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Associations among Maternal Trauma History, Postnatal Maternal Sensitivity, and Infant Temperament

by

Jennifer Lynn Hambleton

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To the Graduate Faculty:

The members of the committee appointed to examine the thesis of Jennifer Hambleton find it satisfactory and recommend that it be accepted.

_____
Nicki Aubuchon-Endsley,
Major Advisor

_____
Samuel Peer,
Committee Member

_____
Mark Austin,
Graduate Faculty Representative

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List of Abbreviations

CT	Childhood trauma
DSM-5	Diagnostic and Statistical Manual of Mental Disorders (5th Ed.)
GRA	Graduate research assistant
IBQ-R-SF	Infant Behavior Questionnaire – Revised – Short Form
IPV	Interpersonal violence
Lab-TAB	Laboratory Temperament Assessment Battery
LMP	Last menstrual period
PTS	Posttraumatic stress
PTSD	Posttraumatic stress disorder
THQ	Trauma History Questionnaire
URA	Undergraduate research assistant

Associations among Maternal Trauma History,

Postnatal Maternal Sensitivity,

and Infant Temperament

Thesis Abstract--Idaho State University (2021)

Women are at increased risk of trauma exposure and of experiencing prolonged PTS. This may negatively impact mother-infant interaction quality and infant temperament. More research is needed to examine interactive mechanisms of developmental risk and to identify which predictors were most robustly related to infant temperament outcomes. The present study aimed to address this gap by examining how maternal sensitivity explained relations between maternal trauma and infant temperament. Mediation via maternal sensitivity was not supported in any of the primary analyses. Greater maternal trauma exposure was found to predict greater infant regulation behavior; however, results were not statistically significant after correcting for type 1 error inflation. Future research models should include additional trauma variables (e.g., recency, type, revictimization/polyvictimization), along with maternal insensitivity/ambiguous responding and closer analysis of the IBQ-R subscales. Follow-up analyses may determine whether null findings were due to construct definitions/measures or to sample limitations.

Keywords: maternal, prenatal, infant, trauma, temperament, development, sensitivity

Chapter I: Associations among Maternal Trauma History, Postnatal Maternal Sensitivity, and Infant Temperament

Women are twice as likely as men to meet diagnostic criteria for posttraumatic stress disorder (PTSD) following trauma exposure and on average, they experience symptoms longer (American Psychological Association, 2017). Gender differences in trauma exposure and posttraumatic stress (PTS) symptomology are observed as early as childhood, such that female children are at greater risk of experiencing sexual abuse or abuse by a caregiver compared with male children (Wamser-Nanney, R. & Cherry, K.E., 2018). Additionally, female children exhibit more symptoms of depression, dissociation, and PTSD symptoms compared with sexually abused male children (Wamser-Nanney, R. & Cherry, K.E., 2018). Compared with men, women also demonstrate greater trauma exposure symptoms following indirect violence exposure, such as witnessing or hearing of serious injury or death of a loved one (Wamser-Nanney, R. & Cherry, K.E., 2018). Research suggests that socially gendered roles, such as caregiving, are positively associated with the observed elevation of trauma symptoms in these women who identify as a caregiver (Wamser-Nanney, R. & Cherry, K.E., 2018). Given women's increased risk for persistent trauma effects on daily functioning, along with the psychosocially influential role that women fill to support their offspring's early development, it is crucial for researchers to examine early risk factors that may increase mother and infant vulnerability to adverse outcomes associated with maternal traumatic experiences.

The offspring infant developmental period represents an ideal time point to study offspring outcome relations with maternal trauma because maternal trauma symptoms are often unresolved prior to motherhood (Seng & Taylor, 2015), and because maternal caregiving behaviors have been shown to influence early infant emotional development following birth

(Braungart-Rieker, Hill-Soderlund, & Karrass, 2010; Kivijärvi, Räihä, Kaljonen, Tamminen, & Piha, 2005; Leerkes, Blankson, & O'Brien, 2009). Moreover, prenatal psychophysiological stress may affect the nature and quality of maternal-infant interactions in the postnatal period, which are also influenced by maternal biopsychosocial stress and mental health (Howland et al., 2017; Juul et al., 2016; Letourneau, Watson, Duffett-Leger, Hegadoren, & Tryphonopoulos, 2011; Van den Bergh et al., 2017). Therefore, the present study aims to examine relations between maternal trauma history and infant temperament, and how these relations may be mediated by postnatal maternal sensitivity toward infants.

In support of this study, theoretical and empirical literature regarding trauma, maternal sensitivity, and infant temperament will be reviewed. Specifically, prior research supports a link between maternal trauma history during pregnancy and offspring temperament, but more studies are needed to better understand other factors involved in those relations to inform prevention and intervention research and practice. Preliminary work highlights the role of maternal postnatal sensitivity (as expressed through behavioral reciprocity) in relation to maternal trauma history and offspring temperament, suggesting that it may be a mediator.

Trauma

Maternal Trauma

According to the Diagnostic and Statistical Manual of Mental Disorders (5th Ed.; DSM-5), traumatic events are defined as "exposure to actual or threatened death, serious injury, or sexual violence," which may be either directly experienced, witnessed in person, learned of about a loved one, or by repeated or extreme exposure to similar events (e.g., first responders exposed to multiple human remains) (American Psychiatric Association, p. 271, 2013), 2017). The DSM-5 further defines the following PTS symptom types associated with traumatic events:

(1) intrusive symptoms that begin after the traumatic event, (2) persistent avoidance of reminders of the traumatic event, (3) negative alterations in cognition and mood that begin or worsen after the traumatic event, (4) and marked alterations in arousal or reactivity (American Psychiatric Association, p. 271—272, 2013).

Intrusive symptoms associated with the traumatic event may involve recurrent, involuntary, and intrusive distressing memories, recurrent and distressing dreams, dissociation (e.g., flashbacks, loss of awareness of present surroundings), intense or prolonged psychological distress upon exposure to reminders of the events and marked physiological reactions to both internal and external reminders of the event (American Psychiatric Association, p. 271, 2013). Persistent avoidance of reminders of the traumatic event may involve avoidance of internal cues, such as distressing memories, thoughts, or feelings about the event. Or, avoidance may involve external cues, such as avoidance of people, places, objects, or situations that evoke psychological distress about the event (American Psychiatric Association, p. 271, 2013). Negative alterations in cognition and mood that begin or worsen after the traumatic event may manifest as an inability to remember important aspects of the event, persistent and exaggerated negative beliefs about oneself, others, or the world, persistent and distorted cognitions about causal factors for the event that lead to blaming others or self-blame, a persistent negative emotional state (e.g., fear, anger, guilt), a marked decrease in interest or participation in activities, feelings of detachment and/or estrangement, and a persistent inability to experience positive emotions (e.g., happiness or satisfaction; American Psychiatric Association, p. 271—272, 2013). Marked alterations in arousal or activity may be experienced as irritable behavior and angry outbursts, reckless or self-destructive behavior, hypervigilance, exaggerated startle response, concentration difficulties, and/or sleep disturbance (American Psychiatric Association, p. 272, 2013).

Given broad variability in different types of traumatic events and PTS symptom experiences, it is also important to define severity in terms of both trauma exposure and PTS. Regarding severity of trauma exposure, there are several contributing factors to consider, which include previous trauma exposure, proximity to the event, indirect versus direct exposure, and degree of harm (American Psychiatric Association, p 2013). The DSM-5 states that "the greater the magnitude of trauma, the greater the likelihood of PTSD," (American Psychiatric Association, p. 278, 2013). Therefore, women who experience complex trauma (e.g., repeated exposure), close proximity, and a greater degree of harm from trauma exposure are more likely to experience a greater amount of clinically elevated PTS symptoms. Severity of PTS symptoms may be defined as a continuum of frequency, intensity, and duration (FID) and any associated impaired functioning. For example, women who were exposed to CT may report different FID experiences that would differentially impact functioning over time. One mother may report no longer being affected by her past CT; whereas, another mother may experience PTS symptoms throughout her life as a result of CT. Therefore, severity of both trauma exposure and PTS stand to elucidate the nature of relations between maternal behaviors and offspring outcomes.

Trauma exposure and PTS symptoms often have adverse and lasting impacts on biopsychosocial functioning, which may increase risk for adverse offspring outcomes, particularly during gestation when the mother's and infant's biological systems interact so directly and robustly with one another (Bosquet Enlow, Egeland, Carlson, Blood, & Wright, 2014; Bowers & Yehuda, 2016). Several types of maternal trauma exposures have been previously examined in relation to parenting behaviors and/or offspring outcomes, including childhood trauma (CT; Hughes & Cossar, 2016; Juul et al., 2016; Lang, Gartstein, Rodgers, & Lebeck, 2010; Lyons-Ruth & Block, 1996; Martinez-Torteya et al., 2014), disaster exposure

(Harville, Xiong, & Buekens, 2010), and interpersonal violence (IPV; Ahlfs-Dunn & Huth-Bocks, 2014; Burke, Lee, & O'Campo, 2008; Zou, Zhang, Cao, & Zhang, 2015).

Specifically, maternal CT has been shown to predict greater neutral maternal affect during mother-infant interactions (Juul et al., 2016). This has important implications for the quality of caregiver interactions, and therefore, whether an infant's needs are met in an adaptive manner. This is congruent with recent research on maternal childhood emotional abuse and neglect, which has shown that maternal childhood emotional abuse predicted lower maternal sensitivity toward infants and greater dysfunction in maternal-child interactions (Hughes & Cossar, 2016; Lang, Gartstein, Rodgers, & Lebeck, 2010). Additionally, maternal childhood physical abuse has been associated positively with emotionally withdrawn caregiving behavior, hostile maternal behaviors (e.g., behaviors that communicate irritation or disgust), mismatched maternal behaviors (e.g., speaking pleasantly about negative content), and negative infant affect (Lyons-Ruth & Block, 1996). Similarly, another study found that mothers who scored lower on positive parenting (as demonstrated by behavioral observations of maternal behavioral sensitivity, engagement, warmth, affective sensitivity and positive affect) also had infants who scored lower in behavioral observations of emotion regulation (Martinez-Torteya et al., 2014).

Regarding disaster exposure, a recent review examined the extant literature to highlight disaster relations with perinatal health (e.g., premature delivery, birthweight, mental health, and infant development; Harville, Xiong, & Buekens, 2010). The review included studies of disasters involving terrorist attacks, environmental and chemical disasters, and natural disasters (e.g., hurricanes, earthquakes; Harville, Xiong, & Buekens, 2010). Overall, results indicated that disaster exposure may predict fetal growth reduction in pregnant women, though there was not a significant difference in gestational age at birth for disaster-exposed women (Harville, Xiong, &

Buekens, 2010). While some infant outcomes are dependent on differences in the type of disaster exposure (e.g., congenital defects related to Chernobyl exposure vs. nutritional deficits related to lack of resources from hurricane damage), results broadly indicated across studies that the severity of disaster exposure was the strongest predictor of mental health in both pregnant and postpartum women, and that this relation was strongest for women with greater direct exposure (e.g., proximity to the disastrous event). These results are consistent with the larger body of gender differences in trauma research which indicates that proximity to trauma exposure is a well-established risk factor for mental and behavioral health outcomes (May & Wisco, 2016). Additionally, post-disaster maternal mental health was shown to predict infant social development and temperament difficulties in studies of the Quebec ice storm of 1998 and Hurricane Katrina (Harville, Xiong, & Buekens, 2010). These patterns across disaster studies highlight the importance of assessing severity of exposure impact on women's functioning following trauma, and of quantifying the frequency of direct versus indirect trauma exposures.

Regarding IPV, one study examined a sample of 120 mother-infant dyads for maternal prenatal and postnatal IPV experiences in relation to infant emotion regulation at 3 months postpartum and infant socioemotional difficulties at 12 months postpartum (Ahlfs-Dunn & Huth-Bocks, 2014). Findings showed that infants demonstrated greater socioemotional difficulties at 12 months when mothers were exposed to IPV during the first year following birth (Ahlfs-Dunn & Huth-Bocks, 2014). Moreover, this association was moderated by maternal posttraumatic stress symptoms (Ahlfs-Dunn & Huth-Bocks, 2014), which suggests that maternal trauma severity indicators help to explain differences in infant outcomes as they pertain to maternal trauma experiences. There were no significant differences between infants of mothers who

experienced prenatal IPV compared with infants of mothers who did not experience prenatal IPV (Ahlfs-Dunn & Huth-Bocks, 2014).

Conversely, a study of 247 mother-infant dyads in China revealed significant relations between IPV perpetrated on mothers during pregnancy and infant temperament and development (Zou, Zhang, Cao, & Zhang, 2015). Specifically, results showed that infants born to mothers who experienced IPV during pregnancy exhibited greater developmental difficulties at 10 months, including higher scores on withdrawal behaviors, greater negative affect, poorer motor coordination, less interest in play activities, higher distractibility, and more frequent crying (Zou, Zhang, Cao, & Zhang, 2015). The differences in findings between and across studies may be best explained by the use of different infant outcome constructs/measures to capture temperament (e.g., behavioral observation versus self-report measures) and assessment at different time points (e.g., maternal variables prior to pregnancy, during pregnancy, and postpartum, and infant variables at different stages of development). However, both studies focused solely on prenatal IPV experiences and did not include an assessment of trauma prior to the prenatal period. Thus, if mothers who experienced trauma prior to conception did not endorse prenatal IPV, the potential contributions of earlier maternal trauma exposure to infant temperament outcomes would not have been captured. This is particularly important in the context of the present study, given a wealth of literature that has shown revictimization and polyvictimization, or complex trauma, to be robust predictors of impaired behavioral health and PTS (Ford, 2021).

Additional work has examined relations between retrospective self-reports of maternal IPV experiences with their partners at two timepoints (i.e., after birth and 12 months postpartum) and infant health and temperament outcomes (Burke, Lee, & O'Campo, 2008). Results showed that psychological IPV was associated with greater infant temperament difficulties at both

timepoints, and physical IPV was associated with lower general infant health (Burke, Lee, & O'Campo, 2008). These findings indicate that infant health and infant temperament outcomes vary as a function of maternal IPV experience types. However, this study was focused on maternal IPV experiences with the baby's father and may not have captured the potential contributions of earlier maternal trauma exposures on infant outcomes. Given the proclivity for prolonged effects of traumatic experiences that stem from multiple types of trauma, and complex trauma, more research is needed to capture the effects of a complete trauma exposure history in relation to maternal parenting behaviors and offspring outcomes.

Additionally, research has examined mothers who were deemed likely to meet diagnostic criteria for PTSD (Bosquet Enlow et al., 2011). A sample of 52 mother-infant dyads were examined for relations between maternal PTSD symptoms and infant emotion reactivity and regulation at 6 months (Bosquet Enlow et al., 2011). Mothers reported PTSD symptoms via a self-report questionnaire based on DSM-IV PTSD diagnostic criteria and were subsequently assigned to either an elevated or non-elevated group based on whether the symptom count would likely meet a PTSD diagnosis (Bosquet Enlow et al., 2011). Analyses indicated that maternal PTSD symptoms were not associated with infant emotional reactivity but did significantly predict emotion regulation behaviors for mothers in the elevated symptom group (Bosquet Enlow et al., 2011). Given that infants learn to regulate their emotions via caregiver interactions, this finding may be reflective of the poorer mother-infant interaction styles observed with trauma-exposed women. Additionally, the elevated versus non-elevated symptom grouping approach is only one way to conceptualize or quantify the severity of trauma exposure. Given that numerous studies have not controlled for PTSD diagnoses and have still demonstrated significant findings among maternal trauma experiences and infant outcomes, it may be beneficial for researchers to

utilize numeric variables for trauma exposure and PTS severity in order to better detect nuances along a continuum that may be limited by PTSD diagnostic criteria.

Despite these findings in the maternal trauma literature, there is a paucity of research examining important moderators and mediators to relations between maternal trauma and infant temperament. Moreover, many studies focus on the effects of one type of trauma exposure at specific timepoints. While invaluable to the extant literature, these studies do not capture comprehensive maternal trauma history that may be instrumental in identifying overarching patterns and mechanisms of associated infant outcomes. Additionally, studies have not disentangled the type of maternal trauma variables (e.g., exposure severity and PTS severity) that may be related most robustly to maternal-infant interaction quality and infant temperament outcomes. This is important as it will inform which variables may be best to target in future research and potential interventions for associated difficulties. Moreover, the use of different trauma assessment measures across studies has resulted in differences in the depth and breadth of coverage pertaining to details of maternal trauma history and offspring outcomes. These research gaps were addressed in the current study by utilizing the Trauma History Questionnaire (THQ; Hooper, Stockton, Krupnick, & Green, 2011) to assess maternal trauma, which accounted for exposure to a wide range of traumatic event types across the lifetime. The THQ also provided data about maternal perceptions of the severity of trauma-associated impaired functioning (which is representative of PTS severity) at the time of the event, as well as over the past year at time of assessment.

Parental-Offspring Trauma-Associated Interactions

A review of the literature on the effects of parental trauma on offspring revealed several factors that may account for these associations, including: reduced maternal sensitivity to

offspring, maternal difficulty with facilitating social interactivity, maternal emotion regulation difficulty, altered cognitions (e.g., defensive reactions, disordered affect, rumination on the traumatic event), insecure attachments (e.g., emotional unavailability of the caregiver), and dysregulation of the HPA axis (atypical biological responses to stress; Kaitz et al., 2009). In particular, these risk factors may explain associations among maternal trauma and adverse offspring effects, including: stress-reactive infant temperament, dysregulated offspring HPA axis, higher rates of anxiety in childhood and adolescence, avoidance or withdrawal from caregivers, maladaptive coping strategies, hypervigilance, poor emotion regulation, chronic stress, interpersonal/socioemotional skill deficits, and lasting alterations within the offspring's cardiometabolic and neuroendocrine processes as a result of HPA axis dysregulation (Ahlfs-Dunn & Huth-Bocks, 2014; Brand, Engel, Canfield, & Yehuda, 2006; Schwerdtfeger Gallus & Nelson Goff, 2007; Seckl, 2008).

Therefore, the current study aimed to examine whether the earliest of these risk factors directly predicted maternal sensitivity during early infancy, which has been shown to directly predict infant temperament. Findings could provide researchers and clinicians with a modifiable target to reduce or eliminate the relationship between maternal trauma history and infant temperament difficulties, which sets the stage for a number of developmental difficulties.

Maternal Sensitivity

Definition

Maternal sensitivity is rooted in attachment theory and was conceived of by Mary Ainsworth while she was examining underlying mechanisms of the formation of insecure versus secure maternal-infant attachments (Bretherton, 2013). Specifically, while she was reviewing transcript narratives of maternal-infant interactions from an observational study conducted in

Uganda, she noticed three overarching behavioral patterns that emerged consistently with securely attached infants, and which came to be known as the first operational definition of maternal sensitivity (Bretherton, 2013). The first behavioral pattern included maternal sensitivity and response to infant signals, such that signals are perceived and correctly interpreted, and then promptly and appropriately responded to by the mother (Ainsworth, 1967, as cited in Bretherton, 2013). The second behavioral pattern included maternal tendencies to provide care that aligned with the infant's state and mood, and that were in time with the infant's needs or desires. The third behavioral pattern involved interaction with the infant, such that quantity of interaction was less important than quality (Ainsworth, 1967, as cited in Bretherton, 2013). Ainsworth found that mother-infant dyads with "good interactions" demonstrated a quality of "mutual delight which characterizes their exchanges" (Ainsworth, 1967, p. 397 as cited in Bretherton, 2013).

Maternal sensitivity has also been defined as the extent to which a mother demonstrates insightfulness about her infant's internal experience, responsiveness to her infant's needs, and the appropriateness of maternal caregiving behaviors across contexts (Koren-Karie, Oppenheim, Dolev, Sher, & Etzion-Carasso, 2002; Shin, Park, Ryu, & Seomun, 2008). However, these pervasive inconsistencies in the ways in which maternal sensitivity is defined, assessed, and reported across studies (Mesman & Emmen, 2013; Shin, Park, Ryu, & Seomun, 2008) makes it challenging to operationalize, replicate, and extend extant literature. Therefore, the current study utilized a well-validated behavioral assessment of early maternal-infant interactions to assess maternal sensitivity in a manner consistent with seminal theoretical work as well as contemporary empirical studies.

Infant Temperament

Definition

Individual differences in infant temperament have been observed from birth, and researchers have theorized that such differences are the result of both psychological and biological influence (Rothbart, 2011). There are several models of infant temperament; however, the scope of the present study will focus on infant temperament as conceptualized and defined through the psychobiological approach developed by Mary Rothbart (2011). Specifically, infant temperament has been previously defined from a psychobiological approach as "constitutionally [or biologically] based individual differences in reactivity and self-regulation, influenced over time by heredity, maturation, and experience" (Rothbart, 1986). The reactivity component of the infant temperament definition involves individual differences in patterns of emotional arousal, motor activity, and attention in response to both internal and external stimuli (Rothbart, 1986). Examples of reactivity patterns are observed in motor and vocal activity, smiling, laughing, fear, and frustration, and are assessed in terms of response threshold, latency, intensity, time to peak intensity, and reaction recovery time (Gartstein & Rothbart, 2003; Rothbart, 1986). The self-regulation component of temperament involves actions that increase or moderate such reactive tendencies (Rothbart, 2011). Self-regulation patterns may enhance or inhibit reactivity, such as engagement in self-soothing when confronted with distressing stimuli, attentional regulation, and approach and avoidance behaviors (Rothbart, 1986).

Assessment

Rothbart (2011) posited that while individual reactivity and self-regulation patterns are relatively stable across contexts (e.g., such as fearfulness exhibited consistently in response to sudden stimulus changes and consistent inhibition to novelty), no single behavioral measure item

provides reliable evidence of consistency over time. For example, an infant who responds fearfully to only one type of stimulus change, such as a loud noise, is not likely to demonstrate the same quality of fearful temperament patterns as an infant who responds fearfully to a variety of stimuli changes and who is inhibited in most new situations. These two infants are qualitatively different from one another on the temperament dimension of fear and multiple items are needed to elucidate such differences.

Therefore, Rothbart (2011) stated that multiple caregiver report items were needed to assess each dimension of reactivity and self-regulation to best capture patterns across contexts, which is why the current study utilizes the Infant Behavior Questionnaire -Revised-Short Form (IBQ-R-SF; Putnam et al., 2014; Gartstein & Rothbart, 2003). Rothbart (2011) posited that reactivity was best captured by separating positive emotionality and negative emotionality components of temperament into two separate dimensions due to findings that individual infants could score high or low on both types of emotionality, and that scoring high on one type did not automatically mean a low score would be obtained on the other type (i.e., they are largely orthogonal factors). Therefore, during the development of the IBQ-R-SF, the construct of reactivity was comprised of two factors, including Surgency and Negative Reactivity, and self-regulation was captured with a third Orienting/Regulation factor (Rothbart, 2011).

The concurrent assessment of reactive and regulation factors provides a strong informational foundation that affords an opportunity for researchers to examine not only how infant temperament is expressed, but why certain temperament patterns may develop given various biopsychosocial constraints or experiences (Rothbart, 2011). Biopsychosocial development occurs rapidly in infancy, and early experiences may influence even relatively stable temperamental tendencies, which result in important implications for long-term outcomes.

For example, while an infant exposed to dysregulated maternal cortisol may develop a sensitized stress response system, the infant may still react adaptively to distress when the caregiver responds in a sensitive manner. This infant may demonstrate a higher level of positive reactivity and greater self-regulation abilities than an infant who is similarly exposed to dysregulated maternal cortisol, but who receives insensitive caregiving. Infants who experience both an elevated stress response and insensitive caregiving may demonstrate higher levels of negative reactivity and decreased self-regulation abilities.

The IBQ-R-SF has been widely used in infant research and captures a broad range of biologically and psychosocially based temperament characteristics that elucidate individual differences in how infants perceive and interact with the world (Davidson, Sherer, & Goldsmith, 2009; Gartstein & Rothbart, 2003; Rothbart, 1981). Therefore, the IBQ-R-SF was utilized within the present study to capture infant temperament surgency, negative affectivity, and regulation/orienting outcomes.

Chapter II: Current Study Model

Maternal trauma and maternal postnatal sensitivity toward offspring have been shown to predict infant temperament outcomes individually and uniquely. However, more research is needed to understand mediating relations and to build a comprehensive theoretical model that would help to explain findings within the field. Therefore, findings from existing literature are synthesized below to support the current study model components and hypothesized relationships.

Maternal Trauma History and Infant Temperament

Research has found a significant positive association between maternal endorsement of intimate partner physical and psychological abuse, and greater infant temperament difficulty following birth and at 12 months postpartum (ß =.20, *SE* = 0.03, p <.001; Burke, Lee, & O'Campo, 2008). Similarly, another study examined infant temperament outcomes in relation to maternal trauma exposure in a sample of 44 mother-infant dyads who were assessed during pregnancy, after birth, and at 1 year postpartum (Lang et al., 2010). Mothers completed self-report forms by mail, including the Childhood Trauma Questionnaire (CTQ), the State Trait Anxiety Inventory (STAI), The PTSD Checklist Civilian version (PCL-C), the IBQ-R, the Parenting Sense of Competence Scale (PSOC), and the Parenting Stress Index- Short Form (PSI-SF; (Lang et al., 2010). Analyses revealed that infants born to mothers with a history of emotional abuse demonstrated lower levels of distress to limitations (ß = -.60, p <.05) and higher scores on falling reactivity (ß = .61, p <.05). These findings suggest that infants develop a blunted distress response to limitation activities, as well as a sensitized response for more rapid recovery from distress. Additionally, infants born to mothers with physical abuse trauma histories demonstrated lower scores on falling reactivity (ß = -.52, p <.05), which indicates that

these infants developed a slower rate of distress response recovery. Taken together, findings support that maternal trauma experiences may affect developmental trajectories in temperament constructs.

Maternal Sensitivity Mediates Trauma History and Infant Temperament Relations

Although no known study examines this mediation hypothesis from the prenatal to infancy periods, there are two bodies of literature that examine univariate relationships between (1) maternal sensitivity and maternal trauma history and (2) infant temperament and maternal trauma history, which support the mediation hypothesis. Research from both bodies of literature is discussed below. Moreover, recent theoretical models linking maternal mental health, maternal-infant reciprocity, and infant development also converge with this hypothesis (Aubuchon-Endsley, Devine, Gee, & Ramsdell-Hudock, 2020).

Maternal Trauma History and Sensitivity

Although there is variability in the literature regarding the size or quantity of relationships between trauma history and maternal sensitivity to infants, several studies support a direct association. This may be because there is a threshold of trauma exposure and/or PTS symptomology that is more likely to lead to behavioral changes between mothers and caregivers. For example, in one study, maternal endorsement of physical abuse from a partner was associated with lower quality of maternal-infant interactions and poorer infant ability to recover from distress, though mediation was not explored (Lang et al., 2010).

In another sample of 255 mother-infant dyads assessed at 6 months postpartum via behavioral observations of mother-infant interactions, maternal affect was coded and the Structured Clinical Interview for Diagnostic and Statistical Manual-5 (DSM-5) disorders (PTSD) module was administered to capture trauma history (Juul et al., 2016). Findings revealed that

greater maternal childhood trauma predicted neutral maternal affect (β = .23, $t = -2.76$, $p = .007$; Juul et al., 2016). These findings indicate that mothers exposed to greater childhood trauma may not be as emotionally responsive to their infants, which may be due to alterations in cognitions, mood, or behavior secondary to clinically significant posttraumatic stress.

In another study, researchers examined low-income mothers and 18-month-old infants to assess relations between different types of maternal trauma (e.g., childhood, adult), caregiving behavior, and infant affect (Lyons-Ruth & Block, 1996). Mother-infant interactions were assessed via naturalistic observation videotapes that were completed at home at 18 months postpartum and were coded for maternal sensitivity using Ainsworth's Sensitivity Scale (Lyons-Ruth & Block, 1996). Mothers also completed the Covert Hostility Scale and the Flatness of Affect Scale to assess maternal affective cues (Lyons-Ruth & Block, 1996). Maternal trauma history was assessed via interview at 8–9 years postpartum via the Posttraumatic Stress Symptom Scale (Lyons-Ruth & Block, 1996). Results revealed a positive association between maternal childhood physical abuse history and increased maternal hostile behaviors ($r = .31$, $p < .05$). Maternal hostile behaviors were defined as inconsistent affective cues and behavior, such as smiling with a sharp tone of voice or speaking in a mismatched pleasant tone about negative content (Lyons-Ruth & Block, 1996). Results from this study provided additional evidence that mothers who reported childhood sexual abuse history were less involved with their infants ($r = -.35$, $p < .05$) and exhibited significantly more restricted affect ($r = .36$, $p < .02$). These findings are important in the context of the current study, as results elucidate key differences in maternal caregiving behaviors stemming from multiple forms of maternal trauma exposures. This literature was extended by the current study through data collection of all variables within the

prenatal and infancy developmental period, and by using updated and well-validated measures for the maternal trauma, maternal sensitivity, and infant temperament constructs.

Maternal Sensitivity and Infant Temperament

Maternal caregiving behaviors are also important to the present study given research which indicates that adverse infant outcomes are associated with insensitive caregiving (Thomas, Letourneau, Campbell, Tomfohr-Madsen, & Giesbrecht, 2017). Specifically, a study of 254 mother-infant dyads showed that infants born to mothers with low maternal sensitivity, exhibited greater negative affect at 3 months (Thomas et al., 2017). Infants with greater negative affectivity at 3 months also demonstrated poorer emotion regulation behaviors at 6 months, but only when maternal sensitivity was low (Thomas et al., 2017).

Additional work examined 143 mother-infant dyads to examine the stability of fear and anger reactivity from 4-16 months postpartum, in relation to maternal reports of infant temperament, and behavioral observations of infant attention regulation and maternal sensitivity (Braungart-Rieker, Hill-Soderland, & Karrass, 2010). Data showed that infants who engaged in less regulatory behaviors also exhibited greater fear and anger reactivity across time (Braungart-Rieker, Hill-Soderland, & Karrass, 2010). Analyses further revealed that infants of more sensitive mothers exhibited slower increases in fear reactivity during behavioral observations of fear-eliciting tasks than infants who had insensitive mothers (Braungart-Rieker, Hill-Soderland, & Karrass, 2010). These findings are supported by previous work, which showed that both infant regulatory difficulties and low maternal sensitivity at 6 months moderated the relationship between infant reactivity to novel situations at 6 months and anxious behavior at 2.5 years (Crockenberg & Leerkes, 2006).

Overall, these research findings suggest that infant and maternal reciprocity behaviors interact with one another to change developmental trajectories (Braungart-Rieker, Hill-Soderland, & Karrass, 2010; Crockenberg & Leerkes, 2006; Kivijärvi, Räihä, Kaljonen, Tamminen, & Piha, 2005). Infants of more sensitive mothers may be afforded an advantage to learn adaptive emotion regulation strategies via maternal modeling that infants of less sensitive mothers are unable to observe/reciprocate and may be less likely to develop for themselves.

Summary

Biopsychosocial development occurs rapidly during infancy, and the influence of early experiences and relatively stable temperamental tendencies each have important implications for long-term outcomes. Despite empirically supported associations between maternal trauma history and maternal postnatal sensitivity (American Psychological Association, 2017; Kaitz, Levy, Ebstein, Faraone, & Mankuta, 2009), our understanding of associations with early infant temperament development is limited, particularly with regard to individual and combined effects of maternal risk factors. Across studies, researchers have examined relations among maternal trauma and maternal sensitivity in relation to infant temperament outcomes; however, there is a paucity of research that includes each of these variables within a single study or theoretical model. Additional longitudinal research is needed to identify maternal and infant targets for prevention and intervention research and for clinical application during critical developmental timepoints. The current study filled gaps in the extant literature by examining different types of maternal trauma variables (i.e., exposure and impairment over the past year across trauma types) in a maternal-offspring sample followed from pregnancy through infancy. Additionally, these variables were investigated in relation to infant temperament outcomes using a comprehensive and well-validated measure of this construct (i.e., Surgency, Negative Affectivity, and

Orienting/Regulation). To our knowledge, this was the first study to examine each of these constructs simultaneously via a mediation model within a sample derived from a health provider shortage area for mental health and primary care.

Hypotheses

Based on findings within the literature, it was proposed that maternal trauma history (as assessed by self-reported severity of trauma-associated impaired functioning over the past year and trauma event exposure) would predict maternal sensitivity (path *a*), and infant temperament (path *c'*). Additionally, maternal sensitivity was predicted to mediate relations between maternal trauma variables and infant temperament (path *ab*).

Hypothesis 1–3 (a–b)

Maternal sensitivity (*M*) would mediate the relationship between maternal trauma history (Hypothesis a = past year impairment, Hypothesis b = exposure(s); *X*) and infant temperament (Hypothesis 1a/1b = Surgency/Reactivity, Hypothesis 2a/2b = Negative Affectivity, Hypothesis 3a/3b = Regulation/Orienting; *Y*), such that mothers with a greater trauma-associated impairment/exposure will score lower on sensitivity and will report lower infant surgency and regulation, and higher negative affectivity.

Chapter III: Methods

Participants

Participants (n = 92) were comprised of mother-infant dyads (mothers between 18–35 years of age at recruitment) who participated in both the prenatal (33–37 weeks gestation) and 6-month postnatal sessions of the Infant Development and Healthy Outcomes in Mothers (IDAHO Mom) Study. While 96 of the original 125 dyads completed the postnatal session, only 92 dyads included reliable behavioral coding for the maternal sensitivity variable and was thereby the final sample size for the present study. The majority of participants identified as White (92%), married (84%), belonged to the Church of Jesus Christ of Latter-Day Saints (64%), and had a college-level education (72%). Regarding annual household income, mothers reported income ranges of less than $5,000 (1%), $5,000 – $9,999 (2%), $10,000 – $29,999 (31%), $30,000 – $49,999 (21%), $50,000 – $74,999 (28%), and $75,000 – $100,000 or more (13%). The Idaho State University Institutional Review Board approved this study.

Measures

Maternal trauma history was assessed via self-report from mothers in the third trimester of pregnancy (33–37 weeks gestation), while maternal sensitivity and infant temperament were assessed at 6 months postpartum (± 2 weeks) from audiovisual recordings and a self-report measure, respectively. Copyrighted measures (e.g., THQ; Hooper et al., 2011 and IBQ-R-SF; Putnam et al., 2014) may be obtained through the test publishers.

Maternal Trauma History

The THQ (Hooper et al., 2011) was developed to assess lifetime trauma exposure to a broad range of events that may meet diagnostic criteria A for PTSD in both clinical and nonclinical samples (Hooper et al., 2011). The THQ can be administered via semi-structured

interview or in self-report format. For the present study, the THQ was administered via computerized self-report during the prenatal session.

The THQ contains 24 Likert-type items that make up four scales that assess exposure to different types of events. These four domains include scales for crime-related events, general disaster and trauma, physical and sexual experiences, and other events not captured within the other three subscales. Each item begins with a "*yes/no*" question, indicating whether or not a specific event has been experienced (e.g., "*Have you ever seen someone seriously injured or killed*?"), which is followed by items that quantify the number of times a specific type of event has been experienced, age at exposure, and an open-end response field to specify who the perpetrator was, or any other relevant details. Each item also includes two Likert-type questions (1= *not at all* to 5 = *extremely*) to indicate how upsetting the traumatic event was at the time of exposure, and how much the participant's life had been affected by the trauma over the past year.

The THQ was developed primarily as a data collection instrument to help inform whether diagnostic thresholds for PTSD are met. Therefore, there is no standard scoring system, and the measure has historically been adapted to meet individual project needs and requirements (Hooper et al., 2011). Total scores and subscale scores can be derived from the data to reflect the frequency of exposure to all or certain types of traumatic events and are calculated by summing the number of trauma event endorsements across and within each scale (Hooper et al., 2011). Some researchers have dichotomized the total trauma score across all event types to classify participants into "high trauma" and "low trauma" exposure groups or into "high magnitude" or "low magnitude" groups based on reported frequency of exposure to traumatic events (Hooper et al., 2011). The present study used a total exposure score across event types to best capture differences along a continuum of trauma exposure(s). While this method does not account for

nuances amongst differences that may be expected based on different types of trauma exposures, a total exposure frequency score still provides novel information about the magnitude of trauma experienced by mothers and the predictive value of this construct with maternal sensitivity and infant temperament outcomes. This method also aligns with the scope of the present study to extend the previously described literature that is primarily limited to specific types of trauma (e.g., CT, IPV, disasters) at specific points in time (e.g., prenatal IPV versus lifetime trauma).

Additionally, the THQ has been used to capture traumatic events in terms of recency and severity of impact on the subject's life at the time of the event and over the past year (Hooper et al., 2011). A severity indicator could have been extracted from the data that indicates how upsetting the event was at the time of the event; however, depending on when the event occurred, this method would not have provided information about the impact of the event on current functional impairment (e.g., an event in childhood may be rated as highly upsetting, but could be rated lower in adulthood), which may flatten infant outcome results. Trauma severity could also be extracted from responses indicating how much the subject has been impacted by an event over the past year, which would provide insight about functional impairment that has persisted since the traumatic event (e.g., lasting effects associated with CT). This definition of severity maps well with the observed experiences of prolonged posttraumatic stress effects and aligns best with the scope of the present study. Therefore, severity of impairment was calculated by averaging the Likert-type scale ratings across all traumatic event endorsements for the question "*How much has it affected your life in the past year?"*

Test-retest reliability was measured at approximately 2 – 3 months apart with a sample of 25 women who reported a broad range of trauma exposure history (Hooper et al., 2011). Stability coefficients ranged from .51 (close person killed) to .91 (robbed), indicating that endorsement of

specific events was fair to excellent across both THQ administrations (Hooper et al., 2011). Given that only coefficients of .70 or greater are considered acceptably reliable (Tavakol & Dennick, 2011), some items did not meet reliability threshold. Upon follow-up, researchers posited that the lowest reliability items were in general categories (i.e., "other") and that participants shifted their answers on the second administration after realizing that their previous answer was captured in another category. Additionally, participants recalled more experiences during the second administration (Hooper et al., 2011). To ensure that trauma experiences were captured accurately within the present study, responses in general categories were individually assessed and checked by graduate research assistants to determine if they are more appropriately captured within one of the more specific categories instead. In the event a response was determined to fit best within a different category, the response was removed from the general category and added to the relevant category variable, while maintaining open-response data verbatim. The internal reliability of the measure was explored as part of the current study. One item was excluded from reliability analyses due to zero variance (e.g., *"Have you ever been exposed to dangerous chemicals or radioactivity that might threaten your health?").* Acceptable internal reliability was found via Cronbach's alpha calculations (Tavakol & Dennick, 2011) for trauma exposure ($\alpha = .79$) and past year impairment across trauma domains ($\alpha = .85$). Removal of specific items would not have resulted in higher reliability values for any of the analyses.

Face validity and content validity were addressed during development of the THQ and are supported by the traumatic event dimensions agreed upon by the developers, foundational base in previous measures, and direct relations to DSM-IV diagnostic criterion for PTSD (Hooper et al., 2011). Construct validity was evaluated in a sample of women ($n = 18$) by comparing the degree of similarity between THQ findings and findings from the Stressful Life

Events Screening Questionnaire (SLESQ; Hooper et al., 2011). Researchers identified nine items *a priori* that were determined to be comparable, and while kappa coefficients between six of these items ranged from good to excellent (κs = .61–1.00), three of these items ranged from low to fair (κs =.13–.45), which suggests the need for possible modifications in the THQ, but may also be a function of small sample size (Hooper et al., 2011). Overall, there has been pervasive national and international use of THQ in a wide range of studies in both clinical and nonclinical samples (Hooper et al., 2011). There appears to be some need and utility for validation research in prenatal samples. However, there was reason to believe that this measure was not valid in the current sample given its widespread use in community samples of adult women. Use of the THQ in the present study adds important data to the extant literature by providing more insight into trauma exposure histories and psychometric properties of the THQ in a prenatal sample of women.

Maternal Sensitivity

Recent research on maternal sensitivity has widely used audiovisual behavioral observation recordings to continuously code maternal behavior and infant affect during a series of standardized tasks (e.g., The Laboratory Temperament Assessment Battery; Lab-TAB; Appendix A) that are designed to elicit variability in maternal-infant behavior (Goldsmith & Rothbart, 1996; Leerkes, 2010; Leerkes & Zhou, 2018). Within the current study, standardized behavioral tasks include a caregiving task, a free-play task, an orientation task, and a limitations task to capture a wide range of mother-infant interactions (see Appendix A for a complete description of behavioral task procedures).

Leerkes and colleagues developed a well-validated coding scheme in which maternal sensitivity and infant affect were each coded separately from behavioral observation task videos,

and then merged in coding program software to create new and automatic, syntax-derived frequency and duration values that reflect the interaction between infant affect and maternal sensitivity (Leerkes & Zhou, 2018). Specifically, these frequency and duration values reflect whether the infant's positive, neutral, or negative affect was met with an insensitive, moderately sensitive, or sensitive maternal response. For example, a mother who consistently and promptly engaged in effective soothing behaviors when her infant was crying would be assigned a "sensitive" classification. Conversely, a mother who consistently ignored or responded with irritation to her fussy infant would be assigned an "insensitive" classification. This coding scheme was utilized in the present study (see Appendix B for coding scheme adapted from Leerkes & Zhou, 2018).

After demonstrating intrarater and interrater (with a standard) coding reliability of at least .80, trained research assistants coded the videos for (1) maternal behavior and (2) infant affect and then utilized overlapping code syntax (see Appendix B, p. 86) to quantify the frequency and duration of maternal sensitivity ratings (see Appendix B for Interact maternal sensitivity coding procedures; Leerkes & Zhou, 2018). The present study examined maternal sensitivity frequency, rather than duration, given research that has shown frequency to be more robustly related to infant outcomes and yielded higher correlations between different domains of mother-infant reciprocity, such as language, touch, and co-occupation (Aubuchon-Endsley, N., Gee, B., Devine, N., Ramsdell-Hudock, H., Swann, H., & Brumley, M. R., 2020; Gee, B., Overrocker, L., Aubuchon-Endsley, N., & Ramsdell-Hudock, H., in press).

To help ensure coding consistency and accuracy, research assistants were instructed to code for a maximum of 2 hours per session when they were well-rested, well-nourished, and alert. Breaks were encouraged in the event of research assistant fatigue or hunger. Standardized,

written instructions with text and visual cues were provided in hard copy and digital format to ensure access during every coding session.

Maternal Behavior. Maternal behavior was coded continuously to capture maternal response to infant behaviors across all standardized laboratory tasks. When mothers could not be seen in the video or were seen during times that were not meant to be coded, they were assigned a code of "0" to indicate "Uncodeable." The mother was assigned a behavioral code of "N" for "Negative" if she demonstrated negative affect toward her infant, if she forced her own agenda on the infant, or if she laughed or smiled in response to the infant's distress. A code of "D" was assigned for "Distracted" if the mother moved away from or abruptly ended interaction with the infant, or if the mother was uninvolved or withdrawn. A "P" code was assigned for "Persistent ineffective" if the mother persistently engaged in an ineffective response manner. An "M" code was assigned for "Monitor" if the mother was watchful of the infant, but not engaged interactively with the infant. An "E" code was assigned for "Engagement" if the mother interacted with, soothed, or provided support or goal-oriented direction to the infant. An "R" code was assigned for "Routine Care" if the mother engaged in routine caregiving behavior, such as wiping the infant's nose or straightening the infant's clothing. If care was provided in an intrusive way, or roughly, the code was assigned an "I" for "Intrusive."

Infant Affect. Infant affect was coded continuously, separately from maternal behaviors, and was based on three categories that included, *Positive* (1), *Neutral* (2), and *Negative* (3). Positive infant affect was coded when infants demonstrated positive vocalizations, smiling, wide-eyed interest, laughing, or excited body movements (i.e., clapping, moving toward stimulus). Neutral affect was coded when neither positive or negative affective behaviors were apparent. Negative affect was coded when the infant engaged in whining, fussing, concerned

facial expressions (i.e., furrowed brows, wrinkled nose), body tension, crying, screaming, or reddened face.

Once both infant and maternal behaviors were coded, the files were merged within the INTERACT Lab Suite software (Mangold, Version 2017) and an automated syntax calculation was performed to create new codes based on mother-infant co-occurring behaviors (Leerkes & Zhou, 2018). These co-occurring behaviors were assigned codes based on *a priori* 3-point sensitivity ratings (i.e., *insensitive*=1, *moderately sensitive*=2, *sensitive*=3). For example, a distracted mother would be assigned an insensitive rating if her infant was exhibiting negative affect; whereas an engaged mother who responded by soothing her distressed infant would be assigned a sensitive rating. Reliability scores for a similar previous study were moderate to high at 6 months and 12 months, respectively (κ=.77; κ=.80; Leerkes & Zhou, 2018).

Infant Temperament

The Infant Behavior Questionnaire-Revised (IBQ-R; Putnam et al., 2014) is a well-validated, 191-item measure that was designed to capture a broad range of nuanced infant temperament reactivity and regulation patterns. However, the length of the IBQ-R was too time-intensive to incorporate widely across studies, and the Infant Behavior Questionnaire–Revised–Short Form (IBQ-R-SF; Putnam et al., 2014; Rothbart, 2011) was subsequently developed with the goal of decreasing completion time. Developers of the IBQ-R-SF set a minimum internal consistency alpha of .65, based on the concept that some scales were multidimensional, and that a conventional cut-off value of .70 might unnecessarily limit the conceptual utility of findings across studies (Putnam et al., 2014). However, over 90% of Cronbach's alpha values were greater than .70 for the IBQ-R-SF, which indicates generally good internal consistency. Notably, the Activity Level and Cuddliness subscales were under .70 in more than one study and represent

areas for future scale improvement and critical thought analysis pertaining to result interpretations. Internal reliability was explored as part of the present study and acceptable internal consistency was found via Cronbach's alpha calculations (Tavakol & Dennick, 2011) for each infant temperament domain (Surgency α = .87; Negative Affectivity α = .71; Regulation/Orienting α = .76). Removal of specific items would not have resulted in higher reliability values for any of the analyses.

Additionally, test-retest reliability ranged from good to excellent (.54-.93) across multiple time spans ranging from 2-11 months, with an average value of .72, which suggests strong longitudinal stability for developmental studies (Putnam et al., 2014). Convergent validity was demonstrated using the short form IBQ–R scales in relation to the Childhood Behavior Questionnaire (CBQ), and analyses revealed that all correlations were statistically significant (*r*s=.17–.34, $p < .01$), although the magnitude was lower with the short form scales than with the standard scales. Despite somewhat weaker convergent and predictive validity for the short form scales in comparison with the standard scales, the short form IBQ-R appears to retain sufficient scale validity of the standard form while significantly shortening participant time and effort costs (Putnam et al., 2014). Given the need to collect additional data from multiple measures in the IDAHO Mom Study and time/cost constraints, the IBQ-R-SF was ideally suited for the longitudinal IDAHO Mom Study and was deemed to have sufficient evidence of reliability and validity properties to meet the needs of the present project.

The IBQ-R-SF contains three factors to measure different aspects of infant temperament, including surgency/reactivity (e.g., *"how often did your baby laugh aloud in play?"*), negative affectivity (e.g., *"how often did your baby cry or fuss before going to sleep for naps?"*), and regulation/orienting (e.g., *"when singing or talking to your baby, how often did s/he soothe*

immediately?"). A total of 14 subscales made up of 91 Likert-type items were formatted to obtain responses in retrospect, over either the past week, or the past 2-week time span (*1=Never to 7=Always, or X=Does not apply*), and includes 12 reverse-coded items (Putnam et al., 2014). Each factor (i.e., Surgency/Reactivity, Negative Affectivity, and Regulation/Orienting) will be included in separate models of the present study.

Surgency involves reactivity in which an individual exhibits relatively high positive affect. The Surgency factor is comprised of six subscales including Approach, Vocal Reactivity, High-Intensity Pleasure, Smiling and Laughter, Activity Level, and Perceptual Sensitivity. The Approach subscale assesses the extent to which an infant expresses excitement and positive anticipation of enjoyable activities, such as receiving a new toy (Rothbart, 2011). The Vocal Reactivity subscale assesses how often an infant coos and vocalizes during daily activities (Rothbart, 2011). The High-Intensity Pleasure subscale assesses how often an infant exhibits enjoyment in response to a high-intensity stimulus, such as a peek-a-boo game (Rothbart, 2011). The Smiling and Laughter subscale measures how often an infant engages in smiling and laughter throughout daily activities and playtime (Rothbart, 2011). The Activity Level subscale assesses gross motor activity, such as how often an infant splashes and kicks playfully in the bathtub (Rothbart, 2011). The Perceptual Sensitivity subscale measures how often an infant perceives low-intensity stimuli from the external environment, such as fabric or surface textures (Rothbart, 2011).

Negative Reactivity involves individual tendencies toward relatively high negative affective traits. Within the Negative Reactivity factor, there are four subscales made up of Sadness, Distress to Limitations, Fear, and Falling Reactivity. The Sadness subscale measures low mood and activity decrease in relation to an infant's personal physical or emotional

suffering, such as appearing sad after a caregiver's prolonged absence or during physical illness (Rothbart, 2011). The Distress to Limitations subscale measures how often an infant becomes distressed in limiting situations, such as being confined by a car seat restraint or being unable to engage in a desired activity (Rothbart, 2011). The Fear subscale assesses how often an infant startles or exhibits distress in response to sudden stimuli changes, or how often the infant demonstrates inhibition in novel situations (Rothbart, 2011). The Falling Reactivity subscale measures an infant's rate of recovery following peak excitement or distress, and how easily an infant is able to fall asleep following general arousal (Rothbart, 2011).

The Orienting/Regulation factor involves behaviors that serve to inhibit or enhance surgency or negative reactivity tendencies (Rothbart, 2011). Within the Orienting/Regulation factor, there are four subscales including Low-Intensity Pleasure, Cuddliness, Duration of Orienting, and Soothability. The Low-Intensity Pleasure subscale assesses how often an infant demonstrates enjoyment in relation to low-intensity stimuli, such as playing quietly with a wooden block (Rothbart, 2011). The Cuddliness subscale assesses an infant's enjoyment of being held or rocked by a caregiver, as demonstrated by expression of joy and/or molding the body toward the caregiver (Rothbart, 2011). The Duration of Orienting subscales measures how often an infant attends to a specific object for a prolonged period of time, such as staring at a crib mobile, or playing with a toy (Rothbart, 2011). The Soothability subscale assesses how often an infant exhibits reduced distress in response to a caregiver's administration of soothing techniques, such as ceasing to cry when a caregiver pats the infant's back (Rothbart, 2011).

Covariates

Several covariates were investigated in reference to predictor and outcome variables, including educational attainment, social support, infant sex, and gestational age at birth. Below is

a brief description of the literature to support the importance of considering each variable in reference to current study models as well as a description of each measure used in the IDAHO Mom Study in order to quantify these covariates.

Educational Attainment. Research has found positive associations between lower maternal sensitivity and lower maternal education (Maas et al., 2015; Neuhauser, 2016), and negative associations between PTSD symptomology and educational attainment (Hardner, Wolf, & Rinfrette, 2017; Polimanti et al., 2019). Additional work has shown a negative association between maternal education and infant temperament difficulties, such that mothers with lower educational attainment had infants who scored higher on activity level, duration of orienting, and fear tasks (Jansen, 2009). Interestingly, the direction of the association was reversed for sadness scores, such that infants of more highly educated mothers also scored higher on indicators of sadness (Jansen, 2009). Given associations between maternal education, predictors, and the outcome variable, educational attainment will be included as a covariate in the present study. Education was assessed via the Hollingshead Four-Factor Index of Socioeconomic Status (SES), which is a widely used measure of SES that has been cited over 5000 times since development (Adams & Weakliem, 2011; Hollingshead, 1975). The four factors used to calculate SES include education, occupation, biological sex, and marital status. Limitations of the Hollingshead SES calculation methods include outdated occupational codes, shifts in education trends among women since the instrument's development, and shifts in family roles that impact monetary resource distribution within nuclear families (Duncan & Magnuson, 2001). Despite criticisms of the Hollingshead SES, the education variable is still useful in providing a marker of socioeconomic risk. For example, education is still often required for occupations that are viewed with higher prestige, and post-secondary education has historically been less accessible

to low-income families (Hollingshead, 1975). Education was scored by assigning a value ranging from 1 to 7 based on educational attainment (*1=less than 7th grade* to *7=graduate professional training*).

Social Support. Research has shown that mothers who reported higher social support were more likely to demonstrate higher maternal sensitivity (Shin et al., 2006), and that lower social support is associated with lower maternal sensitivity (Neuhauser, 2016). Additionally, low social support was significantly related to greater childhood trauma exposure and poorer mental health compared with healthy controls (Huang et al., 2019). Additional research has shown that steeper diurnal cortisol rhythms are positively related to social support in a sample of adult men and women (Sjögren et al., 2006), which may be indicative of a more efficient, adaptive stress response that is dependent on social support availability.

Social support was evaluated via the Social Support Questionnaire – 6 (SSQ-6; Sarason, Sarason, Shearin, & Pierce, 1987). The SSQ-6 assesses participant perceptions of social support relationships. Participants are asked to list up to nine people who can be depended upon for social support across a variety of contexts in six separate items. Participants are also instructed to specify their relation to the people listed. The contexts include (1) listing people who the participant can count on to be dependable when help is needed, (2) who can help the participant to feel relaxed when under pressure, (3) who wholly accepts the participant at worst/best points, (4) who can be counted on to care about the participant regardless of the situation, (5) who can help the participant to feel better when "down in the dumps," and (6) who can be counted on to console the participant when upset. Participants then rate satisfaction level with social support in each context on a 6-point Likert-type scale (*1=very satisfied* to *6=very dissatisfied*). There are two common scoring methods for the SSQ-6, which include the SSQ Number Score (SSQN) and

the SSQ Satisfaction Score (SSQS). The SSQN is derived by calculating the mean of the total number of people listed for all six items. The SSQS score is calculated by averaging the satisfaction scores for all six items. The internal consistency alpha coefficients for both number and satisfaction scores range from .90 to .93 (Sarason et al., 1987).

Only the SSQS score will be utilized as a covariate within the present study, due to the inherent implications of social support quality. High satisfaction ratings of social support relationships, regardless of the number of people included in the network, are more likely to serve as a protective factor against adversity; whereas high numbers of people do not necessarily indicate a high-quality social support network. Therefore, the construct of social support satisfaction is more meaningful within the present study and will be the sole covariate indicator of social support.

Infant Sex. Findings from empirical review suggest that male fetuses may be more sensitive to maternal prenatal cortisol exposure (which is associated with maternal trauma) than female fetuses (Bosquet-Enlow et al, 2017; Van den Bergh et al., 2017), which is due to hormonal differences that emerge during sex differentiation. Additional research indicates that while females may adapt to maternal prenatal cortisol exposure more efficiently than males in early development, females may experience more adverse long-term impact on anxious behaviors and greater negative affectivity (Braithwaite et al., 2017; Sandman, Glynn, & Davis, 2013), and more research is needed to confirm when temporal differences manifest across development. These findings outline a need to examine infant sex as a potential covariate in the current study. Infant sex was determined from maternal self-report during the 6-month postnatal visit via a single item on the IBQ-R-SF, *"What is your baby's sex?"* (Putnam et al., 2014). Female infants were assigned a code "*1*," and male infants were assigned a code "*0*."

Gestational Age at Birth. Research has shown infant gestational age at birth to significantly predict maternal sensitivity (Shin, Park, & Kim, 2006). Specifically, mothers who delivered at 37 weeks gestation or less were more likely to be more sensitive toward their infants (Shin et al., 2006). Given that mothers were recruited between 33-37 weeks gestation in the present study, gestational age at birth will be included as a covariate. Mothers' last menstrual period (LMP) was deemed to be the best method for use in the present study to assess gestational age at birth (see Appendix C; Macaulay, Buchmann, Dunger, & Norris, 2019; Rosenberg et al., 2009). Following data collection, gestational age calculations were quality checked by one undergraduate research assistant and one graduate research assistant by cross-referencing participant delivery dates in data tracking files and by replicating calculations to ensure accuracy.

Procedures

Privacy and Confidentiality

Prior to study enrollment, participants were informed of limits to confidentiality and provided with a copy of the consent form (see Appendix D) to take home for reference. A signed copy was stored separately from deidentified data in a locked filing cabinet in the laboratory. Identifying information was stored separately from participant data. Participant contact information, including names, phone numbers, and addresses, was stored in a password-protected electronic file on a password-protected desktop computer in a locked laboratory, which was only available to research assistants trained to work on the study. The contact information file did not include subject ID numbers. A separate password-protected file that linked participant names and subject ID numbers was stored separately on a password-protected desktop computer in the locked laboratory for purposes of longitudinal tracking and scheduling. All remaining hard copy and electronic participant data were labeled with the unique subject ID

number and stored either in files or on an encrypted, password-protected computer stored in locked file cabinets in a locked laboratory to which only research team members had access.

If a research participant endorsed that they (or another identifiable person) were going to hurt themselves or someone else, the research assistant(s) discontinued the interview and contacted Dr. Aubuchon-Endsley to determine if further supervision, follow-up, or support services were needed. The graduate research assistant provided the participant with regional mental health resources and discussed methods that the participant could use to ensure safety and reduce risk. No instances of limits to confidentiality or mandated reporting occurred during the study.

Recruitment

Participants were recruited through flyer postings and brochures (see Appendix E for recruitment flyer) placed in public rural community settings, which included Idaho State University campus bulletin boards, health services offices, and local businesses, as well as through electronic and social media recruitment posts. In addition to placing recruitment materials in healthcare offices, healthcare providers were recruited to share information about the study with pregnant patients, and to provide brochures directly to them. Once recruits contacted the lab (via email, text, or voice message), a time was scheduled to contact them by phone to provide additional information about the study and to determine eligibility status (see Appendix F for full eligibility screening materials). Of the women who responded to follow-up contact efforts, 179 were not responsive or were unreachable by phone, text, and/or email. 256 women consented to being screened by phone to determine eligibility status and 131 declined to participate due to commute length (53), disinterest or no reason provided (27), time commitment (19), schedule conflicts (15), moving away from the area (7), bed rest restrictions (6), concerns

about preterm labor (2), lack of energy (1), or not being a custodial parent following birth (1). Once eligibility was determined, mothers (*N*=125) were scheduled for a prenatal session during the third trimester (between 33-37 weeks gestation), which took place in the Perinatal Psychobiology Research Lab in the Psychology Department at Idaho State University in Pocatello, Idaho. Week gestation calculations were based on the date of the last menstrual period using pregnancy wheels (Appendix C).

Exclusion Criteria

Recruits were excluded if certain physical or psychological conditions, such as gestational diabetes, toxemia, pre-eclampsia, bipolar disorder, or schizophrenia were endorsed. Participants were also required to be 18-35 years old and within 33-37 weeks gestation at the time of the prenatal session. Recruits were also excluded from the study if they were pregnant with more than one infant, or if the mother was not fluent in English. Lastly, recruits were also excluded if they endorsed exposure to a "C," "D," or "X" risk category medication or excessive substance use during pregnancy.

Prenatal Session

Research assistants met participants upon arrival for the prenatal session in the parking lot to provide vehicular parking passes and assistance as needed by carrying belongings and escorting them to the research lab. The prenatal session began with the informed consent and clinical interviews, which were administered by graduate research assistants. Graduate-undergraduate research assistant pairs completed participant anthropometry assessments for height, weight, and waist circumference. Self-report questionnaires were administered via MediaLab software (Fagerstrom, Arntzen, & Foxall, 2009; Jarvis, 2014) on a laptop computer, guided by undergraduate research assistants who remained present to assist and answer questions

as needed. The prenatal session took approximately 2 to 3 hours to complete, and participants were compensated with $30 in either cash or gift cards (participant choice) for completion of the prenatal session.

Immediately upon completion of the prenatal assessments, undergraduate research assistants scheduled the postnatal session for 6 months (±2 weeks) following the participant's LMP-estimated due date. Reminder calls for the postnatal session were scheduled 1 month, 1 week, and 1 day prior to the session, which also served to ensure that the scheduled session aligned with the targeted postnatal session date range (6 months ±2 weeks), and to reschedule as needed. The participants were thanked for their time and assisted out of the building as needed.

Six-Month Postnatal Session

Mother-infant dyads (*n*=96) came back to the lab when the infants were approximately 6 months old (± 2 weeks) to complete anthropometry assessments, behavioral observations, clinical interviews, and self-report measures. Attrition rate between the prenatal and six-month postnatal sessions was 23.2%; 29 mother-infant dyads did not return due to being either unreachable/unresponsive, uninterested, had moved away, or had miscarried since the prenatal session. The session began by greeting the customer in the parking lot to provide parking permits and to assist with carrying belongings and guiding the participant to the lab. Participants were informed that they would be changing their infants in another room for the behavioral observation tasks, and that while we would provide diaper change supplies, they were welcome to use their own supplies if preferred. Participants were asked to leave all other belongings in the lab space to limit distractions while completing the behavioral tasks in another room. The graduate research assistant (GRA) accompanied the participant to the behavioral task room,

while the undergraduate research assistant (URA) completed video recording procedures in the observation room adjacent to the behavioral task room.

Maternal sensitivity was then measured via behavioral observation during a modified Laboratory Temperament Assessment Battery (Lab-TAB; see Appendix A; Planalp, Van Hulle, Gagne, & Goldsmith, 2017). Mothers were asked to complete a series of standardized behavioral tasks with their infants, which were video recorded. Graduate research assistants were trained on the standardized protocol and memorized each script, room orientation feature, and timeline across tasks prior to completing the behavioral tasks with research participants. The tasks involved caregiving, free-play, orientation, and limitations. During the caregiving task, mothers were instructed to change their infant into a gender-neutral outfit and to make themselves comfortable in the room while the research assistant was away for 4 minutes. During the free-play task, mothers were instructed to fill out a questionnaire while the infant was free to roam and play, again with the research assistant leaving the room. During the orientation task, the mother was instructed to place the infant in an infant seat and to sit adjacent to the infant so that the infant was able to see the mother with some effort in turning. Once the infant was secured in the seat, the research assistant provided the infant with a set of blocks to play with and the mother was instructed to maintain a neutral facial expression and not to engage the infant's attention. During the limitations task, the research assistant gently restrained the infant's arms to prevent movement and looked down to prevent eye contact or interaction with the infant. The mother was instructed to remain uninvolved for the first segment of the task (unless she wanted to end the activity) and was informed that she could interact with the infant as she pleased once signaled by the research assistant.

Upon completion of the behavioral tasks (see Appendix A for task details), the participant was brought back to the lab by both the GRA and URA to complete anthropometry measurements for both mother and infant. The GRA then initiated completion of the clinical interviews and self-report measures with the participant, while the URA cleaned the behavioral observation room and task materials and saved the observation videos to an encrypted external hard drive for future coding. The URA then returned to the lab to update participant tracking information and to upload the videos to the encrypted master data storage system.

Upon completion of the 6-month postnatal session measures, participants were thanked for their contributions to the IDAHO Mom Study with a picture of the mother with her infant in the research lab and a study completion certificate. Participants were compensated $30 in either cash or gift cards (participant choice) for completing the postnatal session, which took approximately 2-3 hours. Participants' contact information was confirmed and retained for potential future follow-up contact, following participant consent.

Quantitative Analyses

Power Analyses

A G*Power *a priori* power analysis was conducted to determine the sample size needed to achieve a power of 0.80 in this study. Previous work has found small to medium effect sizes analyzing these variables (Lyons-Ruth & Block, 1996), thus a medium effect size was sought within the present study. A least-squares linear multiple regression with three predictors, one outcome variable, and up to three covariates was performed, and was based on a medium effect size (f^2 = .15; Cohen 1988, p. 412) and a two-tailed p-value of .05. G*Power results indicated that a sample size of 77 was needed. Previous research (Fritz & MacKinnon, 2007) indicates that a sample size of 71 is necessary to attain .80 power with bias-corrected bootstrapping assessment

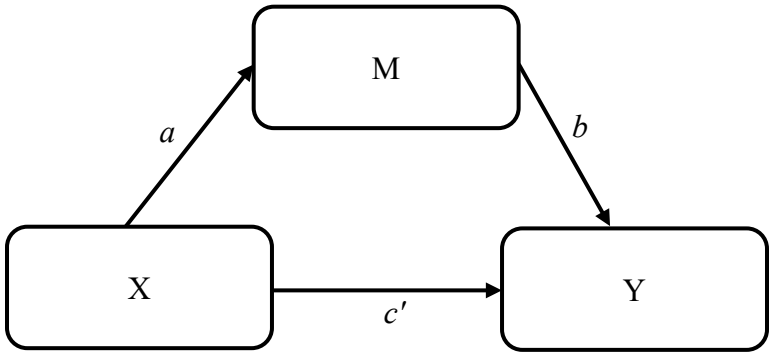
methods in mediation models with medium effect sizes (d = 0.39). Therefore, the present study sample size (n = 92) was deemed to yield sufficient power to proceed with the data analyses.

Primary Statistical Model and Analyses

Analyses for the present study were conducted utilizing IBM SPSS Statistics (Version 27) and Hayes PROCESS Macro (2012) via mediation modeling (Figure 1; Hayes, 2017, p. 585). The primary predictors were maternal trauma (past year impairment and exposure; [X]) in separate models, the mediator was maternal sensitivity frequency (M), and infant temperament was the outcome variable (Y), as measured via the Surgency/Reactivity, Negative Affectivity, and Regulation/Orienting IBQ-R-SF factors in separate models.

Figure 1

Primary Analyses Mediation Model



Note. X=maternal trauma, M=maternal sensitivity, and Y=infant temperament; mediation model 4 adapted from "Introduction to Mediation, Moderation, and Conditional Process Analysis" (Hayes, 2017, p. 585).

A total of 6 mediation models were used to test hypotheses 1–3 (a-b, see Table 1), based on a total frequency score for maternal sensitivity as a mediator of relations between maternal trauma (a = past year impairment and b = exposure) and infant temperament (1 = Surgency/Reactivity, 2 = Negative Affectivity, and 3 = Regulation/Orienting). Results were

adjusted for Type 1 error inflation using the Benjamini-Hochberg false discovery rate correction with q-values set at .05 (Benjamini & Hochberg, 1995). Maternal sensitivity (*M*) was predicted to mediate the relationship between maternal trauma history (Hypothesis a = past year impairment and Hypothesis b = exposure; *X*) and infant temperament (Hypothesis 1a/1b = Surgency/Reactivity, Hypothesis 2a/2b = Negative Affectivity, Hypothesis 3a/3b = Regulation/Orienting; *Y*), such that mothers with a greater trauma-associated impairment/exposure would score lower on sensitivity and would report lower infant surgency and regulation, and higher negative affectivity.

Table 1

Summary of Mediation Model Hypotheses 1-3 (a-b)

Model	Maternal Sensitivity (M)	Maternal Trauma (*X*)	Infant Temperament (*Y*)
Hypothesis 1a	Total Frequency	Past Year Impairment	Surgency/Reactivity
Hypothesis 1b	Total Frequency	Exposure	Surgency/Reactivity
Hypothesis 2a	Total Frequency	Past Year Impairment	Negative Affectivity
Hypothesis 2b	Total Frequency	Exposure	Negative Affectivity
Hypothesis 3a	Total Frequency	Past Year Impairment	Regulation/Orienting
Hypothesis 3b	Total Frequency	Exposure	Regulation/Orienting

Note. M=mediation variable, X=predictor variable, Y=outcome variable. M was proposed to mediate the relationship between X and Y.

Chapter IV: Results

Descriptive Statistics and Covariates

Means and standard deviations were calculated for each primary variable and the covariates. Mothers endorsed exposure to an average of approximately three types of traumatic events (M = 2.7, SD = 0.3), which ranged from 0 to 16 event types endorsed across the sample. Mothers' scores on impairment across trauma domains over the past year averaged between "1 = *not at all*" and "2 (no qualitative descriptor)" across trauma domains (M = 1.5, SD = 0.2), and with sample responses ranging across the entire Likert-type scale from "1 = *not at all*" to "5 = *extremely*." Maternal sensitivity coding resulted in an approximate average of 94.4 instances of sensitive responding across approximately 20 total minutes of behavioral tasks (M = 94.4 seconds, SD = 2.8 seconds). Regarding infant temperament, the Surgency (M = 5.0, SD = 0.1) and Regulation/Orienting (M = 5.2, SD = .05) factors resulted in average values indicative of associated behaviors occurring approximately "*more than half the time."* The Negative Affectivity (M = 3.1, SD = 0.7) factor resulted in an average value indicative of associated behaviors occurring "*less than half the time*."

Regarding covariate descriptive statistics, infant sex frequencies revealed that of the 96 infants who completed the 6-month postnatal session, 49% were female (n = 47) and 51% were male (n = 49). Infant gestational age at birth averaged approximately 39 weeks (M = 39.4 weeks, SD= 0.1 weeks). Mothers' educational attainment scale scores indicated an average education rating commensurate with a standard college degree (M = 5.3, SD = 0.1). Social support quality, as measured with the SSQS, revealed an average "*very satisfied*" rating (M = 5.4, SD = 0.1).

Pearson product-moment correlation coefficients were calculated to determine if statistically significant relationships existed amongst covariates and predictor and outcome

variables. Infant sex and Negative Affectivity were negatively associated (r = -.21, p =.039). A follow-up independent samples t-test revealed a statistically significant difference (t (94) = -2.1, d = -.43, p = .04, 95% CI [-.52, -.01]) between males and females, such that females (M = 3.22, SD = .58) scored higher on Negative Affectivity than males (M = 2.95, SD = .66). Therefore, infant sex was included as a covariate in the primary mediation models containing the outcome variable of Negative Affectivity. No other covariate relations were significant, thus social support quality, educational attainment, and gestational age at birth were not included as covariates in the primary analyses.

Regression Assumptions

Regression assumptions (i.e., normal distribution, linearity, homoscedasticity, multicollinearity) were first examined to ensure analysis assumptions were met for each variable and to determine if data transformations were needed prior to conducting primary analyses. Normality of primary model variables (i.e., maternal trauma, maternal sensitivity, and infant temperament) distributions was assessed via frequency histograms. Maternal sensitivity and infant temperament variables were found to be normally distributed. Maternal trauma past year impairment and exposure variables were both determined to be positively skewed and required transformation. Three transformation calculations (i.e., log base 10, square root, inverse) were performed on both variables and compared for the best approximation of a normal distribution (Tabachnick, Fidell, & Ullman, 2007). The log base 10 transformation provided the best approximation of a normal distribution for the maternal trauma exposure variable; whereas, the inverse transformation provided the best distribution for impairment over the past year across trauma domains. Linearity and homoscedasticity were assessed via residual scatterplots and multicollinearity was ruled out via intercorrelations and variance inflation factors. Except for the

skewed variables that were transformation-corrected, no assumptions were violated.

Mediation Models

There were no statistically significant comparison tests for any of the primary analysis *p*-values. The mediation model measured both indirect (*ab* path) and direct (*c*' path) effects between maternal trauma and infant temperament. The *a* path represents changes in maternal sensitivity (*M*) when changes in maternal trauma (*X*) change by one unit. The *b* path represents changes in infant temperament (*Y*) when values of both maternal trauma (*X*) and maternal sensitivity (*M*) change by one unit (Hayes, 2017). The indirect effect was computed in Haye's PROCESS macro by calculating the product of the *a* and *b* path coefficients (Hayes, 2017) and was analyzed by utilizing a bias-corrected bootstrap 95% confidence interval with 5,000 iterations. This bootstrapping method used original sample replacements to construct a bootstrap confidence interval and sample replication that excludes estimated values that were below the *ab* coefficient value calculated from the original data. This method results in a normal distribution and confidence limits with which to judge statistical significance at $p < .05$. Confidence intervals contained zero and therefore supported retainment of the null hypothesis that there was no indirect effect. The direct effect of maternal trauma on infant temperament (*c'* path) controls for maternal sensitivity mediation contributions by measuring the extent to which changes in infant temperament were associated with changes in maternal trauma when maternal sensitivity was held constant.

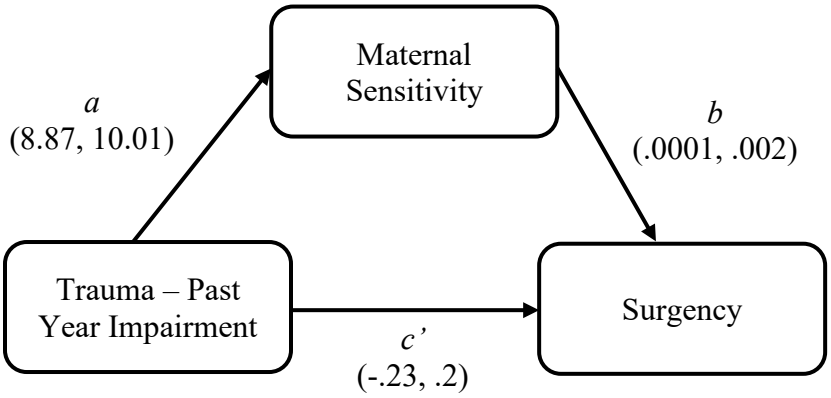
Model 1 (Hypothesis 1a)

The overall mediation model predicting the Surgency factor of infant temperament via past year impairment and maternal sensitivity was not statistically significant ($F[1, 90] = 1.28$, $R^2 = .01$, $p = .26$; ß = -.12, $b = -.23$). The indirect effect of past year impairment on Surgency via

maternal sensitivity was also not statistically significant, as indicated by a bootstrap confidence interval containing zero (ß = .004, *SE* = 0.01, 95% CI [-.03, .003]. Both the *a* and *b* paths were not statistically significant, further suggesting there was no mediation via maternal sensitivity (*t*[92] = 0.89, *SE* = 10.01, *p* = .38; *t*[92]= 0.04, *SE* = 0.01, *p* = .97). There was no statistically significant direct effect of past year impairment from trauma on Surgency (ß = -.23, *t*[92] = -1.13, *SE* = 0.20, *p* = .26).

Figure 2

Model 1 Hypothesis 1a



Note. Unstandardized beta coefficient and standard deviation results for each path (b, SD).

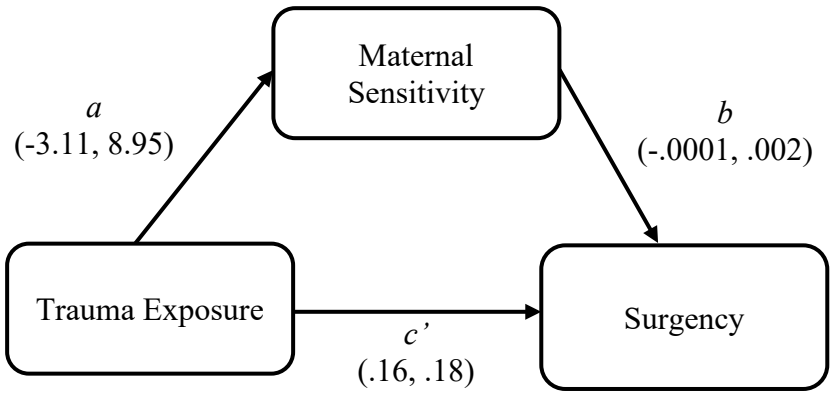
Model 2 (Hypothesis 1b)

The overall mediation model predicting the Surgency factor of infant temperament via trauma exposure and maternal sensitivity was not statistically significant ($F(1,90) = 0.85$, $R^2 = 0.009$, $p = 0.36$; $\beta = 0.1$, $b = 0.16$). The indirect effect of trauma exposure on Surgency via maternal sensitivity was also not statistically significant, as indicated by a bootstrap confidence interval containing zero ($\beta = 0.0001$, *SE* = 0.01, 95% CI [-0.02, 0.02]. Both the *a* and *b* paths were not statistically significant, further suggesting there was no statistically significant mediation via maternal sensitivity ($t(92) = -0.35$, *SE* = 8.95, p=0.73; $t(92) = -0.028$, *SE* = 0.002,

p = 0.98). Likewise, there was no statistically significant direct effect of trauma exposure on Surgency (β = 0.17, t[92] = 0.92, SE = 0.18, p = 0.36).

Figure 3

Model 2 Hypothesis 1b



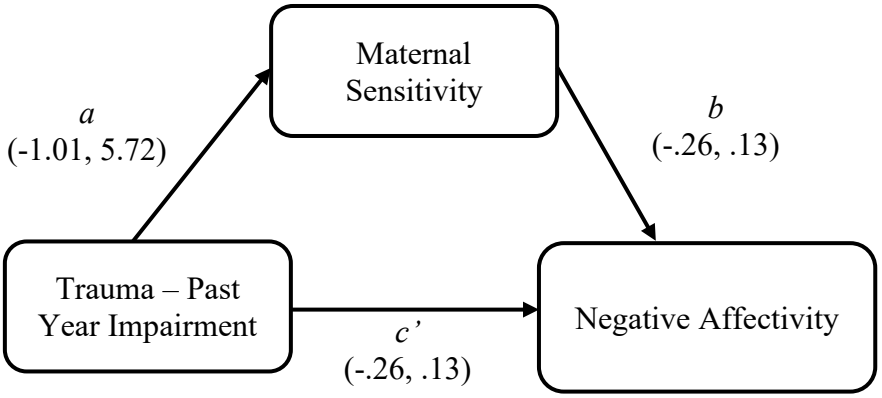
Note. Unstandardized beta coefficient and standard deviation results for each path (b, SD).

Model 3 (Hypothesis 2a)

The overall mediation model predicting the Negative Affectivity factor of infant temperament via past year impairment and maternal sensitivity while controlling for infant sex was not statistically significant (F(2, 89) = 1.95, R^2 = .042, p = 0.15; β = -0.2, b = -0.26). The indirect effect of trauma past year impairment on Negative Affectivity via maternal sensitivity was also not statistically significant, as indicated by a bootstrap confidence interval containing zero (β = 0.005, SE = 0.01, 95% CI [-0.03, 0.03]. Both the a and b paths were not statistically significant, further suggesting there was no mediation via maternal sensitivity (t(92) = 0.87, SE = 10.08, p = 0.39; t(92) = 0.53, SE = 0.003, p = 0.6), even when controlling for infant sex (t(92) = -0.18, SE = 5.72, p = 0.86; t(92) = -1.94, SE = 0.13, p = 0.06). There was no statistically significant direct effect of past year impairment from trauma on Negative Affectivity (β = 0.02, t[92] = 0.07, SE = 0.24, p = 0.94).

Figure 4

Model 3 Hypothesis 2a (Controlling for Infant Sex)



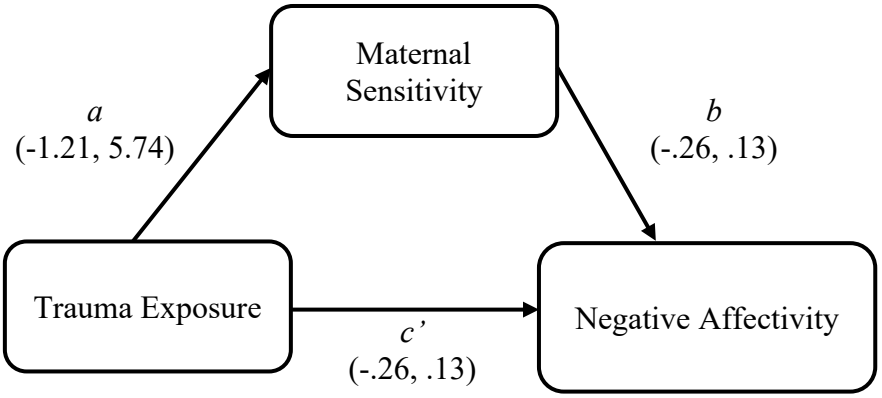
Note. Unstandardized beta coefficient and standard deviation results for each path (b, SD).

Model 4 (Hypothesis 2b)

The overall mediation model predicting the Negative Affectivity factor of infant temperament via trauma exposure and maternal sensitivity (while controlling for infant sex) was not statistically significant ($F(2, 89) = 1.97$, $R^2 = 0.04$, $p = 0.15$; $\beta = -0.21$, $b = -0.26$). The indirect effect of trauma exposure on Negative Affectivity via maternal sensitivity was also not statistically significant, as indicated by a bootstrap confidence interval containing zero ($\beta = -0.002$, $SE = 0.01$, 95% CI [-0.23, 0.03]. Both the *a* and *b* paths were not statistically significant, further suggesting there was no mediation via maternal sensitivity ($t(92) = -0.21$, $SE = 5.74$, $p = 0.83$; $t(92) = -1.96$, $SE = 0.13$, $p = 0.05$). There was no statistically significant direct effect of trauma exposure on Negative Affectivity (β=0.06, $t[92] = 0.27$, $SE = 0.21$, $p = 0.79$).

Figure 5

Model 4 Hypothesis 2b (Controlling for Infant Sex)



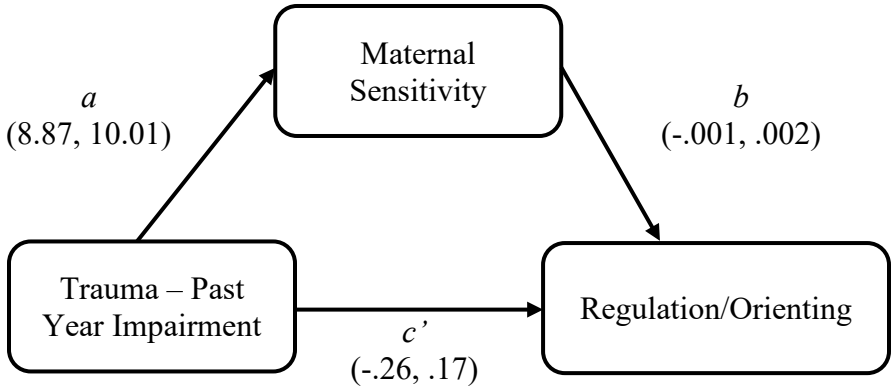
Note. Unstandardized beta coefficient and standard deviation results for each path (b, SD).

Model 5 (Hypothesis 3a)

The overall mediation model predicting the Regulation/Orienting factor of infant temperament via past year impairment and maternal sensitivity was not statistically significant ($F(1, 90) = 2.35$, $R^2 = .025$, $p = 0.13$; $\beta = -0.16$, $b = -0.27$). The indirect effect of trauma past year impairment on Regulation/Orienting via maternal sensitivity was also not statistically significant, as indicated by a bootstrap confidence interval containing zero ($\beta = -0.005$, $SE = 0.01$, 95% CI [-0.04, 0.02]. Both the *a* and *b* paths were not statistically significant, further suggesting there was no mediation via maternal sensitivity ($t(92) = 0.89$, $SE = 10.01$, $p = 0.38$; $t(92) = -0.51$, $SE = 0.002$, $p = 0.61$). There was no statistically significant direct effect of past year impairment from trauma on Regulation/Orienting ($\beta = -0.26$, $t[92] = -1.47$, $SE = 0.18$, $p = 0.15$).

Figure 6

Model 5 Hypothesis 3a



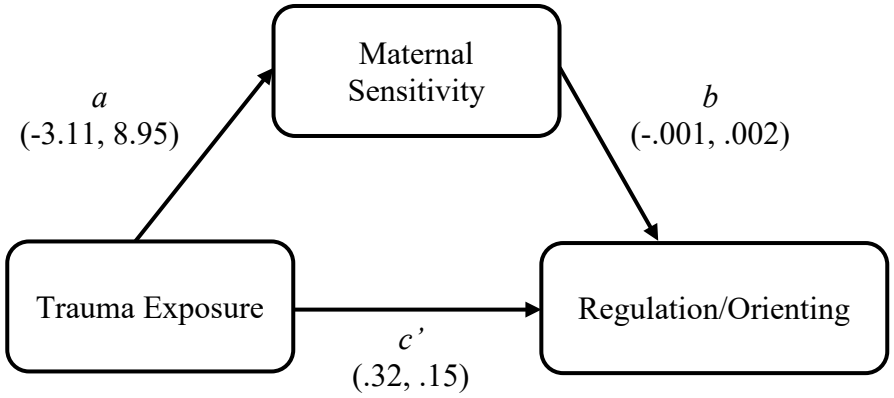
Note. Unstandardized beta coefficient and standard deviation results for each path (b, SD).

Model 6 (Hypothesis 3b)

The overall mediation model predicting the Regulation/Orienting factor of infant temperament via trauma exposure and maternal sensitivity was statistically significant ($F(1, 90) = 4.46$, $R^2 = 0.05$, $p = 0.04$; $\beta = 0.22$, $b = 0.32$). The indirect effect of trauma exposure on Regulation/Orienting via maternal sensitivity was not statistically significant, as indicated by a bootstrap confidence interval containing zero ($\beta = 0.002$, $SE = 0.011$, 95% CI [-0.02, 0.03]. Both the *a* and *b* paths were not statistically significant ($t(92) = -0.35$, $SE = 8.95$, $p = 0.73$; $t(92) = -0.58$, $SE = 0.002$, $p = 0.56$). There was also a statistically significant direct effect of trauma exposure on Regulation/Orienting while considering maternal sensitivity in the model ($b = 0.32$, $t[92] = 2.08$, $SE = 0.15$, $p = 0.04$).

Figure 7

Model 6 Hypothesis 3b



Note. Unstandardized beta coefficient and standard deviation results for each path (b, SD).

Additionally, a positive correlation was found between trauma event exposure and the infant temperament factor of Regulation/Orienting (r = 0.215, p = 0.035), which suggests that increased maternal trauma exposure is related to increased infant regulation and orienting behaviors and represents mixed findings with previous literature. This will be addressed in more detail within the discussion section.

Type 1 Error Correction

After conducting the Benjamini-Hochberg (1995) method for false discovery rate type 1 error correction for the primary models, the adjusted alpha values revealed that there were no statistically significant findings for either indirect or direct paths for all models (Table 2).

Table 2

Type 1 Error Correction: Benjamini-Hochberg Approach

Model	p-value	Rank	Adjusted Alpha	Statistically Significant
6	0.04	1	0.008	No
5	0.13	2	0.017	No
4	0.15	3	0.03	No
3	0.15	4	0.03	No
1	0.26	5	0.04	No
2	0.36	6	0.05	No

Note. False discovery rate computations via the Benjamini-Hochberg approach (1995) yielded no statistically significant findings for any of the models.

Chapter V: Discussion

Current Study Findings

Results from the present study did not support mediation through maternal sensitivity for any of the primary analysis models. There may be a few contributing factors to this finding, which include potential range restriction and ceiling effects within the present sample. Notably, the sample majority indicated approximately no impairment associated with past trauma, which suggests that there was not enough variance in trauma impairment scores to detect potential effects that may be present in mothers with varying levels of posttraumatic impairment. The sample was also largely comprised of well-educated, married mothers with a high level of social support satisfaction. Despite these sample characteristics, there were no statistically significant correlations among covariates and primary variables, except for the positive association found between infant sex and negative affectivity (Bosquet-Enlow et al, 2017; Van den Bergh et al., 2017). Analyses revealed that female infants scored higher in negative affect than males within the present sample. Prior research on infant gender differences in negative affectivity indicated that females are more negatively emotional compared with males when exposed to similarly high levels of prenatal maternal cortisol (Braithwaite, et al., 2017), which suggests that prenatal maternal cortisol release should also be considered within this area of research. Despite gender differences in negative affect, there were no statistically significant findings on direct or indirect pathways in the models that examined negative affectivity when infant sex was included as a covariate. Also, gestational age at birth averaged full-term in the present sample, at approximately 39 weeks and was not associated with any of the primary variables. Previous research (Shin, Park, & Kim, 2006) found that mothers who delivered at 37 weeks gestation or less exhibited greater maternal sensitivity, which was inconsistent with the current study

findings. Given that the majority of mothers in the present sample delivered at 39 weeks, there may have been a range restriction in the sample and may partially explain why no statistically significant associations were observed.

Additionally, despite the wide range of trauma exposure endorsements across trauma event types, average impairment scores were only just above "*not at all,"* which suggests that overall impairment was not elevated to the degree that mothers were significantly affected by their overall past trauma experiences. This finding is consistent with research that has shown that most trauma victims do not develop clinical PTS (Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993). Specifically, these researchers examined a cohort of 4,008 women in the U.S. for lifetime trauma history and PTSD (Resnick et al., 1993). Results showed that while 69% of the sample endorsed traumatic event exposure, only 12.3% were deemed to meet diagnostic criteria for lifetime PTSD, and only 4.6% met diagnostic criteria for PTSD within the past 6 months at time of assessment (Resnick, et al., 1993). Results also showed that PTSD prevalence was greater among crime-exposed women compared with non-crime exposed women (25.8% versus 9.4%, respectively; Resnick et al., 1993), which supports the stance that trauma event type is an important distinction to make in trauma research.

A direct effect and a positive association were found for maternal trauma exposure on the infant temperament Regulation/Orienting factor, which was no longer statistically significant after correcting for Type 1 error inflation. No other direct or indirect effects were observed. Despite the lack of statistical significance, and given limitations of the present study, it is important to consider the direction of the relationship between maternal trauma exposure and infant regulation, which was in opposition to the anticipated effect that greater trauma exposure would predict decreased infant regulation behaviors. Sample characteristics may help to explain

these results. Specifically, prior research has demonstrated positive associations between maternal sensitivity and social support (Neuhauser, 2016; Shin et al., 2006) and negative associations between maternal trauma and social support (Huang et al., 2019), and the present sample largely indicated a "*very high*" satisfaction rating for social support quality. Research has also found positive associations between maternal sensitivity and maternal education (Maas et al., 2015; Neuhauser, 2016), and negative associations between PTSD symptomology and education (Hardner, Wolf, & Rinfrette, 2017; Polimanti et al., 2019), and the majority of the present study sample reported having at least a college education. Taken together, it may be that mothers with the protective factors present within this sample (e.g., "*very high*" social support satisfaction and college education) were better enabled to adjust in an adaptive manner following traumatic experiences (Hardner, Wolf, & Rinfrette, 2017; Polimanti et al., 2019) and were therefore better enabled to develop maternally sensitive behaviors with their infants (Maas et al., 2015; Neuhauser, 2016; Shin et al., 2006) and were buffered against the effects of clinically elevated PTS. Together, these patterns may have supported development of greater infant regulation ability (Braungart-Rieker, Hill-Soderland, & Karrass, 2010; Crockenberg & Leerkes, Thomas et al., 2017). These are prospective hypotheses and further research should address these potential relations to broaden our understanding of potential effects and relationship directions between maternal trauma variables and infant temperament outcomes.

Limitations

It is important to consider that the Idaho Mom Study was not primarily designed for trauma research, and it is possible that some recruits who could have added variability in trauma predictors were excluded from the study upon eligibility screening due to endorsement of associated risk factors (e.g., serious mental health concerns, borderline personality disorder,

schizophrenia). Moreover, while the continuous trauma variables provided an estimate of overall trauma exposure and post-trauma impairment, revictimization and polyvictimization were not distinguished from one another and could have elucidated outcome differences if assessed separately (Cook et al., 2005; Ford, 2021). Additionally, given that maternal trauma history was assessed in the prenatal period and maternal sensitivity and infant temperament were both assessed in the 6-month postpartum session, it is possible that trauma exposure and impairment across trauma domains could have changed between sessions. In that case, trauma exposure and impairment scores may have changed between sessions and therefore may not have comprehensively captured variable relations. Also, the present study hypotheses predicted linear relationships among primary variables; however, evidence suggests that such relations may not be linear (e.g., cumulative risk modeling in trauma; Masten & Wright, 1998). It may be that linear modeling of maternal trauma, maternal sensitivity, and infant temperament variables did not capture a full range of potential effects among variables and does not take into account the complexity of individual differences in cumulative risk that would be reflective of differences in relation directions and effects.

While the aim of the present study was to analyze mothers' lifetime trauma exposure and impairment scores across trauma types via continuous variables, effects may not have been detected due to not controlling for the specific types of trauma (e.g., IPV, CT, disaster), recency of traumatic events, and proximity (e.g., witnessing an event versus hearing about an event) that have demonstrated statistically significant results among primary variables in previous work (Ahlfs-Dunn & Huth-Bocks, 2014; Brand, Engel, Canfield, & Yehuda, 2006; Lang et al., 2010; Lyons-Ruth & Block, 1996; Yehuda et al., 2005; Zou, Zhang, Cao, & Zhang, 2015). Notably, these variables are also associated with the biological stress response (e.g., hypothalamic-

pituitary-adrenal (HPA) axis), which has important implications for maternal-infant stress physiology during the gestational period (Bosquet-Enlow et al, 2017; Bublitz & Stroud, 2012; Juul et al., 2016). Maternal cortisol is also related to maternal sensitivity and infant temperament outcomes (Bosquet Enlow et al., 2017; Finegood et al., 2016). HPA axis functioning was not considered within the scope of the present study and may provide greater insight into primary variable modeling relations.

Given that the present sample largely demonstrated characteristics that are associated with greater maternal sensitivity (e.g., high social support satisfaction and college education), our ability to detect significant findings may have been limited. It may also be that mothers were responding more sensitively than usual during the one-time live observation method due to knowing that they were being observed by the research assistants and were aware that they were being recorded.

Strengths

While previous research has largely explored univariate relations among maternal trauma, maternal sensitivity, and infant temperament, no studies have examined a mediation model that includes both maternal sensitivity and maternal trauma conceptualized in multiple ways (i.e., average impairment across trauma domains and exposure across trauma domains). The present study addressed gaps in the literature by examining the unique and combined associations of maternal trauma and sensitivity in relation to infant temperament reactivity and regulation outcomes. Additionally, the present study utilized well-validated and reliable measures of primary variables with subscales and factors that demonstrated acceptable internal consistency with the present sample. While the mediation hypotheses were not statistically significant, results add to the extant literature by providing insight into maternal trauma,

maternal sensitivity and infant temperament outcomes within a sample of prenatal women and 6-month-old infants who have access to greater social support quality and education in a federally designated underserved health and mental healthcare provider shortage area.

Future Directions

Future work using existing data from the Idaho Mom Study may broaden our understanding as to whether null findings from the present study are attributable to the way in which constructs were defined and measured versus sample limitations. Specifically, research may be expanded by utilizing additional trauma variables (e.g., event type, timing, recency) and by including sensitive, insensitive, and ambiguous maternal responding within the maternal sensitivity construct. Literature is limited about the prevalence of each of these maternal sensitivity constructs in relation to one another in behavioral observation research. A ratio of insensitive versus sensitive versus ambiguous maternal behavior may elucidate overarching patterns between mother-infant interaction quality and outcome variables that would otherwise go undetected with only one component of sensitivity. Additionally, previous research has indicated that specific subscales (e.g., falling reactivity, activity, cuddliness) within the infant temperament factors (e.g., Surgency, Negative Affectivity, and Surgency) of the IBQ-R-SF are significantly related to both maternal trauma and maternal sensitivity (Braungart-Rieker, Hill-Soderland, & Karrass, 2010; Crockenberg & Leerkes, 2006; Lang et al., 2010). It may be that further analysis of the more specific infant temperament behaviors defined by these subscales would yield greater insight into potential differences among primary variable relations within the Idaho Mom Study sample.

Additionally, the Idaho Mom Study collected cortisol samples from mothers during the prenatal session, and prior research has shown that offspring are vulnerable to trauma-associated

alterations in the mother's biological stress-response system during gestation (Buss et al., 2012; Howland, Sandman, & Glynn, 2017; Van den Bergh et al., 2017). HPA axis alterations due to trauma exposure often persist long after a traumatic event has transpired, particularly in women (American Psychological Association, 2017) and are often unresolved prior to pregnancy (Seng, 2015). Prenatal psychophysiological stress may also affect the nature and quality of maternal-infant interactions in the postnatal period, which are also influenced by maternal biopsychosocial stress and mental health (Howland et al., 2017; Juul et al., 2016; Letourneau, Watson, Duffett-Leger, Hegadoren, & Tryphonopoulos, 2011; Van den Bergh et al., 2017). Therefore, inclusion of maternal prenatal cortisol release as a predictor in future research with the present study sample may provide a more comprehensive model of psychobiological infant temperament risk in relation to maternal trauma history and maternal sensitivity behaviors.

Finally, results from this study highlight the need for future research to explore disparities among mother-infant dyads with a more diverse range of social support quality, education, marital status, religious affiliation, and offspring gestational age at birth. A large portion of respondents to the study recruitment advertisements declined to participate due to the commute and time commitment concerns. A more diverse sample inclusive of single mothers with low educational attainment, low social support quality, who reside in rural versus urban areas, and have more limited income resources may be best recruited in future research by conducting study sessions within the subjects' homes to ease the burden of transportation and time concerns.

References

Adams, J., & Weakliem, D. L. (2011). August B. Hollingshead's "Four Factor Index of Social Status": from unpublished paper to citation classic. *Yale Journal of Sociology, 8*(11).

Ahlfs-Dunn, S. M., & Huth-Bocks, A. C. (2014). Intimate partner violence and infant socioemotional development: The moderating effects of maternal trauma symptoms. *Infant Mental Health Journal, 35*(4), 322-335. doi:10.1002/imhj.21453

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (DSM-5®). American Psychiatric Pub.

American Psychological Association. (2017). *Facts about women and trauma.* Retrieved from https://www.apa.org/advocacy/interpersonal-violence/women-trauma#:~:text=These%20include%3A%20nightmares%2C%20insomnia%2C,and%20alcohol%2Fsubstance%20abuse%20problems

Aubuchon-Endsley, N., Devine, N., Gee, B. M., Ramsdell-Hudock, H. (2020). The Dynamic Reciprocity Model: A preliminary framework for understanding early caregiver-offspring interactions. *Quarterly Journal of Women's Health & Nursing, 1*(1), 1–3.

Aubuchon-Endsley, N., Gee, B., Devine, N., Ramsdell-Hudock, H., Swann, H., & Brumley, M. R. (2020). A cohort study of relations among caregiver-infant co-occupation and reciprocity. *The Occupational Therapy Journal of Research: Occupation, Participation and Health, 40*(4), 261-269. doi: 10.1177/1539449220905791

Benjamini, Y., & Hochberg, Y. (1995). Controlling the false discovery rate: A practical and powerful approach to multiple testing. *Journal of the Royal statistical society: series B (Methodological)*, *57*(1), 289-300.

Bosquet Enlow, M., Devick, K. L., Brunst, K. J., Lipton, L. R., Coull, B. A., & Wright, R. J. (2017). Maternal lifetime trauma exposure, prenatal cortisol, and infant negative affectivity. *Infancy, 22*(4), 492-513.

Bosquet Enlow, M., Egeland, B., Carlson, E., Blood, E., & Wright, R. J. (2014). Mother–infant attachment and the intergenerational transmission of posttraumatic stress disorder. *Development and Psychopathology, 26*(1), 41-65. doi:10.1017/S0954579413000515

Bosquet Enlow, M., Kitts, R. L., Blood, E., Bizarro, A., Hofmeister, M., & Wright, R. J. (2011). Maternal posttraumatic stress symptoms and infant emotional reactivity and emotion regulation. *Infant Behavior and Development, 34*(4), 487-503.

Bowers, M. E., & Yehuda, R. (2016). Intergenerational transmission of stress in humans. *Neuropsychopharmacology, 41*, 232-244. doi:10.1038/npp.2015.247

Braithwaite, E. C., Pickles, A., Sharp, H., Glover, V., O'Donnell, K. J., Tibu, F., & Hill, J. (2017). Maternal prenatal cortisol predicts infant negative emotionality in a sex-dependent manner. Physiology & behavior, 175, 31-36.

Brand, S. R., Engel, S. M., Canfield, R. L., & Yehuda, R. (2006). The effect of maternal PTSD following *in utero* trauma exposure on behavior and temperament in the 9-month-old infant. *Annals of the New York Academy of Sciences, 1071*(1), 454-458. doi:10.1196/annals.1364.041

Braungart-Rieker, J. M., Hill-Soderlund, A. L., & Karrass, J. (2010). Fear and anger reactivity trajectories from 4 to 16 months: The roles of temperament, regulation, and maternal sensitivity. *Developmental psychology, 46*(4), 791.

Bretherton, I. (2013). Revisiting Mary Ainsworth's conceptualization and assessments of maternal sensitivity-insensitivity. *Attachment & Human Development, 15*(5-6), 460-484.

Bublitz, Margaret H., and Laura R. Stroud. "Childhood sexual abuse is associated with cortisol awakening response over pregnancy: preliminary findings." Psychoneuroendocrinology 37.9 (2012): 1425-1430.

Burke, J. G., Lee, L.-C., & O'Campo, P. (2008). An exploration of maternal intimate partner violence experiences and infant general health and temperament. *Maternal and Child Health Journal, 12*(2), 172-179.

Buss, C., Davis, E. P., Shahbaba, B., Pruessner, J. C., Head, K., & Sandman, C. A. (2012). Maternal cortisol over the course of pregnancy and subsequent child amygdala and hippocampus volumes and affective problems. *Proceedings of the National Academy of Sciences, 109*(20), E1312-E1319.

Cohen, J. (1988). Statistical power analysis for the behavioral sciences–second edition. 12 Lawrence Erlbaum Associates Inc. Hillsdale, New Jersey, 13.

Cook, J. M., Elhai, J. D., Cassidy, E. L., Ruzek, J. I., Ram, G. D., & Sheikh, J. I. (2005). Assessment of trauma exposure and post-traumatic stress in long-term care veterans: Preliminary data on psychometrics and post-traumatic stress disorder prevalence. Military medicine, 170(10), 862-866.

Crockenberg, S. C., & Leerkes, E. M. (2006). Infant and maternal behavior moderate reactivity to novelty to predict anxious behavior at 2.5 years. *Development and Psychopathology, 18*(1), 17.

Davidson, R. J., Sherer, K. R., & Goldsmith, H. H. (2009). Handbook of affective sciences: Oxford University Press.

Duncan, G. J., & Magnuson, K. A. (2001). Off with Hollingshead: Socioeconomic resources, parenting, and child development. *Socioeconomic Status, Parenting, and Child Development,* 83-106.

Fagerstrom, A., Arntzen, E., & Foxall, G. R. (2009). Use of MediaLab™ in experimental behavioral research: The case of consumer decision making. *European Journal of Behavior Analysis*, *10*(2), 203-214.

Finegood, E. D., Blair, C., Granger, D. A., Hibel, L. C., & Mills-Koonce, R. (2016). Psychobiological influences on maternal sensitivity in the context of adversity. *Developmental psychology, 52*(7), 1073.

Ford, J. D. (2021). Polyvictimization and developmental trauma in childhood. European Journal of Psychotraumatology, 12(sup1), 1866394.

Fritz, M. S., & MacKinnon, D. P. (2007). Required sample size to detect the mediated effect. *Psychological Science, 18*(3), 233-239.

Gartstein, M. A., & Rothbart, M. K. (2003). Studying infant temperament via the revised Infant Behavior Questionnaire. *Infant Behavior and Development, 26*(1), 64-86.

Gee, B., Overrocker, L., Aubuchon-Endsley, N., & Ramsdell-Hudock, H. (in press). Infant maternal reciprocity: A co-occupation perspective. Annals of International Occupational Therapy.

Goldsmith, H., & Rothbart, M. (1996). The Laboratory Temperament Assessment Battery (LabTAB): Locomotor version 3.0 Technical Manual. *Madison, WI: Department of Psychology, University of Wisconsin*.

Hardner, K., Wolf, M. R., & Rinfrette, E. S. (2017). Examining the relationship between higher educational attainment, trauma symptoms, and internalizing behaviors in child sexual abuse survivors. *Child Abuse & Neglect*, 86, 375-383.

Harville, E. W., Xiong, X., & Buekens, P. (2010). Disasters and perinatal health: A systematic review. *Obstetrical & gynecological survey*, *65*(11), 713.

Hayes, A. F. (2012). My macros and code for SPSS and SAS. URL: http://afhayes. com/spss-sas-andmplus-macros-and-code. html.

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*: Guilford Publications.

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

Hooper, L. M., Stockton, P., Krupnick, J. L., & Green, B. L. (2011). Development, use, and psychometric properties of the Trauma History Questionnaire. *Journal of Loss and Trauma, 16*(3), 258-283.

Howland, M. A., Sandman, C. A., & Glynn, L. M. (2017). Developmental origins of the human hypothalamic-pituitary-adrenal axis. *Expert Review of Endocrinology & Metabolism, 12*(5), 321-339. doi:10.1080/17446651.2017.1356222

Huang, Z. H., Hou, C. L., Huang, Y. H., He, X. Y., Wang, Q. W., Chen, X., ... & Jia, F. J. (2019). Individuals at high risk for psychosis experience more childhood trauma, life events and social support deficit in comparison to healthy controls. Psychiatry Research, 273, 296-302.

Hughes, M., & Cossar, J. (2016). The relationship between maternal childhood emotional abuse/neglect and parenting outcomes: A systematic review. *Child abuse review, 25*(1), 31-45.

Jansen, P. W., Raat, H., Mackenbach, J. P., Jaddoe, V. W., Hofman, A., Verhulst, F. C., & Tiemeier, H. (2009). Socioeconomic inequalities in infant temperament. *Social Psychiatry and Psychiatric Epidemiology, 44*(2), 87-95.

Jarvis, B. G. (2014). MediaLab (Version 2014.1. 127)[Computer Software]. New York, NY: Empirisoft Corporation.

Juul, S., Hendrix, C., Robinson, B., Stowe, Z., Newport, D., Brennan, P., & Johnson, K. (2016). Maternal early-life trauma and affective parenting style: The mediating role of HPA-axis function. *Archives of Women's Mental Health, 19*(1), 17-23. doi:10.1007/s00737-015-0528-x

Kaitz, M., Levy, M., Ebstein, R., Faraone, S. V., & Mankuta, D. (2009). The intergenerational effects of trauma from terror: A real possibility. *Infant Mental Health Journal, 30*(2), 158-179.

Kivijärvi, M., Räihä, H., Kaljonen, A., Tamminen, T., & Piha, J. (2005). Infant temperament and maternal sensitivity behavior in the first year of life. *Scandinavian Journal of Psychology, 46*(5), 421-428.

Koren-Karie, N., Oppenheim, D., Dolev, S., Sher, E., & Etzion-Carasso, A. (2002). Mothers' insightfulness regarding their infants' internal experience: Relations with maternal sensitivity and infant attachment. *Developmental psychology, 38*(4), 534.

Lang, A. J., Gartstein, M. A., Rodgers, C. S., & Lebeck, M. M. (2010). The impact of maternal childhood abuse on parenting and infant temperament. *Journal of Child and Adolescent Psychiatric Nursing, 23*(2), 100-110.

Leerkes, E. M. (2010). Predictors of maternal sensitivity to infant distress. *Parenting: Science and Practice, 10*(3), 219-239.

Leerkes, E. M., & Zhou, N. (2018). Maternal sensitivity to distress and attachment outcomes: Interactions with sensitivity to nondistress and infant temperament. *Journal of family psychology, 32*(6), 753.

Leerkes, E. M., Blankson, A. N., & O'Brien, M. (2009). Differential effects of maternal sensitivity to infant distress and nondistress on social-emotional functioning. *Child Development, 80*(3), 762.

Letourneau, N., Watson, B., Duffett-Leger, L., Hegadoren, K., & Tryphonopoulos, P. (2011). Cortisol patterns of depressed mothers and their infants are related to maternal–infant interactive behaviours. *Journal of Reproductive and Infant Psychology, 29*(5), 439-459.

Lyons-Ruth, K., & Block, D. (1996). The disturbed caregiving system: Relations among childhood trauma, maternal caregiving, and infant affect and attachment. *Infant Mental Health Journal: Official Publication of The World Association for Infant Mental Health, 17*(3), 257-275.

Maas, A. J. B., de Cock, E. S., Vreeswijk, C. M., Vingerhoets, A. J., & van Bakel, H. J. (2015). A longitudinal study on the maternal–fetal relationship and postnatal maternal sensitivity. *Journal of Reproductive and Infant Psychology, 34*(2), 110-121.

Macaulay, S., Buchmann, E. J., Dunger, D. B., & Norris, S. A. (2019). Reliability and validity of last menstrual period for gestational age estimation in a low-to-middle-income setting. *Journal of Obstetrics and Gynaecology Research, 45*(1), 217-225.

Mangold (Version 2017) [INTERACT Lab Suite Software]. Mangold International GmbH (Ed.) www.mangold-international.com

Martinez-Torteya, C., Dayton, C. J., Beeghly, M., Seng, J. S., McGinnis, E., Broderick, A., . . . Muzik, M. (2014). Maternal parenting predicts infant biobehavioral regulation among

women with a history of childhood maltreatment. *Development and Psychopathology, 26*(2), 379-392.

Masten, A. S., & Wright, M. O. D. (1998). Cumulative risk and protection models of child maltreatment. *Journal of Aggression, Maltreatment & Trauma, 2*(1), 7-30.

May, C. L., & Wisco, B. E. (2016). Defining trauma: How level of exposure and proximity affect risk for posttraumatic stress disorder. Psychological Trauma: Theory, Research, Practice, and Policy, 8(2), 233.

Mesman, J., & Emmen, R. A. (2013). Mary Ainsworth's legacy: A systematic review of observational instruments measuring parental sensitivity. Attachment & Human Development, 15(5-6), 485-506.

Neuhauser, A. (2016). Predictors of maternal sensitivity in at-risk families. *Early Child Development and Care, 188*(2), 126-142.

Planalp, E. M., Van Hulle, C., Gagne, J. R., & Goldsmith, H. H. (2017). The infant version of the Laboratory Temperament Assessment Battery (Lab-TAB): Measurement properties and implications for concepts of temperament. *Frontiers in Psychology, 8*, 846.

Polimanti, R., Ratanatharathorn, A., Maihofer, A. X., Choi, K. W., Stein, M. B., Morey, R. A., ... & Gelernter, J. (2019). Association of economic status and educational attainment with posttraumatic stress disorder: A mendelian randomization study. *JAMA network open, 2*(5), e193447-e193447.

Putnam, S. P., Helbig, A. L., Gartstein, M. A., Rothbart, M. K., & Leerkes, E. (2014). Development and assessment of short and very short forms of the Infant Behavior Questionnaire–Revised. *Journal of Personality Assessment, 96*(4), 445-458.

Resnick, H. S., Kilpatrick, D. G., Dansky, B. S., Saunders, B. E., & Best, C. L. (1993). Prevalence of civilian trauma and posttraumatic stress disorder in a representative national sample of women. *Journal of consulting and clinical psychology*, *61*(6), 984.

Rosenberg, R. E., Ahmed, A. N. U., Ahmed, S., Saha, S. K., Chowdhury, M. A., Black, R. E., . . . Darmstadt, G. L. (2009). Determining gestational age in a low-resource setting: validity of last menstrual period. *Journal of Health, Population, and Nutrition, 27*(3), 332.

Rothbart, M. K. (1981). Measurement of temperament in infancy. Child development, 569-578.

Rothbart, M. K. (1986). Longitudinal observation of infant temperament. *Developmental Psychology, 22*(3), 356.

Rothbart, M. K. (2011). *Becoming who we are: Temperament and personality in development*: Guilford Press.

Sandman, C. A., Davis, E. P., Buss, C., & Glynn, L. M. (2012). Exposure to prenatal psychobiological stress exerts programming influences on the mother and her fetus. *Neuroendocrinology, 95*(1), 8-21.

Sandman, C. A., Glynn, L. M., & Davis, E. P. (2013). Is there a viability–vulnerability tradeoff? Sex differences in fetal programming. *Journal of Psychosomatic Research, 75*(4), 327-335.

Sarason, I. G., Sarason, B. R., Shearin, E. N., & Pierce, G. R. (1987). A brief measure of social support: Practical and theoretical implications. *Journal of Social and Personal Relationships, 4*(4), 497-510.

Schwerdtfeger Gallus, K., & Nelson Goff, B. (2007). *Intergenerational transmission of trauma: Exploring mother-infant prenatal attachment* (Vol. 20).

Seckl, J. R. (2008). Glucocorticoids, developmental 'programming' and the risk of affective dysfunction. *Progress in Brain Research, 167*, 17-34.

Seng, J. & Taylor, J. (2015). *Trauma informed care in the perinatal period*: Dunedin Academic Press Ltd.

Shin, H., Park, Y. J., & Kim, M. J. (2006). Predictors of maternal sensitivity during the early postpartum period. *Journal of Advanced Nursing, 55*(4), 425-434.

Shin, H., Park, Y. J., Ryu, H., & Seomun, G. A. (2008). Maternal sensitivity: A concept analysis. *Journal of Advanced Nursing, 64*(3), 304-314.

Sjögren, E., Leanderson, P., & Kristenson, M. (2006). Diurnal saliva cortisol levels and relations to psychosocial factors in a population sample of middle-aged Swedish men and women. *International Journal of Behavioral Medicine, 13*(3), 193-200.

Tabachnick, B. G., Fidell, L. S., & Ullman, J. B. (2007). *Using multivariate statistics* 5, pp. 78-91). Boston, MA: Pearson.

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International journal of medical education, 2*, 53.

Thomas, J. C., Letourneau, N., Campbell, T. S., Tomfohr-Madsen, L., & Giesbrecht, G. F. (2017). Developmental origins of infant emotion regulation: Mediation by temperamental negativity and moderation by maternal sensitivity. *Developmental psychology, 53*(4), 611.

Van den Bergh, B. R., van den Heuvel, M. I., Lahti, M., Braeken, M., de Rooij, S. R., Entringer, S., . . . King, S. (2017). Prenatal developmental origins of behavior and mental health: The influence of maternal stress in pregnancy. *Neuroscience & Biobehavioral Reviews*.

Wamser-Nanney, R., & Cherry, K. E. (2018). Children's trauma-related symptoms following complex trauma exposure: Evidence of gender differences. *Child Abuse & Neglect,* 77, 188-197.

Yehuda, R., Engel, S. M., Brand, S. R., Seckl, J., Marcus, S. M., & Berkowitz, G. S. (2005). Transgenerational effects of posttraumatic stress disorder in babies of mothers exposed to the World Trade Center attacks during pregnancy. The Journal of Clinical Endocrinology & Metabolism, 90(7), 4115-4118.

Zou, S., Zhang, Y., Cao, Y., & Zhang, Y. (2015). Correlation of maternal abuse during pregnancy with infant temperament and development. *Archives of Disease in Childhood*, *100*(10), 938-943.

Appendix A: Behavioral Observation Task Procedure

Protocol for 6 Month Observation (Adapted from Leerkes 6/2010)
Revised 11/18/15

Overview and Task Details

Within two weeks of the infant's 6 month birthday, mother and infant behavior will be videotaped during a laboratory assessment of infant temperament similar to those used by others (Goldsmith & Rothbart, 1996; Leerkes & Crockenberg, 2003).

Mothers will be instructed to feed their infants prior to the laboratory visit given the impact that breastfeeding may have on behavior and to reduce time that mother-infant dyads spend in the lab to complete behavioral tasks.

During a 4-minute caregiving task, mothers will be asked to change their infant's diaper and to change their infant's outfit into a gender neutral outfit. We will provide mothers with clothing. The experimenter will leave the room during this time. Then the experimenter will instruct the mothers to play with their infant as they normally would for 7 minutes to make themselves and their infants comfortable while using any of the toys in the room. The experimenter will leave the room during this time. Following this, the experimenter will return to the room and ask the mother to place her infant in an infant seat. Mothers will sit adjacent to the infant, situated so that with some effort infants can see them. This will be followed by a task orientation task, and a limitations task.

During the *orientation task,* the experimenter will provide the child with a set of blocks to play with for 3 minutes. Mothers will be instructed to remain neutral and uninvolved during the entirety of the task.

During the *limitations task*, the experimenter will kneel in front of the infant seat, gently hold the infant's forearms immobile for 4 minutes, with her head down, and will not interact with the infant. During the first minute the mother will be instructed to remain neutral and uninvolved unless she wants to end the activity. Then the experimenter will signal the mother that she may interact with her infant as she pleases.

The entire observation will last approximately 18 minutes and will be videotaped. Be sure to not obstruct the camera's view of participants by sitting on the purple couch whenever providing instructions or otherwise between paradigms.

*Be sure to sit on the purple couch whenever providing instructions, close doors to the participant and observation rooms quietly, and keep the noise down and lights off in the observation room at all times.

Script/Protocol

Roles

RA-E: *Experimenter/Lead RA for the family*

RA-V: *Primary Videotaper*

[Note: RA-E should not wear bracelets, a watch, or rings]

Greeting

RA-V: *Wait in video room and monitor video for mom and baby to enter observation room and* ***begin recording as soon as possible****. Monitor video throughout observation to make sure mom and baby stay within view.*

RA-E: *Meet mom and baby in waiting room and make positive small talk regarding the baby as you walk mom into the observation room. Allow mom to use restroom if necessary while walking back* [If brought stroller, coats or other non-diaper bag items, leave in lab 527]

E.g., "Hi. I've been looking forward to meeting baby's name! Look at you. Aren't you a big guy! Or Look at those big eyes. She/he looks alert and ready to go. How have you been doing, Mom?"

RA-E: *Enter observation room and begin explaining visit to mom*

Baby bag can stay on floor next to mom's chair

"You can take a seat in this chair right here."

Sit on the purple couch and be sure not to block camera.

"I just wanted to let you know that I'm supposed to be neutral around baby so I don't distract him/her or affect his/her reactions today. So, I won't be talking to or interacting with him/her much. I know that might seem strange, so I wanted to let you know I am doing it on purpose."

"Today we will be doing a set of play tasks and I'll explain them in detail before we begin each one.

"You are welcome to use any of the infant supplies and toys in the room. If you brought toys from home, I'd like you not to use them. We like everyone to use all of the same toys. "

"Do you have any questions before we begin?

RA-E: *Determine if baby was fed/napped prior to visit*

"Did baby fall asleep or eat on the drive here?

"Were you able to feed baby before you left your home?"

If yes: "Great!! What time did you start feeding baby? How long did you feed baby until? So it sounds like the total feeding time was approximately XX minutes? Did baby have formula, breastmilk, solids, or some combination thereof? [If baby had breastmilk] Does baby breastfeed or take breastmilk from a bottle? About how much did he/she eat? Thank you!!" [Make a copy of responses and place in file after the session]

Pre-Obs Feeding Time: _____to _____ Occurred: **At Home** **At Lab** (circle one)

Pre-Observation Feeding Method (circle all that apply):

Breast **Bottle w/ Formula** **Bottle w/ Breast Milk** **Solid Food**

If **Bottle** Fed: Amount of Last Feeding: _____ ounces. **Bottle Contents:** Formula BM

If **Breastfed**: One _____ Two _____ Breasts. Total Feeding Time: _____

"Okay, just so you know once we start the activities it will be approximately 20 minutes until we finish the behavioral tasks and we would really like to avoid feeding during that time as much as possible. Do you think that baby will be okay to not eat until [TIME]?"

-----Caregiving Task—4 minutes-----

RA-E: *Explain caregiving task to mom*

"All right. I am going to start by leaving you both alone in here for about 4 minutes. While I am gone, I'd like you to do 2 things. First, I'd like you to change baby's diaper. We have diapers and wipes available if you'd like to use them. If you prefer to use your own supplies or need to use additional supplies that you brought, that is fine too. Also, I'd prefer that you not use a pacifier for the next few activities because we are trying to record baby's face and it's hard to see with a pacifier in the mouth. And I'd prefer you not use your cell phone during the activities today. Do you have any questions?"

Walk over to storage box with infant supplies.

"We keep all of our supplies over here. If you prefer to use your own please feel free to get them now."

Allow mother to get needed supplies.

"After you change baby's diaper I'd like you to change him/her into one of these outfits."

Show mom baby outfits.

"The reason we do this is so that all of the babies look somewhat similar when we watch the videotapes. We wash them after every visit—so any one you pick is clean."

"Larger sizes are on the bottom, smaller sizes are on the top."

Point out Changing Pad

"We set up a sanitary changing pad for you to change baby here. Once you're done changing baby's outfit, you can put his/her clothes from home in that basket there *(point to brown clothes bin next to chair)*. We are videotaping baby with that camera *(point to camera facing infant chair)* and this camera *(point to camera mounted on wall)* for this part, so as much as possible try to have him/her facing in one of those directions and try not to get between him/her and the camera. A member of our research staff is videotaping in the room next to this one so please do your best to keep baby facing either of those cameras. Do you have any questions?"

"Okay great! So please change his/her diaper, change his/her outfit, and I'll be back in a few minutes."

RA-E: Begin Caregiving Task

1. **Leave the observation room**

2. **Set stop watch and wait in video room**

Stop watch 4 minutes

3. **When 4 minutes (total time) are over return to observation room. Say "Thanks for changing baby!"**

4. Place the changing pad in the brown clothing bin

-----Free Play Task—7 minutes-----

RA-E: *Explain free play task to mom*

"I want to be sure baby has a chance to have some fun to help him/her get used to a new place, so I have this basket of toys you can use to play with him/her. "

Hold up basket of toys for mom then place back on floor

"These are washed after every visit too. Remember, we are videotaping baby with that camera *(point to camera facing infant chair)* and this camera *(point to camera mounted on wall)* for this part, so as much as possible try to have him/her facing in one of those directions and try not to get between him/her and the camera."

"When I get back, I'll tell you more about what we are going to do next. In the meantime, please, make yourselves comfortable, and feel free to use anything in the room. I'd also like you to fill out this brief form while I am gone."

Hand mother clipboard with 6 Month Infant Health and Sleep Questionnaire.

"Okay great! So you can just play in here, fill out the form, and I'll be back in a few minutes."

RA-E: Begin Free Play Task

1. **Leave the observation room**

2. **Set stop watch and wait in video room**

Stop watch 7 minutes

3. **When 7 minutes (total time) are over return to observation room. Say "How is everything going? We'd like to transition to the next task, so we'll have you complete the Infant Health and Sleep Questionnaire afterwards."**

4. Take clipboard and questionnaire from mother and set aside. Remember to take questionnaire with you when you exit from the orientation task.

5. Fold the blue mat in half and place it behind the purple couch

-----Transition to LABTAB/Emotion Tasks-----

RA-E: *Explain general task instructions*

"We are interested in babies' temperaments, so we put them in situations that may be a little unusual, but not that different from what might happen in a normal day. Babies show all different reactions to these situations. Some smile and laugh, some get upset, and others don't seem bothered at all.

During these next tasks, baby is going to be sitting in this chair *(point to infant seat)*, and you'll be sitting in this chair *(point to mom chair)*, where you can see what is happening**. We really want to get to the end of each of the two activities for every baby**. If baby cries, I will continue to the end of the activity unless you tell me to stop, or I will stop the activity if baby is **extremely upset for 30 seconds**. We also ask that you not take baby out of the chair during the activities unless you'd like to end the activity. The activities will take 7 minutes to complete. Do you have any questions?

RA-E: *Explain task orientation task to mother.*

"For this task, I will give baby a set of blocks to play with for 3 minutes. I'd like you to remain in this chair, and if baby tries to engage your attention try to remain as uninvolved as possible. If all of the blocks become too far for baby to reach, you can quickly push them forward but remember not to engage his/her attention. I'll come back in the room when the 3 minutes are complete. Do you have any questions?"

If mom asks if she can pick up blocks from the floor, instruct her to only pick them up if there are no blocks left on the tray for baby to play with.

"Okay, let's put baby in the seat and get started."

Allow mom to take time putting infant into seat

***Move diaper bag** and **toy basket** next to mother chair out of baby's view*

***Take** 6 Month Infant Health and Sleep Questionnaire and clipboard into the observation room.*

-----Task Orientation Task-----

RA-E: *If the infant is holding a toy, take it away. Snap the infant tray into infant seat.*

RA-E: Begin Task Orientation Task

1. Give the infant the blocks to play with **(dump out of bucket)**, say **"Here are some blocks for you to play with."**

2. Say to mom, **"Just remain as uninvolved as possible and I'll be back in 3 minutes."**

3. Leave the observation room

4. **Set stop watch**

   Stop watch 3 minutes

5. **When 3 minutes (total time) are over return to observation room. Say "Ok. We are all done with that one."**

If the infant is intensely distressed for 30 seconds continuously, end the activity. Intense distress includes a full blown cry, red face, and closed eyes.

If baby is upset when the task is over, ask mother to calm baby down before the next task is started. If baby is calm, continue to the next task.

-----Limitations Task-----

RA-E: *Explain limitations task to mother.*

> "For this next one I am going to kneel in front of baby and gently hold his/her arms still. Now, I won't be squeezing or anything. I will be holding them gently, but firmly enough that he/she can't move them easily. For the first minute, I'd like you to remain uninvolved. I'd like you to remain in this chair, keep a neutral/blank facial expression, and avoid making eye-contact with him/her. This is important, because we want to see how baby responds without your help. Then, I will say OK and you can interact with him/her however you would like while the activity continues for three minutes **so we can see how he/she responds with your help**, except, I'd like you not to take him/her out of the seat unless you want to stop the activity like we talked about before. You can move around and use any of the toys in the room. I'll just remind you, that this is the camera focusing on baby's face *(point to camera facing infant chair)*, so try not to get between baby and the camera so we can always have a good picture of his/her face. I won't be speaking to either one of you during this activity, **and I'll plan to finish the whole activity unless you tell me to stop or baby is extremely upset for 30 seconds**. Do you have any questions?"
>
> "Okay great! So just remain uninvolved for the first minute, and try not to get between him/her and the camera while you're involved during the last three minutes."

RA-E: *If the infant is holding a toy take it away right before you start. Make sure bracelets/watch/rings have been removed.*

RA-E: Begin Limitations Task

1. **Clean up all blocks from the tray, floor, etc. and place out of view with the other toys.**
2. **Remove tray from high chair and set behind infant out of view.**
3. **Kneel in front of infant.**
4. **Set stop watch.**
5. **Hold arms with head down.**
6. **At 1 minute, say "OK, you can get involved now" while keeping hand on stopwatch and head down [but motioning side to side with head]. Then resume head down for another 3 minutes.**
7. **When 4 minutes (total time) are over. Let go. "Ok. We are all done with that one."**

If infant is intensely distressed for 30 seconds during the mother uninvolved portion, signal her to become involved early. If the infant is intensely distressed for 30 continuous seconds while the mother is involved end the activity. Intense distress includes a full blown cry, red face, and closed eyes.

RA-E: *If baby is upset when the task is over, ask mother to calm baby down before the next part of the study is started. If baby is calm, continue.*

RA-E: "We are no longer videotaping you and your baby and will move on to the next part of the study. But before we begin that do you need a break or to use the restroom? Since we will be weighing **baby** next, it would be good to change him/her now if necessary and we have a bathroom with a changing station down the hall."

RA-V: END VIDEO RECORDING

**Be sure to bring brown laundry basket into 527 and have URA help with anthropometry before cleaning up the lab, backing up video, etc.*

Appendix B: Maternal Sensitivity Interact Coding Procedure

Interact Coding Instructions for IDAHO MOM (6/4/19)

General Coding Rules

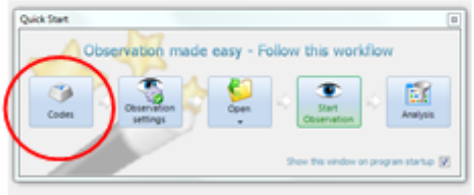
- Always code when you are well-rested, alert, and well-nourished.
- Never code for more than 2 hours at a time.
- Be aware of your own state and arousal while coding. If you become irritable or fatigued in the course of coding, take breaks. Go for a walk, get fresh air, have a snack. If you do these things and still feel "off" it is better (for the quality of the data) to STOP for that day.
- Some tapes are harder to code than others for a variety of reasons. A baby's cries may be intense and or aversive; a baby or mother's behavior may make you feel sad; the tape may be blurry or zoomed out so far that it's harder to see, etc. Take these things into account when you are making decisions about how long you can hang in there. You could even put that tape aside for now and work on another (knowing that the first will have to be completed eventually).
- If you are really unsure about something, ask Dr. Aubuchon-Endsley. If it's a major question…gosh I am not sure if I understand this particular code at all, ask immediately. If it is something idiosyncratic about a particular baby, gee I think something important is happening at 16:05, but I am not sure what….you can save several of those questions up and ask at one meeting to be more time efficient.
- 6 Month observations will always take priority over coding.

Preparing to Code

1. Retrieve dongle
    a. Located in the Mangold Interact Yellow Box (located in cabinet next to window).
    b. Retrieve the dongle (silver USB stick on key ring) from the small navy cloth bag.
    c. Insert dongle into USB port on computer.

2. Open program
    a. File Explorer → CMSTICK → Mangold INTERACT → INTERACT

3. Open coding system
    a. From workflow menu, select codes.



    b. The "Current Codes" pop-up menu will appear, select "Open" from toolbar.
    c. Codes can be found in the following pathway: Documents\Behavioral Coding\Experiments\Idaho Mom\Codes
    d. Select coding scheme
        i. InfantReactivity_IdahoMom
        ii. MaternalBehavior_IdahoMom

4. Ensure correct coding settings are activated
    a. Return to workflow menu and select "Observation settings"

    b. Observation source = Multimedia coding
    c. Coding mode = Standard (ad hoc)
    d. All others unchecked
        i. See attached screenshot if needed for clarification

5. Open video to code
    a. Return to workflow menu and select "Open"

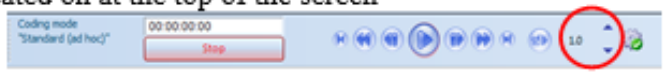
    b. Videos can be found on the hard drive.

i. Select all video files for that participant.
    1. There could be 2-4 camera angles depending upon when the participant enrolled in the study.

6. Start coding
    a. From workflow menu, select "Start Observation", this will generate a new file

    b. You will be asked if you want to link the multimedia file to the new document, select "Yes".
    c. You will be asked if you want to store the document with the multimedia file, select "No".
    d. Save the data file in the data folder for Idaho Mom.
        i. Documents\Behavioral Coding\Experiments\Idaho Mom\Data
    e. Name the file: PID_Age_IdahoMom_CodingScheme
        i. Infant Reactivity Example: 001_6_IdahoMom_InfantReactivity
        ii. Maternal Behavior Example: 001_6_IdahoMom_MaternalBehavior
        iii. **Please make sure that you name the files as outlined above.** It is important that one can easily distinguish which participant, session and behavior were coded in the data file.
    f. Press play on the Control panel to beginning the video

7. Change Video Speed
    a. Located on at the top of the screen



    b. Default is 1.0 Normal Speed
    c. Change to .5 Normal Speed (but be aware that some behaviors are best observed normal 1.0 Speed)
        i. Helpful Hints: 0.8 and 0.9 are good speeds for both behavioral categories, but keep in mind that vocalizations are distorted at all speeds except 1.0 Normal Speed.

8. Enlarge the video window so you can see facial features and eye movement

9. Periodically throughout coding and after coding each task save the data file

10. Coding the session
    a. Watch the entire video without pausing it to get a sense of what to expect. Rewind to back to the start of the video and begin coding.
    b. Code infant behavior at the start of the video, pausing anytime the infant's behavior changes by selecting the code. If you make mistakes, you can edit the codes while the video is paused by selecting the column and change the code

manually. Remember that the codes are case sensitive. All alphabetical codes are lower case.

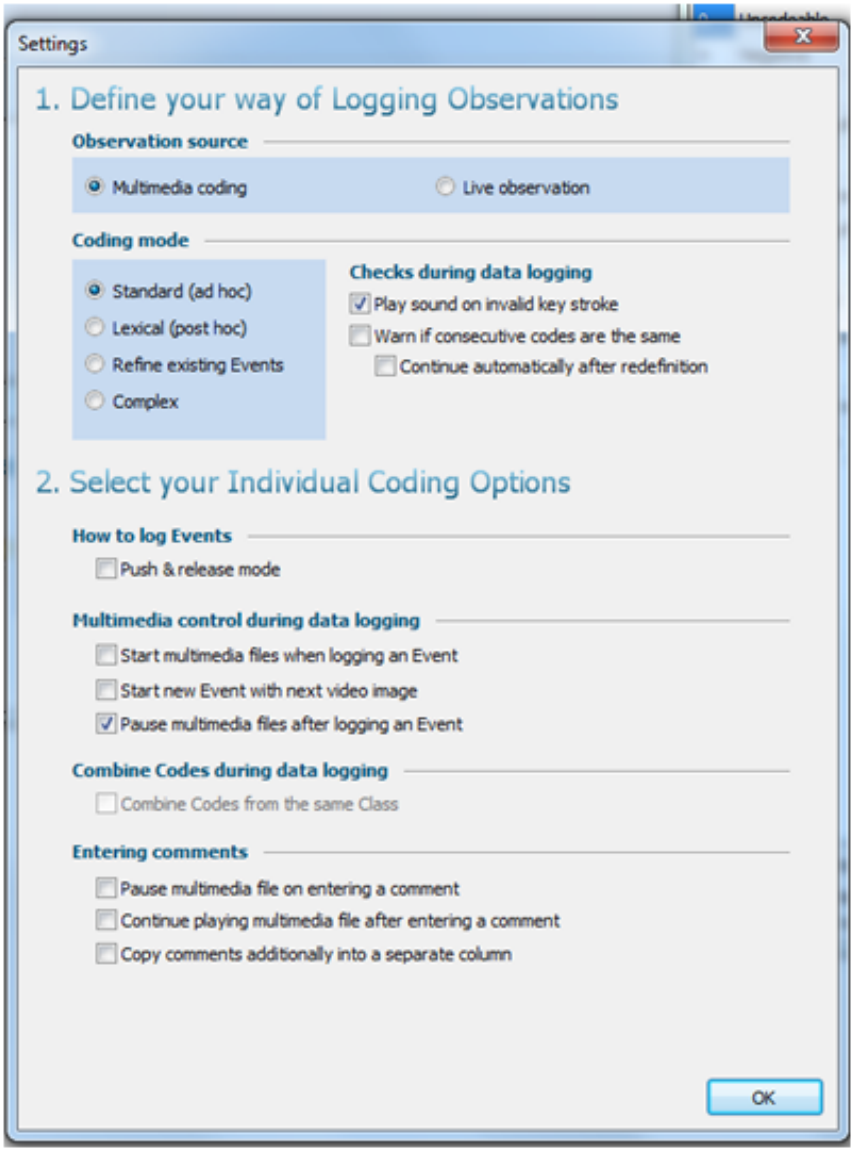
c. When you are done coding, click the stop icon in the control panel and save the data file by selecting the save icon in the control panel.
d. There are 2-4 camera angles per participant. Interact will allow you to open all associated videos so that you can rotate thru them to determine the best camera view to score each behavioral task.
e. For more information on each coding scheme, refer to that coding definition at the end of this document.

Some Information to Keep in Mind

The quality of the videotapes vary. Some are blurry, some are clear. Sometimes the video is zoomed in so close to baby you cannot see mom. Do your best to infer what she is doing. When this happens, pay special attention to vocal cues.

Mothers often speak softly, and they are hard to hear due to the sound quality. If you suspect mom is talking, turn the volume up. Also, look for other cues like lip or head movements that may accompany speaking.

Observation Settings for Interact



Note: You can opt to either check or uncheck "Pause multimedia files after logging an Event". This option is nice for when you are starting to make sure that you have pressed the correct key, etc.You will have to manually press play to resume the video after each automatic pause.

Revised Infant Reactivity Codes (10/20/16)

Code	Description	Definition
1	Positive	Brief, low intensity positive vocalization, brief smile, wide-eyed interest/pleasure Definite positive vocalization and/or bright smile. Maybe accompanied by excited body movement Open mouth, intense smile, can be laughing or squealing
2	Neutral	No negative or positive affect apparent in vocalizations, facial expressions, or body movements. Includes moderate interest and confusion/bewilderment
3	Negative	Fusses, whines, whimpers, and/or facial expressions that indicate wariness or displeasure (frowning and furrowed brow/wrinkled nose [confusion/puzzlement is not negative]). Maybe accompanied by body tension, uncoordinated movements, mild startles. May be brief or continual. Cries and/or facial expression indicating clear distress (fear, sadness, anger)/ May be brief. May be continuous moderate sobbing. Screams, wails, sobs intensely; mouth wide. May include breath holding, breathless crying, tears, eyes closed, angry or fearful facial expressions, red face, body tremors, and intense startles.

Revised Maternal Behavior Codes (10/20/2016)

For the Reciprocity reliability standard, there is only one caregiver in the room. The female in the white shirt with blonde hair is mom.

Code	Description	Definition
0	Uncodeable*	Either mother cannot be seen or it is part of tape that is not meant to be coded (e.g., warm-up period or break or mother uninvolved portion of activity). Always start and end with this code.
N	Negative	Mother displays negative affect facially or vocally. Must be in reaction to the baby or displayed toward the baby (e.g., baby cries and mother makes a negative face; or mother appears to be making angry face about the toy but directs the face toward the infant). May include disciplining infant and instructing infant not to cry in a directive tone. May include any other negative behavior not captured by the other codes. **-OR-** Mother forces her own agenda on infant. This may include verbally encouraging a frightened infant to look at a toy (tone must have forceful or insistent quality), physically moving the infant's arm, head or body toward an undesired object, distracting the infant with new objects or behaviors when the infant is otherwise engaged/interested, kissing and wiping when the infant is otherwise engaged/interested. If infant does not respond negatively to behavior, only code as intrusive if all coders agree the behavior is clearly egregious. **-OR-** Mother laughs or smiles **when infant is distressed, wary, nervous, etc.;** does not include attempts to distract or reassure the infant while engaging, supporting or calming. May appear nervous, involuntary, or negative in quality. The infant does not have to see a smile in order to count as mismatched affect. May also include mother contradicting or denying infant's emotional or behavioral reaction (e.g. "you're not scared" or "that's not scary" or "it's funny" in matter of fact, firm tone if infant is distressed). If intrusive co-occurs with mismatched affect, code mismatched affect.

D	Distracted	Mother physically moves away from the infant or abruptly stops interacting with the infant. Includes infant-focused behaviors that do not maintain contact/interaction (e.g., moving away to get toy, pick up pacifier, without engaging in other ways like vocalizing). If mother talks to infant while she moves away, code as engagement or calming depending on the nature of the vocalization. If mother continues to hold an object the infant is looking at in the infant's view while moving away, continue to code as engagement. Do not use this code when a mother simply sits back in her seat unless you think she abruptly stopped interacting. **-OR-** Mother is uninvolved with the infant. She may be expressionless or withdrawn (e.g., sitting back in chair, not making eye contact, or watching infant). Mother may be engaged in activities that are non-infant focused (e.g., filling out questionnaires, reading magazines, looking around the room, talking to the experimenter, etc.) or infant focused (e.g., selecting a toy from the box).
P	Persistent ineffective	Mother continues to respond to infant in the same potentially sensitive manner (task focused, engaged, support, calming) when it is not effective and alternative responses are available. Examples include, repeatedly presenting a puppet to a distressed infant when it is not soothing the infant, continuing to pat, stroke, or vocalize to the infant when it is not working, vocalizing from a distance but not increasing proximity or touching when infant remains distressed. (Particularly apparent when infant's affect increases in negativity or maintains same level of negative, but mom engages in same behavior). May also include repeated attempts to engage (either task or non-task focused) with infant when infant is not interested. (Particularly apparent when infant looks away). Use an approximate 5 second rule; if mother engages in ineffective behavior for more than 5 seconds, use this code. If the mother is using the same toy or playing the same game, but makes **new** subtle changes (e.g., turns the toy over, presents it in a different way, says something different, changes tone of voice, adds other elements), do not code persistent ineffective. **Continue to code as persistent ineffective if mother continues to cycle through a series of previously used changes within a category (e.g., holds toy close, then far away over and over again; shows b the same 2 toys over and over again; manipulates toy in several ways, but has done them all before).** When mother returns to a previously ineffective response, initially code as task focused, engaged, or calming **for 5sec** before coding as persistent ineffective again. Only use this code if mother has been calming,

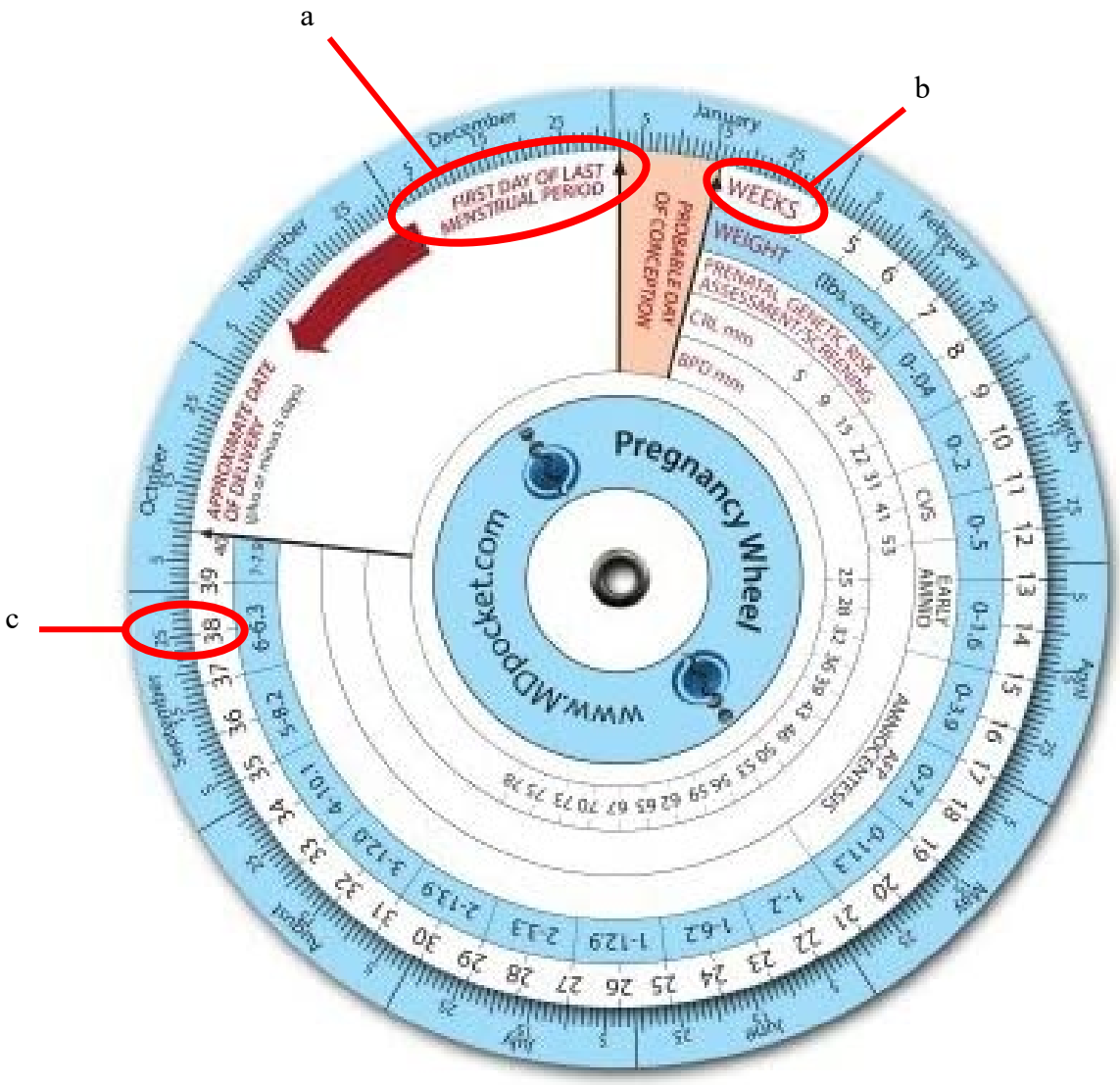
		engaging, supporting, or task focused when the infant is neutral (if the infant is negative, maintain task focused for appropriate sens score).
M	Monitor	Mother watches infant or monitors situation (e.g., looking at novel toy or experimenter while holding arms). May be jointly focused on object with infant. May be accompanied by questions to the experimenter. If there is eye-contact, it is engaged, not monitor.
E	Engagement	Mother interacts with, plays with, (may be infant or mother initiated) or attempts to distract infant. May include vocalizing, making faces, introducing other objects, banging the table, peek a boo, reading, singing, **eye-contact** etc. May involve components of the task (e.g., repeating sounds of truck, dancing to the music, talking about the task) as long as you get the sense that mother is not trying to direct the infant to focus on the activity (see task focused above for distinction). Includes any vocalizing that is not covered by other categories. Includes responding to infant's affective reaction-e.g., laughing when infant is excited/enthusiastic. **-OR-** Mother soothes/calms infant (may occur even if infant is not distressed). May be physical, vocal or both. Examples include: stroking head or hand, patting gently, holding hand, vocalizing in a gentle voice "it's all right", "sshhhh" "it's almost over," smiling as reassurance, or moving the infant to make more comfortable. May include empathic vocalizations (e.g., "ooohhh, you don't like that sound, do you?"). Pay attention to the quality of the vocalization, must occur in soothing tone. **Must believe the mothers is trying to soothe/calm/comfort the infant. If co-occurs with engagement, not for a conference.** **-OR-** Mother provides support (i.e., physical or verbal **comfort**) for engagement, attention to, or exploration of task following infant's lead when infant is distressed, on the verge of becoming distressed, or just recovering from distress. Mother maintains infant's attention on task gently **or** does not try to take infant's attention away from the toy while simultaneously **calming** the infant (e.g., rubbing head, holding hand, talking about toy in soothing/playful manner). For example, holding infant's hand or putting arms around infant while infant is looking at toy with a wary expression. **If behavior appears social in nature, code as engagement.** **-OR-** Mother attempts to direct infant's attention on the lab activity—we must believe her goal is to get the infant to look at or touch the toy.

		Examples include pointing at the toy or experimenter, saying look at it or touch it, moving infant's hand toward the novel toy, grabbing infant's hand and waving bye bye to the truck, banging hand on table in rhythm of toy or mimicking sounds of the toy while motioning her head in the direction of the toy, etc. (code as intrusive if infant is distressed or disinterested). May include *very brief* instances of both mother and infant watching toy when preceded and followed by other task focused behaviors.
R	Routine Care	Mother wipes child's nose or face, puts on sock, straightens clothing, adjusts position in seat or strap of seat, brushes hair out of eyes etc. If this co-occurs with engagement or calming code them rather than routine care. If done with intrusive or rough quality, code intrusive.

Sensitivity Ratings
0=Uncodeable
1=Insensitive
2=Ambiguous/moderately sensitive
3=Sensitive

Code	Maternal Behavior Description	Infant Affect Positive	Infant Affect Neutral	Infant Affect Negative
0	Uncodeable	0	0	0
N	Negative	1	1	1
D	Distracted	1	2	1
P	Persistent Ineffective	2	2	2
M	Monitor	2	3	1
E	Engagement	3	3	3
R	Routine Care	3	3	2

Appendix C: Pregnancy Gestation Wheel Procedure



1. First day of last menstrual period (LMP) determined via maternal self-report during prenatal session.
    a. The first day of LMP was then aligned with the respective arrow on the wheel (a).

2. Delivery date determined via maternal self-report during the 6-month postnatal session.
    a. Delivery date located on wheel after aligning first day of LMP.

3. Gestational age in weeks at birth was determined by referencing the "Weeks" row (b).
    a. e.g., A September 25th delivery date would indicate 38 weeks gestation (c).

Appendix D: Informed Consent Form

Idaho State University (ISU)
Human Subjects Committee
Informed Consent Form for Non-Medical Research

CONSENT TO PARTICIPATE IN RESEARCH
Infant Development and Healthy Outcomes in Mothers (Idaho Mom Study)

You are asked to be in a research study. The study is conducted by Dr. Nicki Aubuchon-Endsley. She is faculty in Psychology at ISU. You are asked because you are an adult (18+ years), pregnant woman. We plan to enroll 60-80 women. Participation is voluntary. Read details below and ask questions before participating.

1. **STUDY PURPOSE**
The study explores pregnancy experiences and baby's growth and behavior. This includes body size, diet, mood/stress, health, and childbirth. Pregnancy history, culture, self-care, and roles also impact babies. As do pregnancy length and baby's health and diet.

2. **PROCEDURES**

- If you contact us, we meet with you in the ISU lab to discuss study details.
- If you consent, we ask you to answer questions. This includes pregnancy history, mood/stress, substance use, ethnicity/race, and diet. Your weight, midsection, and height are measured. You take home tubes for saliva samples. Tubes are picked up by research staff after the 3-day sampling.
- You receive saliva sample directions. We send you text message reminders. We request you send a "Done" text to confirm completion.
- We contact you 1 month, 1 week, and 1 day before your 6-month postnatal visit. This confirms session date/time.
- At this visit, you answer questions about mood/stress, substance use, diet, and breastfeeding. We ask about baby's behavior, health, and diet. We measure you and baby's height, weight, and midsection. We have you and baby play while video-recorded.
- The chart below includes the duration, frequency, location, and cash reimbursement by procedure.

Session & Location	Duration	Activities	Reimbursement
Third Trimester Session ISU	120-150 minutes	Study Consent Interviews and Questionnaires Height, weight, and midsection	$30
Home Saliva Collection	15 minutes/ day	Provide saliva samples and respond to 2 text messages/day	$5/day
6-month Postnatal Session ISU	120-150 minutes	<u>Mother</u> Interviews, questionnaires, height, weight, and midsection <u>Baby</u> Behavior, height, weight, and midsection	$30
Total	4.75-5.25 hours		$75

3. **POTENTIAL RISKS AND DISCOMFORTS**

Saliva, Height, Weight, and Midsection:
There are no known risks for these measures.

Maternal Interviews and Questionnaires:
Some questions about experiences and feelings may make you uncomfortable.

Infant Behavior:
Behavior tasks do not differ from baby's everyday life. If baby experiences mild discomfort, this typically goes away after the brief tasks.

Addressing Potential Risks and Discomforts

- If you are uncomfortable, speak with research staff. You may skip questions or discontinue at any time with no penalty.
- Research staff check in with you often and provide breaks. If there is something more you need, let us know.
- Staff do not talk to others about what you say. Except in instances listed below under Confidentiality.
- If you or baby have lasting discomfort, contact staff immediately.
- The procedure may involve unforeseeable risks.

4. **ANTICIPATED BENEFITS TO SUBJECTS**

The study is not meant to improve health. It may increase understanding of your thoughts, feelings, and behavior.

5. **ANTICIPATED BENEFITS TO SOCIETY**

This study may increase knowledge of pregnancy health effects on babies' development. This may inform prenatal services.

6. **ALTERNATIVES TO PARTICIPATION**

This is not a treatment study. Information is collected for research only. The alternative is not to participate. You may discontinue at any time.

7. **PAYMENT FOR PARTICIPATION**

- You are paid $30 after completing each session. And $5 for each day of completed saliva samples. You can receive $15 for completing the 4 samples for 3 days.
- Research staff pick up the 3-day saliva sample and pay you.
- For ISU students, you may also receive 1 credit unit for each half hour. This applies to eligible courses.
- After study withdrawal, you are paid only for sessions/samples completed.

8. **SALIVA SAMPLE REMAINING AT THE END OF THE STUDY**

At the end of this form, indicate whether saliva may be shared with other researchers. If you agree, and later withdraw, we may not be able to retrieve your sample. The researcher will not store sample(s) indefinitely.

9. **FINANCIAL OBLIGATIONS**
You may have some low-cost travel or communication expenses.

10. **PRIVACY AND CONFIDENTIALITY**
Data Collection, Storage, and Confidentiality:

- Only research staff know that you are a research participant.
- No information you provide is disclosed to others without your written permission. Except (a) to protect your rights or welfare and (b) if required by law.
- We are REQUIRED to report if you or others are about to hurt yourself or another. We are required to report ongoing abuse of a child, elder, or dependent.
- If you report past violence or abuse, we will provide you with a list of helpful resources.
- Your Consent Form and name are stored separately from data. Data is coded by a number and stored on a secure computer. All Consent Forms and data are stored in a locked lab accessible only by research staff.
- When presenting study results, no information will reveal your identity.
- Video/audio recordings are saved by number. Identifying information is not recorded. You may request any portion be destroyed. Only research staff access tapes.

Data Disposal:
All data are stored for no less than 3 years after babies reach 21. Then, data are destroyed in a confidential manner. All video or audio tapings are destroyed after all data is collected and analyzed.

Follow-up Contacts:
If we plan to use any records for other reasons, we attempt to contact you to obtain your consent.

11. **GENETIC INFORMATION IN YOUR SAMPLE: POSSIBLE LIMITS TO CONFIDENTIALITY**

- Fluid samples contain genetic information that varies among people. These variations can be identifying. All precautions are taken to maintain your confidentiality.
- We cannot predict future research or technology developments. Unforeseeable problems may arise. This includes insurance or employment discrimination based on genetics.
- Within limits imposed by technology and law, every effort is made to maintain your privacy.

12. **PARTICIPATION AND WITHDRAWAL**
Your participation is VOLUNTARY. Non-participation does not affect your relationship with ISU. You may withdraw consent and discontinue at any time without penalty.

13. **WITHDRAWAL OF PARTICIPATION BY THE INVESTIGATOR**

- The investigator may withdraw you from the study to protect your health or safety. Or because your results can no longer be used.
- Dr. Nicki Aubuchon-Endsley will let you know of this decision.
- If so, you are paid only for completed sessions/samples.

14. **NEW FINDINGS**
During the study, you are informed of major new findings (good or bad). This includes changes in risks or benefits or new participation alternatives. This will include re-obtaining consent.

15. **IDENTIFICATION OF INVESTIGATORS**
If you experience adverse reaction, immediately contact Dr. Nicki Aubuchon-Endsley. (208) 282-2574 or 921 South 8th Avenue, Stop 8112, Pocatello, ID 83209-8112.

16. **RIGHTS OF RESEARCH SUBJECTS**
You may withdraw consent and discontinue at any time without penalty. You are not waiving any legal claims, rights or remedies due to participation. If you have questions about your rights as a research subject, you may contact the Human Subjects Committee. (208) 282-2179 or at ISU, Mail Stop 8046, Pocatello, ID 83209.

SIGNATURE OF RESEARCH SUBJECT OR LEGAL REPRESENTATIVE
I have/have been read the above information. I have been given a chance to ask questions. All of my questions have been fully answered. I have been given a copy of the informed consent form.

BY SIGNING THIS FORM, I WILLINGLY AGREE TO PARTICIPATE IN THE RESEARCH IT DESCRIBES.

_____
Research Subject Name

_____ _____
Research Subject Signature Date

SHARING OF RESEARCH SAMPLES
Check the appropriate box and initial in the space provided:
- I agree to have my fluid sample shared with other researchers. _____
- I do not want my fluid sample shared with other researchers. _____

Appendix E: Recruitment Flyer

Are You Pregnant?

Sign up for the Idaho Mom Study!

What is it all about?

Purpose: To examine women's experiences during pregnancy and how they may relate to the growth and behavior of their babies.

Payment: You will receive up to $75 and students may receive 1 credit for each half hour of participation toward relevant ISU courses.

IDAHO Mom

Infant **D**evelopment **A**nd **H**ealthy **O**utcomes in Mothers

Contact Us!

Dr. Nicki Aubuchon-Endsley
Telephone: 208.282.2574
E-mail: idahomom@isu.edu

Idaho Mom Study
Phone: (208) 282-2574
E-mail: idahomom@isu.edu

Idaho Mom Study
Phone: (208) 282-2574
E-mail: idahomom@isu.edu
Idaho Mom Study
Phone: (208) 282-2574
E-mail: idahomom@isu.edu
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E-mail: idahomom@isu.edu
Idaho Mom Study
Phone: (208) 282-2574
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Appendix F: Eligibility Screening Materials

Idaho Mom Study
Phone Screening Interview

SCREEN ID#: _____	**STATUS:** ____eligible ____ineligible

Hello, my name is XXXXX. I am a researcher with the Idaho Mom Study.

Thank you very much for your interest in our study. Is now a good time for me to tell you a little more about the study?

This research study will investigate babies' behavioral responses and growth at 6 months postpartum to see how this relates to mothers' behaviors and lifestyle factors during pregnancy, and we are recruiting women before 37 weeks gestation in pregnancy.

First, how you did you learn about the study? **(Name of office and/or location*tracking database)**

Study Description

If you decide to be part of the study and are selected, you will participate in two different sessions. You will be compensated for each session that you and/or your baby complete. The first session occurs during your 3rd trimester and includes interviews and questionnaires about yourself and your feelings and behaviors during pregnancy in addition to a measurement of your height, weight, and waist size. The 2nd and final session will take place at 6 months postpartum. This session will include similar interviews and questionnaires as the first session in addition to questions about your delivery and infant's health. This visit will also include measurement of the length, weight, and waist size of your infant as well as a couple of behavioral observations of you and your baby. Each session will take approximately 2-2.5 hours. You will receive $30 cash compensation at the end of each session that you complete. And, you could receive an additional $15 for completing a series of saliva samples following your first session, which will be retrieved from your home by a research assistant. ISU students may also receive 1 credit for every half hour of research participation toward eligible courses.

Does this sound like something you might be interested in? **YES NO**

(IF NO) I understand that you don't want to participate in this project. In the interest of improving future projects like this one, we ask everyone who declines the study to give a reason for their refusal. Will you please share with me why you do not want to be in this project?

(possible options)
__Not interested
__Concerned about time commitment
__Concerned about privacy
__Do not want to participate in research
__Do not want to talk about mood and behavior
__Other, please explain: _____

Thank you very much for your time. Congratulations on your pregnancy.

Idaho Mom Study
Phone Screening Interview

(IF YES) Ok, great! I just need to ask you some questions now and maybe later to find out if you're eligible for this research study. Your participation in this interview is completely voluntary.

These questions are about yourself, your pregnancy, your physical and mental health. We would also like to ask about your use of medications and substances and how we can get in touch with you after today. These questions should take about 15 minutes. Some of these questions may make some people feel a little uncomfortable; feel free to not answer any questions if you prefer.

Your answers will be kept confidential. The information you provide will be destroyed after we determine your eligibility for the study, except your contact information needed to follow-up with you. We will destroy all but your contact information even if you join the study.

If you have any questions about this interview, please feel free to ask me or you can call the Principal Investigator, Dr. Nicki Aubuchon-Endsley, at 208-282-2574. If you have any questions about your rights as a research subject, you may contact the Human Subjects Committee office at (208) 282-2179.

Will you give me permission to ask you these questions?
ORAL CONSENT: _____ YES _____ NO

Thanks, first I'd like to confirm your contact information (see below).

Idaho Mom Study
Phone Screening Interview

1. Today's Date:_____

2. Administered By: _____

[redacted]

(To be separated from screen once eligibility is ascertained)

3. Subject Name: _____

4. Subject Address: _____

5. Subject Day Phone #: _____ (Best time to call: _____)

6. Evening Phone #: _____ (Best time to call: _____)

7. Email: _____

8. How best to leave a message: _____

_____

9a. Permission to email message: ___yes _____ no

9b. Text message: ___yes _____ no

9c. If okay to text message, who is your mobile carrier? _____

Idaho Mom Study
Phone Screening Interview

EXCLUSION CHECKLIST

Now, I am going to read a list of substances you may have been exposed to during your pregnancy. Please wait until I get to the end and say yes if you have been exposed to any of these substances **during your pregnancy**, and **no** if you **have not been exposed to any of** these substances **during pregnancy**. Please be as accurate and honest as possible. Your answers will be kept confidential.

During your pregnancy, did you use:

1. **Any recreational substances**
2. **Alcohol**
3. **Medications of the following classes**

Amphetamines
Methylphenidate, like Ritalin
i.e. Dexedrine
Methadone
i.e. Diacetylmorphine
Morphine
i.e. Roxanol, Duramorph
Opium
i.e. Laudanum, Paregoric
Barbiturates
i.e. Amytal, Nembutal, Seconal, Phenobarbital, Barbs
Benzodiazepines/Tranquilizers
i.e. Ativan, Librium, Rohypnol, Valium, Buspar

Anxiety/Psychotropic Medications, Antidepressants
i.e. Prozac, Lithium, Zoloft, Wellbutrin, Zyban, Amitriptyline/Elavil, Nardil, Trazodone/Desyrel, Imipamine/Tofranil, Clomipramine/Anafranil, Doxepin/Sinequan/Adapin, Nortriptyline/Aventyl, Haldol, Dilantin, Depakote, Tegretol
Other Psychological Medications
Steroid Medications, like Prednisone or Flonase
i.e. Nasonex
Thyroid Medications, like Synthroid
i.e. Levoxyl, Cytomel

Did potential participant answer YES to any of the questions on the previous page? ☐Yes ☐No

Substance 1: _____
How often? _____
Approximately how much did you use each time?
_____
Have you stopped using this? ____ Yes ____ No
IF YES: When did you stop?: _____
How many people would share, including yourself?_____

Substance 2: _____
How often? _____
Approximately how much did you use each time?
_____
Have you stopped using this? ____ Yes ____ No
IF YES: When did you stop?: _____
How many people would share, including yourself?_____

Substance 3: _____
How often? _____
Approximately how much did you use each time?
_____
Have you stopped using this? ____ Yes ____ No
IF YES: When did you stop?: _____
How many people would share, including yourself?_____

*If potential participant has used any of the above medications, please discuss exclusion with PI.

Idaho Mom Study
Phone Screening Interview

10. What is your primary language? _English Not English_____

10a. **(If English)** Do you have difficulty reading? ____ Yes ____ No

10 b. **(IF NOT ENGLISH)** How well do you:

read, _____

write, and _____

understand English? _____

11. Expected Date of Delivery: _____

12. Current Gestation: _____(calculate using pregnancy wheel for scheduling)

13. Are you pregnant with more than one baby? ____ yes ____ no

14. What is your birth date? _____ month _____ day _____ year

15. Diagnosed with Gestational Diabetes: ____ yes ____ no

16. Did you have Gestational Diabetes in previous pregnancy(ies)?
____ yes ____ no ____N/A

17. Told you were at risk for Gestational Diabetes: ____ yes ____ no

18. Diagnosed with High Blood Pressure, Pre-eclampsia, or Toxemia: ____ yes ____ no

19. Did you have High Blood Pressure, Pre-eclampsia, or Toxemia in previous pregnancy(ies)?
____ yes ____ no ____N/A

20. Diagnosed with Hyper/hypothyroidism or any other type of thyroid disorder : ____ yes ____ no

21. Other complications**: ("Has your doctor said that you are a 'high risk pregnancy'? Is he/she concerned about your baby being small?" or concerned about high blood pressure, excess fluid, low fluid, preterm labor):** ____ yes ____ no

22. If yes, explain:_____

23. Have you been hospitalized during this pregnancy? ____ yes ____ no

If yes, reason for hospitalization:_____

24. Have you **ever** been diagnosed with a physical illness, such as HIV, AIDS, Heart Disease, Herpes, Hepatitis, Asthma, Anemia, Seizures, or Group B Strep? ____ yes ____no

24a. If yes, list physical illnesses:_____

Idaho Mom Study
Phone Screening Interview

25. Do you have any physical or learning disabilities? ____ Yes ____ No
Explanation: _____

26. Have you had any other health issues? _____ yes _____ no
If yes, describe:_____

27. Have you ever been diagnosed with a psychological disorder:_____ yes _____ no
If yes, describe:_____

Check if one of the categories below:

Bipolar disorder	____ Yes	____ No
Schizophrenia	____ Yes	____ No
Schizoaffective disorder	____ Yes	____ No
Psychosis	____ Yes	____ No

27a. If ever diagnosed with Bipolar disorder, ask:

- Have you had a period of time when you were feeling so good, "high", excited, hyper, or irritable that other people thought you were not your normal self or you were so hyper that you got into trouble? ____ Yes ____ No

27b. If yes, describe: _____
_____

28. Is the Idaho Department of Health and Welfare Child & Families Services involved in this pregnancy or will they be involved at the baby's birth? ____ Yes ____ No

How will they be involved? _____

28a. Has the Idaho Department of Health and Welfare Child & Families Services or the Department of Children, Youth, and Families been involved in any previous pregnancies or with other children?
____ Yes ____ No _____ N/A

How were they involved? _____

Thank you so much for your time and participation in the questions.

*If between 33-37 weeks gestation, schedule prenatal session.

*If earlier in pregnancy, "*We will give you a call **when you are between 25-32 weeks along in your pregnancy** to let you know if you will be invited to participate further in the study.*

INTERNAL RECORD KEEPING – TO BE ENTERED IN TRACKING DATABASE

Researcher who completed screen: Date Screen Completed:

ELIGIBLE Yes No