, Garwood, & Stifter, 1997; Campbell, 1979; Clark, Kochanska, & Ready, 2000; Davidov & Grusec, 2006; Laukkanen, Ojansuu, Tolvanen, Alatupa, & Aunola, 2014; Lee & Bates, 1985; Milliones, 1978). There is also evidence of children with low effortful control eliciting negative maternal parenting behaviors (Bridgett et al., 2009; Brody & Ge, 2001; Lengua, 2006; Stepp et al., 2014), but little is known about child negative affectivity or effortful control's relationship with parent-child synchrony.

Within this limited literature, one study found that toddlers with a difficult temperament (more intense, less positive in mood, and less adaptable to daily routines) engaged in less synchronous interactions with their caregivers (Lindsey et al., 2010). Another study found that high-risk, low-income male toddlers displaying less negative emotionality, as measured by higher frustration tolerance, engaged in more synchronous mother-child interactions than those displaying lower frustration tolerance (Skuban et al., 2006). Furthermore, an inverse relationship was found between infant negative emotionality (similar to negative affectivity) and mother-daughter synchrony (Feldman, 2003). Lastly, although not measuring synchrony per se, angry infants were found to have fewer occasions of shared positive emotion with their mothers (Kochanska, Friesenborg, Lange, & Martel, 2004), relevant to the current study as shared affect is a component of synchrony.

Research reviewed above provides evidence for child temperament high in negative affectivity and low in effortful control contributing to increased negative parenting behaviors, and for a negative association between negative affectivity and synchronous mother-child

interactions. Although effortful control's association with synchrony has not specifically been investigated, given its relationship to parenting in general, we would expect effortful control to have a positive relationship with synchrony in the current study. There is also a gap in the literature investigating temperament's moderating role on the relationship between maternal BPD and mother-child synchrony. Given the emotional and relational deficits associated with BPD, child temperament high in negative affectivity and low in effortful control may make it even more difficult for a mother with BPD to interact synchronously with her child.

Current Study

The current study used both categorical (yes/no diagnosis) and continuous (self-reported borderline features) measures of BPD, to compare synchrony during mother-child interactions of mothers with BPD and their offspring aged 4-7 and normative comparisons. Additionally, this study examined the association between child temperament and synchrony and explored the possibility of a moderating role of child temperament in the relationship between maternal BPD or maternal BPD features and synchrony. Maternal major depressive disorder (MDD), which is the disorder most often co-morbid with BPD (Zanarini et al., 1998), was controlled for in the analysis of group differences.

It was hypothesized that: (1) mothers with BPD would have mother-child interactions that were less synchronous (characterized by less responsiveness, reciprocity, engagement, harmony, mutual focus, and shared affect) than those interactions of normative mothers and their children. In the sample as a whole it was hypothesized that: (2) maternal borderline features would significantly negatively correlate with mother-child synchrony; and that (3) child negative affectivity temperament variables would significantly negatively correlate with mother-child synchrony, and child effortful control temperament variables would significantly positively

correlate with mother-child synchrony. Additionally, we explored the possibility of the moderating role child temperament plays in the relationship between maternal BPD status or maternal BPD features and mother-child synchrony. Child temperament might moderate the relationship between maternal BPD status and mother-child synchrony such that mothers with BPD, who also have children with temperaments higher in negative affectivity or lower in effortful control, might be more likely to have less synchronous mother-child interactions. Child temperament might also moderate the relationship between maternal BPD features and mother-child synchrony such that mothers with higher levels of BPD features, who also have children with temperaments higher in negative affectivity or lower in effortful control, might be more likely to have less synchronous mother-child interactions.

Chapter 2. Method

Participants

The sample consisted of $N = 70$ children age 4-7 years ($M = 5$ years, 4 months, $SD = 10.8$ months) and their mothers: $n = 36$ children whose mothers had BPD, $n = 34$ children whose mothers did not have BPD. The low-socio-economic status sample was predominantly Caucasian (89%, $n = 62$), and 11% ($n = 8$) were of an ethnic minority background. Across racial background, 11% ($n = 8$) of children were of Hispanic ethnicity. Fifty percent were female.

Both clinical and comparison mothers were recruited from rural and urban areas in a 5-county region in the Southeastern United States. A clinical psychologist distributed brochures describing the study to therapists, physicians, and other healthcare professionals during presentations on treatment for BPD. These professionals then handed the brochures to female patients whom they thought met criteria for BPD and who had a child between ages 4-7. Research assistants recruited comparison mothers with brochures distributed at local Boys and Girls Clubs and preschools. They also recruited both clinical and comparison mothers from flyers posted throughout the community. We provided compensation to all participants: gift cards for mothers, small toys for children.

Procedures

Research assistants scheduled a home visit during which they 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 a demographic interview. After the home visit, research assistants contacted mothers to schedule a laboratory visit at the university.

During the laboratory visit, a clinical psychologist further assessed mothers for BPD and current major depressive disorder (MDD) with structured clinical interviews. Mothers also completed both a self-report questionnaire on their symptomatology and a parent-report questionnaire on their children's temperament. Mothers and children also participated in a 10-minute puzzle interaction task while being videotaped.

Measures

Demographics. A research assistant assessed demographic information with a maternal interview (Mount Hope Family Center, 1995).

Borderline personality disorder. The Structured Clinical Interview for DSM-IV Axis II Disorders (SCID-II, M. B. First, Gibbon, Spitzer, Williams, & Benjamin, 1997) 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 by a clinical psychologist using the SCID-II. High inter-rater reliability ($k = .91$) has been found for the diagnosis of BPD using the SCID-II (Lobbestael, 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, & Hyler, 1988).

Maternal borderline features. The Personality Assessment Inventory (PAI, Morey, 1991) 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). We used the 24-item PAI-BOR scale in this study as a continuous measure of borderline features for all mothers. It includes a total borderline feature score (BOR) and subscales of affective instability, identity disturbance, negative relationships, and self-harm/impulsivity. See Appendix

C for subscale items in original PAI-BOR scale. Mothers endorsed results using a Likert scale of false, slightly true, mainly true, or very true. There is support for convergent validity between the PAI-BOR scale and structured interviews for BPD (Kurtz & Morey, 2001; Stein, Pinsker-Aspen, & Hilsenroth, 2007). In the current sample, mothers' BPD diagnosis was significantly correlated with total BOR, $r = .83, p < .000$, 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-BOR 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 the total of all four subscales. Additionally, a factor analysis of the PAI-BOR subscales was conducted in the current study in order to determine whether our sample answered questionnaire items in the way we would expect given original subscales. After factor analysis there were four subscales of the PAI-BOR (BOR-1 comprised mainly of original *affective instability* items; BOR-2 mainly comprised of the original *negative relationships* items; BOR-3 comprised of some of the original *self-harm/impulsivity* items; BOR-4 composed of the original self harm/impulsivity subscale's questions regarding spending habits; and a total borderline features composite). See Appendix D for item inclusion per factor analyzed subscale. After factor analysis of the PAI-BOR scale, Cronbach's alphas were $\alpha = .94$ for BOR-1; $\alpha = .89$ for BOR-2; $\alpha = .84$ for BOR-3; $\alpha = .77$ for BOR-4; and $\alpha = .95$ for the total of all four subscales.

Major depressive disorder. The Structured Clinical Interview for Axis I Disorders (Michael B. First, Gibbon, Spitzer, & Williams, 1996) was also administered by a clinical psychologist to assess maternal current MDD as a control variable. Inter-rater reliability for the diagnosis of major depressive disorder has been found to range from $k = .66$ (Lobbestael et al.,

2011) to $k = .80$ (Zanarini et al., 2000). Studies have also demonstrated superior validity of the SCID over standard clinical interviews (Fennig, Craig, Lavelle, Kovasznay, & Bromet, 1994; Kranzler, Kadden, Babor, & Tennen, 1996). In the current sample, there were four children's mothers diagnosed with current major depressive disorder (5.71%), all of whom were also diagnosed with BPD.

Mother-child interaction. Mothers and their children were videotaped from behind a one-way mirror during a 10-minute puzzle-solving task. Although the current study originally intended to code a 10-minute storytelling task, it was discovered through review of tape during coder training that the puzzle task elicited more dyadic interaction than did the more one-sided storytelling task. This provided an opportunity to code a more balanced range of synchrony scores. The puzzles were administered one at a time as completed, advancing in difficulty level. Before leaving the room, the examiner provided the dyad with a puzzle and the instructions, "This puzzle is for your child to complete, but feel free to give any help you think your child might need". These instructions were reiterated after each puzzle change.

Synchrony. The interactional synchrony scale utilized to code videotapes of the puzzle-solving mother-child interaction task was adapted by Keown and Woodward (2002) from a coding scheme by Mize and Pettit (1997). The adaptation has had a moderate level of inter-rater reliability with a kappa value of .66, and was used in a sample of children 4-5 years old (Keown & Woodward, 2002). Using this synchrony scale, scores were coded from 0-5, with higher scores reflecting interactions distinguished by mutual engagement, mutual responsiveness, a balance in offering and following leads, and shared affect. Conversely, lower scores reflect interactions that are asynchronous and disjointed. After familiarizing themselves with the coding manual's detailed descriptions and examples, the first and second coders (doctoral graduate student and

undergraduate research assistant, respectively) met once a week to review and discuss “gold standard tapes” of low, medium, and high level mother-child synchrony. In order to achieve inter-rater reliability, the first coder randomly selected 20% of the interaction tasks to be coded by both coders, once training was completed. Any discrepancies between coders were resolved by discussion and video-review. An intraclass correlation coefficient, $ICC = .91$, was calculated for inter-rater reliability. Once reliability was achieved, the remainder of the videotapes were independently coded by the first coder (doctoral-level graduate student). Scores from 0-5 were coded for every 30-second interval of the 10-minute puzzle-solving task. Then all of the 30-second interval scores were averaged to create a total synchrony score for each mother-child dyad.

Child temperament. The CBQ short form (CBQ, Putnam & Rothbart, 2006) is a 94-item parent-report measure of temperament in children aged 3-7 in which items are endorsed using a seven-point Likert scale ranging from 1 to 7. Rothbart’s scale was chosen to measure child temperament in the current study as it focuses 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 (F. Putnam, personal communication, October 6, 2010). In alignment with Linehan and colleagues expanded biosocial theory that includes trait impulsivity (low effortful control) and negative affectivity as vulnerability factors in the development of BPD (Crowell, Beauchaine, & Linehan, 2009), we assessed these two broad dimensions of temperament utilizing the CBQ. These two dimensions are also the most relevant in the literature for children’s socio-emotional outcomes and the development of other psychopathology (Kiff, Lengua, & Zalewski, 2011).

Negative affectivity will be measured using individual subscales of *anger/frustration* and *fear*, and effortful control will be measured using individual subscales of *inhibitory control* and *attentional focusing*. As with the PAI-BOR scale, analyses will also be conducted using subscales of the CBQ factor analyzed in the current sample (*anger/frustration*, *fear*, and *effortful control*). For negative affectivity, *anger/frustration* is related to interruption of tasks or blocking of goals, and *fear* refers to unease, worry, or nervousness related to anticipated pain, distress, and threatening situations. For effortful control, *attentional focusing* is the ability to maintain focus on tasks and shift attention as needed, and *inhibitory control* is the ability to plan and suppress inappropriate approach responses under instruction or in new situations (Rothbart, 2007).

Moderate correlations have been found between laboratory observations of children's temperament and caregiver responses on the CBQ (Kochanska, Murray, Jacques, Koenig, & Vandegeest, 1996; Majdandžić & van den Boom, 2007; Majdandžić, van den Boom, & Heesbeen, 2008). The CBQ short form demonstrated satisfactory internal consistency and criterion validity and exhibited longitudinal stability and cross-informant agreement comparable to the standard CBQ. Cronbach's alphas from the development of the original short form subscales ranged from $\alpha = .68$ to $.85$ for all 15 scales (Putnam & Rothbart, 2006). Cronbach's alphas in the current sample were as follows: *anger/frustration*, $\alpha = .84$; *fear*, $\alpha = .71$; *inhibitory control*, $\alpha = .77$; and *attentional focusing*, $\alpha = .67$. After factor analysis of the CBQ in the current sample, Cronbach's alphas were $\alpha = .84$ for the same original *anger/frustration* subscale; $\alpha = .78$ for a subscale mainly comprised of the original *fear* subscale items; and $\alpha = .84$ for a subscale combining most of the items from both the original *inhibitory control* and *attentional focusing* subscales into one *effortful control* subscale. See Appendices E and F for original CBQ and factor analyzed CBQ items per subscale, respectively.

There were some missing data in the CBQ in our sample (0.75%). The overall item mean among those children with the same gender and who had mothers in the same clinical group (BPD or comparison) as the individual with missing data was substituted in for missing items. Individual items for each subscale were summed, and a mean rating score was computed for the child's behavior on each subscale.

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. However, maternal education did not significantly correlate with the dependent variable (mother-child synchrony), and was therefore not 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), current maternal MDD *was* controlled for in the analysis of group differences. See Table 1 for descriptive statistics.

Power Analysis: Using standardized Cohen's d effect sizes, a power analysis was conducted to determine the sample size required to detect small, medium, and large effects across this study's different analyses, assuming a power of .80 and $\alpha = .05$. Cohen's effect sizes of .1, .25, and .4 were used to represent small, medium, and large effect sizes, respectively for the ANCOVA. Cohen's effect sizes of .1, .3, and .5 were used for bivariate correlations, and .02, .15, and .35 for hierarchical multiple regressions. Given our sample size ($N = 70$), we only had enough power to detect large effect sizes for ANCOVA, bivariate correlation, and hierarchical multiple regression analyses with borderline features, and both medium and large effect sizes for hierarchical multiple regression analyses with BPD status. See Table 2 for sample sizes.

Factor Analysis: In order to best determine whether our sample answered questionnaire items in the way we would expect given previously validated factor structures of subscales (Morey, 1991; Putnam & Rothbart, 2006), factor analyses of both the Personality Assessment Inventory-Borderline Features scale (PAI-BOR) and the Child Behavior Questionnaire-Short

Form (CBQ-SF) were conducted prior to hypothesis testing. A principal components exploratory factor analysis, utilizing a promax rotation as in a previous PAI-BOR factor analysis study (Jackson & Trull, 2001), revealed four factors for the PAI-BOR scale. Determining the number of factors to extract involved taking both eigenvalues above 1.0 and the scree plot into consideration. The PAI-BOR scale had five eigenvalues above 1.0 (BOR 1 = 12.21; BOR 2 = 1.83; BOR 3 = 1.33; BOR 4 = 1.18; BOR 5 = 1.09). The scree plot visually suggested a one-factor solution. Indeed, PAI-BOR original subscales are highly correlated with each other. See Table 3 for correlations between individual subscales. However, individual subscale items more clearly loaded where they were originally intended to by using a four factor model, though the breakdown was somewhat different than the four original subscales. This was also in contrast to the six factor model found in one previous PAI-BOR factor analysis study (Jackson & Trull, 2001), however very similar to the breakdown found in another study's four factor model (Gardner & Qualter, 2009).

BOR 1 is comprised mainly of items from the original PAI-BOR Affective Instability Scale, with the addition of three items from other subscales (Identity Disturbance subscale items: "My attitude about myself changes a lot", "I often wonder what I should do with my life" and Negative Relationship: "Once someone is my friend, we stay friends"). BOR 2 is comprised mainly of items from the original PAI-BOR Negative Relationships Scale, with the removal of 1 item ("Once someone is my friend, we stay friends"), and the addition of two items from the Identity Disturbance subscale ("I worry a lot about other people leaving me" and "I can't handle separation from those close to me very well"). The addition of these two items is likely due to the fact that the wording of the items does indeed address relationships with others. BOR 3 is comprised of three of the six original items from the Self-Harm/Impulsivity subscale, and BOR 4

is comprised of another two items from this original subscale that both address spending habits specifically. In both previous factor analysis studies of the PAI-BOR, questions related to reckless spending loaded onto their own factor (Gardner & Qualter, 2009; Jackson & Trull, 2001). Of the original Self-Harm/Impulsivity subscale items, one was removed (“When I’m upset, I typically do something to hurt myself”). The low factor loadings on this item were likely due to the fact that it is the only question in the Self-Harm/Impulsivity subscale that directly addresses self-harm. Although there were cross loadings above .3 on some items retained in the factor analyzed subscales, removing these items did not improve the overall model. See Table 4 for coefficients from the four-factor rotated pattern matrix. Also see Appendices C and D for original PAI-BOR and factor analyzed PAI-BOR items per subscale, respectively.

A principal components exploratory factor analysis, utilizing a direct oblimin rotation, revealed three factors for the Child Behavior Questionnaire-Short Form. Although previous factor analyses of CBQ short and very short forms used a different extraction method, they each used an oblimin rotation (de la Osa, Granero, Penelo, Domènech, & Ezpeleta, 2014; Putnam & Rothbart, 2006; Sleddens, Kremers, Candel, De Vries, & Thijs, 2011). The CBQ-SF had seven eigenvalues above 1.0 (CBQ 1 = 6.99; CBQ 2 = 2.51; CBQ 3 = 2.29; CBQ 4 = 1.56; CBQ 5 = 1.34; CBQ 6 = 1.22 ; CBQ 7 = 1.04). The scree plot visually suggested a three-factor solution. The individual subscale items more clearly loaded where they were originally intended to when using a three factor model as the scree plot suggested. The first factor is comprised of all the original six items in the anger/frustration subscale. The second factor is comprised of five of the original six items in the fear subscale, with the removal of “Is afraid of fire” due to loading most highly on an incorrect factor as well as having cross loadings. Two items total were removed from the original inhibitory control subscale, “Can wait before entering into new activities if s/he

is asked to” and the attentional focusing subscale, “When building or putting something together, becomes very involved in what she/he is doing and works for long periods”, due to high cross loadings and no factor load above .4, respectively. Once these two items were removed, all other items from both subscales loaded on a single factor which became a new effortful control composite. See Table 5 for coefficients from the three-factor rotated pattern matrix. Also see Appendices E and F for original CBQ and factor analyzed CBQ items per subscale, respectively.

Hypothesis Testing

Hypothesis (1): To test Hypothesis 1, an ANCOVA was used to examine mean level differences in mother-child synchrony (dependent variable) as a function of maternal group membership: BPD group versus normative group (independent variable), controlling for current maternal MDD. In contrast to Hypothesis 1, there was no significant difference between the mean levels of mother-child synchrony in the BPD group ($M = 2.37$, $SD = .46$) and the normative comparison group ($M = 2.57$, $SD = .59$), $F(1, 67) = 2.22$, $p = .14$. The significance of the covariate itself, current MDD, in this analysis was $F(1, 67) = .001$, $p = .97$. Without controlling for current maternal depression, there still remained no significant group differences in mean levels of synchrony, $F(1, 68) = 2.41$, $p = .13$, with mean levels remaining the same. See Table 6 for means, standard deviations, and significance values of synchrony as well as all other key variables.

Hypothesis (2): To test Hypothesis 2, a two-tailed Pearson bivariate correlation analysis was conducted to examine correlations between mothers' borderline features (independent variable) and mother-child synchrony (dependent variable) across the sample as a whole. Using PAI subscales factor analyzed with the current sample (BOR-1, Affective Instability; BOR-2, Negative Relationships; BOR-3, Self-Harm/Impulsivity; and BOR-4, Reckless Spending), as well

as a composite of total borderline features comprised of all four subscales, there was only partial support for Hypothesis 2. BOR-2 (negative relationships) significantly negatively correlated with mother-child synchrony, and BOR 1 (affective instability) and total borderline features were marginally significantly correlated with mother-child synchrony. However, BOR 3 and BOR 4, both related to the original PAI Self-Harm/Impulsivity subscale, were not significantly correlated to mother-child synchrony. See Table 7 for correlation coefficients and significance values.

In comparison, using the PAI's original maternal borderline feature subscales (affective instability, identity disturbance, negative relationships, and self-harm/impulsivity), as well as a composite of total borderline features comprised of the four PAI-BOR subscales, there was again only partial support for Hypothesis 2. Identity disturbance, negative relationships, and total borderline features significantly negatively correlated with mother child synchrony. Additionally, affective instability negatively correlated with mother-child synchrony with marginal significance. Lastly, self-harm/impulsivity again did not significantly negatively correlate with mother-child synchrony. See Table 8 for correlation coefficients and significance values.

Hypothesis (3): A two-tailed Pearson bivariate correlation analysis was conducted to determine correlations between child temperament (independent variable) and mother-child synchrony (dependent variable). Using factor analyzed Child Behavior Questionnaire (CBQ) subscales of anger/frustration, fear, and effortful control, there were no significant correlations between any child temperament variables and mother-child synchrony. See Table 9 for correlation coefficients and significance values.

Similarly, using the CBQ's original subscales (negative affectivity: anger/frustration and fear; effortful control: inhibitory control and attentional focusing), children's anger/frustration

and fear did not significantly negatively correlate with mother-child synchrony. Additionally, there was no significant positive correlation between children's inhibitory control and mother-child synchrony. In partial support of Hypothesis 3, however, children's attentional focusing was significantly positively correlated with mother-child synchrony. See Table 10 for correlation coefficients and significance values.

Exploratory Moderation Testing

Exploratory Moderation (1): Hierarchical multiple regression analyses were conducted to examine the possibility of child temperament moderating the relationship between maternal group status and mother-child synchrony. Prior to regression analyses, child temperament variables were centered to reduce collinearity between the interaction term and first order predictors. The interaction term was created by calculating the product of the uncentered BPD group status and centered child temperament variables. Main effects for BPD group status and child temperament were entered into the first step of the model, and the interaction term between BPD group status and child temperament was entered in the second step. There was one regression analysis with BPD group status entered as the predictor variable, child temperament entered as the moderator, and mother-child synchrony entered as the dependent variable, for each of the individual child temperament variables.

Although we had planned to control for current maternal MDD, initial regression analyses indicated that it did not significantly contribute to the model, $\beta = -.05$, $t(68) = -.40$, $p = .69$, and it was therefore not controlled for in reported analyses. None of the interactions between maternal group membership and child temperament were significant whether utilizing factor analyzed child temperament variables or the original CBQ subscales. See Tables 11-13 for

hierarchical regression analyses and significance values regarding main effects and interaction effects.

Exploratory Moderation 2: Hierarchical multiple regression analyses were conducted to explore the possibility that child temperament would moderate the relationship between maternal borderline features (predictor variable) and mother-child synchrony (dependent variable). Prior to regression analyses, maternal borderline features and child temperament variables were centered to reduce collinearity between the interaction term and first order predictors. The interaction term was created by calculating the product of the centered maternal borderline features and child temperament variables. Main effects for maternal borderline features and child temperament were entered in the first step of the model, and the interaction terms between maternal borderline features and child temperament were entered in the second step. Running numerous individual hierarchical regression analyses to account for all combinations of borderline features and child temperament variables would introduce a potential increase in Type I error. To reduce this possibility, all maternal borderline feature subscales were entered simultaneously into the first step of the regression model along with one individual child temperament variable. There were three regression analyses conducted in this manner when testing with factor analyzed subscales (one for each of three child temperament variables) and four regressions when testing with original measure subscales. As total borderline features (BOR-TOT) is a composite that would overlap with other borderline subscales in the model, it was tested separately, with BOR-TOT entered into the first step of the model along with one individual child temperament variable per regression.

Again, initial regression analyses indicated current maternal MDD did not significantly contribute to the model, therefore it was not controlled for in reported analyses. There were no

significant interactions between maternal borderline features and child temperament variables when using original PAI-BOR and CBQ subscales, however there was one significant interaction when using factor analyzed subscales. The significant interaction between maternal ‘negative relationships’ (BOR-2) and child ‘effortful control’, $\beta = .36$, $t(60) = 2.25$, $p < .05$, indicates that the association between mother-child synchrony and maternal ‘negative relationships’ varies across levels of child ‘effortful control’. The interaction was decomposed by testing the simple slope of maternal ‘negative relationships’ for high and low levels of ‘effortful control’ (1 standard deviation above and below the mean level of ‘effortful control’). Synchrony and maternal ‘negative relationships’ were significantly and negatively associated at low levels of child ‘effortful control’, $\beta = -.55$, $t(66) = -2.92$, $p < .01$, and unrelated for high levels of effortful control, $\beta = -.11$, $t(66) = -.63$, $p > .10$. See Figure 1 for simple slope analysis interaction. Also see Tables 14-23 for hierarchical regression analyses and significance values regarding main effects and interaction effects.

Chapter 4. Discussion

The current study assessed mother-child synchrony in mothers with BPD and their children age 4-7 as compared to normative comparison dyads using a categorical measure of BPD. Contrary to our hypothesis, there were no group differences in mother-child synchrony between the maternal BPD group and the normative comparison group. Characteristics of the coding system used may have made it difficult to identify group differences. Although the dyad as the “unit of analysis” allows for a better understanding of the quality of the parent-child relationship (Thompson & Walker, 1982) as opposed to the assessment of individual parent and child behaviors, it may be that the use of a global rating scale did not fully capture subtle variations in mother-child interactions. For example, as the manual is written, an average score of 3 (on a 0-5 scale) was assigned to both dyads that minimally responded to each other for half the interval as well as those that engaged in conversation with joint attention, shared affect, eye contact, and peer-like behavior with one miscue. Despite observing noticeable variation between different dyads’ interactions while coding video, ultimately they were mostly coded as average (3) due to the large range of included presentations per the manual.

In addition, both mothers in the BPD group and normative comparison group were matched on low-SES. Perhaps this contextual factor is partially responsible for similar levels of mother-child synchrony between groups. For example, low-SES mothers have been found to be less sensitive and more hostile (Ziv, Aviezer, Gini, Sagi, & Koren-Karie, 2000) as well as less responsive and more interfering and overdirective during interactions with their children (Crittenden & Bonvillian, 1984), which are related to synchrony. There may thus have been limited variance in synchrony in the sample as a whole because of a ceiling effect due to low-

SES. Lastly, given our sample size ($N = 70$), we did not have enough power to detect small or medium sized effects, which may have obscured group differences.

Additionally, the study assessed the relationship between maternal borderline features and synchrony in the sample as a whole using a continuous measure of BPD. Mothers' 'negative relationships' were significantly negatively associated with mother-child synchrony and mothers' total borderline features and 'affective instability' were marginally negatively associated with mother-child synchrony, when examining PAI subscales factor analyzed with the current sample. Similarly, using original PAI subscales, mothers' 'identity disturbance, 'negative relationships' and total borderline features were significantly negatively associated with mother-child synchrony, and their 'affective instability' was marginally negatively associated. Using PAI subscales factor analyzed with the current sample, mothers' 'self-harm/impulsivity' and 'reckless spending' were not related to mother-child synchrony. Similarly, using original PAI subscales, mothers' self-harm/impulsivity was not related to mother-child synchrony.

Across both sets of analyses, a mother's negative relationships were significantly negatively associated with synchrony. Bowlby's attachment theory posits that a child's attachment with their primary caregiver leads to the development of internal working models. These models are mental representations of the world, the self, and others, and influence an individual's expectations for future interactions and relationships (Bowlby, 1988). In a study examining the mothers of our laboratory's adolescent sample, mothers' self-reported parental attachment quality was negatively associated with their 'negative relationships' (Grassetti, 2011). This means that a mother who experienced low parental attachment quality as a child, likely formed a negative internal working model of relationships, which extends to conflicted interactions with others in adulthood, including their own children. By the age of 5 most children

have formed their own working models of themselves and their mothers which have similarly been influenced by previous interactions with their caregiver (Light, 1979). This complex interchange between a mother and her child can therefore manifest as reduced dyad synchrony if both mother and child's internal working models of relationships have been compromised.

The current study also assessed the relationship between child temperament variables and synchrony. Contrary to our hypothesis, no child temperament variable correlated with synchrony when examining CBQ subscales factor analyzed with the current sample. However, when using original CBQ subscales, the current study found that children's attentional focusing was associated with mother-child synchrony. This is an interesting finding as coded aspects of synchrony include a dyad's joint focus and mutual task engagement. Perhaps, in the current study, a child was better able to maintain mother-child synchrony when reported to have high attentional focusing because the difficult problem-solving puzzle interaction task required focus. It may also be that a history of synchronous interactions with their mother involving joint attention allowed for the child to learn how to focus their attention (Pêcheux, Findji, & Ruel, 1992). In regards to no significant correlations between negative affectivity and synchrony across both sets of analyses, it may be that the puzzle task is enjoyable/entertaining enough that a child's low frustration tolerance is not exhausted within a short 10-minute interaction, and that their fearful temperament is not activated in a safe environment with their parent. These findings may have been different for observations of mother-child interactions in more naturalistic settings.

Lastly, the current study explored the possibility of child temperament moderating the relationship between maternal group status or borderline features and mother-child synchrony. When using either subscales factor analyzed with the current sample or original CBQ subscales,

child temperament did not moderate the relationship between maternal group status and synchrony. Similarly, when using original PAI subscales, there were no significant interactions between borderline features and child temperament. However, when using factor analyzed subscales of maternal borderline features, there were main effects of total borderline features and ‘negative relationships’ being negatively associated with synchrony, as well as one significant interaction between maternal ‘negative relationships’ and child ‘effortful control’. This interaction was such that mothers reporting negative relationships had increased difficulty sustaining synchronous mother-child interactions when their children had low versus high effortful control. This is an important finding as it suggests that children with temperaments low in effortful control may be at particular risk for disrupted mother-child interactions in the context of maternal relational deficits. This is of interest as children whose temperamental traits are 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 et al., 2011).

Although in current findings there was only one interaction between child temperament and a maternal BPD feature, a recent study similarly investigating the moderating effect child temperament has on the relationship between maternal BPD symptoms and parenting came across similar results (Zalewski et al., 2014). The authors found that although there were main effects between maternal BPD symptoms and parenting as well as adolescent temperament (negative emotionality and self-control) and parenting, the relationship between maternal BPD symptoms and parenting was unexpectedly not moderated by adolescent temperament. The authors discussed limitations to their study that included not using a maternal diagnosis of BPD, using questionnaires to measure parenting rather than observational measures, and only

examining mother-daughter interactions. They also suggested examining earlier developmental periods during which interactions may be more child-driven or reciprocal than adolescence (Zalewski et al., 2014).

However, despite the current study addressing these possible concerns, only one interaction was found between maternal negative relationships and child effortful control. As previously discussed, it may be that although the puzzle task elicited a display of the child's effortful control capabilities (staying focused on and persisting through the task), it did not activate a child's negative affectivity. It may therefore be that the association between mothers' 'negative relationships' and synchrony is moderated by both child negative affectivity and effortful control, but only in situations that elicit those temperamental characteristics.

Clinical Implications

Although several studies have noted positive attributes for children who were part of more synchronous parent-child dyads during early childhood (Ambrose & Menna, 2013; Harrist et al., 1994; Healey et al., 2010; Lindsey et al., 1997; Mize & Pettit, 1997; Pasiak & Menna, 2015), there have been studies to show that this construct is also associated with positive child outcomes during infancy (Isabella & Belsky, 1991), toddlerhood (Kochanska & Murray, 2000; Lindsey et al., 2010; Lindsey, Cromeens, Colwell, & Caldera, 2009; Rocissano, Slade, & Lynch, 1987), middle childhood (Criss, Shaw, & Ingoldsby, 2003) and adolescence (Lindsey, Colwell, Frabutt, Chambers, & MacKinnon-Lewis, 2008). These studies suggest the importance of having synchronous parent-child interactions throughout a child's development. Given that the current study found that mothers' borderline features are negatively associated with synchrony, improving the quality of interactions (synchrony) may deter some of the negative child outcomes associated with reduced synchrony.

Dialectical Behavioral Therapy (DBT) was originally created to treat women who meet criteria for BPD, and involves skills training to learn how to cope with emotion dysregulation and increase interpersonal effectiveness (Linehan, 1993). Learning these DBT skills may also help mothers with high borderline features reduce overall borderline features as well as affective instability and negative relationships so that they may interact more effectively with their children. Indeed, one study found that individual's with high borderline features, but not necessarily a BPD diagnosis, benefited from the utilization of learned DBT skills. Use of these skills significantly reduced individuals' scores on the PAI-BOR scale for overall borderline features as well as several subscales, including affective instability and negative relationships (Stepp, Epler, Jahng, & Trull, 2008).

Strength of Study

A strength of the current study included using a continuous self-report measure of borderline features, in addition to a categorical diagnosis of BPD, in order to examine synchrony across the sample as a whole. Though categorical diagnoses are useful in clinical practice, using a continuous measure was informative of the differences in synchrony that were present in mothers with sub-threshold BPD and their children. Assessing symptoms across the whole sample allowed for increased statistical power to detect effects in analyses.

Limitations

Although the current study's sample size is relatively large compared to previous studies of mothers with BPD and their children, the small sample size still reduces the power to detect effects. This may explain the ability to detect significant findings between some maternal borderline features and synchrony across the whole sample, while detecting no significant findings across groups. The cross sectional design of the study also does not allow us to draw

conclusions about direction of causality. Furthermore, where significant results were found, it may have been due to shared method variance with mothers reporting both on their own borderline features as well as their children's temperament. However, in a previous study using the same sample, maternal psychopathology likely did not influence mothers' ratings of their own children's temperament as there was concordance found between both maternal and teacher reports of child characteristics as well as maternal reports and children's narrative representations (Mena et al., in press).

Additionally, the manual for the interactional synchrony coding scheme utilized provided detailed descriptions and examples related to a play task, whereas the current study examined synchrony during a more structured puzzle-task. Although the problem-solving aspect of the puzzle-task promoted ongoing mother-child interaction, it did not seem to carry the same lightheartedness that a play interaction would. Therefore, the puzzle-task was likely not as conducive to higher synchrony behaviors such as shared affect, eye contact, physical closeness, and peer-like behavior. This in turn likely limited the range of observed synchrony. Furthermore, directions for the puzzle task were biased towards a child-directed interaction as mothers were instructed that the puzzle was for their child to complete but that they could feel free to help their child as they saw necessary. While many dyads still worked on the puzzle jointly, some mothers were less interactive as they were conscientious of the instructions and wanted to allow the child to complete the puzzles themselves. These dyads in turn did not receive high synchrony scores as their interaction was not as reciprocal or balanced in leading and following, suggesting that the study's instructions may have influenced observed synchrony.

Future Directions

More research needs to be conducted to better understand how maternal BPD or high borderline features and child temperament contribute to dyad synchrony. As the current study encountered limitations in observing a more structured puzzle-solving task, future studies could examine mother-child synchrony during an unstructured play setting as the coding manual intended. This would serve to both increase the lightheartedness of the interaction to elicit more shared affect, eye contact, and peer-like behavior as well elicit interactions that are more equally balanced than a child-directed puzzle task. Observations coded in more naturalistic home settings could also account for a diversity of interactions that may activate a child's temperament more than in a laboratory setting. This may allow for better detection of child temperament's relation to synchrony as well as its potentially moderating role between maternal BPD or high borderline features and synchrony.

Additionally, as the number of increasingly difficult puzzles administered varied between dyads, it would be interesting to control for this by administering each puzzle for a set period of time. This would eliminate the potential for increasing puzzle difficulty creating increased dyad frustration and overall reduced synchrony in certain dyads over others. Furthermore, in addition to inclusion of mother and child characteristics, future research may also want to consider including contextual factors in their study (e.g. low-SES, parenting stress, support, cultural factors), as these may confound the effects of maternal BPD or high borderline features on mother-child synchrony. As Belsky suggests, it may be maternal and child characteristics as well as contextual factors working together to best account for differences in parental functioning (Belsky, 1984). Lastly, future studies could use a dyadic synchrony coding scheme that does not rely on global ratings to perhaps better capture subtle variations in mother-child interactions.

Conclusion

In the current study, negative correlations between mothers' borderline features and mother-child synchrony, as well as reduced synchrony when mother's 'negative relationships' interacted with a child's low effortful control, suggest the potential for targeting the quality of mother-child interactions in this population. Although a child's temperamental vulnerabilities are largely expected to remain stable, treatment that reduces a mother's high borderline features may help improve her interactions with her children. Future research should continue to expand the limited literature on mothers with BPD and their children in order to better understand the developmental precursors to the disorder.

References

- Albright, M. B., & Tamis-LeMonda, C. S. (2002). Maternal depressive symptoms in relation to dimensions of parenting in low-income mothers. *Applied Developmental Science*, 6(1), 24-34. doi:http://dx.doi.org/10.1207/S1532480XADS0601_03
- Ambrose, H. N., & Menna, R. (2013). Physical and relational aggression in young children: The role of mother-child interactional synchrony. *Early Child Development and Care*, 183(2), 207-222. doi:<http://dx.doi.org/10.1080/03004430.2012.669756>
- Association, A. P. (2013). *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.
- Barnow, S., Aldinger, M., Arens, E. A., Ulrich, I., Spitzer, C., Grabe, H.-J., & Stopsack, M. (2013). Maternal transmission of borderline personality disorder symptoms in the community-based Greifswald Family Study. *Journal of Personality Disorders*, 27(6), 806-819. doi:http://dx.doi.org/10.1521/pedi_2012_26_058
- Bates, J. E. (1980). The concept of difficult temperament. *Merrill-Palmer Quarterly*, 26(4), 299-319.
- Belsky, J. (1984). The determinants of parenting: A process model. *Child Development*, 55(1), 83-96. doi:<http://dx.doi.org/10.2307/1129836>
- Bowlby, J. (1988). *A secure base: Parent-child attachment and healthy human development*: Basic Books, New York, NY.
- Braungart-Rieker, J., Garwood, M. M., & Stifter, C. A. (1997). Compliance and noncompliance: The roles of maternal control and child temperament. *Journal of Applied Developmental Psychology*, 18(3), 411-428. doi:[http://dx.doi.org/10.1016/S0193-3973\(97\)80008-1](http://dx.doi.org/10.1016/S0193-3973(97)80008-1)
- Bridgett, D. J., Gartstein, M. A., Putnam, S. P., McKay, T., Iddins, E., Robertson, C., . . . Rittmueller, A. (2009). Maternal and contextual influences and the effect of temperament

- development during infancy on parenting in toddlerhood. *Infant Behavior & Development*, 32(1), 103-116. doi:<http://dx.doi.org/10.1016/j.infbeh.2008.10.007>
- Brody, G. H., & Ge, X. (2001). Linking parenting processes and self-regulation to psychological functioning and alcohol use during early adolescence. *Journal of Family Psychology*, 15(1), 82-94. doi:<http://dx.doi.org/10.1037/0893-3200.15.1.82>
- Campbell, S. B. (1979). Mother–infant interaction as a function of maternal ratings of temperament. *Child Psychiatry and Human Development*, 10(2), 67-76. doi:<http://dx.doi.org/10.1007/BF01433498>
- Clark, L. A., Kochanska, G., & Ready, R. (2000). Mothers' personality and its interaction with child temperament as predictors of parenting behavior. *Journal of Personality and Social Psychology*, 79(2), 274-285. doi:<http://dx.doi.org/10.1037/0022-3514.79.2.274>
- Cohn, J. F., Campbell, S. B., Matias, R., & Hopkins, J. (1990). Face-to-face interactions of postpartum depressed and nondepressed mother-infant pairs at 2 months. *Developmental Psychology*, 26(1), 15-23. doi:<http://dx.doi.org/10.1037/0012-1649.26.1.15>
- Cohn, J. F., Matias, R., Tronick, E. Z., Connell, D., & Lyons-Ruth, K. (1986). Face-to-face interactions of depressed mothers and their infants. *New Directions for Child Development*, 34, 31-45. doi:<http://dx.doi.org/10.1002/cd.23219863405>
- Crandell, L. E., Patrick, M. P. H., & Hobson, R. P. (2003). 'Still-face' interactions between mothers with borderline personality disorder and their 2-month-old infants. *The British Journal of Psychiatry*, 183(3), 239-247. doi:<http://dx.doi.org/10.1192/bjp.183.3.239>
- Criss, M. M., Shaw, D. S., & Ingoldsby, E. M. (2003). Mother-son positive synchrony in middle childhood: Relation to antisocial behavior. *Social Development*, 12(3), 379-400. doi:<http://dx.doi.org/10.1111/1467-9507.00239>

- Crittenden, P. M., & Bonvillian, J. D. (1984). The relationship between maternal risk status and maternal sensitivity. *American Journal of Orthopsychiatry*, 54(2), 250-262.
doi:<http://dx.doi.org/10.1111/j.1939-0025.1984.tb01492.x>
- Crowell, S. E., Beauchaine, T. P., & Linehan, M. M. (2009). A biosocial developmental model of borderline personality: Elaborating and extending linehan's theory. *Psychological Bulletin*, 135(3), 495-510. doi:<http://dx.doi.org/10.1037/a0015616>
- Davidov, M., & Grusec, J. E. (2006). Untangling the Links of Parental Responsiveness to Distress and Warmth to Child Outcomes. *Child Development*, 77(1), 44-58.
doi:<http://dx.doi.org/10.1111/j.1467-8624.2006.00855.x>
- de la Osa, N., Granero, R., Penelo, E., Domènech, J. M., & Ezpeleta, L. (2014). The short and very short forms of the Children's Behavior Questionnaire in a community sample of preschoolers. *Assessment*, 21(4), 463-476.
doi:<http://dx.doi.org/10.1177/1073191113508809>
- Feldman, R. (2003). Infant-mother and infant-father synchrony: The coregulation of positive arousal. *Infant Mental Health Journal*, 24(1), 1-23.
doi:<http://dx.doi.org/10.1002/imhj.10041>
- Fennig, S., Craig, T., Lavelle, J., Kovasznay, B., & Bromet, E. J. (1994). Best-estimate versus structured interview-based diagnosis in first-admission psychosis. *Comprehensive Psychiatry*, 35(5), 341-348. doi:[http://dx.doi.org/10.1016/0010-440X\(94\)90273-9](http://dx.doi.org/10.1016/0010-440X(94)90273-9)
- Field, T., Healy, B. T., Goldstein, S., & Guthertz, M. (1990). Behavior-state matching and synchrony in mother-infant interactions of nondepressed versus depressed dyads. *Developmental Psychology*, 26(1), 7-14. doi:<http://dx.doi.org/10.1037/0012-1649.26.1.7>

- First, M. B., Gibbon, M., Spitzer, R. L., Williams, J. B., & Benjamin, L. S. (1997). *User's guide for the structured clinical interview for DSM-IV axis II personality disorders (SCID-II)*. Washington, DC: American Psychiatric Press.
- First, M. B., Gibbon, M., Spitzer, R. L., & Williams, J. B. W. (1996). *User's guide for the Structured Clinical Interview for DSM-IV Axis I disorders (research version)*. Washington, DC: American Psychiatric Press.
- Gardner, K., & Qualter, P. (2009). Reliability and validity of three screening measures of borderline personality disorder in a nonclinical population. *Personality and Individual Differences*, 46(5-6), 636-641. doi:10.2466/pr0.97.1. 161-166.
doi:<http://dx.doi.org/10.1016/j.paid.2009.01.005>
- Grant, B. F., Chou, S. P., Goldstein, R. B., Huang, B., Stinson, F. S., Saha, T. D., . . . Ruan, W. J. (2008). Prevalence, correlates, disability, and comorbidity of DSM-IV borderline personality disorder: Results from the Wave 2 National Epidemiologic Survey on Alcohol and Related Conditions. *Journal of Clinical Psychiatry*, 69(4), 533-545.
doi:<http://dx.doi.org/10.4088/JCP.v69n0404>
- Grassetti, S. N. (2011). *Borderline features and attachment in adolescents whose mothers have borderline personality disorder*. Unpublished master's thesis. University of Tennessee. Knoxville, TN.
- Harrist, A. W., Pettit, G. S., Dodge, K. A., & Bates, J. E. (1994). Dyadic synchrony in mother–child interaction: Relation with children's subsequent kindergarten adjustment. *Family Relations: An Interdisciplinary Journal of Applied Family Studies*, 43(4), 417-424.
doi:<http://dx.doi.org/10.2307/585373>

- Harrist, A. W., & Waugh, R. M. (2002). Dyadic synchrony: Its structure and function in children's development. *Developmental Review*, 22(4), 555-592.
doi:[http://dx.doi.org/10.1016/S0273-2297\(02\)00500-2](http://dx.doi.org/10.1016/S0273-2297(02)00500-2)
- Healey, D. M., Gopin, C. B., Grossman, B. R., Campbell, S. B., & Halperin, J. M. (2010). Mother-child dyadic synchrony is associated with better functioning in hyperactive inattentive preschool children. *Journal of Child Psychology and Psychiatry*, 51(9), 1058-1066. doi:<http://dx.doi.org/10.1111/j.1469-7610.2010.02220.x>
- Hobson, R. P., Patrick, M., Crandell, L., García-Pérez, R., & Lee, A. (2005). Personal relatedness and attachment in infants of mothers with borderline personality disorder. *Development and Psychopathology*, 17(2), 329-347.
doi:<http://dx.doi.org/10.1017/S0954579405050169>
- Hobson, R. P., Patrick, M. P. H., Hobson, J. A., Crandell, L., Bronfman, E., & Lyons-Ruth, K. (2009). How mothers with borderline personality disorder relate to their year-old infants. *The British Journal of Psychiatry*, 195(4), 325-330.
doi:<http://dx.doi.org/10.1192/bjp.bp.108.060624>
- Isabella, R. A., & Belsky, J. (1991). Interactional synchrony and the origins of infant-mother attachment: A replication study. *Child Development*, 62(2), 373-384.
doi:<http://dx.doi.org/10.2307/1131010>
- Jackson, K. M., & Trull, T. J. (2001). The factor structure of the Personality Assessment Inventory-Borderline Features (PAI-BOR) Scale in a nonclinical sample. *Journal of Personality Disorders*, 15(6), 536-545. doi:<http://dx.doi.org/10.1521/pedi.15.6.536.19187>

- Keown, L. J., & Woodward, L. J. (2002). Early parent-child relations and family functioning of preschool boys with pervasive hyperactivity. *Journal of Abnormal Child Psychology*, 30(6), 541-553. doi:<http://dx.doi.org/10.1023/A:1020803412247>
- Kiel, E. J., Gratz, K. L., Moore, S. A., Latzman, R. D., & Tull, M. T. (2011). The impact of borderline personality pathology on mothers' responses to infant distress. *Journal of Family Psychology*, 25(6), 907-918. doi:<http://dx.doi.org/10.1037/a0025474>
- Kiff, C. J., Lengua, L. J., & Zalewski, M. (2011). Nature and nurturing: Parenting in the context of child temperament. *Clinical Child and Family Psychology Review*, 14(3), 251-301. doi:<http://dx.doi.org/10.1007/s10567-011-0093-4>
- Kochanska, G., Friesenborg, A. E., Lange, L. A., & Martel, M. M. (2004). Parents' Personality and Infants' Temperament as Contributors to Their Emerging Relationship. *Journal of Personality and Social Psychology*, 86(5), 744-759. doi:<http://dx.doi.org/10.1037/0022-3514.86.5.744>
- Kochanska, G., Murray, K., Jacques, T. Y., Koenig, A. L., & Vandegeest, K. A. (1996). Inhibitory control in young children and its role in emerging internalization. *Child Development*, 67(2), 490-507. doi:<http://dx.doi.org/10.2307/1131828>
- Kochanska, G., & Murray, K. T. (2000). Mother-child mutually responsive orientation and conscience development: From toddler to early school age. *Child Development*, 71(2), 417-431. doi:<http://dx.doi.org/10.1111/1467-8624.00154>
- Kranzler, H. R., Kadden, R. M., Babor, T. F., & Tennen, H. (1996). Validity of the SCID in substance abuse patients. *Addiction*, 91(6), 859-868. doi:<http://dx.doi.org/10.1111/j.1360-0443.1996.tb03580.x>

- Kurtz, J. E., & Morey, L. C. (2001). Use of structured self-report assessment to diagnose borderline personality disorder during major depressive episodes. *Assessment*, 8(3), 291-300. doi:<http://dx.doi.org/10.1177/107319110100800305>
- Laukkanen, J., Ojansuu, U., Tolvanen, A., Alatupa, S., & Aunola, K. (2014). Child's difficult temperament and mothers' parenting styles. *Journal of Child and Family Studies*, 23(2), 312-323. doi:<http://dx.doi.org/10.1007/s10826-013-9747-9>
- Lee, C. L., & Bates, J. E. (1985). Mother-child interaction at age two years and perceived difficult temperament. *Child Development*, 56(5), 1314-1325.
doi:<http://dx.doi.org/10.2307/1130246>
- Lengua, L. J. (2006). Growth in temperament and parenting as predictors of adjustment during children's transition to adolescence. *Developmental Psychology*, 42(5), 819-832.
doi:<http://dx.doi.org/10.1037/0012-1649.42.5.819>
- Light, P. (1979). *Development of a child's sensitivity to people*. London: Cambridge University Press.
- Lindsey, E. W., Colwell, M. J., Frabutt, J. M., Chambers, J. C., & MacKinnon-Lewis, C. (2008). Mother-child dyadic synchrony in European American and African American families during early adolescence: Relations with self-esteem and prosocial behavior. *Merrill-Palmer Quarterly*, 54(3), 289-315. doi:<http://dx.doi.org/10.1353/mpq.0.0003>
- Lindsey, E. W., Cremeens, P. R., & Caldera, Y. M. (2010). Mother-child and father-child mutuality in two contexts: Consequences for young children's peer relationships. *Infant and Child Development*, 19(2), 142-160. doi:10.1002/icd.462
- Lindsey, E. W., Cremeens, P. R., Colwell, M. J., & Caldera, Y. M. (2009). The structure of parent-child dyadic synchrony in toddlerhood and children's communication competence

- and self-control. *Social Development*, 18(2), 375-396.
doi:<http://dx.doi.org/10.1111/j.1467-9507.2008.00489.x>
- Lindsey, E. W., Mize, J., & Pettit, G. S. (1997). Mutuality in parent–child play: Consequences for children's peer competence. *Journal of Social and Personal Relationships*, 14(4), 523-538. doi:<http://dx.doi.org/10.1177/0265407597144007>
- Linehan, M. M. (1993). *Cognitive-behavioral treatment of borderline personality disorder*: Guilford Press, New York, NY.
- Lobbestael, J., Leurgans, M., & Arntz, A. (2011). Inter-rater reliability of the Structured Clinical Interview for DSM-IV Axis I disorders (SCID I) and Axis II disorders (SCID II). *Clinical Psychology & Psychotherapy*, 18(1), 75-79. doi:<http://dx.doi.org/10.1002/cpp.693>
- Lundy, B. L. (2002). Paternal socio-psychological factors and infant attachment: The mediating role of synchrony in father-infant interactions. *Infant Behavior & Development*, 25(2), 221-236. doi:[http://dx.doi.org/10.1016/S0163-6383\(02\)00123-6](http://dx.doi.org/10.1016/S0163-6383(02)00123-6)
- Majdandžić, M., & van den Boom, D. C. (2007). Multimethod longitudinal assessment of temperament in early childhood. *Journal of Personality*, 75(1), 121-167.
doi:<http://dx.doi.org/10.1111/j.1467-6494.2006.00435.x>
- Majdandžić, M., van den Boom, D. C., & Heesbeen, D. G. M. (2008). Peas in a pod: Biases in the measurement of sibling temperament? *Developmental Psychology*, 44(5), 1354-1368.
doi:<http://dx.doi.org/10.1037/a0013064>
- Mena, C. G., Macfie, J., & Strimpfel, J. M. (in press). Negative Affectivity and Effortful Control in Mothers with Borderline Personality Disorder and in their Young Children. *Journal of Personality Disorders*.

- Milliones, J. (1978). Relationship between perceived child temperament and maternal behaviors. *Child Development*, 49(4), 1255-1257. doi:<http://dx.doi.org/10.2307/1128773>
- Millon, T., & Davis, R. D. (1995). The development of personality disorders *Developmental psychopathology, Vol. 2: Risk, disorder, and adaptation*. (pp. 633-676): John Wiley & Sons, Oxford.
- Mize, J., & Pettit, G. S. (1997). Mothers' social coaching, mother–child relationship style, and children's peer competence: Is the medium the message? *Child Development*, 68(2), 312-332. doi:<http://dx.doi.org/10.2307/1131852>
- Morey, L. C. (1991). *Personality assessment inventory*. Odessa, FL: Psychological Assessment Resources.
- Mount Hope Family Center. (1995). Mt. Hope Demographic Interview. Unpublished manuscript. University of Rochester.
- Murray, L., Fiori-Cowley, A., Hooper, R., & Cooper, P. (1996). The impact of postnatal depression and associated adversity on early mother–infant interactions and later infant outcomes. *Child Development*, 67(5), 2512-2526. doi:<http://dx.doi.org/10.2307/1131637>
- Newman, L. K., & Stevenson, C. (2005). Parenting and Borderline Personality Disorder: Ghosts in the Nursery. *Clinical Child Psychology and Psychiatry*, 10(3), 385-394. doi:<http://dx.doi.org/10.1177/1359104505053756>
- Newman, L. K., Stevenson, C. S., Bergman, L. R., & Boyce, P. (2007). Borderline personality disorder, mother-infant interaction and parenting perceptions: Preliminary findings. *Australian and New Zealand Journal of Psychiatry*, 41(7), 598-605. doi:<http://dx.doi.org/10.1080/00048670701392833>

- Ogata, S. N., Silk, K. R., Goodrich, S., Lohr, N. E., Westen, D., & Hill, E. M. (1990). Childhood sexual and physical abuse in adult patients with borderline personality disorder. *The American Journal of Psychiatry*, 147(8), 1008-1013.
- Pasiak, C., & Menna, R. (2015). Mother–child synchrony: Implications for young children’s aggression and social competence. *Journal of Child and Family Studies*.
doi:<http://dx.doi.org/10.1007/s10826-015-0113-y>
- Pêcheux, M.-G., Findji, F., & Ruel, J. (1992). Maternal scaffolding of attention between 5 and 8 months. *European Journal of Psychology of Education*, 7(3), 209-218.
doi:<http://dx.doi.org/10.1007/BF03172826>
- Posner, M. I., Rothbart, M. K., Vizueta, N., Thomas, K. M., Levy, K. N., Fossella, J., . . . Kernberg, O. (2003). An approach to the psychobiology of personality disorders. *Development and Psychopathology*, 15(4), 1093-1106.
doi:<http://dx.doi.org/10.1017/S0954579403000506>
- Putnam, S. P., & Rothbart, M. K. (2006). Development of Short and Very Short Forms of the Children's Behavior Questionnaire. *Journal of Personality Assessment*, 87(1), 102-112.
doi:http://dx.doi.org/10.1207/s15327752jpa8701_09
- Reinelt, E., Stopsack, M., Aldinger, M., Ulrich, I., Grabe, H. J., & Barnow, S. (2013). Longitudinal transmission pathways of borderline personality disorder symptoms: From mother to child? *Psychopathology*, 47(1), 10-16.
doi:<http://dx.doi.org/10.1159/000345857>
- Rocissano, L., Slade, A., & Lynch, V. (1987). Dyadic synchrony and toddler compliance. *Developmental Psychology*, 23(5), 698-704. doi:<http://dx.doi.org/10.1037/0012-1649.23.5.698>

- Rothbart, M. K. (2007). Temperament, development, and personality. *Current Directions in Psychological Science*, 16(4), 207-212. doi:<http://dx.doi.org/10.1111/j.1467-8721.2007.00505.x>
- Siever, L. J., & Davis, K. L. (1991). A psychobiological perspective on the personality disorders. *The American Journal of Psychiatry*, 148(12), 1647-1658.
- Skodol, A. E., Rosnick, L., Kellman, D., Oldham, J. M., & Hyler, S. E. (1988). Validating structured DSM-III—R personality disorder assessments with longitudinal data.—700 M. *The American Journal of Psychiatry*, 145(10), 1297-1299.
- Skuban, E. M., Shaw, D. S., Gardner, F., Supplee, L. H., & Nichols, S. R. (2006). The correlates of dyadic synchrony in high-risk, low-income toddler boys. *Infant Behavior & Development*, 29(3), 423-434. doi:<http://dx.doi.org/10.1016/j.infbeh.2006.02.004>
- Sleddens, E. F. C., Kremers, S. P. J., Candel, M. J. J. M., De Vries, N. N. K., & Thijs, C. (2011). Validating the Children's Behavior Questionnaire in Dutch children: Psychometric properties and a cross-cultural comparison of factor structures. *Psychological Assessment*, 23(2), 417-426. doi:<http://dx.doi.org/10.1037/a0022111>
- Stein, M. B., Pinsker-Aspen, J. H., & Hilsenroth, M. J. (2007). Borderline pathology and the Personality Assessment Inventory (PAI): An evaluation of criterion and concurrent validity. *Journal of Personality Assessment*, 88(1), 81-89. doi:http://dx.doi.org/10.1207/s15327752jpa8801_11
- Stepp, S. D., Epler, A. J., Jahng, S., & Trull, T. J. (2008). The effect of dialectical behavior therapy skills use on borderline personality disorder features. *Journal of Personality Disorders*, 22(6), 549-563. doi:<http://dx.doi.org/10.1521/pedi.2008.22.6.549>

- Stepp, S. D., Olino, T. M., Klein, D. N., Seeley, J. R., & Lewinsohn, P. M. (2013). Unique influences of adolescent antecedents on adult borderline personality disorder features. *Personality Disorders: Theory, Research, and Treatment*, 4(3), 223-229.
doi:<http://dx.doi.org/10.1037/per0000015>
- Stepp, S. D., Whalen, D. J., Pilkonis, P. A., Hipwell, A. E., & Levine, M. D. (2012). Children of mothers with borderline personality disorder: Identifying parenting behaviors as potential targets for intervention. *Personality Disorders: Theory, Research, and Treatment*, 3(1), 76-91. doi:<http://dx.doi.org/10.1037/a0023081>
- Stepp, S. D., Whalen, D. J., Scott, L. N., Zalewski, M., Loeber, R., & Hipwell, A. E. (2014). Reciprocal effects of parenting and borderline personality disorder symptoms in adolescent girls. *Development and Psychopathology*, 26(2), 361-378.
doi:<http://dx.doi.org/10.1017/S0954579413001041>
- Thompson, L., & Walker, A. J. (1982). The dyad as the unit of analysis: Conceptual and methodological issues. *Journal of Marriage and the Family*, 44(4), 889-900.
doi:<http://dx.doi.org/10.2307/351453>
- White, H., Flanagan, T. J., Martin, A., & Silvermann, D. (2011). Mother–infant interactions in women with borderline personality disorder, major depressive disorder, their co-occurrence, and healthy controls. *Journal of Reproductive and Infant Psychology*, 29(3), 223-235. doi:<http://dx.doi.org/10.1080/02646838.2011.576425>
- Zalewski, M., Stepp, S. D., Scott, L. N., Whalen, D. J., Beeney, J. F., & Hipwell, A. E. (2014). Maternal borderline personality disorder symptoms and parenting of adolescent daughters. *Journal of Personality Disorders*, 28(4), 541-554.
doi:http://dx.doi.org/10.1521/pedi_2014_28_131

- Zanarini, M. C., Frankenburg, F. R., Dubo, E. D., Sickel, A. E., Trikha, A., Levin, A., & Reynolds, V. (1998). Axis I comorbidity of borderline personality disorder. *The American Journal of Psychiatry*, 155(12), 1733-1739.
- Zanarini, M. C., Skodol, A. E., Bender, D., Dolan, R., Sanislow, C., Schaefer, E., . . . Gunderson, J. G. (2000). The Collaborative Longitudinal Personality Disorders Study: Reliability of Axis I and II diagnoses. *Journal of Personality Disorders*, 14(4), 291-299.
doi:<http://dx.doi.org/10.1521/pedi.2000.14.4.291>
- Ziv, Y., Aviezer, O., Gini, M., Sagi, A., & Koren-Karie, N. (2000). Emotional availability in the mother–infant dyad as related to the quality of infant–mother attachment relationship. *Attachment & Human Development*, 2(2), 149-169.
doi:<http://dx.doi.org/10.1080/14616730050085536>

Appendices

Appendix A

Tables

Table 1

Demographic Differences Between BPD and Normative Comparison Groups

	Whole sample	BPD	Comparison	
	<i>N</i> = 70	<i>n</i> = 36	<i>n</i> = 34	
Variable	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>t</i>
Child Age (years)	5.37 (0.90)	5.36 (0.93)	5.38 (0.87)	0.11
Maternal Age (years)	32.41 (5.04)	32.28 (4.84)	32.56 (5.32)	0.23
Family Yearly Income (\$)	31,841 (27,854)	29,385 (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)	50%	53%	47%	0.23
Child Minority Ethnic Background	11%	11%	12%	0.01
Child Hispanic	11%	14%	9%	.44
Mother Graduated High School or GED	89%	81%	97%	4.71*
Mother Has Partner	57%	56%	59%	0.08

**p* < .05

Table 2

Power Analysis to Determine Required Sample Size

Type of Analysis	<u>Sample Size (N)</u>		
	Small Effect Size	Medium Effect Size	Large Effect Size
ANCOVA	780	130	52
Bivariate Correlation	780	81	26
HMR (BPD status)	387	56	27
HMR (Borderline Features)	602	89	44

$\alpha = .05$, power = .80

ANCOVA = Analysis of Covariance

HMR = Hierarchical Multiple Regression

Table 3

Correlations Between Original PAI-BOR Maternal Borderline Features

Variable	1	2	3	4	5
1 Total Borderline Features	1				
2 Affective Instability	.94***	1			
3 Identity Disturbance	.95***	.88***	1		
4 Negative Relationships	.89***	.77***	.80***	1	
5 Self-Harm/Impulsivity	.82***	.73***	.73***	.59***	1

*** $p < .001$

Table 4

Factor Analysis of the Personality Assessment Inventory- Borderline Features Scale (PAI-BOR): Coefficients from a Four-Factor Rotated Pattern Matrix

Scale	Item	Factor			
		BOR 1	BOR 2	BOR 3	BOR 4
AI	1. Mood Shifts	.70*			
AI	4. Moods intense	.69*			
AI	7. Mood steady (R)	.62*			
AI	10. Little control over anger	.84*			
AI	14. Happy person	.74*			
AI	18. Can't express all of anger	.54*	.36		
ID	2. Attitude about self changes	.74*		.31	
ID	11. Wonder about life	.83*			
NR	20. Stay friends with people (R)	.74*		-.44	
ID	8. Worry about people leaving		.77*		
ID	15. Can't handle separation		.53*	.31	
NR	3. Relationships stormy		.71*		
NR	6. Let people know they've hurt me		.77*	.39	
NR	9. People let me down		.77*		
NR	12. Rarely lonely (R)		.70*		
NR	16. Mistakes in picking friends		.78*		
SH	13. Do things impulsively			.80*	
SH	21. Too impulsive			.80*	
SH	23. Reckless person			.70*	
SH	22. Spend money easily				.62*
SH	24. Careful about money (R)				.87*

Scale = Subscale to which the item was originally assigned (Morey, 1991). AI = Affective Instability; ID = Identity Disturbance; NR = Negative Relationships; SH = Self-Harm/Impulsivity. R = reverse-scored item.

Extraction Method: Principal Component Analysis. Rotation Method: Promax with Kaiser Normalization. Eigenvalue >1. Coefficients marked with an asterisk (*) represent the factor to which the item was assigned in the four-factor model. Only cross-loadings above .3 indicated.

Table 5

Factor Analysis of the Child Behavior Questionnaire-Short Form (CBQ-SF): Coefficients from a Three Factor Rotated Pattern Matrix

Scale	Item	Factor		
		Anger/ Frustration	Fear	Effortful Control
A	2. Gets angry when told...	.82*		
A	14. Has temper tantrums...	.69*		
A	30. Gets quite frustrated...	.80*		
A	40. Gets angry when can't...	.63*		
A	61. Rarely gets upset (R)...	-.73*		
A	87. Gets angry when called...	.76*		
F	17. Is afraid of burglars...		.69*	
F	23. Is afraid of loud noises.		.67*	
F	35. Is not afraid of the dark (R)		-.64*	
F	63. Is afraid of the dark.		.64*	
F	68. Is rarely frightened (R)...		-.69*	
IC	45. Prepares for trips...	.33		-.76*
IC	53. Has trouble sitting still (R)...			.61*
IC	67. Is good at following...		-.32	-.63*
IC	73. Approaches places...			-.64*
IC	81. Can easily stop an activity...			-.60*
AF	16. When practicing an (R)...			.66*
AF	21. Will move from one task(R)...		.37	.55*
AF	62. When drawing or coloring...			-.53*
AF	84. Is easily distracted (R)...	.33		.58*
AF	21. Sometimes becomes absorbed..		.31	-.49*

Scale = Subscale to which the item was originally assigned. A = Anger/Frustration; F = Fear; IC = Inhibitory Control; AF = Attentional-Focusing. R = reverse-scored item.

Extraction Method: Principal Component Analysis. Rotation Method: Direct Oblimin with Kaiser Normalization. Eigenvalue >1. Coefficients marked with an asterisk (*) represent the factor to which the item was assigned in the three-factor model. Only cross-loadings above .3 indicated.

Table 6

Descriptive Statistics for Synchrony, Maternal Borderline Features, and Child Temperament

Variable	Whole sample <i>N</i> = 70 <i>M</i> (<i>SD</i>)	BPD <i>n</i> = 36 <i>M</i> (<i>SD</i>)	Comparison <i>n</i> = 34 <i>M</i> (<i>SD</i>)	<i>t</i>
Synchrony	2.46 (.54)	2.37 (.46)	2.57 (.59)	1.55
<i>Original Maternal PAI-BOR Features</i>				
Total Borderline Features	28.78 (19.48)	44.38 (13.07)	12.26 (8.09)	12.28***
Affective Instability	8.16 (6.16)	13.00 (4.20)	3.03 (2.83)	11.58***
Identity Disturbance	7.32 (5.41)	11.38 (4.17)	3.03 (2.42)	10.17***
Negative Relationships	9.40 (5.59)	13.31 (3.38)	5.26 (4.34)	8.67***
Self-Harm/Impulsivity	3.90 (4.34)	6.69 (4.36)	.94 (1.30)	7.39***
<i>Factor Analyzed Maternal PAI-BOR Features</i>				
Total Borderline Features	1.05 (.75)	1.63 (.57)	.44 (.28)	10.95***
BOR 1	1.31 (.96)	2.07 (.65)	.50 (.45)	11.70***
BOR 2	1.47 (.93)	2.10 (.65)	.82 (.70)	7.91***
BOR 3	.54 (.82)	.99 (.93)	.07 (.16)	5.68***
BOR 4	.89 (.90)	1.38 (.91)	.37 (.53)	5.65***
<i>Original CBQ-SF Child Temperament</i>				
Anger/Frustration	5.00 (1.36)	5.44 (1.20)	4.52 (1.37)	2.97**
Fear	4.13 (1.29)	4.57 (1.25)	3.67 (1.19)	3.10**
Inhibitory Control	4.35 (1.18)	4.00 (1.02)	4.73 (1.22)	2.70**
Attentional Focusing	4.39 (1.17)	4.02 (1.08)	4.77 (1.16)	2.79**
<i>Factor Analyzed CBQ-SF Child Temperament</i>				
Anger/Frustration	4.99 (1.36)	5.44 (1.20)	4.52 (1.37)	2.99**
Fear	4.01 (1.50)	4.48 (1.48)	3.51 (1.38)	2.84**
Effortful Control	4.27 (1.17)	3.93 (1.11)	4.63 (1.13)	2.61*

p* < .05, *p* < .01, ****p* < .001

BOR-1 = Primarily comprised of Original Personality Assessment Inventory Affective Instability Subscale Items; BOR-2 = Primarily comprised of Original Personality Assessment Inventory Negative Relationships Subscale Items; BOR-3 = Comprised of some of the Original Personality Assessment Inventory Self-Harm/Impulsivity Subscale Items; BOR-4 = Comprised of the Original Personality Assessment Inventory Self-Harm/Impulsivity Subscale Items referencing Reckless Spending

Table 7

Bivariate Correlations Between Factor Analysis Personality Assessment Inventory-Borderline Features (PAI-BOR) Scale Items and Mother-Child Synchrony

Variable	Maternal Borderline Features				
	Borderline Total	BOR 1	BOR 2	BOR 3	BOR 4
Mother- Child Synchrony	-.21 [†]	-.22 [†]	-.34**	-.11	-.03

[†] $p < .10$; ** $p < .01$

BOR 1 comprised mainly of items from original PAI-BOR Affective Stability Scale

BOR 2 comprised mainly of items from original PAI-BOR Negative Relationships Scale

BOR 3 comprised of 3 items from original PAI-BOR Self-Harm/Impulsivity Scale

BOR 4 comprised of another 2 items from original PAI-BOR Self-Harm/Impulsivity Scale

Table 8

Bivariate Correlations Between Maternal Borderline Features (PAI-BOR) and Mother-Child Synchrony

Variable	Maternal Borderline Features				
	Borderline Total	Affective Instability	Identity Disturbance	Negative Relationships	Self-Harm/ Impulsivity
Mother- Child Synchrony	-.25*	-.20 [†]	-.30*	-.30*	-.09

[†] $p < .10$; * $p < .05$

PAI-BOR = Personality Assessment Inventory-Borderline Features

Table 9

Bivariate Correlations Between Factor Analysis Child Behavior Questionnaire (CBQ) Scale Items and Mother-Child Synchrony

Variable	Child Temperament		
	Anger/Frustration	Fear	Effortful Control
Mother-Child Synchrony	-.01	.09	.17
† $p \leq .10$			

Table 10

Bivariate Correlations Between Child Behavior Questionnaire (CBQ) Variables and Mother-Child Synchrony

Variable	<u>Child Temperament</u>			
	Negative Affectivity		Effortful Control	
	Anger/Frustration	Fear	Inhibitory Control	Attentional Focusing
Mother-Child Synchrony	-.01	.07	.09	.25*

* $p < .05$

Table 11

Hierarchical Multiple Regression Analyses of the Interaction Between Maternal Group Status and Factor Analysis Child Temperament Variables in Predicting Mother-Child Synchrony

Predictor Variables	<u>Mother-Child Synchrony</u>				
	ΔR^2	<i>B</i>	<i>SE</i>	β	<i>t</i>
Negative Affectivity					
<i>Anger/Frustration</i>					
Step 1: Group Status	.04	-.22	.14	-.21	1.61
Anger/ Frustration		.02	.05	.06	.48
Step 2: Group Status	.01	-.22	.14	-.20	1.59
Anger/Frustration		.06	.07	.15	.84
Group Status X Anger/Frustration		-.07	.10	-.12	.73
<i>Fear</i>					
Step 1: Group Status	.06	-.26	.13	-.24	1.90 [†]
Fear		.06	.05	.17	1.34
Step 2: Group Status	.00	-.25	.13	-.24	1.88 [†]
Fear		.04	.07	.12	.61
Group Status X Fear		.03	.09	.07	.38
Effortful Control					
Step 1: Group Status	.05	-.16	.13	-.15	1.18
Effortful Control		.06	.06	.12	.98
Step 2: Group Status	.02	-.16	.13	-.15	1.21
Effortful Control		.02	.08	-.04	.24
Group Status X Effortful Control		.15	.11	.23	1.30

[†] $p < .10$

Table 12

Hierarchical Multiple Regression Analyses of the Interaction Between Maternal Group Status and Child Negative Affectivity Temperament Variables (Original Child Behavior Questionnaire-CBQ) in Predicting Mother-Child Synchrony

Predictor Variables	<u>Mother-Child Synchrony</u>				
	ΔR^2	B	SE	β	t
Negative Affectivity					
<i>Anger/Frustration</i>					
Step 1: Group Status	.04	-.22	.14	-.21	1.62
Anger/Frustration		.03	.05	.06	.50
Step 2: Group Status	.01	-.22	.14	-.20	1.60
Anger/Frustration		.06	.07	.15	.87
Group Status X Anger/Frustration		-.08	.10	-.12	.74
<i>Fear</i>					
Step 1: Group Status	.06	-.26	.14	-.24	1.90 [†]
Fear		.07	.05	.16	1.24
Step 2: Group Status	.00	-.25	.14	-.24	1.87 [†]
Fear		.04	.08	.09	.50
Group Status X Fear		.05	.11	.09	.47

[†] $p < .10$

Table 13

Hierarchical Multiple Regression Analyses of the Interaction Between Maternal Group Status and Child Effortful Control Temperament Variables (Original Child Behavior Questionnaire-CBQ) in Predicting Mother-Child Synchrony

Predictor Variables	<u>Mother-Child Synchrony</u>				
	ΔR^2	B	SE	β	t
Effortful Control					
<i>Inhibitory Control</i>					
Step 1: Group Status	.04	-.18	.13	-.17	1.37
Inhibitory Control		.02	.06	.04	.31
Step 2: Group Status	.01	-.18	.14	-.17	1.33
Inhibitory Control		-.03	.08	-.06	.33
Group Status X Inhibitory Control		.10	.12	.14	.87
<i>Attentional Focusing</i>					
Step 1: Group Status	.08 [†]	-.12	.13	-.12	.94
Attentional Focusing		.10	.06	.21	1.71 [†]
Step 2: Group Status	.01	-.12	.13	-.12	.94
Attentional Focusing		.06	.08	.12	.69
Group Status X Attentional Focusing		.09	.11	.13	.78

[†] $p < .10$

Table 14

Hierarchical Multiple Regression Analyses of the Interaction Between Factor Analyzed Maternal Total Borderline Features (BOR-TOT) and Factor Analyzed Child Temperament Variables in Predicting Mother-Child Synchrony

Predictor Variables	<u>Mother-Child Synchrony</u>				
	ΔR^2	B	SE	β	t
Negative Affectivity					
<i>Anger/Frustration</i>					
Step 1: BOR-TOT	.06	-.19	.10	-.27	2.00*
Anger/Frustration		.05	.05	.12	.87
Step 2: BOR-TOT	.00	-.20	.10	-.28	2.01*
Anger/Frustration		.05	.05	.13	.91
BOR-TOT X Anger/Frustration		.02	.07	.04	.33
<i>Fear</i>					
Step 1: BOR-TOT	.09*	-.22	.09	-.32	2.42*
Fear		.08	.05	.23	1.76 [†]
Step 2: BOR-TOT	.01	-.24	.09	-.33	2.54*
Fear		.08	.05	.21	1.62
BOR-TOT X Fear		.07	.06	.12	1.02
Effortful Control					
Step 1: BOR-TOT	.05	-.12	.10	-.17	1.30
Effortful Control		.04	.06	.09	.67
Step 2: BOR-TOT	.00	-.12	.10	-.17	1.28
Effortful Control		.04	.06	.09	.65
BOR-TOT X Effortful Control		.01	.07	.02	.16

[†] $p < .10$; * $p < .05$

BOR-TOT = Total Borderline Features

Table 15

Hierarchical Multiple Regression Analyses of the Interaction Between Factor Analyzed Maternal Borderline Features Subscales and Factor Analyzed Child Anger/Frustration in Predicting Mother-Child Synchrony

Predictor Variables	<u>Mother-Child Synchrony</u>				
	ΔR^2	B	SE	β	t
Step 1: BOR-1	.16*	-.03	.12	-.06	.30
BOR-2		-.28	.10	-.49	2.69**
BOR-3		.04	.10	.05	.36
BOR-4		.10	.09	.17	1.13
Anger/Frustration		.06	.05	.16	1.24
Step 2: BOR-1	.02	-.03	.14	-.06	.25
BOR-2		-.28	.11	-.49	2.49*
BOR-3		.04	.10	.06	.39
BOR-4		.07	.10	.12	.71
Anger/Frustration		.08	.06	.21	1.45
BOR-1 X Anger/Frustration		.00	.11	.00	.01
BOR-2 X Anger/Frustration		-.05	.09	-.12	.57
BOR-3 X Anger/Frustration		-.02	.09	-.03	.18
BOR-4 X Anger/Frustration		.08	.10	.16	.85

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

BOR-1 = Primarily comprised of Original Personality Assessment Inventory Affective Instability Subscale Items

BOR-2 = Primarily comprised of Original Personality Assessment Inventory Negative Relationships Subscale Items

BOR-3 = Comprised of some of the Original Personality Assessment Inventory Self-Harm/Impulsivity Subscale Items

BOR-4 = Comprised of the Original Personality Assessment Inventory Self-Harm/Impulsivity Subscale Items referencing Reckless Spending

Table 16

Hierarchical Multiple Regression Analyses of the Interaction Between Factor Analyzed Maternal Borderline Features Subscales and Factor Analyzed Child Fear in Predicting Mother-Child Synchrony

Predictor Variables	<u>Mother-Child Synchrony</u>				
	ΔR^2	B	SE	β	t
Step 1: BOR-1	.17*	-.04	.11	-.07	.37
BOR-2		-.24	.10	-.42	2.38*
BOR-3		.02	.10	.03	.20
BOR-4		.09	.09	.14	.93
Fear		.06	.05	.17	1.28
Step 2: BOR-1	.05	-.04	.12	-.08	.38
BOR-2		-.25	.10	-.43	2.41*
BOR-3		.04	.11	.06	.37
BOR-4		.05	.10	.09	.54
Fear		.07	.05	.21	1.53
BOR-1 X Fear		.08	.06	.21	1.27
BOR-2 X Fear		-.07	.06	-.18	1.20
BOR-3 X Fear		-.03	.07	-.06	.35
BOR-4 X Fear		.05	.07	.10	.68

* $p < .05$

BOR-1 = Primarily comprised of Original Personality Assessment Inventory Affective Instability Subscale Items

BOR-2 = Primarily comprised of Original Personality Assessment Inventory Negative Relationships Subscale Items

BOR-3 = Comprised of some of the Original Personality Assessment Inventory Self-Harm/Impulsivity Subscale Items

BOR-4 = Comprised of the Original Personality Assessment Inventory Self-Harm/Impulsivity Subscale Items referencing Reckless Spending

Table 17

Hierarchical Multiple Regression Analyses of the Interaction Between Factor Analyzed Maternal Borderline Features Subscales and Factor Analyzed Effortful Control in Predicting Mother-Child Synchrony

Predictor Variables	<u>Mother-Child Synchrony</u>				
	ΔR^2	B	SE	β	t
Step 1: BOR-1	.15 [†]	-.01	.11	-.01	.07
BOR-2		-.24	.10	-.42	2.37*
BOR-3		.02	.10	.04	.24
BOR-4		.13	.09	.22	1.44
Effortful Control		.04	.06	.10	.72
Step 2: BOR-1	.07	.01	.13	.02	.09
BOR-2		-.26	.10	-.46	2.55*
BOR-3		.01	.11	.01	.08
BOR-4		.12	.11	.21	1.16
Effortful Control		.01	.07	.03	.17
BOR-1 X Effortful Control		-.03	.10	-.06	.25
BOR-2 X Effortful Control		.20	.09	.36	2.25*
BOR-3 X Effortful Control		-.09	.09	-.17	1.02
BOR-4 X Effortful Control		-.04	.09	-.08	.43

[†] $p < .10$; * $p < .05$

BOR-1 = Primarily comprised of Original Personality Assessment Inventory Affective Instability Subscale Items

BOR-2 = Primarily comprised of Original Personality Assessment Inventory Negative Relationships Subscale Items

BOR-3 = Comprised of some of the Original Personality Assessment Inventory Self-Harm/Impulsivity Subscale Items

BOR-4 = Comprised of the Original Personality Assessment Inventory Self-Harm/Impulsivity Subscale Items referencing Reckless Spending

Table 18

Hierarchical Multiple Regression Analyses of the Interaction Between Maternal Total Borderline Features (Original PAI-BOR scale) and Child Negative Affectivity Temperament Variables (Original Child Behavior Questionnaire-CBQ) in Predicting Mother-Child Synchrony

Predictor Variables	<u>Mother-Child Synchrony</u>				
	ΔR^2	B	SE	β	t
Negative Affectivity					
<i>Anger/Frustration</i>					
Step 1: BOR-TOT	.08	-.01	.00	-.32	2.40*
Anger/Frustration		.06	.05	.14	1.08
Step 2: BOR-TOT	.00	-.01	.00	-.32	2.38*
Anger/Frustration		.06	.05	.15	1.09
BOR-TOT X Anger/Frustration		.00	.00	.02	.16
<i>Fear</i>					
Step 1: BOR-TOT	.10*	-.01	.00	-.35	2.71**
Fear		.09	.05	.23	1.75 [†]
Step 2: BOR-TOT	.01	-.01	.00	-.36	2.76**
Fear		.09	.05	.22	1.68 [†]
BOR-TOT X Fear		.00	.00	.11	.91

[†] $p < .10$; * $p < .05$, ** $p < .01$

BOR-TOT = Total Borderline Features

Table 19

Hierarchical Multiple Regression Analyses of the Interaction Between Maternal Total Borderline Features (Original PAI-BOR scale) and Child Effortful Control Temperament Variables (Original Child Behavior Questionnaire-CBQ) in Predicting Mother-Child Synchrony

Predictor Variables	<u>Mother-Child Synchrony</u>				
	ΔR^2	B	SE	β	t
Effortful Control					
<i>Inhibitory Control</i>					
Step 1: BOR-TOT	.06	-.01	.00	-.26	1.97 [†]
Inhibitory Control		-.01	.06	-.01	.09
Step 2: BOR-TOT	.00	-.01	.00	-.26	1.94 [†]
Inhibitory Control		-.01	.06	-.01	.09
BOR-TOT X Inhibitory Control		.00	.00	-.01	.07
<i>Attentional Focusing</i>					
Step 1: BOR-TOT	.09*	-.01	.00	-.18	1.35
Attentional Focusing		.08	.06	.17	1.33
Step 2: BOR-TOT	.00	-.01	.00	-.18	1.39
Attentional Focusing		.08	.06	.17	1.28
BOR-TOT X Attentional Focusing		.00	.00	-.06	.47

[†] $p < .10$; * $p < .05$

BOR-TOT = Total Borderline Features

Table 20

Hierarchical Multiple Regression Analyses of the Interaction Between Maternal Borderline Feature Subscales (Original PAI-BOR scale) and Child Anger/Frustration (Original Child Behavior Questionnaire-CBQ) in Predicting Mother-Child Synchrony

Predictor Variables	<u>Mother-Child Synchrony</u>				
	ΔR^2	B	SE	β	t
Step 1: BOR-A	.17*	.02	.02	.24	.93
BOR-I		-.05	.03	-.55	1.98 [†]
BOR-N		-.02	.02	-.24	1.22
BOR-S		.03	.02	.23	1.31
Anger/Frustration		.06	.05	.16	1.20
Step 2: BOR-A	.02	.02	.02	.28	.99
BOR-I		-.06	.03	-.66	2.08*
BOR-N		-.02	.02	-.22	1.04
BOR-S		.03	.02	.25	1.31
Anger/Frustration		.06	.06	.16	1.10
BOR-A X Anger/Frustration		-.01	.02	-.11	.42
BOR-I X Anger/Frustration		.02	.02	.29	.92
BOR-N X Anger/Frustration		-.01	.02	-.19	.79
BOR-S X Anger/Frustration		.00	.02	-.01	.05

[†] $p < .10$; * $p < .05$

BOR-A = Borderline Affective Instability; BOR-I = Borderline Identity Disturbance; BOR-N = Borderline Negative Relationships; BOR-S = Borderline Self-Harm/Impulsivity

Table 21

Hierarchical Multiple Regression Analyses of the Interaction Between Maternal Borderline Feature Subscales (Original PAI-BOR scale) and Child Fear (Original Child Behavior Questionnaire-CBQ) in Predicting Mother-Child Synchrony

Predictor Variables	<u>Mother-Child Synchrony</u>				
	ΔR^2	B	SE	β	t
Step 1: BOR-A	.17*	.02	.02	.20	.78
BOR-I		-.05	.03	-.51	1.83 [†]
BOR-N		-.02	.02	-.20	1.04
BOR-S		.02	.02	.19	1.05
Fear		.06	.05	.15	1.17
Step 2: BOR-A	.04	.02	.02	.23	.84
BOR-I		-.05	.03	-.53	1.72 [†]
BOR-N		-.02	.02	-.24	1.15
BOR-S		.02	.03	.20	.89
Fear		.07	.06	.17	1.23
BOR-A X Fear		.02	.02	.29	1.31
BOR-I X Fear		.00	.02	-.05	.14
BOR-N X Fear		-.01	.02	-.17	.87
BOR-S X Fear		.00	.02	.01	.02

[†] $p < .10$; * $p < .05$

BOR-A = Borderline Affective Instability; BOR-I = Borderline Identity Disturbance; BOR-N = Borderline Negative Relationships; BOR-S = Borderline Self-Harm/Impulsivity

Table 22

Hierarchical Multiple Regression Analyses of the Interaction Between Maternal Borderline Feature Subscales (Original PAI-BOR scale) and Child Inhibitory Control (Original Child Behavior Questionnaire-CBQ) in Predicting Mother-Child Synchrony

Predictor Variables	<u>Mother-Child Synchrony</u>				
	ΔR^2	B	SE	β	t
Step 1: BOR-A	.15 [†]	.02	.02	.28	1.07
BOR-I		-.06	.03	-.57	1.99 [†]
BOR-N		-.02	.02	-.19	.92
BOR-S		.03	.02	.25	1.41
Inhibitory Control		.02	.06	.05	.39
Step 2: BOR-A	.07	.03	.02	.34	1.21
BOR-I		-.05	.03	-.52	1.82 [†]
BOR-N		-.03	.02	-.27	1.29
BOR-S		.02	.02	.18	.93
Inhibitory Control		.01	.07	.03	.20
BOR-A X Inhibitory Control		-.02	.02	-.25	.97
BOR-I X Inhibitory Control		.04	.03	.39	1.53
BOR-N X Inhibitory Control		.01	.02	.13	.73
BOR-S X Inhibitory Control		-.02	.03	-.23	.94

[†] $p < .10$

BOR-A = Borderline Affective Instability; BOR-I = Borderline Identity Disturbance; BOR-N = Borderline Negative Relationships; BOR-S = Borderline Self-Harm/Impulsivity

Table 23

Hierarchical Multiple Regression Analyses of the Interaction Between Maternal Borderline Feature Subscales (Original PAI-BOR scale) and Child Attentional Focusing (Original Child Behavior Questionnaire-CBQ) in Predicting Mother-Child Synchrony

Predictor Variables	<u>Mother-Child Synchrony</u>				
	ΔR^2	B	SE	β	t
Step 1: BOR-A	.18*	.03	.02	.34	1.32
BOR-I		-.06	.03	-.57	2.08*
BOR-N		-.02	.02	-.18	.89
BOR-S		.03	.02	.26	1.53
Attentional Focusing		.10	.06	.21	1.65
Step 2: BOR-A	.06	.04	.02	.44	1.60
BOR-I		-.05	.03	-.48	1.71 [†]
BOR-N		-.03	.02	-.31	1.50
BOR-S		.02	.03	.13	.61
Attentional Focusing		.07	.07	.14	.99
BOR-A X		-.02	.02	-.27	1.03
Attentional Focusing					
BOR-I X		.03	.02	.29	1.29
Attentional Focusing					
BOR-N X		.02	.02	.21	1.12
Attentional Focusing					
BOR-S X		-.03	.02	-.24	1.17
Attentional Focusing					

[†] $p < .10$; * $p < .05$

BOR-A = Borderline Affective Instability; BOR-I = Borderline Identity Disturbance; BOR-N = Borderline Negative Relationships; BOR-S = Borderline Self-Harm/Impulsivity

Appendix B

Figure

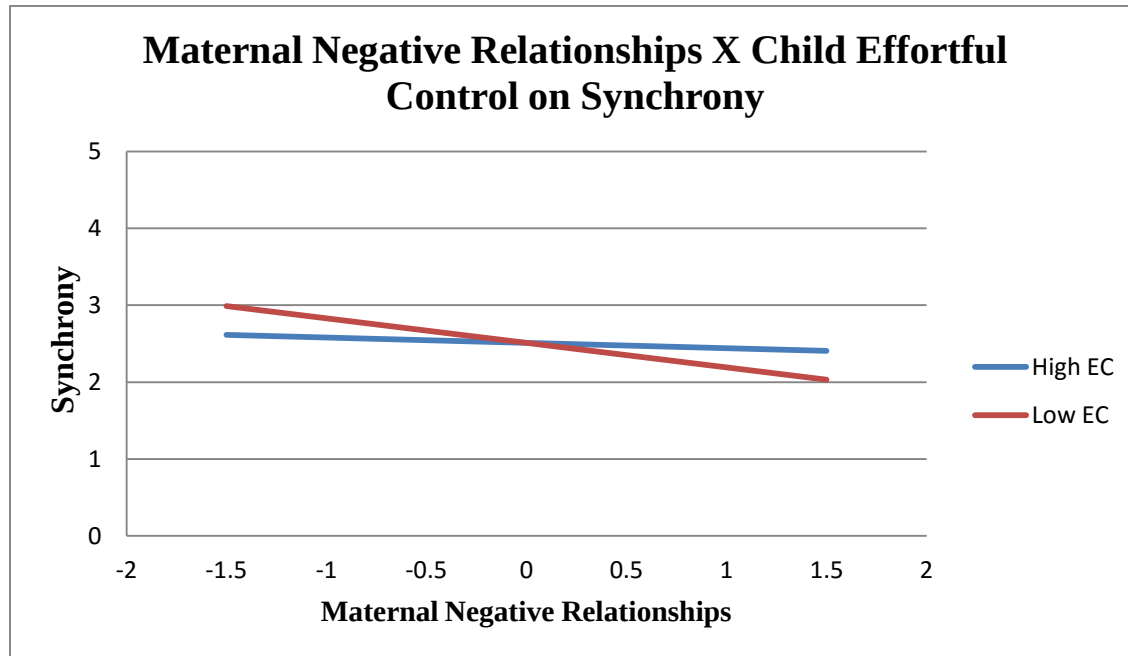


Figure 1. Interaction Effect Between Factor Analyzed Maternal Negative Relationships and Child Effortful Control on Mother-Child Synchrony.

Appendix C

Personality Assessment Inventory-Borderline Features (PAI-BOR) Scale Items

Affective Instability Subscale

- 1. My mood can shift quite suddenly.
- 4. My moods get quite intense.
- 7. My mood is very steady.
- 10. I have little control over my anger.
- 14. I've always been a pretty happy person.
- 18. I've had times when I was so mad I couldn't do enough to express all my anger.

Identity Disturbance Subscale

- 2. My attitude about myself changes a lot
- 5. Sometimes I feel terribly empty inside
- 8. I worry a lot about other people leaving me.
- 11. I often wonder what I should do with my life.
- 15. I can't handle separation from those close to me very well.
- 19. I don't get bored very easily.

Negative Relationships Subscale

- 3. My relationships have been stormy.
- 6. I want to let certain people know how much they've hurt me.
- 9. People once close to me have let me down.
- 12. I rarely feel very lonely.
- 16. I've made some real mistakes in the people I've picked as friends.
- 20. Once someone is my friend we stay friends.

Self-Harm/Impulsivity Subscale

- 13. I sometimes do things so impulsively that I get into trouble.
- 17. When I'm upset, I typically do something to hurt myself.
- 21. I'm too impulsive for my own good.
- 22. I spend money too easily.
- 23. I'm a reckless person.
- 24. I'm careful about how I spend my money.

Appendix D

Factor Analyzed Personality Assessment Inventory-Borderline Features (PAI-BOR) Scale Items

Affective Instability Subscale

- 1. My mood can shift quite suddenly.
- 4. My moods get quite intense.
- 7. My mood is very steady.
- 10. I have little control over my anger.
- 14. I've always been a pretty happy person.
- 18. I've had times when I was so mad I couldn't do enough to express all my anger.
- 2. My attitude about myself changes a lot
- 11. I often wonder what I should do with my life.
- 20. Once someone is my friend we stay friends.

Negative Relationships Subscale

- 8. I worry a lot about other people leaving me.
- 15. I can't handle separation from those close to me very well.
- 3. My relationships have been stormy.
- 6. I want to let certain people know how much they've hurt me.
- 9. People once close to me have let me down.
- 12. I rarely feel very lonely.
- 16. I've made some real mistakes in the people I've picked as friends.

Impulsivity Subscale

- 13. I sometimes do things so impulsively that I get into trouble.
- 21. I'm too impulsive for my own good.
- 23. I'm a reckless person.

Reckless Spending Subscale

- 22. I spend money too easily.
- 24. I'm careful about how I spend my money.

Appendix E

Child Behavior Questionnaire (CBQ) Short Form Items

Negative Affectivity

Anger/Frustration Subscale:

- 2. Gets angry when told s/he has to go to bed.
- 14. Has temper tantrums when s/he doesn't get what s/he wants.
- 30. Gets quite frustrated when prevented from doing something s/he wants to do.
- 40. Gets angry when s/he can't find something s/he wants to play with.
- 61. Rarely gets upset when told s/he has to go to bed.
- 87. Gets angry when called in from play before s/he is ready to quit.

Fear Subscale:

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

Effortful Control

Inhibitory Control Subscale:

- 38. Can wait before entering into new activities if s/he is asked to.
- 45. Prepares for trips and outings by planning things s/he will need.
- 53. Has trouble sitting still when s/he is told to (at movies, church, etc.)
- 67. Is good at following instructions.
- 73. Approaches places s/he has been told are dangerous slowly and cautiously.
- 81. Can easily stop an activity when s/he is told "no."

Attentional Focusing Subscale:

- 16. When practicing an activity, has a hard time keeping her/his mind on it.
- 21. Will move from one task to another without completing any of them.
- 62. When drawing or coloring in a book, shows strong concentration.
- 71. When building or putting something together, becomes very involved in what s/he is doing, and works for long periods.
- 84. Is easily distracted when listening to a story.
- 89. Sometimes becomes absorbed in a picture book and looks at it for a long time.

Appendix F

Factor Analyzed Child Behavior Questionnaire (CBQ) Short Form Items:

Anger/Frustration Subscale

- 2. Gets angry when told s/he has to go to bed.
- 14. Has temper tantrums when s/he doesn't get what s/he wants.
- 30. Gets quite frustrated when prevented from doing something s/he wants to do.
- 40. Gets angry when s/he can't find something s/he wants to play with.
- 61. Rarely gets upset when told s/he has to go to bed.
- 87. Gets angry when called in from play before s/he is ready to quit.

Fear Subscale

- 17. Is afraid of burglars or the "boogie man."
- 23. Is afraid of loud noises.
- 35. Is not afraid of the dark.
- 63. Is afraid of the dark.
- 68. Is rarely frightened by "monsters" seen on TV or at movies.

Effortful Control Composite Subscale

- 45. Prepares for trips and outings by planning things s/he will need.
- 53. Has trouble sitting still when s/he is told to (at movies, church, etc.)
- 67. Is good at following instructions.
- 73. Approaches places s/he has been told are dangerous slowly and cautiously.
- 81. Can easily stop an activity when s/he is told "no."
- 16. When practicing an activity, has a hard time keeping her/his mind on it.
- 21. Will move from one task to another without completing any of them.
- 62. When drawing or coloring in a book, shows strong concentration.
- 84. Is easily distracted when listening to a story.
- 89. Sometimes becomes absorbed in a picture book and looks at it for a long time.

Vita

Christina Mena was born in Toronto, Canada and grew up in Wyomissing, Pennsylvania until she attended Pennsylvania State University for undergraduate studies. 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, and will complete her Doctor in Philosophy degree in Clinical Psychology in 2017 upon completion of an APA-accredited internship.