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**MATERNAL BORDERLINE PERSONALITY SYMPTOMS AND STRESS
RESPONDING DURING PREGNANCY AS PREDICTORS OF NEWBORN
NEUROBEHAVIOR**

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ABSTRACT

Introduction. Borderline personality disorder (BPD) is characterized by difficulties with emotion regulation, impulsivity, and unpredictable relationships (Sanislow et al., 2002; Brodsky et al., 2006). Regulating stress is particularly difficult for women with BPD (Kuo & Linehan, 2009). It may be that pregnant women experiencing emotion dysregulation expose their unborn infants to heightened stress in various ways, which has implications for neurobehavioral outcomes. However, the literature examining how women with BPD respond to stress during pregnancy is lacking. Examining maternal physiological reactivity to stress is important because research supporting Linehan's biosocial developmental theory suggests maternal BPD and physiological stress responses during pregnancy may shape infant neurobehavior while *in utero* (Linehan, 1993; Crowell et al., 2009; Crandell, Patrick & Hobson, 2003; Lindsay, Buss, Wadhwa, & Entringer., 2018; Kofman, 2002; Davis, Glynn, Waffarn, & Sandman., 2011; Glover, O'Connor, Heron, & Golding., 2004; Weinstock, 2001).

Present Study. To build on research examining infant neurobehavioral outcomes for women with BPD the present study aimed to 1) examine whether women with symptoms of BPD who are pregnant show similar stress and emotion physiological regulation difficulties as women with BPD who are not pregnant. We examined the associations between BPD and autonomic responses during a resting baseline and during the Trier Social Stress Test (TSST). We hypothesized a) higher maternal symptoms of BPD would be associated with heightened heart rate (HR) and reduced respiratory sinus arrhythmia (RSA), an index of parasympathetic nervous system responding, during baseline. This profile would indicate biologic vulnerability for emotion dysregulation (Kuo & Linehan, 2009). We also expected b) HR to increase from a baseline to a preparatory phase of the TSST for women with BPD symptoms, as this would indicate anticipatory stress responding for women with BPD. Additionally, we expected c) RSA would decrease from a baseline to the recovery phase of the TSST for women with BPD to reflect difficulty with emotion regulation while recovering from stress.

We also aimed to 2) examine the associations between BPD and newborn neurobehavior. We hypothesized d) higher maternal BPD symptoms would be associated with impairments in newborn neurobehavior (i.e. attention, self-regulation, stress/abstinence, and arousal/excitability).

Method. One hundred and thirty-four pregnant women in their third trimester of pregnancy and their newborns participated. All women filled out a demographic questionnaire and the Borderline Symptom List—Short Form (BSL-23), which determines BPD symptom severity (Bohus et al., 2009). A BPD summary score was utilized from the BSL-23 (i.e. a mean value measuring the key 23 BPD symptoms). Each pregnant woman's physiological stress response was measured with the TSST, which elicits a stress response in adults with a preparation, stress (i.e. speech and math tasks), and a recovery phase (Kudielka, Hellhammer, & Kirschbaum, 2007). We collected continuous measures of HR and RSA during a 10-minute baseline and the TSST. Finally, newborns were assessed at the hospital with the NICU Network Neurobehavioral Scale (NNNS), which assesses infants at high-risk for neurodevelopmental delays and behavioral outcomes with specific summary scores (e.g., attention, self-regulation, stress/abstinence, and arousal/excitability; Lester et al., 2004; Lester & Tronick, 2004; Lester et al., 2009).

Results. First, we examined associations between BPD and physiological responses during a 10-minute baseline and to the TSST. Maternal borderline personality symptoms were significantly and negatively correlated with baseline RSA ($r = -.17, p = .05$). There was no significant association between maternal BPD and baseline HR ($r = .11, p = .22$). These findings suggest that pregnant women experiencing more symptoms of BPD during the third trimester of pregnancy have lower RSA responding during baseline but not heightened HR (hypothesis a). Next, results suggested that mean HR during the preparatory phase was significantly higher than during the baseline for all women ($t(137) = 4.17, p < .001$; Mean Difference = 4.07 bpm), but HR during the preparation episode was not significantly associated with BPD ($r = .14, p = .12$). These two findings suggest stress increased while preparing for a speech for all women, not more for those with higher BPD symptoms (hypothesis b). Next, we computed a change score for the difference between baseline RSA and recovery RSA. We then examined correlations between this change score and BPD, but the association was not significant ($r = .12, p = .23$). This finding suggests women with BPD symptoms while pregnant did not show differences in physiological dysregulation at recovery compared to baseline (hypothesis c).

Finally, to address our second aim we examined correlations between maternal BPD and newborn NNNS summary scores, but the associations were not significant (hypothesis d).

Conclusion. These findings extend previous research on maternal BPD by showing that women with symptoms of BPD who are pregnant show similar levels of baseline RSA compared to non-pregnant women with BPD, but do not share other stress and emotional dysregulation responses. It is possible that unexamined covariates, such as comorbidity or the presence/absence of dissociation, an important BPD symptom which influences autonomic responding (Ebner-Priemer et al., 2005), could account for the present findings. The present study focused specifically on parasympathetic nervous system responding to examine emotion dysregulation. Future research should simultaneously assess parasympathetic and sympathetic responding in relation to BPD and newborn neurobehavior, as both sub-autonomic systems are imperative to a full understanding of physiologic emotional-responding (Kuo & Linehan, 2009).

Keywords: borderline personality disorder (BPD), maternal physiologic stress, heart rate (HR), respiratory sinus arrhythmia (RSA), emotion dysregulation (ER), newborn neurobehavior, NICU Network Neurobehavioral Scale (NNNS)