Understanding the Influence of Maternal Depression, Anxiety, and Stress on Maternal-Reported and Laboratory-Observed Child Behaviors

Kristin N. Dowe

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This dissertation is approved by the following members of the Final Oral Committee:

Linnea Burk, Professor, Psychology

Douglas C. Dean, III, Assistant Professor, Pediatrics

H. Hill Goldsmith, Professor, Psychology

Julie Poehlmann, Professor, Human Development and Family Studies

Sarah J. Short, Assistant Professor, Educational Psychology

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Abstract

Women are at an increased risk for the development of perinatal mood and anxiety disorders which affect mother-child interactions and children's socioemotional and regulatory development. This work explores how the timing of maternal mental health and stress impacts maternal and observer perceptions of children's problem, competence, and regulatory behaviors and assesses the potential moderating role of maternal sensitivity. Pregnant mothers (*N*=149) completed questionnaires and laboratory-based assessments during the first two postpartum years. A subsample of mothers (*N*=105) completed a survey to explore the long-term effects of maternal stress on their child's (*M*age = 6.05 years) response to the COVID-19 pandemic. Results highlight the predictive power of perinatal (but not preconception) maternal mental health and stress variables when considering maternal-reported (but not observer-reported) child problem and competence behaviors. No significant findings emerged when predicting child regulatory behaviors or pandemic responses and maternal sensitivity did not emerge as a significant moderator. Our findings support the link between perinatal adversity and later child socioemotional behaviors when assessed via maternal report. The predictive role of demographic variables, procedural constraints, clinical implications, and limitations are addressed.

Introduction

Depressive disorders and anxiety disorders are two of the most common categories of mental health conditions afflicting individuals worldwide (National Institute of Mental Health, n.d.). Women in the perinatal period are at particular risk for experiencing increased adversity, including depression, anxiety, and stressors more broadly. Research has often focused on the influence of maternal stress, often defined as an amalgamation of both the presence of a variety of stressors and mental health concerns, in the immediate pre- and postpartum period on mother and child functioning (e.g., maternal sensitivity during interactions, children's behavioral outcomes). Comparatively less focus has been placed on understanding the influence of such factors existing *prior to* the peripartum period. Further, research remains mixed when considering how factors such as stress or mental health concerns impact maternal perceptions of children's behaviors. While awareness of the nature and prevalence of peripartum mood disorders and related stressors has increased in recent years, proper identification and intervention efforts continue to lag. With the push towards destigmatization of mental health concerns, intervention and outreach efforts must continue to improve to more accurately target women at risk for developing or worsening peripartum mood concerns that may impact offspring outcomes.

This dissertation explores how the timing of maternal mental health and stress, measured as distinct experiences, impacts both maternal and observer perceptions of children's behaviors. Further, we will extend this exploration by assessing how maternal sensitivity may serve as a potentially modifiable link between maternal factors and child outcomes. In doing so, we hope results can inform the development and use of targeted interventions aimed at improving

maternal sensitivity to child behaviors as a means of buffering potential negative effects of maternal depression, anxiety, and stress on offspring.

Depressive Disorders: Definition and Prevalence

The category 'depressive disorders' in the Diagnostic and Statistical Manual – Fifth Edition (DSM-5) is made up of a series of sub-disorders including, but not limited to, major depressive disorder (MDD) and persistent depressive disorder (PDD). MDD is perhaps the most well-known depressive disorder, with an estimated prevalence of 7% of the U.S. population meeting diagnostic criteria. Individuals aged 18- to 29 years old are three times as likely to meet criteria than older adults, while women are 1.5 to 3 times more likely to meet criteria than men, beginning in early adolescence (American Psychiatric Association, 2013).

Individuals meeting the criteria for MDD experience a range of cognitive, affective, and somatic symptoms including, but not limited to, depressed mood, anhedonia, weight and appetite changes, sleep disruption, psychomotor changes, fatigue, difficulty concentrating, feelings of worthlessness, guilt, hopelessness, and/or recurrent suicidal ideation. Symptoms must be present most of the day, more days than not, for at least two weeks. However, PDD is relatively less common, with an estimated prevalence of 0.5% of the U.S. population meeting diagnostic criteria. The key distinction between MDD and PDD is the chronicity of symptoms: PDD symptoms (similar to the symptomatology of MDD, defined above) must be present for most of the day, more days than not, for at least two years to be diagnosed (American Psychiatric Association, 2013).

The course of depressive disorders is variable, with some individuals experiencing longstanding remission while others may go months or years without improvement or relief. As the duration of depressive symptom remission increases, the likelihood of symptom recurrence

decreases. However, approximately 50% of individuals experiencing even one major depressive episode in their lifetime will go on to experience one or more depressive episodes; after two major depressive episodes, this estimate jumps to approximately 80% of individuals experiencing further recurrent depressive episodes (Burcusa & Iacono, 2007).

Anxiety Disorders: Definition and Prevalence

The DSM-5 characterizes anxiety disorders by persistent and excessive fear and avoidance behaviors due to real or perceived imminent threats and/or anticipation of future threats. Types of anxiety disorders include but are not limited to, specific phobias (e.g., social anxiety disorder, or social phobia), panic disorder, and generalized anxiety disorder (American Psychiatric Association, 2013).

Individuals meeting the criteria for specific phobia experience persistent marked fear and anxiety about a specific object or situation that is out of proportion to the actual danger posed. Social anxiety disorder is characterized by significant fear and anxiety regarding one or more social situations, including the fear of receiving negative evaluations from others. Individuals meeting the criteria for panic disorder experience recurrent, unexpected panic attacks characterized by somatic symptoms including, but not limited to, accelerated heart rate, shaking, shortness of breath, chest discomfort, dizziness, paresthesiae, derealization, depersonalization, and a fear of losing control or dying. Following an attack, individuals experience persistent worry of additional panic attacks and display maladaptive changes in behavior to avoid recurrence. Individuals meeting the criteria for generalized anxiety disorder experience excessive and difficult to control anxiety and worry for more days than not for at least 6 months. In addition, at least three of the following symptoms must be present: restlessness, fatigue, difficulty concentrating, irritability, muscle tension, and/or sleep disturbance.

Prevalence estimates vary dependent upon the type of anxiety disorder; specific phobia (including social anxiety disorder) is estimated to affect roughly 7-9% of the U.S. population, while the prevalence of panic disorder and generalized anxiety disorder is much lower, with roughly 2-3% of the U.S. population meeting diagnostic criteria. Women are more likely than men to experience clinically significant levels of anxiety disorders (American Psychiatric Association, 2013).

Importantly, depressive and anxiety disorders are often comorbid. In one study, 45% of individuals with a lifetime diagnosis of MDD also met the diagnostic criteria for a lifetime anxiety disorder (Kessler et al., 2015). Individuals with comorbid diagnoses may have more severe symptoms than individuals meeting diagnostic criteria for only one disorder, thus influencing treatment outcomes and recovery rates (Pollack, 2005). Further, Wilhelm et al. (1999) found that the lifetime presence of an anxiety disorder increases the risk for recurrent depression.

Perinatal Maternal Depressive and Anxiety Disorders

Women in the peripartum period are at significant risk for the development of or exacerbation of mood disorders (Hahn-Holbrook et al., 2018; Pearson et al., 2018). The prevalence of maternal postpartum depression has historically been estimated to be roughly 13% (O'Hara & Swain, 1996). A more recent meta-analysis found the overall prevalence of perinatal depression to be 11.9%, though when stratified based upon time assessed (prenatal vs. postnatal) and income level (high income vs. low and middle income), estimates ranged from roughly 9% to 19% (Woody et al., 2017). Maternal anxiety, on the other hand, has estimates ranging from 12% to 17% (Paul et al., 2013; Vesga-López et al., 2008), or 1 in 5 peripartum women (Fawcett et al., 2019). Comorbidity is frequent during pregnancy as well (Korja et al., 2018; Wenzel et al.,

2005), with an estimated 13% of women having comorbid peripartum depression and anxiety (Ibanez et al., 2012). While the exact prevalence is still unknown, these disorders have a significant impact on a vast proportion of the world's population.

Perinatal Screening and Relevant Considerations

Estimates of perinatal mental health concerns appear to be increasing, potentially due to increased societal awareness or improved assessment built into prenatal medical care. Indeed, perinatal mental health screening is standard practice as it allows for the identification of mothers showing high rates of depressive and anxious symptomatology (American College of Obstetricians and Gynecologists, 2018). However, there remains a lack of consensus on the suggested frequency of screening and whether to use symptom thresholds to identify those mothers most at risk.

Timing and Frequency of Screening

Most women are screened periodically throughout their pregnancies to identify symptomatology with a perinatal onset. However, women with a lifetime history of depression or anxiety are at an increased risk for the development of or worsening of similar symptoms during the peripartum period (Johansen et al., 2020). Therefore, when exploring the prevalence or risk for depressive and/or anxious symptomatology in the perinatal period, it is imperative to pay heed to the quality of a mother's mental health *prior to conception.* Further, some researchers recommend screening more often throughout the perinatal period, and even well into the postpartum period via maternal screening at their infant's pediatric appointments (Liberto, 2012). Such extended screening practices would better capture the variability in symptomatology; indeed, Bayrampour et al. (2015) note that maternal depression and anxiety symptoms are variable within the perinatal period. Some individuals may have shorter, time-limited

depressive/anxious periods while others may have more chronic, long-lasting periods. However, given the resources necessary for extensive, frequent screening, Knights et al. (2016) suggest that it may be more impactful to frequently screen only those mothers most at risk.

The Use of Symptom Thresholds in Screening

Regardless of screening frequency, the question remains as to how to identify who is most at risk. Most commonly, providers utilize score cut points, or thresholds, to identify women endorsing significant levels of symptomatology. While higher scores are indeed often reflective of higher distress, the problem with using cut points is that it does not identify those women scoring below the threshold, yet still experiencing significantly impairing symptoms. Depression is largely understood as a continuum (Cuijpers et al., 2004; Lewinsohn et al., 2003; Rodríguez et al., 2012) with scores falling below clinically diagnostic levels (i.e., subclinical or subthreshold depression) still producing potentially significant levels of impairment to individual functioning (Beardslee et al., 2011; Conners-Burrow et al., 2014; Tronick & Reck, 2009). Indeed, some individuals experiencing subthreshold depression may later develop clinically diagnosable depression (Cuijpers & Smit, 2004; Lee et al., 2018; Tuithof et al., 2018).

While comparatively less research has been devoted to understanding subthreshold anxiety, it is not farfetched to assume that a similar relationship between subthreshold anxiety symptoms and functional impairment may be found (van Os, 2013). Thus, Ferrari et al. (2021) highlight the importance of attending to any symptomatology endorsed by women and not just those scores that exceed the clinical thresholds.

Even with a lack of consensus on procedural considerations, perinatal screening is inarguably a critical practice in routine obstetric care. Not only does perinatal screening allow for the identification of women at risk for new or worsening mental health concerns, but it allows for

the early provision of interventions to prevent dysfunctional outcomes in both the woman and her offspring.

Impacts of Depression and Anxiety

Impact of Perinatal Symptoms

The impacts of maternal depression and anxiety on offspring outcomes have often been explored in the context of when maternal symptomatology occurs. For instance, prenatal maternal depression and anxiety may potentially increase the risk for a range of negative child outcomes, encompassing cognitive, psychological, and socioemotional domains (Stein et al., 2014). Offspring of antenatally depressed women show decreased cognitive development (Koutra et al., 2013); similarly, high trait anxiety in women prenatally is associated with decreased offspring math achievement (Pearson et al., 2016) and socioemotional competence (Koutra et al., 2013). Offspring of women experiencing comorbid antenatal depression and anxiety are themselves at risk for developing similar symptomatology (Pawlby et al., 2009; Pearson et al., 2013).

Similar negative outcomes in offspring appear when considering maternal mood concerns occurring during the postpartum period. Children of postnatally depressed mothers exhibit decreased cognitive achievement and difficulties with attentional control (Hay et al., 2001; Pearson et al., 2016), as well as decreased social competence (Korhonen et al., 2012) or higher levels of emotional sensitivity (Murray et al., 2006). Both maternal postpartum depression and anxiety increase the offspring's risk of developing anxious and depressive disorders (Agnafors et al., 2013; Barker et al., 2011; Halligan et al., 2007; Murray et al., 2011), including internalizing disorders (Morales-Munoz et al., 2023; Sterba et al., 2007).

Impact of Non-Perinatal Symptoms

The effects of maternal depression and anxiety on offspring outcomes, however, are not constrained to the maternal symptoms occurring in the immediate pre- or postpartum periods. During childhood and adolescence, offspring of mothers who are concurrently depressed may experience a greater risk for the development of psychological problems, including internalizing and externalizing problems (Agnafors et al., 2013; Korhonen et al., 2012). Perhaps more notable, though, is that preconception maternal mental health predicts childhood outcomes, including greater emotional reactivity (Spry et al., 2020) and early regulatory difficulties (Petzoldt et al., 2015). These outcomes can persist throughout childhood/adolescence and into adulthood, thus highlighting that the lifetime prevalence of maternal symptomatology may, above and beyond concurrent symptomatology, play a vital role in offspring emotional outcomes.

Importantly, children exposed to acute (i.e., one to two months) maternal major depression or more chronic (i.e., spanning twelve months or longer) maternal *mild* depression have an elevated risk of developing depressive and anxiety disorders themselves throughout childhood and into adolescence. Perhaps most striking is the finding that even just a *single* exposure to maternal depression *at any time* during the child's first ten years of life equally predicts later youth depression (Hammen & Brennan, 2003). Similar research examining child outcomes for women experiencing chronic vs. acute anxiety is limited, as most work in this area focuses on obstetrical outcomes such as maternal gestational hypertension or pre-eclampsia (Schwartz et al., 2015), preterm births (Roesch et al., 2004), low birth weight (Liou et al., 2016), or the use of Cesarean delivery (Schwartz et al., 2015).

While much work has outlined the associations between maternal depression/anxiety and child outcomes, support is mixed (Sanger et al., 2015) and may depend heavily on how symptoms are assessed (e.g., self-report vs. clinical interview). It is important to assess this

relationship from multiple angles (i.e., mother report and laboratory observations) to illuminate risk trajectories and better understand how and when to provide clinical interventions. Indeed, the quality of the mother-infant relationship (and maternal sensitivity more specifically)is critical for later child emotional, social, and cognitive development (Bornstein et al., 2012).

Impacts of Depression and Anxiety on Maternal-Reported Outcomes

Mothers experiencing heightened negative self-views, a common symptom of both depressive and anxious disorders, may view their children in a hypercritical or overly negative light (Beck, 1999; Cornish et al., 2006). Further, the mother's current mental state may impact her perceptions of her child's emotionality and behaviors (Edhborg et al., 2000; Foreman & Henshaw, 2002; Najman et al., 2001; Richters, 1992; Tronick & Reck, 2009). The "depression distortion model" suggests that maternal depression may prompt the mother to inaccurately overreport child problem behaviors (Boyle & Pickles, 1997; Fergusson et al., 1993; Richters & Pellegrini, 1989), thus affecting how mothers respond to their children (i.e., less appropriately or sensitively; Burrous et al., 2009). Indeed, mothers with more severe depressive/anxious symptomatology report more problem behaviors and poorer social competence outcomes in their children when compared with teacher-report (Morales et al., 2023) and child-report (Briggs-Gowan et al., 1996). Results of several studies support the depression-distortion hypothesis (e.g., Clark et al., 2017; Fergusson et al., 1993; Müller et al., 2011; Ringoot et al., 2015), while others run counter to the depression-distortion hypothesis (Boyle & Pickles, 1997; Olino et al., 2020; Richters, 1992; Richters & Pellegrini, 1989).

On the other hand, the concept of depressive realism ("accuracy model") suggests that depressed individuals may perceive their surroundings more realistically and thus be more accurate reporters (Alloy & Abramson, 1979). Under this assumption, depressed and anxious

mothers who report heightened rates of children's behavior problems may be reporting more accurately and in a less biased fashion than non-affected mothers (Richters, 1992). Some researchers have found evidence to support this hypothesis (Hane et al., 2006; Lovejoy, 1991; Moore & Fresco, 2012) and others have not (Carson et al., 2010).

Though initially proposed as models reflective of depression symptoms, researchers have extended the work to incorporate other internalizing symptomatology, including anxiety (Chilcoat & Breslau, 1997; Clark et al., 2017). Thus, a mother experiencing heightened anxiety may also show biased perceptions of her child's behaviors.

While research remains mixed on whether the "distortion" or "accuracy" model may be superior, maternal report methodology continues to be relied upon heavily because mothers are typically the caregiver who spends the most time with their infant, and they are therefore the best source of information when it comes to the child's day-to-day characteristics (Boyle & Pickles, 1997; Goldsmith & Gagne, 2012; Madsen et al., 2020). Given the frequency with which maternal report is used to identify child behaviors, we need to understand how maternal factors, including depression, anxiety, and stress, may affect over- or under-reporting of child outcomes to better inform intervention use.

Impacts of Depression and Anxiety on Laboratory-Observed Outcomes

Maternal depressive and anxious symptomatology presents significant challenges for the mother-infant relationship (Bigelow et al., 2010; Manian & Bornstein, 2009). Much of this work has incorporated the use of laboratory-based observations, including the Still-Face Paradigm (SFP; Tronick et al., 1978), to understand mother-child interactions and the impact of maternal mental health on child outcomes. Mothers with depressive and anxious symptoms may exhibit decreased sensitivity and responsiveness to their infant's cues (Burrous et al., 2009; Lester et al.,

1995; Lowe et al., 2012). Similarly, mothers who indicate higher levels of familial stress may be more distracted and thus respond insensitively to their infants (Belsky & Fearon, 2002).

This phenomenon of distraction and decreased sensitivity has often been labeled 'emotional unavailability,' and it underscores the importance of the emotional back-and-forth in the caregiver-child relationship (Bornstein et al., 2012). Mothers showing decreased sensitivity may be less effective and more inconsistent when managing child behaviors (Beck, 1999), and they may model less effective regulatory techniques when compared with their non-depressed and non-anxious counterparts (Silk et al., 2006). These maternal difficulties have significant implications for the infant's early emerging regulatory development (Conradt & Ablow, 2010; Feldman et al., 2011; Gunning et al., 2013). As a result of insensitive interactions, the infant will encounter fewer situations in which the mother can scaffold effective regulatory strategies. Infants of depressed mothers, then, may have fewer regulatory behaviors at their disposal and thus may use less effective regulatory behaviors when compared with children of non-depressed, non-anxious mothers. Importantly, the ability to effectively regulate emotions may lead to improved socioemotional and behavioral competencies later in life (Calkins et al., 1999; Leerkes et al., 2009; Robson et al., 2020; Sroufe, 2005). Using less effective regulatory behaviors may place a child at risk for developing internalizing or externalizing disorders (Eisenberg et al., 2001); thus, improving maternal sensitivity may lead to more optimal offspring outcomes.

Influence of Stressors

Maternal depression and anxiety are compounded in the presence of added stressors across numerous domains, including but not limited to marital stress (Whisman & Baucom, 2012), financial stress (Perzow et al., 2018), and familial (e.g., parenting) stress (Abidin, 1992; Arbel et al., 2020). These stressors are often co-occurring and positively related to one another

(K. Crnic & Low, 2002; Essex et al., 2002) and may be relatively stable across time (Cherry et al., 2019; Östberg et al., 2007; Planalp & Goldsmith, 2020; Putnick et al., 2010). Depressed mothers report higher rates of stressors when compared to their non-depressed counterparts (Leigh & Milgrom, 2008); further, similar results occur when examining mothers reporting higher rates of anxiety (Zietlow et al., 2019).

Data suggests that lifetime stress exposure in mothers (i.e., stress experienced at any point prior to conception and the peripartum period) has important downstream effects on infant outcomes, including infant emotional reactivity (Hipwell et al., 2019). These outcomes may be in part due to the potential for children to be exposed to their caregivers' stressors through parent-child interactions; conversely, these interactions can also increase levels of parenting stress (Neece et al., 2012). Specifically, mothers indicating higher levels of stress may be less sensitive and less responsive toward their infants' cues (Belsky et al., 1996; Belsky & Fearon, 2002). The effects of stress can accumulate over time, such that chronic stress is a further detriment to parenting and child functioning (Crnic et al., 2005). Therefore, identifying and measuring maternal stress experiences not only just within the peripartum period, but also across a mother's lifespan, may prove to be more enlightening than simply focusing on concurrent stress. In this way, we can work to better understand how maternal depression, anxiety, and stress experiences influence the transmission of psychopathological risk to children.

Pandemic-Related Stress

The novel Coronavirus (COVID-19) illness, caused by the virus severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has, without a doubt, dramatically impacted individuals and families worldwide. The rapid rise in and prevalence of COVID-19 cases sparked an equally tremendous boom in research exploring the outcomes and aftereffects of the pandemic across

countless facets of life, including mental health and well-being for adults (Ahrens et al., 2021; Fontanesi et al., 2020; Marazziti & Stahl, 2020; Pierce et al., 2020; Qiu et al., 2020; Racine et al., 2020) and children/adolescents (Dalton et al., 2020; Golberstein et al., 2020; Huang & Zhao, 2020; Prime et al., 2020; Russell et al., 2020). Other domains investigated include parenting quality (Chung et al., 2020; Cluver et al., 2020; Lucassen et al., 2021), family functioning (Fosco et al., 2021; Humphreys et al., 2020; Usher et al., 2020), and stress (Brown et al., 2020; Spinelli et al., 2020).

Families experienced higher levels of stress while coping with the pandemic due to the increased levels of disruption to family functioning (Browne et al., 2021; Cassinat et al., 2021; Lucassen et al., 2021), such as school closures (Gassman-Pines et al., 2022) or the lack of a daily routine (Liu et al., 2021). In particular, mothers often experienced heightened rates of stress due to increased caregiving demands (Almeida et al., 2020; Giannotti et al., 2022; Shelleby et al., 2022; van Bakel et al., 2022). Chung et al. (2020) found that parents reporting more stress due to COVID-19 were at an increased risk for utilizing harsher parenting styles, thus negatively impacting the parent-child relationship.

Additionally, researchers explored pandemic-related effects on mental health in both parents and children; some studies found the expected deterioration in mental health (Fontanesi et al., 2020; Huang & Zhao, 2020), but some studies reported the opposite – an improvement in mental health quality following lockdown (Ahrens et al., 2021). While pre-existing mental health problems and/or stressors leave some individuals more susceptible to the negative effects possible following the onset of a global pandemic, other individuals may demonstrate resiliency. This difference, and possible factors leading to susceptibility or resiliency in the face of adversity, warrants further attention.

Clinical Interventions

Researchers have made significant progress in understanding maternal depression and anxiety, and we must continue to use this knowledge to inform targeted interventions aimed at alleviating the ever-growing disease burden. Children of parents with diagnoses of depression and/or anxiety are themselves at risk for developing similar mental health concerns (Beardslee et al., 2011); strikingly, the leading cause of disease burden in individuals aged 10- to 24 years old is neuropsychiatric disorders (Copeland et al., 2015; Harhay & King, 2012). Due to this increased risk for less optimal childhood outcomes, intervention work often focuses on alleviating maternal symptomatology and improving maternal parenting behaviors during early child development.

Some researchers recommend interventions aimed at preventing the further development of unwanted symptoms or behaviors in mothers (Madigan et al., 2018; Roubinov et al., 2022) or even treating mothers to complete remission from symptomatology (Misri et al., 2010). Many interventions may be conducted throughout the perinatal period, that is, during pregnancy and into the postpartum period (Agako et al., 2022; Matvienko-Sikar et al., 2023; Pettman et al., 2023). Still, how maternal depression/anxiety exert their influence on child outcomes remain obscured. Stress, for instance, may exacerbate the effects of maternal depression/anxiety, possibly via the influence of stress on maternal sensitivity and the mother-child relationship. As such, the timing of the intervention might be less important than the content or targets of the interventions themselves.

However, there is significant multifinality in outcomes for mothers experiencing risk factors (e.g., stress, mental health concerns); indeed, not all depressed, anxious, or stressed mothers and their offspring are impacted the same way. Thus, Goodman (2020) suggests that

interventions may be more effective if they specifically target the potential mechanisms of risk transmission versus maternal risk factors more broadly. For instance, interventions could focus on improving parenting behaviors (e.g., sensitivity, Lindhiem et al., 2011) as parent-child interactions are modifiable contexts that may impact the association between maternal risk and adverse mother and child outcomes (Goodman & Garber, 2017). Given the strong relationships found between sensitive caregiving and optimal socioemotional outcomes (Feldman et al., 2011; Gunning et al., 2013; Leerkes, 2010; Raby et al., 2015), sensitivity is a common, yet nonetheless important, parenting behavior often addressed within intervention work. In particular, Leerkes et al. (2009) suggest that improving mothers' sensitivity to distress (versus non-distress) can improve parent-child relationships and promote social competence and behavioral adjustment in children. Sensitivity interventions can be initiated both pre- and postnatally (Leerkes et al., 2015), increasing the accessibility of such work to a wider range of individuals. Interventions aimed at improving maternal sensitivity may not only improve mother-child interactions but also improve the mother's perceptions of her child, making them a compelling treatment option to buffer against the negative impacts of maternal depression and anxiety.

Current Study Aims and Hypotheses

This dissertation includes two sections that will explore the intricate relationships between maternal mental health, external maternal stressors, and child behaviors. Collectively, the results will inform the potential development and use of targeted interventions aimed at improving maternal sensitivity to child behaviors as a means of buffering against the negative effects of maternal depression/anxiety and stress on offspring.

Section One

The first section has two aims: the first aim (Aim 1.1) is to assess whether maternal depression and/or anxiety predict child outcomes. Specifically, we will first analyze whether the timing of maternal mental health predicts child behaviors. We have three maternal mental health time points (i.e., pregnancy, postpartum, and lifetime) and three outcome variables representing child behaviors (i.e., maternal-reported problem and competence behaviors, laboratory-observed problem and competence behaviors, and laboratory-observed regulatory behaviors, all assessed at child age 24 months).

We used a series of four-stage hierarchical linear regressions with each set of dependent variables. Aim 1.1a focuses on maternal-reported child behaviors, using the five BITSEA problem factor scores and four BITSEA competence factor scores as dependent variables (i.e., we performed nine separate hierarchical linear regressions). Aim 1.1b focuses on observer-reported child behaviors, using the post-visit observer rating factor scores as dependent variables (i.e., we performed three separate hierarchical linear regressions). Finally, Aim 1.1c focuses on children's regulatory behaviors during the SFP, using the regulatory variables as dependent variables (i.e., we performed four separate hierarchical linear regressions). For all hierarchical linear regressions, we introduced sociodemographic variables, including child sex and family SES, in the first block. Next, we entered the lifetime presence or absence of maternal depression/anxiety in the second block, maternal depression/anxiety experienced during pregnancy in the third block, and maternal depression/anxiety experienced during the first postpartum year in the last block. The maternal mental health variables were entered in this order due to the perceived chronological impact of each timepoint on child outcomes (e.g., the lifetime variable represents the most distal measurement from child behaviors assessed at age 24 months).

We hypothesize that mothers experiencing higher rates of depression and/or anxiety (at all time points) will report higher levels of child problem behaviors and lower levels of child competence behaviors. Analyses using post-visit observer ratings of children's behavior are exploratory and have no separate hypotheses; rather, we are interested in whether results mirror those found with maternal-reported data. Finally, we hypothesize that mothers experiencing higher rates of depression/anxiety (at all time points) will have children who use fewer regulatory strategies during the distressing SFP, as evidenced by decreased rates of self-regulation, mother-focused regulation, toy-focused regulation, and environment-focused regulation.

The second aim (Aim 1.2) is to explore the possible moderating effects of early maternal sensitivity (assessed at child age 6 months). Moderation analyses will be conducted on any findings from Aim 1.1 that are statistically significant; therefore, Aim 1.2 is exploratory although we implicitly expected to find evidence of moderation.

Section Two

Section two has four aims and analyses will largely parallel those for section one, with a few notable exceptions detailed below. Our two maternal stress indices (i.e., pregnancy stress index and postpartum stress index will serve as the independent variables. We will again utilize the outcome variables representing child behaviors (i.e., maternal-reported BITSEA problem and competence factor scores, post-visit observer ratings, and child regulation during the SFP, all assessed at child age 24 months).

The first aim (Aim 2.1) was to assess whether maternal stress predicts child outcomes. Specifically, we first analyzed whether the timing of maternal stress predicts child behaviors. We used a series of multiple linear regressions with each set of dependent variables, controlling for

family SES and child sex. Aim 2.1a focuses on maternal-reported child behaviors, using the five BITSEA problem factor scores and four BITSEA competence factor scores as dependent variables (i.e., we performed nine separate multiple regressions). We hypothesized that mothers experiencing higher rates of stress (at both time points) will report higher levels of child problem behaviors and lower levels of child competence behaviors. Aim 2.1b focuses on observer-reported child behaviors, using the post-visit observer rating factor scores as dependent variables (i.e., we performed three separate multiple regressions). These analyses are exploratory, as we are interested to see whether results mirror those found with maternal-reported data. Finally, Aim 2.1c focuses on children's regulatory behaviors during the SFP, using the regulatory variables as dependent variables (i.e., we performed four separate multiple regressions). We hypothesized that mothers experiencing higher rates of stress (at both time points) will have children who use fewer regulatory strategies during the distressing SFP, as evidenced by decreased rates of self-regulation, mother-focused regulation, toy-focused regulation, and environment-focused regulation.

The second aim (Aim 2.2) is to examine the possible moderating effects of early maternal sensitivity (assessed at child age 6 months). We conducted moderation analyses on any findings from Aim 2.1 that were statistically significant; therefore, Aim 2.2 is exploratory although we implicitly expected to find evidence of moderation.

The third aim (Aim 2.3) is to explore which individual stress composites (versus the overall stress indices) are driving associations between maternal stress and child outcome variables. These analyses are also exploratory.

Lastly, the fourth aim (Aim 2.4) focuses on associations between early maternal stress and maternal reports of their children's COVID-19-related stress. We hypothesize that mothers

with higher rates of stress in both the pregnancy and postpartum periods will report higher rates of children's COVID-19-related stress.

Methods

Participants

Participants were women and their singleton children enrolled in the Baby Brain and Behavior Project, a longitudinal study of how early experiences influence the developing brain and impact child well-being. Women (hereafter referred to as 'mothers') were eligible for study participation based on several criteria, including being between 18 and 40 years of age, expecting singleton births, having no diagnosis of major psychiatric illness (i.e., schizophrenia, bipolar disorder, borderline personality disorder), having no pre-existing neurological conditions or major head trauma, having no autoimmune disease or infections during pregnancy, and having an uncomplicated childbirth. Additional exclusionary criteria included time spent in the neonatal intensive care unit (NICU) for medical interventions and if the infant did not go home with the mother at discharge.

Mothers reported on demographic characteristics of their child and families at each timepoint of the study. At the time of birth, the sample consisted of 149 mother-infant dyads (mothers' mean age 32.94 years, SD = 3.83 years; 51.7% female infants). 91.9% of mothers self-identified as White, 4.0% as Asian, 2.0% as American Indian or Native Alaskan, and 2.0% as Black. Mothers also reported on their child's biological father's demographic characteristics: 92.1% of mothers identified their child's fathers as White, 2.9% as Asian, 2.2% as other, 1.4% as Black, and 1.4% as American Indian or Native Alaskan. 87.8% of mothers identified their child's race as White, 7.4% as Asian, 2.0% as Black, 1.4% as American Indian or Native Alaskan, 0.7% as Hawaiian or Pacific Islander, and 0.7% as other. Mothers, fathers, and infants were primarily non-Hispanic/Latino (96.6%, 87.8%, and 87.9%, respectively). Racial and ethnic minority representation in the sample is notably low, though the demographic breakdown follows similar

patterns to the recruitment region at large: within Dane County, Wisconsin, 84.1% of residents are White, 5.8% are Black, 6.6% are Asian, 0.5% are American Indian/Native Alaskan, and 0.1% are Hawaiian/Pacific Islander. Overall, study recruiters were able to successfully fulfill NIH recruitment targets. Family participation in study components, including permission to collect magnetic resonance imaging (MRI) data on children, did not differ between racial groups.

The median family income was $80,001 to $90,000 annually. The most common educational attainment for mothers was a graduate degree (50.3%), followed by a college degree (33.6%). For fathers, the most common educational attainment was a graduate degree (32.9%), followed by a college degree (28.2%). 89.9% of mothers reported they were married to the child's biological father at the time of enrollment.

Longitudinal analyses utilized a subset of mothers who opted to participate in the final timepoint of data collection (N=105; mean child age 72.61 months [6.05 years], SD = 7.31 months [.61 years], 53.3% female children). Of these participating mothers, 92.4% self-identified as White, 3.8% as Asian, 1.9% as Black, and 1.9% as American Indian/Native Alaskan. 89.5% identified their child's race as White, 5.7% as Asian, 1.9% as Black, 1% American Indian/Native Alaskan, 1% Hawaiian/Pacific Islander, and 1% as other or more than one race. Mothers and infants were primarily non-Hispanic/Latino (96.2% and 88.6%, respectively). The median family income was $100,001 to $150,000 annually. The most common educational attainment remained a graduate degree for mothers (46.7%) and a graduate degree for fathers (40.4%). 88.5% of the mothers reported they were married to the child's biological father at the final data collection timepoint. Mothers who participated at the final data collection timepoint were more likely to have higher levels of education, $t(147) = -2.623$, $p = .031$. There were no significant effects found for maternal race, maternal ethnicity, marital status, child sex, or family income.

Procedures

We included a detailed outline of the timepoints making up the longitudinal study in Appendix A.

Mothers in the second trimester of their pregnancy (<28 weeks' gestation) were recruited through print and electronic advertisements placed in birth clinics, day care centers, libraries, community centers, laundromats, and grocery stores in Madison, Wisconsin and the surrounding area. Recruitment of specialized populations (e.g., mothers of diverse racial/ethnic backgrounds, mothers with a history of depression symptoms) was facilitated through use of advertisements with targeted language. Mothers confirmed they met inclusion criteria through interviews before enrollment and study team members verified this information using medical history questionnaires obtained during the study.

At various timepoints throughout their pregnancies and the first two years of their child's lives, mothers completed a series of surveys focusing on personal health, personal psychopathology, child temperament, parenting practices, family environment, and stress. We provide a full breakdown of which surveys were collected and when in Appendix B.

When children were 6- and 24 months of age, mother-child dyads attended in-person laboratory visits and completed a battery of observed behavioral tasks and the Still-Face Paradigm (SFP; Tronick et al., 1978), which was videotaped for later scoring. The SFP is a 4.5-minute-long task broken up into three 90-second episodes: the play, still-face, and play reunion episodes. During the play episode, experimenters instruct mothers to engage normally with their child. During the still-face episode, mothers cease all physical and verbal interaction with their child, maintaining a neutral expression throughout. Mothers then resume normal interaction with their child during the play reunion episode. The 6- and 24-month SFP procedures were slightly

altered to reflect the developmental changes in mother-child interactions; mainly, the 24-month SFP includes a stackable block toy that mothers and children are allowed to play with during play and play reunion episodes (e.g., Weinberg et al., 2008).

At child age 12 months, graduate-level clinical psychology students under the direct supervision of a licensed clinical psychologist (L.B.) administered the Structured Clinical Interview for *DSM-IV-TR* Axis I Disorders – Non-Patient Edition (SCID-I/NP; First et al., 2002) to assess for the mothers' lifetime prevalence of psychological disorders.

In September 2021 ($M_{child\ age}$ = 6.05 years, range: 4.92-7.33 years), mothers who had previously indicated an interest in participating in future data collection (n = 132) were recontacted to gauge interest in completing fully online survey data collection. Mothers (N = 105) provided consent to complete a series of surveys collected at earlier timepoints, as well as a survey exclusively addressing the family's experience with COVID-19.

Measures

Maternal Symptom Measures

Two measures of maternal symptoms, the 20-item Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987) and the 20-item State Trait Anxiety Inventory (STAI; Spielberger, 2010) were administered longitudinally to mothers to assess for concurrent depression and anxiety symptomatology. We combined these measures to produce composite scores reflective of maternal depression/anxiety occurring during distinct timepoints (pregnancy and postpartum). Mothers also completed the SCID-I/NP interview at 12 months postpartum to assess for the presence of clinically diagnosable depression and/or anxiety disorders across the mother's lifespan.

Edinburgh Postnatal Depression Scale. The EPDS is well-validated for use during both the antenatal and postnatal periods (Murray & Carothers, 1990). Items are designed to assess an individual's current level (i.e., severity within the past 7 days) of depressive symptomatology (e.g., 'I have felt sad or miserable'). Mothers select the frequency with which the item reflects their experience on a four-point Likert scale ranging from 0 ('No, not at all') to 4 ('Yes, most of the time'). If mothers indicate the presence of an item within the past week, they then report on the historical frequency of that item (i.e., 'If yes, have you felt this way for a month or more?'). Certain items are reverse scored, such that when all responses are summed to create an overall EPDS score, higher scores are reflective of more severe depressive symptomatology. We calculated a pregnancy-specific EPDS score by averaging the total EPDS scores collected at 24- and 34 weeks of pregnancy (Cronbach's alpha = 0.91). Similarly, we calculated a postpartum-specific EPDS score by averaging the total EPDS scores collected at 1-, 6-, and 12 months postpartum (Cronbach's alpha = 0.92). The average pregnancy EPDS and average postpartum EPDS scores were moderately correlated with each other (r = .718). There was no missing data for the EPDS.

State Trait Anxiety Inventory. The STAI is designed to assess an individual's level of current anxiety (i.e., 'State Anxiety', derived from items such as "I feel calm," and "I feel anxious") and an estimate of an individual's tendency for "anxiety-proneness" (i.e., 'Trait Anxiety', derived from items such as "I am tense," and "I am presently worrying about possible misfortunes"). Mothers select the frequency with which the item reflects their current experience from a four-point Likert scale ranging from 1 (Not at all) to 4 (Very much so). We summed mothers' responses to all items to calculate an STAI sum score; if a mother had greater than 10% of her data missing, we did not compute a score. We calculated a pregnancy-specific STAI score

by averaging the sum of STAI scores collected at 24- and 34 weeks of pregnancy (Cronbach's alpha = 0.93). Similarly, we calculated a postpartum-specific STAI score by averaging the sum of STAI scores collected at 1-, 6-, and 12 months postpartum (Cronbach's alpha = 0.95). The average pregnancy STAI and average postpartum STAI scores were moderately correlated with each other (r = .675).

Structured Clinical Interview for DSM-IV. The present study focused on lifetime history of depressive disorders (major depressive disorder, persistent depressive disorder) and anxiety disorders (generalized anxiety disorder, panic disorder, agoraphobia, specific phobia, social anxiety disorder, and obsessive compulsive disorder). Depressive and anxiety disorders were often comorbid in our sample. Refer to the "Score Creation" section for more information on how this data was prepared for analysis.

Maternal Stress Measures

Mothers completed six measures longitudinally to assess for stressors (e.g., financial, role overload, parenting, marital) and their effects (e.g., anger expression).

Essex Financial Stress. The Essex Financial Stress scale (EFS; Essex et al., 2002) is a four-item questionnaire assessing finance-related stress, including worries about current or future money problems and difficulty in paying monthly bills. A financial stress score is calculated by averaging scores across the four items, with a higher score indicating more financial stress. Total EFS scores from the timepoints of interest were all strongly correlated with each other (rs > .77). The average EFS score calculated at 34 weeks pregnancy represented the pregnancy EFS score. Then, we took the average of the three postpartum EFS scores to represent the postpartum EFS score (Cronbach's alpha = 0.93). There was no missing data for this measure.

Emotional Role Overload. Maternal role overload is measured using the Emotional Role Overload survey (ERO; Essex et al., 2002, modeled after Barnett & Marshall, 1989), which assesses personal difficulty managing the requirements and commitments of parenting. A role overload score is calculated by averaging scores across the five items, with a higher score indicating more role overload. Total role overload scores from the timepoints of interest were all moderately correlated amongst each other (*r*s > .43). The average ERO score calculated at 34 weeks pregnancy represented the pregnancy ERO score. Then, we took the average of the three postpartum ERO scores to represent the postpartum ERO score (Cronbach's alpha = 0.89). There was no missing data for this measure.

Parenting Stress Index. Mothers' parenting stress is evaluated using the Parenting Stress Index (PSI; Abidin, 1995), a questionnaire designed to analyze the degree of stress parents experience from their caregiving responsibilities. The PSI is a 120-item checklist aimed at identifying stress attributable to child characteristics (i.e., Child Domain), parent characteristics (i.e., Parent Domain), and situational life events (i.e., Life Stress Domain). To reduce redundancy, we only assessed the Parent Domain of the PSI for this study (31 items). We calculated scale scores by summing the scores within three specific categories: Competence (11 items; Cronbach's alpha = 0.93), Role Restriction (7 items; Cronbach's alpha = 0.89), and Child Reinforces Parent (6 items; Cronbach's alpha = 0.86). The Parent Domain of the PSI also produces an attachment scale score; we did not use this for analyses. If a mother had more than one item missing per scale, we did not compute a score. Scale scores were weakly to strongly correlated with each other (*r*s ranged from .157 to .782).

Barnett Partner Role Quality Scale. The 19-item Barnett Partner Role Quality Scale (BPRQS; Barnett & Marshall, 1989) is used to assess the current quality of the marital

relationship or partnership. Mothers report on rewarding (e.g., 'When you think about your relationship right now, how rewarding is it because you have a spouse/partner who is easy to get along with?') and concerning aspects (e.g., 'When you think about your relationship right now, how concerned are you because your spouse/partner is not home enough?') on a four-point Likert scale ranging from 1 (Not at all) to 4 (Extremely). The present study focused on the marital conflict subscale, which we calculated by averaging the scores on three conflict-related items. If a mother had one or more missing items for the conflict subscale, a score was not computed. Marital conflict scores from the timepoints of interest were moderately correlated with each other (*r*s > .50). The average BPRQS marital conflict score calculated at 34 weeks pregnancy represented the pregnancy marital conflict score. Then, we took the average of the three postpartum BPRQS marital conflict scores to represent the postpartum marital conflict score (Cronbach's alpha = .85).

Anger Expression Inventory. Mothers' anger expression is assessed using the Anger Expression Inventory (AEI; Spielberger et al., 1985). The AEI is a 24-item questionnaire identifying a total anger expression score made up of three subscales: anger suppression ("Anger/In," example item: 'I keep things in'), anger expression ("Anger/Out", e.g., 'I argue with others'), and anger control ("Anger/Control," e.g., 'I control my behavior'). Mothers indicate the frequency of each item on a four-point Likert scale ranging from 1 (Almost never) to 4 (Almost always). We calculated the overall anger expression score using the following formula: "Anger/In" + "Anger/Out" – "Anger/Control" + 16. Higher scores are indicative of a greater tendency to express, suppress, or control anger. Total AEI scores from the three timepoints of interest were all moderately correlated amongst each other (*r*s > .57); we averaged

scores to create one average postpartum AEI score (Cronbach's alpha = 0.76). There was no missing data for this measure.

Family Expressiveness Questionnaire. Mothers report on the degree of emotional expressiveness shown in their families using the Family Expressiveness Questionnaire (FEQ; Halberstadt, 1986). This 40-item questionnaire uses a 9-point Likert scale ranging from 1 (Not at all frequently in my family) to 9 (Very frequently in my family). The FEQ produces sum scores for four domains: positive-dominance, positive-submissive, negative-dominance, and negative-submissive. This study only used the negative-dominance (example item: 'Expressing dissatisfaction with someone else's behavior') and negative-submissive (e.g., 'Telling a family member how hurt you are') scales; if a mother had greater than 10% of her data missing, a score was not computed. Negative-dominance and negative-submissive scales from all timepoints of interest were strongly correlated with each other (*r*s > .68). The average FEQ negativity score calculated at 34 weeks pregnancy represented the pregnancy FEQ negativity score. Then, we took the average of the three postpartum FEQ negativity scores to represent the postpartum FEQ negativity score (Cronbach's alpha = 0.94).

Child Outcome Measures

Two measures of child socioemotional functioning were collected at child age 24 months, one in which the mother reports on the child's functioning (i.e., Brief Infant-Toddler Social and Emotional Assessment, Briggs-Gowan et al., 2004) and one in which an experimenter rates the child's functioning following a laboratory assessment (i.e., 'Post-Visit Observer Ratings,' Gagne et al., 2011). One measure of child stress (i.e., Nikolaidis et al., 2020), in which the mother reports on the impact of COVID-19 on their children, was administered to mothers when their children were 4-6 years old.

Brief Infant-Toddler Social and Emotional Assessment. Mothers completed the 49-item Brief Infant-Toddler Social and Emotional Assessment (BITSEA; Briggs-Gowan et al., 2004) in which they report on the frequency of socioemotional competence behaviors (e.g., interpersonal functioning) and problem behaviors (e.g., internalizing/externalizing behaviors). Response options use a 3-point Likert scale ranging from 0 (Not true/rarely) to 2 (Very true/often). We calculated competence and problem scale scores by summing their respective items; an example item from the competence scale is 'Looks for you (or other parent) when upset' and an example item from the problem scale is 'Seems nervous, tense, or fearful'. Internal reliability for the competence and problem scales was high (.61 and .64, respectively).

Post-Visit Observer Ratings. The 24-month laboratory visit consisted of several tasks designed to mimic every day, emotion-eliciting experiences the child would typically be exposed to. Immediately after the laboratory visit was finished, trained researchers completed post-visit ratings (based off of Gagne et al., 2011) to provide an overall impression of the child's behavior and emotional responses observed during the visit. The experimenter provides overall ratings on 28 distinct behaviors and emotions observed during the entire laboratory visit, using a 5-point scale (1 = absence or minimal observation of target behavior or emotion, 5 = high frequency of target behavior or emotion). An example of a target behavior includes the child's overall cooperation with the experimenter, with the experimenter selecting a rating from the following choices:

1. Consistently shows some resistance to suggestions or requests; seldom, if ever, fully cooperates
2. Consistently shows some resistance to suggestions or requests; cooperates fully in a few instances

3. Average degree of resistance; may show some minor resistance less than half the time
4. Typically cooperates; a few instances of minor resistance
5. Consistently cooperates; no evidence of any resistance

An example of a target emotion includes the child's proneness to anger/irritability, with the following rating options possible:

1. No signs of anger or irritability at all
2. Only subtle or ambiguous signs of anger/irritability; shows in 1 or 2 fleeting instances
3. Mild anger or irritability; shown in only appropriate situations
4. Moderate anger/irritability in 1-3 situations, and/or mild anger throughout
5. Extreme anger/irritability in 1-3 situations, and/or child frequently shows some anger or even aggressiveness

Refer to Appendix C to see all the Post-Visit Observer Rating codes.

Coronavirus Health Impact Survey. The CoRonavIruS Health Impact Survey (CRISIS; Nikolaidis et al., 2020) parent/caregiver baseline form is a 63-item questionnaire gathering basic child and familial demographic data along with COVID-19-related health items. Mothers also report on their child's pandemic-related life changes, daily behaviors, mood states, pandemic-related worries, media use, and substance use (the latter of which we did not collect for this study).

Still-Face Paradigm Measures

We assessed several measures of child and mother functioning (e.g., child regulation, child affect, maternal sensitivity) from the SFP. We considered SFP data as missing if families

did not complete the laboratory visit, the father (versus the mother) completed the laboratory visit, or the SFP play and/or play reunion episode was uncodeable (e.g., due to child distress).

Child Affect during the 6-Month SFP. Based upon a coding scheme developed by Braungart-Rieker & Stifter (1996), child affect is coded every three seconds during each episode of the SFP. We coded affect on a 7-point Likert scale, ranging from -3 (screaming, extreme crying, large grimace, mouth open) to 0 (neutral expression) to 3 (squealing with delight, intensely laughing, smiling with mouth opened widely).

Coders were trained by a highly experienced coder until they were reliable ($\alpha \geq .70$). Inter-rater reliabilities (intraclass correlations) were obtained from approximately 25% of the videotapes; if any coding drift occurred ($\alpha < .7$), all coders convened for further training. Scoring reliability estimates for child affect from the 6-month SFP ranged from .73 to .99, with an average $\alpha = .87$.

Maternal Sensitivity during the 6-Month SFP. We coded maternal sensitivity in three-second intervals during the SFP play and play reunion episodes; sensitivity is not assessed during the still-face episode due to mothers' required disengagement. Each episode is 90 seconds in length; thus, there are thirty sensitivity codes per episode. Sensitivity scoring is adapted from a scale developed by Leerkes (2010), whereby the mother's behaviors in response to her child are coded. Maternal behaviors assessed include negative, intrusive, mismatched affect, withdrawn, persistent ineffective, monitor, calm engagement, reciprocal engagement/positive play, and routine care. Refer to Table D1 in Appendix D to see sensitivity codes and their descriptions.

Coders were trained by a highly experienced coder until they were reliable ($\alpha \geq .70$). Inter-rater reliabilities (intraclass correlations) were obtained from approximately 11% of the videotapes; if any coding drift occurred ($\alpha < .7$), discrepant codes were discussed and resolved in

a conference with the master coder. Scoring reliability estimates for maternal sensitivity from the 6-month SFP ranged from .98 to 1.0, with an average $\alpha = .99$.

Child Regulation during the 24-Month SFP. For this paper, we will focus on child regulatory data collected from the 24-month laboratory visit. Children's regulatory behaviors were coded every three seconds as present or absent during all three episodes of the SFP (e.g., Planalp & Braungart-Rieker, 2015). Visual codes included looking at the parent, looking at the toy (i.e., toy-focused distraction), or looking around the room (i.e., environmental distraction). Verbal codes included the child vocalizing to themselves or vocalizing to their parent. Motor codes included the child seeking proximity or physical contact with their parent, high-intensity motor behavior (e.g., running around the room, throwing toy), self-soothing (e.g., fingering clothing, touching body), and toy-focused engagement.

Coders were trained by a highly experienced coder until they were reliable ($\alpha \geq .70$). Inter-rater reliabilities (intraclass correlations) were obtained from approximately 12% of the videotapes; if any coding drift occurred ($\alpha < .7$), all coders convened for further training and discussion. Scoring reliability estimates for child regulation from the 24-month SFP ranged from .76 to .86, with an average $\alpha = .81$.

Maternal Symptom Scores

Pregnancy Maternal Depression/Anxiety Composite Formation. Both the EPDS and the STAI can be used as categorical measurements of depressive and anxious symptomatology, respectively. However, given our smaller community-based sample size, we combined the pregnancy (i.e., 24 weeks and 34 weeks) EPDS and STAI scores to create a pregnancy-specific maternal depression/anxiety composite score. First, we calculated the total pregnancy EPDS and total pregnancy STAI scores before calculating the *z*-score for each. Next, we take the average of

the two standardized scores to produce the pregnancy maternal depression/anxiety composite score to be used in analyses.

Postpartum Maternal Depression/Anxiety Composite Formation. We created our postpartum maternal depression/anxiety composite by using an identical analytic process as just described for the pregnancy-specific composite, with the notable distinction being the use of postpartum-specific timepoints. Specifically, we utilized EPDS and STAI data collected at 1-, 6-, and 12 months postpartum.

Lifetime Maternal Depression/Anxiety Composite Formation. Following standard procedures (First et al., 2002), data collected from the SCID-I/NP is used to categorize mothers in our sample as follows: 'No depression' (*n*=89) and 'Lifetime prevalence of clinical depression' (*n*=57). Similarly, mothers are also categorized as follows: 'No anxiety' (*n*=112) and 'Lifetime prevalence of clinical anxiety' (*n*=34). Given our small sample size and considerable comorbidity amongst disorders, we created a lifetime maternal depression/anxiety composite score by categorizing mothers in our sample as follows: 'Absence of clinical depression/anxiety in lifetime' (*n*=78) and 'Presence of clinical depression/anxiety in lifetime' (*n*=68).

Maternal Stress Scores

Pregnancy Stress Index Score Formation. Following procedures outlined by Essex et al. (2002), we created a stress index score to capture the experience of stressors by mothers as rated at 34 weeks of pregnancy. We first created composite scores for familial anger expression, maternal role overload, and financial stress domains. Table 1 displays the descriptive statistics of relevant variables used to create composite scores.

Familial Anger Expression. The anger expression composite consists of data collected from the BPRQS and FEQ scales. Specifically, the three items that make up the Marital Conflict

subscale of the BPRQS ("When you think about your relationship right now, how concerned are you… because of arguing or fighting? Because of not getting along? Because your partner is critical of you?") and the average of the two negative subscales from the FEQ (negative dominance and negative-submissive) are both *z*-scored before we averaged them together to create an overall pregnancy familial anger expression composite score. This composite thus represents a family's tendency to feel and express negative emotions, including anger, contempt, and dissatisfaction, such that higher scores reflect increased prevalence and expression of negativity.

Role Overload. The pregnancy role overload score is simply the *z*-score of the total role overload score from the ERO, defined as the average of all five items. The pregnancy role overload score thus represents the mother's experiences of demanding obligations during pregnancy (i.e., with higher scores representing higher demands and less time available for non-obligatory demands).

Financial Stress. The pregnancy financial stress score is the average of all four items from the EFS questionnaire, *z*-scored for further data combination. Higher scores reflect increased stress due to financial concerns.

We then averaged the resulting anger expression, role overload, and financial stress scores to create the overall index score, hereafter referred to as the "pregnancy stress index" (Figures 1 and 2). Higher scores represent higher rates of stress within the pregnancy period.

Postpartum Stress Index Score Formation. Similar to the pregnancy stress index score formation, we created composite scores for familial anger expression, role overload, financial stress, and parenting stress domains for three specific timepoints: child age 1 month (T3), 6 months (T4), and 12 months (T5).

Familial Anger Expression. The postpartum familial anger expression composite (Table 2) parallels the pregnancy composite in that it consists of the Marital Conflict subscale of the BPRQS and the average of the two negative subscales from the FEQ; however, it also includes the calculated overall anger expression score from the AEI (which was not collected during pregnancy). Scores across these three scales are all *z*-scored before we averaged them together to create an overall postpartum familial anger expression composite score.

Role Overload. To create the postpartum role overload scale (Table 3), we calculated the average of the *z*-scores for the PSI Role Restriction subscale (not administered during pregnancy) and the total role overload score from the ERO. Thus, like the pregnancy role overload score, the postpartum role overload composite score represents the mother's experiences of demanding obligations during the first postpartum year (e.g., higher scores representing higher childcare demands and/or less time available for non-obligatory demands).

Financial Stress. The postpartum financial stress score creation (Table 4) mirrors the creation of the pregnancy financial stress score, such that we calculated the average of the four items of the EFS and then *z*-scored for further combination.

Parenting Stress. Given the transition to parenthood within the postpartum period, we calculated a parenting stress composite by *z*-scoring the PSI Competence and Child Reinforces Parent subscales and then calculating the average of the two *z*-scores (Table 5). The parenting stress composite thus represents a mother's self-efficacy as a parent (i.e., higher scores suggesting increased feelings of incompetence) and her experience of interactions with her child as not reinforcing (e.g., her engagement is not reciprocated by the child).

We averaged the resulting anger expression, role overload, financial stress, and parenting stress composite scores (one score each for T3, T4, and T5) within timepoints to create

individual postpartum stress index scores. Given the high correlation across timepoints, we further averaged the stress index scores into one overall index score, hereafter referred to as the "postpartum stress index" (Figures 3 and 4). Higher scores represent higher rates of stress within the postpartum period.

For descriptive statistics of the stress index variables, see Table 6. For correlations amongst components used to create the stress index variables, see Table 7.

Child Outcome Scores

Two measures of child socioemotional functioning were collected at child age 24 months, one in which the mother reports on the child's functioning (i.e., Brief Infant-Toddler Social and Emotional Assessment, Briggs-Gowan et al., 2004) and one in which an experimenter rates the child's functioning following a laboratory assessment (i.e., 'Post-Visit Observer Ratings'). One measure of child stress (i.e., Nikolaidis et al., 2020) was administered at child age 4-6 years, in which the mother reports on the impact of COVID-19 on their children.

BITSEA Competence Behaviors Factor Scores. Principal axis factor analysis with varimax rotation was conducted to assess the underlying structure for the 11 items of the BITSEA Competence Behaviors Scale. Initially, we examined the factorability of the 11 items. We observed that 5 of the 11 items correlated at least .3 with at least one other item (8 of the 11 items correlated at least .25 with at least one other item), suggesting reasonable factorability (see Table 8 for descriptives). Secondly, the Kaiser-Meyer-Olkin measure of sampling adequacy was .672, above the commonly recommended value of .6, and Bartlett's test of sphericity was significant (X^2 (55) = 122.522, $p < .001$). The diagonals of the anti-image correlation matrix were also all over .5.

We extracted four factors and then rotated. The first factor accounted for 21.4% of the variance, the second factor accounted for 13.2%, the third factor accounted for 10.9%, and the fourth factor accounted for 9.4%. Table 9 displays the items and factor loadings for the rotated factors, with loadings less than .2 omitted to improve clarity.

The first factor, which seems to index children's social relatedness and mastery motivation, was most strongly defined by items about engagement with parents, such as through social referencing, affection, and sharing in displays of pleasure. The second factor, which seemed to index children's compassion towards others, was strongly defined by compassion exhibited towards inanimate objects, with moderate loadings on items about altruistic and companionable behaviors. The third factor, which seemed to index children's attention and pointing behaviors, was defined by items addressing pointing/signaling to another individual, attention spans, and imitation behaviors. The fourth factor loaded on the one remaining item, "Follows rules," suggesting that this factor indexes children's compliance behaviors.

We examined internal consistency for the first three factors using Cronbach's alpha. The alphas were .492 for Factor 1 (4 items), .5 for Factor 2 (3 items), and .442 for Factor 3 (3 items). See Table 10 for descriptive statistics for the four BITSEA Competence Behavior scale factors.

Overall, these analyses indicated that four distinct factors were underlying the BITSEA Competence Behaviors scale and that these factors were moderately internally consistent. We eliminated none of the items. An approximately normal distribution was evident for the composite score data in the current study; thus the data were well-suited for parametric statistical analyses.

BITSEA Problem Behaviors Factor Scores. Principal axis factor analysis with varimax rotation was conducted to assess the underlying structure for the 31 items of the BITSEA Problem Behaviors Scale. Initially, we removed eight problem behavior items from all analyses due to minimal variance (i.e., having a frequency less than 0.1). The following items were removed: "Has less fun than other children", "Seems very unhappy, sad, depressed, or withdrawn", "Purposely tries to hurt you (or other parent)", "Repeats a particular movement, over and over (like rocking, spinning)", "Spaces out, is totally unaware of what's happening around him/her", "Does not make eye contact", "Avoids physical contact", and "Hurts her/himself on purpose (e.g., bangs his/her head)". Therefore, we retained the remaining 23 problem behavior items for analysis.

Next, we examined the factorability of the 23 items. We observed that 13 of the 23 items correlated at least .3 with at least one other item (22 of the 23 items correlated at least .25 with at least one other item), suggesting reasonable factorability (see Table 11 for descriptives). Secondly, the Kaiser-Meyer-Olkin measure of sampling adequacy was .529, above the minimally acceptable value of 0.50, and Bartlett's test of sphericity was significant (X^2 (253) = 505.511, $p <$ .001). Fourteen of the 23 diagonals of the anti-image correlation matrix were over .5 (the remaining 9 diagonals ranged from .424 to .495).

We extracted five factors and then rotated. The first factor accounted for 11.9% of the variance, the second factor accounted for 9.2%, the third factor accounted for 8.1%, the fourth factor accounted for 7.2%, and the fifth factor accounted for 6.8%. Table 12 displays the items and factor loadings for the rotated factors, with loadings less than .2 omitted to improve clarity.

The first factor was defined by children's destructive and oppositional behaviors, including aggressive behaviors towards others and misbehaviors. The second factor was strongly

defined by children's sleep problems. The third factor seemed to index children's emotional dysregulation and was defined by frequent, strong tantrum behaviors, refusal behaviors, and difficulty adjusting to change. The fourth factor indexed children's repetitive and/or sensory behaviors and had a small negative loading on the item: "Does not react when hurt." Finally, the fifth factor was defined by children's fear and anxiety behaviors.

We examined internal consistency for each of the factors using Cronbach's alpha. The alphas were .582 for Factor 1 (8 items), .815 for Factor 2 (2 items), .541 for Factor 3 (4 items), .504 for Factor 4 (4 items), and .375 for Factor 5 (5 items). See Table 13 for descriptive statistics for the five BITSEA Problem Behavior scale factors.

Overall, these analyses indicated that five distinct factors were underlying the BITSEA Problem Behaviors scale and that these factors were moderately internally consistent. An approximately normal distribution was evident for the composite score data in the current study; thus, the data were well-suited for parametric statistical analyses.

Post-Visit Observer Ratings Factor Scores. We conducted principal axis factor analysis with varimax rotation to assess the underlying structure for the 28 items of the Post-Visit Observer Ratings scale. Initially, we examined the factorability of the 28 items. We observed that all of the 28 items correlated at least .3 with at least one other item, suggesting reasonable factorability (see Table 14 for descriptives). Secondly, the Kaiser-Meyer-Olkin measure of sampling adequacy was .905, well above the commonly recommended value of .6, and Bartlett's test of sphericity was significant (X^2 (378) = 3003.449, $p < .001$). The diagonals of the anti-image correlation matrix were also all over .5.

We extracted three factors and then rotated. The first factor accounted for 40.6% of the variance, the second factor accounted for 23.9%, and the third factor accounted for 6.0%. Table

15 displays the items and factor loadings for the rotated factors, with loadings less than .2 omitted to improve clarity.

The first factor was strongly defined by items reflecting the child's positive affect and interest in the laboratory visit. The second factor was strongly defined by children's compliance and cooperation behaviors, as well as attention to tasks and adaptation to changes in test materials. Further, there were moderate negative loadings on inattention behaviors and anger/frustration. Finally, the third factor was defined by items reflecting the child's negative affect, including sadness and fear.

We examined internal consistency for each of the factors using Cronbach's alpha. The alphas were .962 for Factor 1 (13 items), .934 for Factor 2 (12 items), and .625 for Factor 3 (3 items). See Table 16 for descriptive statistics for the three Post-Visit Observer Ratings scale factors.

Overall, these analyses indicated that three distinct factors were underlying the Post-Visit Observer Ratings scale and that these factors were moderately internally consistent. We eliminated none of the items. An approximately normal distribution was evident for the composite score data in the current study; thus, the data were well-suited for parametric statistical analyses.

Child Regulation Scores. Four scores were calculated to represent self-regulation, mother-focused regulation, toy-focused regulation, and environment-focused regulation. We chose to focus on the proportion of time children spent engaging in behaviors occurring specifically during the still-face and play reunion episodes (versus the play episode) to calculate scores more representative of regulation of distress (e.g., Adamson & Frick, 2003). Self-

regulation was defined by children's self-focused vocalizations; we did not include self-soothing behaviors due to the minimal presence of these behaviors within the data. We summed children's time spent vocalizing to their mother, time spent looking at their mother, and proximity-seeking behaviors to create a mother-focused regulatory variable. We summed engagement with the toy and toy-focused visualizations to create a toy-focused regulatory variable. Finally, we summed children's time spent visually focused on their environment (versus toy or mother) and high-intensity motor behavior to create an environment-focused regulatory variable.

COVID-19 Scores. We created two variables from the CRISIS survey assessing the impact of COVID-19: pandemic-related worries and pandemic-related life changes. We calculated the COVID-19 worries variable by averaging scores across several items assessing children's worries (e.g., children's concern over infection of self or friends/family, concern of detrimental impact to physical and/or mental/emotional health), such that higher scores reflect higher levels of pandemic-specific worries. We calculated the COVID-19 life changes variable by averaging scores across items reflecting structural changes due to the pandemic, such as changes in children's social contacts, effects on family relationships, changes in living situations, and familial financial concerns. Higher scores on this variable reflect higher amounts of life changes due to the pandemic.

Maternal Sensitivity Scores

Following procedures outlined in Leerkes (2010), we compare mothers' behaviors against concurrent child affect ratings to calculate a final maternal sensitivity rating. In doing so, we can assess mothers' behaviors from a broader perspective that takes the child's emotional reactions and responses into account, versus assessing sensitivity in isolation. Each epoch in

which maternal sensitivity behaviors are coded is thus "translated" into a maternal sensitivity rating, resulting in a total of thirty maternal sensitivity ratings per episode.

We coded these final sensitivity ratings on a three-point Likert scale, ranging from 1 (insensitive) to 3 (sensitive). For instance, if a mother is demonstrating negative or intrusive behaviors, her final sensitivity rating will be a 1, indicative of less sensitivity, no matter the child's affective state (positive, negative, or neutral). If a mother is calmly engaging her child and the child is showing either positive or neutral affect, the mother will receive a final sensitivity rating of 3 (more sensitive). If, however, the child is showing negative affect, the mother receives a final sensitivity rating of 2 (somewhat sensitive). Refer to Table D2 in Appendix D for a breakdown of maternal sensitivity ratings based on maternal behavior and child affect.

We reduced maternal sensitivity ratings by averaging each mother's sensitivity ratings from the play and play reunion episodes into one overall mean maternal sensitivity rating.

Covariates

The main covariates included in all analyses are child sex and family socioeconomic status (SES). Mothers report on their child's sex at each timepoint; child sex is scored such that a 0 represents male and 1 represents female. Mothers report on their years of education, their child's father's years of education, and their annual family income at each timepoint. We calculated a standardized composite score reflecting family SES from the parent education and family income variables, such that higher scores reflect higher SES levels.

Section One Results

Preliminary Analyses

Collinearity was assessed for all variables of interest in all analyses through examination of Variance Inflation Factor (VIF) scores; all were below the typically accepted threshold for multicollinearity (i.e., all VIF scores were less than 10).

We displayed the bivariate correlations of the variables of interest in Table 17. We coded sex such that 0 represented male children and 1 represented female children.

Preliminary regression analyses (Table 18) were computed to determine whether depression and/or anxiety (measured at each timepoint), child sex, or family SES predict the BITSEA domain scores (i.e., individual regressions predicting Problem and Competence Scales).

BITSEA Problem Scale

The results of the ANOVA were significant, $F(5,111) = 3.131$, $p = .011$. Lifetime maternal depression/anxiety, maternal depression/anxiety during pregnancy, maternal depression/anxiety during the first postpartum year, child sex, and family SES explained 12.4% of the variance in Problem Scale scores. Maternal postpartum depression and/or anxiety was the only significant predictor ($p = .007$), such that for every unit increase in maternal depression/anxiety scores, a 1.914 unit increase in Problem Scale scores is predicted when holding lifetime maternal depression/anxiety, pregnancy depression/anxiety, child sex, and family SES constant.

BITSEA Competence Scale

The results of the ANOVA were significant, $F(5,111) = 2.307$, $p = .049$. Lifetime maternal depression/anxiety, maternal depression/anxiety during pregnancy, maternal depression/anxiety during the first postpartum year, child sex, and family SES explained 9.4% of the variance in Competence Scale scores. Maternal postpartum depression and/or anxiety was the only significant predictor ($p = .009$), such that for every unit increase in maternal depression/anxiety scores, a 1.101 unit decrease in Competence Scale scores is predicted when holding lifetime maternal depression/anxiety, pregnancy depression/anxiety, child sex, and family SES constant.

Aim 1.1. Predicting Child Behaviors from Maternal Depression/Anxiety

Aim 1.1a. Maternal-Reported Child Behaviors

Maternal-Reported Child Problem Behaviors. Initial bivariate correlations demonstrated that children's destructive and/or oppositional behaviors were significantly positively correlated with maternal depression/anxiety experienced during pregnancy ($r = .215$, $p = .010$) and the first postpartum year ($r = .198$, $p = .033$). Similarly, children's emotion dysregulation behaviors were significantly positively correlated with maternal depression/anxiety experienced during pregnancy ($r = .198$, $p = .033$) and postpartum ($r = .222$, $p = .016$); additionally, emotion dysregulation behaviors were significantly negatively correlated with family SES levels ($r = -.273$, $p = .003$).

Hierarchical Linear Regressions. We examined the predictive effect of specific sociodemographic and maternal mental health variables on maternal-reported child problem behaviors, as assessed by the BITSEA. To this aim, we performed five separate regression models.

Results from the hierarchical regression predicting maternal-reported child destructive and/or oppositional behaviors (Table 19, Parts I and II) demonstrated that in the first block, neither child sex nor family SES significantly predicted the outcome, $F(2,113) = .544$, $p = .582$. The second block, including maternal lifetime depression/anxiety, did not significantly improve the first model ($\Delta F(1,112) = .861$, $p = .355$). The third model, which included maternal pregnancy depression/anxiety ($\beta = .203$, $p = .044$), was not significant ($F(4,111) = 1.534$, $p = .197$); however, this model did produce a significant improvement from the second model, $\Delta F(1,111) = 4.136$, $p < .05$, $\Delta R^2 = .035$. Finally, the overall model in the last block was not significant, $F(5,110) = 1.277$, $p = .279$. Maternal postpartum depression/anxiety did not emerge as a significant predictor of child destructive and/or oppositional behavior ($p = .593$), but its addition to the model eliminated the previously significant predictive effect of maternal pregnancy depression/anxiety ($\beta = .151$, $p = .276$).

Next, we replicated the hierarchical regression analysis with maternal-reported child sleep problems. The results indicated that the overall regression model was not significant, $F(5,110) = 1.058$, $p = .387$ (Table 20, Parts I and II). No significant predictive effects of the sociodemographic or maternal mental health variables emerged across any of the four blocks.

Results from the hierarchical regression predicting maternal-reported child emotion dysregulation behaviors (Table 21, Parts I and II) highlighted that the first model was significant, $F(2,113) = 4.981$, $p = .008$, $R^2 = .081$. Family SES exhibited a significant negative predictive effect ($\beta = -.273$, $p = .003$) on the outcome but child sex did not ($\beta = -.064$, $p = .479$). The inclusion of maternal lifetime depression/anxiety in the second model ($\Delta F(1,112) = .253$, $p = .616$), pregnancy depression/anxiety in the third model ($\Delta F(1,111) = 2.024$, $p = .158$), and postpartum depression/anxiety in the fourth model ($\Delta F(1,110) = 2.187$, $p = .142$) did not

significantly improve upon the preceding models. Nevertheless, the overall model in the last block was significant, $F(5,110) = 2.917$, $p = .016$, and this was driven by the predictive effect of family SES ($\beta = -.260$, $p = .007$).

The fourth set of hierarchical linear regressions predicting maternal-reported child repetitive and/or sensory sensitivity behaviors (Table 22, Parts I and II) demonstrated that neither child sex nor family SES significantly predicted the outcome in the first model, $F(2,113) = .162$, $p = .850$. The second model, which included maternal lifetime depression/anxiety ($\beta = -.189$, $p = .048$) was not significant ($F(3,112) = 1.442$, $p = .235$); however, this model did produce a significant improvement from the first model, $\Delta F(1,112) = 3.991$, $p < .05$, $\Delta R^2 = .034$. Conversely, the inclusion of pregnancy depression/anxiety in the third model ($\Delta F(1,111) = .140$, $p = .709$) and postpartum depression/anxiety in the fourth model ($\Delta F(1,110) = .584$, $p = .447$) did not significantly improve upon the preceding models. While the overall model was not significant, $F(5,110) = 1.000$, $p = .422$), maternal lifetime depression/anxiety remained a significant predictor of child repetitive and/or sensory sensitivity behaviors after adjusting for all other explanatory variables ($\beta = -.224$, $p = .033$).

The last set of hierarchical linear regression predicting maternal-reported child problem behaviors, specifically child fear and/or anxiety behaviors, indicated that none of the models were significant (Table 23, Parts I and II). No significant predictive effects of the sociodemographic or maternal mental health variables emerged across any of the four blocks.

Maternal-Reported Child Competence Behaviors. Initial bivariate correlations demonstrate that children's social relatedness and/or mastery motivation behaviors were significantly negatively related with maternal depression/anxiety experienced during the first

year postpartum (r = -.187, p = .043). Children's compassionate behaviors towards others were significantly correlated with child sex (r = .254, p = .006), such that female children were rated as exhibiting higher levels of compassionate behaviors (M = .21, SD = .71) than male children (M = -.25, SD = 1.04). Similarly, children's attention/pointing behaviors were significantly correlated with child sex (r = -.223, p = .016), such that male children were rated as exhibiting higher levels of attention/pointing behaviors (M = .17, SD = .65) than female children (M = -.15, SD = .78). Children's rule following behaviors were significantly negatively correlated with maternal depression/anxiety experienced during pregnancy (r = -.189, p = .043) and postpartum (r = -.249, p = .007).

Hierarchical Linear Regressions. We then examined the predictive effect of our sociodemographic and maternal mental health variables on maternal-reported child competence behaviors, as assessed by the BITSEA. To this aim, we performed four separate regression models.

Our first set of hierarchical linear regressions, predicting maternal-reported child social relatedness and/or mastery motivation behaviors, indicated that none of the models were significant (Table 24, Parts I and II). While the final model, which included maternal postpartum depression/anxiety, did not reach significance (F(5,110) = 1.007, p = .417), it was approaching a significant improvement to model 3 (ΔF(1,110) = 3.856, p = .052). Overall, no significant predictive effects of the sociodemographic or maternal mental health variables emerged across any of the four blocks.

Results from the hierarchical linear regression predicting maternal-reported child compassion behaviors towards others (Table 25, Parts I and II) highlighted that the first model was significant, F(2,113) = 4.539, p = .013, R^2 = .074. Child sex exhibited a significant positive

predictive effect on the outcome variable (β = .246, p = .008), but family SES did not (β = .104, p = .252). The second model, which included maternal lifetime depression/anxiety (β = -.029, p = .754), was significant (F(3,112) = 3.035, p = .032) but did not produce a significant improvement over the first model, ΔF(1,112) = .099, p = .754. The third model (F(4,111) = 2.260, p = .067) and the fourth model (F(5,110) = 1.822, p = .114) were not significant. Nevertheless, in the final model, child sex remained significant after adjusting for all other explanatory variables, such that mothers rated their female children as having higher rates of compassion behaviors towards others than male children (β = .238, p = .014).

The third set of hierarchical linear regressions predicting maternal-reported child pointing/attention behaviors (Table 26, Parts I and II) highlighted that the first model was significant, F(2,113) = 3.990, p = .021, R^2 = .066. Child sex exhibited a significant negative predictive effect (β = -.234, p = .011) of the outcome but family SES did not (β = .120, p = .189). The second model (F(3,112) = 2.681, p = .050), which included maternal lifetime depression/anxiety was significant but did not produce a significant improvement over the first model, (ΔF(1,112) = .125, p = .725). The third model (F(4,111) = 2.282, p = .065) and final model (F(5,110) = 2.212, p = .058) approached significance but did not significantly improve upon previous models. In the final model, the predictive effect of child sex remained significant after adjusting for all other explanatory variables, such that mothers rated their male children as using more pointing/attention behaviors than female children (β = -.274, p = .005).

Finally, results from the hierarchical linear regression predicting maternal-reported child rule-following behaviors (Table 27, Parts I and II) showed that the first model (F(2,113) = 1.136, p = .325) and the second model (F(3,112) = 1.095, p = .355) were not significant. The third model, which included pregnancy depression/anxiety (β = -.254, p = .011) was significant,

$F(4,111) = 2.539$, $p = .044$. This model was a significant improvement over the second model, $\Delta F(1,111) = 6.707$, $p = .011$, $\Delta R^2 = .055$. The fourth model, which included postpartum depression/anxiety ($\beta = -.295$, $p = .040$), was significant ($F(5,110) = 2.952$, $p = .015$) and this was a minor improvement over the third model, $\Delta F(1,110) = 4.301$, $p = .040$, $\Delta R^2 = .034$.

Aim 1.1b. Post-Visit Observer Ratings of Child Behaviors

Bivariate Relationships. Initial bivariate correlations demonstrate that post-visit observer ratings of children's positive affect/interest behaviors were significantly correlated with family SES ($r = .234$, $p = .012$); no other significant correlations emerged.

Hierarchical Linear Regressions. We examined the predictive effect of specific sociodemographic and maternal mental health variables on observer impressions of child behavior, as assessed with post-visit ratings. To this aim, we performed three separate regression models.

The first hierarchical linear regression predicting post-visit observer ratings of child positive affect/interest behaviors (Table 28, Parts I and II) indicated that the first model was significant, $F(2,109) = 3.889$, $p = .023$, $R^2 = .067$. Family SES exhibited a significant positive predictive effect ($\beta = .242$, $p = .010$) on the outcome but child sex did not ($\beta = -.103$, $p = .269$). The second model, which included maternal lifetime depression/anxiety ($\beta = -.088$, $p = .357$) was significant ($F(3,108) = 2.874$, $p = .040$), but this was not a significant improvement over the first model, $\Delta F(1,108) = .855$, $p = .357$. The inclusion of maternal pregnancy depression/anxiety in the third model ($F(4,107) = 2.167$, $p = .078$) and maternal postpartum depression/anxiety in the fourth model ($F(5,106) = 1.746$, $p = .130$) did not significantly improve the preceding models. In the final model, the predictive effects of family SES remained significant after

adjusting for all other explanatory variables, such that children from families with higher SES were observed to demonstrate more positive affect/interest behaviors (β = .230, p = .021).

The next hierarchical linear regression predicted post-visit observer ratings of child compliance behaviors and demonstrated that none of the models were significant (Table 29, Parts I and II). No significant predictive effects of the sociodemographic or maternal mental health variables emerged across any of the four blocks.

Similarly, none of the models predicting post-visit observer ratings of child negative affect behaviors were significant (Table 30, Parts I and II). No significant predictive effects of the sociodemographic or maternal mental health variables emerged across any of the four blocks.

Aim 1.1c. Child Regulatory Behaviors During the Still-Face Paradigm

Bivariate Relationships. Initial bivariate correlations demonstrate that children's mother-directed regulatory behaviors were significantly positively correlated with child sex (r = .204, p = .031), such that female children used higher rates of mother-directed regulatory strategies (M = 1.04, SD = .66) than male children (M = .80, SD = .47). Additionally, children's environment-directed regulatory strategies were significantly positively correlated with maternal depression/anxiety experienced during both pregnancy (r = .204, p = .031) and the first postpartum year (r = .211, p = .025).

Hierarchical Linear Regressions. Finally, we examined the predictive effect of specific sociodemographic and maternal mental health variables on child regulatory behaviors as assessed during the 24-month SFP task. To this aim, we performed four separate regression models.

The first set of hierarchical linear regressions predicted child self-directed regulatory behaviors and indicated that none of the models were significant (Table 31, Parts I and II). No significant predictive effects of the sociodemographic or maternal mental health variables emerged across any of the four blocks.

Next, we predicted child mother-directed regulatory behaviors (Table 32, Parts I and II). The first model was significant, $F(2,109) = 3.449$, $p = .035$, $R^2 = .060$. Child sex emerged as a significant predictor of the outcome variable ($\beta = .205$, $p = .030$) but family SES did not ($\beta = .118$, $p = .207$). The second model ($F(3,108) = 2.343$, $p = .077$), the third model ($F(4,107) = 1.793$, $p = .136$), and the final model ($F(5,106) = 1.422$, $p = .222$) did not significantly improve upon preceding models. In the final model, the predictive effect of child sex remained significant after adjusting for all other explanatory variables, such that female children were observed to utilize higher rates of mother-directed regulatory strategies ($\beta = .201$, $p = .039$).

The third set of hierarchical linear regressions predicted child toy-directed regulatory behaviors and indicated that none of the models were significant (Table 33, Parts I and II). No significant predictive effects of the sociodemographic or maternal mental health variables emerged across any of the four blocks.

Finally, we conducted the last set of hierarchical linear regressions to predict children's environment-directed regulatory strategies (Table 34, Parts I and II). The first model ($F(2,109) = .168$, $p = .845$) and the second model ($F(3,108) = .136$, $p = .938$) did not significantly predict the outcome variable. Conversely, the third model included maternal pregnancy depression/anxiety and was not significant ($F(4,107) = 1.166$, $p = .330$) but did significantly improve upon the second model, $\Delta F(1,107) = 4.242$, $p = .042$. The inclusion of maternal postpartum

depression/anxiety (β = .144, p = .347) in the final model was not significant, $F(5,106) = 1.110$, p = .359; further, it eliminated the previously significant predictive effect of maternal pregnancy depression/anxiety on children's use of environment-directed regulatory strategies (β = .109, p = .454).

Aim 1.2. Does Maternal Sensitivity Moderate the Effect of Maternal Depression and/or Anxiety on Child Behaviors?

We completed subsequent regression analyses to investigate whether maternal sensitivity moderates the effect of maternal depression and/or anxiety on child behaviors. We conducted moderation analyses only for those Aim 1 regressions in which maternal depression and/or anxiety (as opposed to the covariates family SES or child sex) was found to be a significant predictor in the final models. Thus, we conducted analyses to determine whether maternal sensitivity moderates the relationship between maternal lifetime depression/anxiety and repetitive and/or sensory sensitivity behaviors and maternal postpartum depression/anxiety and rule-following behaviors (Table 35, Parts I and II).

The overall model failed to predict a relationship between lifetime depression/anxiety and child repetitive and/or sensory sensitivity behaviors when controlling for child sex, family SES, maternal sensitivity, pregnancy depression/anxiety, and postpartum depression/anxiety, $F(7,93) = .580$, p = .770. Maternal sensitivity was not a significant predictor of child repetitive and/or sensory sensitivity behaviors (β = -.214, p = .642), and the interaction between maternal sensitivity and lifetime depression/anxiety was also an insignificant predictor (β = -.003, p = .996).

The overall model significantly predicted a relationship between postpartum depression/anxiety and child rule-following behavior when controlling for child sex, family SES, maternal sensitivity, lifetime depression/anxiety, and pregnancy depression/anxiety, $F(7,93) = 2.917$, $p = .008$. Postpartum depression/anxiety was the only significant predictor of the outcome variable ($\beta = -.352$, $p = .009$); maternal sensitivity was not a significant predictor ($\beta = .084$, $p = .755$) and the interaction between maternal sensitivity and maternal postpartum depression/anxiety failed to predict child rule-following behavior ($\beta = .618$, $p = .130$).

Section Two Results

Preliminary Analyses

Collinearity was assessed for all variables of interest in all analyses through examination of Variance Inflation Factor (VIF) scores; all were below the typically accepted threshold for multicollinearity (i.e., all VIF scores were less than 10).

Table 36 displays the bivariate correlations of the variables of interest. We coded sex such that 0 represented male children and 1 represented female children.

Preliminary regression analyses (Table 37) were computed to determine whether maternal stress (measured at both timepoints), child sex, or family SES predict the BITSEA domain scores (i.e., individual regressions predicting Problem and Competence Scales).

BITSEA Problem Scale

The results of the ANOVA were significant, $F(4,110) = 4.916$, $p < .001$. Pregnancy stress, postpartum stress, child sex, and family SES explained 15.2% of the variance in Problem Scale scores. Maternal postpartum stress was the only significant predictor ($p = .006$), such that for every unit increase in maternal depression/anxiety scores, a 2.444 unit increase in Problem Scale scores is predicted when holding pregnancy stress, child sex, and family SES constant.

BITSEA Competence Scale

The results of the ANOVA were significant, $F(4,110) = 3.769$, $p = .007$. Pregnancy stress, postpartum stress, child sex, and family SES explained 12.1% of the variance in Competence Scale scores. Both maternal pregnancy stress ($p = .042$) and postpartum stress ($p < .001$) were significant predictors; however, while increased stress during pregnancy was

associated with higher Competence Scale scores (β = .255), the converse was demonstrated with stress during the postpartum period (β = -.474).

Aim 2.1. Does Early Maternal Stress Predict Child Behaviors Measured at Child Age 24 Months?

Aim 2.1a. Maternal-Reported Child Behaviors

Maternal-Reported Child Problem Behaviors. Initial bivariate correlations demonstrated that maternal-reported child destructive and/or oppositional behaviors were significantly positively related to maternal postpartum stress (r = .278, p = .002). Further, maternal-reported child emotion dysregulation behaviors were significantly positively related to both maternal pregnancy stress (r = .231, p = .013) and maternal postpartum stress (r = .247, p = .007).

ANOVAs for four of the five child problem behavior factor scores were not significant (see Table 38). Child sex, family SES, pregnancy stress, and postpartum stress failed to predict maternal-reported sleep behaviors (F(4,109) = .645, p = .632), repetitive and/or sensory sensitivity problems (F(4,109) = .963, p = .431), and fear and/or anxiety behaviors (F(4,109) = .851, p = .496). When predicting destructive and/or oppositional behaviors, results were trending towards significance (F(4,109) = 2.403, p = .054), with postpartum stress as the sole significant predictor of this outcome (β = .318, p = .014).

The ANOVA predicting maternal-reported child emotional dysregulation behaviors reached significance (F(4,109) = 3.687, p = .007). Maternal pregnancy stress, postpartum stress, child sex, and family SES explained 11.9% of the variance in emotion dysregulation scores. Family SES was the only significant predictor of this outcome (p = .012). For every unit increase

in family SES ratings, mothers rated their children .272 units lower on emotion dysregulation problems when holding all other variables constant.

Maternal-Reported Child Competence Behaviors. While most correlations between maternal-reported child competence behaviors and stress indices were in the same direction (i.e., negative), none of the correlations were statistically significant.

Two of the four ANOVAs predicting child competence behavior factor scores were not significant (see Table 38). Child sex, family SES, maternal pregnancy stress, and maternal postpartum stress failed to predict maternal-reported child social relatedness/mastery motivation behaviors ($F(4,110) = 1.995$, $p = .100$), though maternal pregnancy stress and postpartum stress both emerged as significant predictors of this outcome ($p = .038$ and $p = .009$, respectively) when holding all other variables constant. Similarly, antecedent variables failed to predict maternal-reported child rule-following behaviors ($F(4,110) = 2.289$, $p = .064$), though maternal postpartum stress emerged as a significant predictor of this outcome when holding all other variables constant ($p = .022$).

The ANOVA predicting maternal-reported child compassionate behaviors towards others reached significance ($F(4,110) = 2.478$, $p = .048$). Child sex, family SES, maternal pregnancy stress, and maternal postpartum stress explained 8.3% of the variance in children's compassion scores. However, neither maternal pregnancy stress ($p = .406$) nor maternal postpartum stress ($p = .298$) were significant predictors of compassion scores; rather, child sex was the sole significant predictor ($p = .016$), such that female children were predicted to have compassion scores .425 scores higher than male children when holding all other variables constant.

Finally, the ANOVA predicting maternal-reported child attention/pointing behaviors also reached significance ($F(4,110) = 3.909$, $p = .005$). Child sex, family SES, maternal pregnancy stress, and maternal postpartum stress explained 12.4% of the variance in attention/pointing scores. Maternal postpartum stress was a significant predictor of attention/pointing scores ($p = .012$), such that for every unit increase in postpartum stress scores, a .441 unit decrease in children's attention/pointing behaviors was predicted when holding all other variables constant. Similarly, child sex significantly predicted attention/pointing scores ($p = .002$), such that female children were predicted to have attention/pointing scores .440 units lower than male children when holding all other variables constant.

Aim 2.1b. Post-Visit Observer Ratings of Child Behaviors

Bivariate Relationships. Initial bivariate correlations demonstrated that post-visit observer ratings of child positive affect/interest behaviors were negatively related with postpartum stress ($r = -.231$, $p = .014$). No other associations reached statistical significance.

Two of the three ANOVAs predicting the post-visit observer ratings factor scores were not significant (Table 39). Child sex, family SES, maternal pregnancy stress, and maternal postpartum stress failed to predict post-visit observer ratings of children's negative affect ($F(4,105) = .107$, $p = .980$). Similarly, antecedent variables failed to predict post-visit observer ratings of children's compliance behaviors ($F(4,105) = 1.887$, $p = .118$), though maternal postpartum stress did emerge as a significant predictor of this outcome when holding all other variables constant ($p = .048$).

The ANOVA predicting post-visit observer ratings of children's positive affect/interest did reach significance ($F(4,105) = 3.672$, $p = .008$). Child sex, family SES, maternal pregnancy

stress, and maternal postpartum stress explained 12.3% of the variance in child positive affect/interest scores. Maternal postpartum stress significantly predicted children's observed positive affect/interest scores (p = .020), such that for every one unit increase in postpartum stress scores, a .550 unit decrease in positive affect/interest scores was predicted when holding all other variables constant. Similarly, family SES also significantly predicted positive affect/interest scores (p = .030); for every unit increase in family SES scores, a .285 unit increase in observed child positive affect/interest scores was predicted when holding all other variables constant.

Aim 2.1c. Child Regulatory Behaviors During the Still-Face Paradigm

Bivariate Relationships. No significant correlations were demonstrated between child regulatory behaviors and the stress indices, though maternal postpartum stress and children's use of self-regulation strategies were trending towards significance (r = .182, p = .054). Overall, similar patterns emerged among variables. Specifically, stress indices were negatively related to children's mother-directed and toy-directed regulatory strategies and positively related to children's self-regulation and environment-directed regulatory strategies.

None of the four ANOVAs predicting children's regulatory behaviors reached statistical significance (Table 40). Child sex, family SES, maternal pregnancy stress, and maternal postpartum stress did not significantly predict children's toy-directed regulation (F(4,105) = .636, p = .638) and environment-directed regulation behaviors (F(4,105) = .745, p = .564). Antecedent variables failed to predict self-regulation (F(4,105) = 1.357, p = .254), though maternal postpartum stress was trending towards significance when predicting this outcome and holding all other variables constant (p = .063). Similarly, antecedent variables failed to predict

mother-directed regulation ($F(4,105) = 1.926$, $p = .112$) behaviors, though child sex was a significant predictor ($p = .023$) of this outcome when holding all other variables constant.

Aim 2.2. Does Maternal Sensitivity Moderate the Effect of Early Maternal Stress on Child Behaviors?

We completed subsequent regression analyses to investigate whether maternal sensitivity moderates the effect of maternal stress on child behaviors. We conducted moderation analyses only for those Aim 2.1 regressions in which maternal pregnancy or postpartum stress (as opposed to the covariates family SES or child sex) were found to be a significant predictor. Thus, we conducted analyses to determine whether maternal sensitivity moderates the relationship between maternal postpartum stress and maternal-reported destructive and/or oppositional behaviors, social relatedness/mastery motivation behaviors, pointing/attention behaviors, and rule-following behaviors; maternal pregnancy stress and maternal-reported social relatedness/mastery motivation behaviors; and maternal postpartum stress and post-visit observer ratings of children's positive affect/interest and compliance behaviors.

No significant interaction effects emerged when including maternal sensitivity as a moderator (Table 41). However, maternal sensitivity did emerge as a significant predictor of several child outcomes variables. Specifically, maternal sensitivity predicted child destructive and/or oppositional behaviors, such that for every one unit increase in maternal sensitivity ratings, a .768 unit decrease in destructive and/or oppositional behaviors is predicted, when holding all other variables constant. Because both the pregnancy stress index and postpartum stress index were significant predictors of children's social relatedness/mastery motivation behaviors, we ran moderation analyses with both stress composites and their interactions with maternal sensitivity in one model. No significant interaction effects emerged, but maternal

sensitivity did significantly predict children's social relatedness/mastery motivation behaviors, such that for every one unit increase in maternal sensitivity, a .150 unit increase in mothers' reports of children's social relatedness/mastery motivation behaviors is predicted, holding all other variables constant.

Aim 2.3. Which Individual Stress Components are Driving the Relationships Between Maternal Stress and Child Outcomes?

We calculated linear regression models predicting child outcome scores (that were significantly predicted from a maternal stress variable in Aim 2.1) from the individual stress composites that we used to create the overall stress indices while controlling for child sex, family SES, and the opposing timepoint's stress index score. As a reminder, we calculated the pregnancy stress index from family anger expression, role overload, and financial stress, while the postpartum stress index was calculated from these three domains and a parenting stress-specific score. Thus, we ran multiple regressions predicting maternal-reported child destructive and/or oppositional behaviors, social relatedness/mastery motivation behaviors, pointing/attention behaviors, rule-following behaviors, and post-visit observer ratings of child positive affect/interest and compliance behaviors using the individual postpartum stress composites as predictors; one additional regression was conducted to predict social relatedness/mastery motivation behaviors from the individual pregnancy stress composites due to both stress timepoints being significant predictors in Aim 2.1 (see Table 42).

When predicting destructive and/or oppositional behavior from the postpartum stress composite scores, the role overload composite appears to be the most important independent variable in the regression model ($\beta = .228$, $p = .056$) with parenting stress being a close second ($\beta = .215$, $p = .040$).

When predicting social relatedness/mastery motivation behaviors from individual pregnancy stress composite variables, the postpartum stress index variable (included as a covariate) had the largest influence on this outcome (|β| = .385, p = .004). Apart from this, pregnancy financial stress was the second most influential predictor (β = .262, p = .055). When analyses were repeated but with the postpartum stress composite variables as predictors, role overload emerged as the most influential predictor (|β| = .284, p = .020).

The covariate child sex was the most influential predictor of children's pointing/attention behaviors (|β| = .292, p = .003). Postpartum financial stress was the next most influential predictor (|β| = .240), though this was not a significant predictor (p = .066).

When predicting children's rule-following behaviors from the individual postpartum stress composite scores, parenting stress was the most influential predictor (|β| = .197) though this was not a significant predictor (p = .066).

Family SES was the most influential predictor of post-visit observer ratings of children's positive affect/interest behaviors (β = .265, p = .008), with family anger expression as a close second (|β| = .263, p = .029).

When predicting post-visit observer ratings of children's compliance behaviors, postpartum financial stress was the most influential predictor (|β| = .380, p = .004).

Aim 2.4. Does Early Maternal Stress Predict Maternal-Reports of Children's COVID-19 Related Stress, Measured at Child Age 4-6 Years?

Descriptive Results of the Coronavirus Health and Impact Survey (CRISIS)

Mothers (N = 105) completed the Coronavirus Health and Impact Survey (CRISIS; Nikolaidis et al., 2020) across a span of seven months (September 2021 – April 2022).

Schooling. Children ranged in age from 4.92 – 7.33 years (M = 6.05 years), and 85.7% (n = 90) were enrolled in school during the 2020-2021 school year. Specifically, five children were enrolled in pre-kindergarten, 71 children in kindergarten (i.e., 4K or 5K), and 11 children in first grade. School buildings were closed for 34.3% (n = 36) of the children enrolled in school; of these children, 94.4% (n = 35) resumed taking classes online. The remaining children whose school buildings were not closed (at the time of mothers' survey completion) all attended classes in person.

Essential Workers in the Home. 32.4% (n = 34) of children lived in a home with an adult who was characterized as an essential worker; 55.9% (n = 19) of the adults were either first responders, healthcare providers, or other workers in a facility treating COVID-19.

Family Exposure and COVID-19 Complications. At the time of survey completion, 31.4% (n = 34) of children had been exposed to someone likely to have had COVID-19 (i.e., someone with a positive COVID-19 test or with symptoms but no diagnosis); 11.4% (n = 12) were exposed to a member of the same household. 16.2% (n = 17) of children were suspected of having COVID-19 themselves. A subset of children had family members become physically ill (14.7%, n = 15), be hospitalized (3.8%, n = 4), or pass away (2.9%, n = 3) due to COVID-19 complications. Some children's family members experienced a reduced ability to earn money (12.4%, n = 13) or lost their job (5.7%, n = 6) due to COVID-19.

Children's COVID-19 Worries. Mothers reported on their children's COVID-19 worries that occurred during the 6 months before survey completion. Most children were slightly worried about both themselves becoming infected with COVID-19 (n = 54, 51.4%) and their

friends or family becoming infected with COVID-19 (*n* = 45, 42.9%). The majority of children were not worried that their mental and emotional health would be influenced by COVID-19 (44.8%, *n* = 47); however, 35.2% (*n* = 37) of children were slightly worried, 12.4% (*n* = 13) were moderately worried, and 7.6% (*n* = 8), were very worried about their mental/emotional wellbeing. Most children (49.5%, *n* = 52) were reported to "occasionally" ask questions, read, or talk about COVID-19. Mothers also reported how hopeful their child was that the COVID-19 crisis would end soon; 19.0% (*n* = 20) of children were extremely hopeful, 18.1% (*n* = 19) were very hopeful, 37.1% (*n* = 39) were moderately hopeful, 21.0% (*n* = 22) were slightly hopeful, and 4.8% (*n* = 5) were not at all hopeful.

Social Effects. Most children experienced significantly less social interaction with others outside of the home (66.6%, *n* = 70). Many children found the stay-at-home orders slightly stressful (52.4%, *n* = 55) and had "a little" difficulty with refraining from close contact with others (51.4%, *n* = 54). The quality of friendships became "a little worse" for some children during this time (41.9%, *n* = 44); however, most children experienced no significant changes in the quality of their friendships (48.6%, *n* = 51). Similarly, most children experienced no significant changes in the quality of their familial relationships during the stay-at-home period (63.8%, *n* = 67).

Child Emotions. Mothers also reported on the frequency of common emotions in their children that occurred during the two weeks before the mother's survey completion. Most children were rated as moderately relaxed/calm (39.0%, *n* = 41) while a subset was rated as moderately nervous/anxious (18.1%, *n* = 19). 50.5% of children (*n* = 53) were rated as slightly fatigued or tired. 47.6% of children (*n* = 50) were rated as moderately focused/attentive, while 14.3% (*n* = 15) were rated as moderately unfocused/distracted. Most children were rated as

slightly irritable or easily angered (56.2%, $n = 59$), with the second most frequent category being moderately irritable or easily angered (20.0%, $n = 21$). Finally, most children were rated as not feeling lonely (58.1%, $n = 61$).

Bivariate Relationships

Initial bivariate correlations demonstrated that while mother's reports of children's life changes due to COVID-19 were significantly positively related to mother's reports of children's COVID-19-related worries ($r = .467$, $p < .001$), no other significant associations amongst children's COVID-19 worries and other variables of interest emerged. However, mothers' reports of children's COVID-19-related life changes were related to both the pregnancy stress index ($r = .271$, $p = .006$) and the postpartum stress index ($r = .317$, $p < .001$).

Regression Results

Table 43 reports regression results. Child sex, family SES, pregnancy stress, and postpartum stress failed to predict mothers' reports of children's COVID-19-related worries ($F(4,97) = 1.447$, $p = .224$). Maternal pregnancy stress, postpartum stress, child sex, and family SES explained only 5.6% of the variance in children's COVID-19 worries. Pregnancy stress was the only significant predictor of this outcome ($p = .040$), such that mothers with higher pregnancy stress levels rated their children as having higher levels of COVID-19-related worries ($\beta = .301$). We did not find the same relationship for mothers with higher levels of postpartum stress ($\beta = -.104$, $p = .464$).

The ANOVA predicting mothers' reports of children's COVID-19-related life changes reached significance ($F(4,97) = 3.869$, $p = .006$). Maternal pregnancy stress, postpartum stress, child sex, and family SES explained 13.8% of the variance in ratings of children's COVID-19-

related life changes. However, postpartum stress (β = .260) and child sex (β = .189) were only trending towards significance as predictors of this outcome (both *p*'s = .058).

Discussion

Maternal mental health has wide-reaching impacts on children's socioemotional and behavioral development. Extensive research examines the effect of maternal depression and anxiety on children's developmental outcomes. Numerous links have been identified between both clinically significant levels of perinatal maternal mental health and several socioemotional (Avan et al., 2010; Shaw & Vondra, 1995), behavioral (Madigan et al., 2018; Murray et al., 1999), and psychological outcomes in offspring (Glasheen et al., 2013; Pawlby et al., 2009). Comparatively less work has explored the impacts of preconception mental health or subthreshold levels of symptomatology, even though research has identified that mild levels of depression and anxiety still exert detrimental effects on mother and child outcomes (Beardslee et al., 2011; Hammen & Brennan, 2003). However, not all mothers experiencing mental health concerns will be impacted similarly (Toth et al., 2009). Thus, understanding the impact of maternal mental health, including the timing of symptoms – such as symptoms occurring before conception – is a priority for research.

Nevertheless, higher levels of maternal sensitivity is a proposed context in which maternal mental health influences child outcomes, as maternal sensitivity impacts not only children's developing regulatory capacities (Feldman et al., 2011), but also the mother's perception of her child (Mesman & Emmen, 2013). There remains an unsettled debate between two distinct hypotheses, namely, the depression-distortion hypothesis and the depressive realism hypothesis (Fergusson et al., 1993). The depression-distortion hypothesis posits that mothers experiencing mental health concerns will report on their child's behaviors in a more negatively biased and inaccurate manner, while the depressive realism hypothesis posits that these mothers are actually reporting in a more fair, accurate manner. Though opposing, both hypotheses – and

their impact on the mother-child relationship – offer avenues for intervention work aimed at improving maternal sensitivity and decreasing undesired outcomes in children.

Therefore, the goal of the first section was to explore similarities and differences between maternal-reported and laboratory-observed child behaviors, taking into special consideration distinct periods of maternal mental health, namely, maternal depression and anxiety symptoms experienced during pregnancy, the first postpartum year, and across the mother's lifespan. We capitalized on the availability of concurrent maternal-reported and laboratory-observed child behaviors and ran parallel analyses examining child problem, competence, and regulatory behaviors occurring at child age 24 months. Additionally, our analyses went one step further to explore whether maternal sensitivity may serve as an important context in which maternal depression/anxiety exerts influence over child outcomes.

For the second half of this study, we explored how maternal stress impacts children's behavioral outcomes. Existing work often conceptualizes stress as an umbrella term that encompasses various stressors (e.g., financial, marital, parenting) *and* mental health concerns. This is understandable, as differing stressors often co-occur with each other and with common psychological concerns (Arbel et al., 2020; O'Connor et al., 2014); indeed, higher levels of prenatal depression and anxiety predict higher levels of postpartum parenting stress (Misri et al., 2010). Further, Neece et al. (2012) identify a bidirectional relationship between parenting stress and children's behavioral problems; thus, we must clearly delineate how differing types of stress may engender greater risk for negative outcomes in mother-child dyads. Indeed, Booth et al. (2018) suggest that varied domains of stress negatively impact maternal sensitivity, thereby influencing socioemotional development in children. However, we must attempt to understand

maternal factors that may precipitate problematic outcomes in children at a more fine-grained level by distinguishing between types of stressors.

Therefore, the goal of the second section was to explore the impact of stress on child behaviors. Analyses mimicked those conducted in the first section, such that we considered the effect of stress on maternal-reported and laboratory-observed child behaviors at distinct timepoints (pregnancy and the first postpartum year) and we explored the possible moderating role of maternal sensitivity. We specifically broke down any significant findings by individual stress components to determine which type of stressor may be most impactful. Finally, we chose to capitalize on the unique "natural experiment" of the COVID-19 pandemic by exploring how early maternal stress impacts maternal-reporting of children's experiences of the COVID-19 pandemic.

Predicting Maternal-Reported Child Problem Behaviors

Destructive and/or Oppositional Behaviors

Maternal mental health was significantly correlated with maternal-reported child destructive and/or oppositional behaviors. The offspring of depressed mothers are at a greater risk for destructive and disruptive behaviors in childhood and adolescence (Tully et al., 2008; Zahn-Waxler et al., 1990). Our results indicate that both pregnancy- and postpartum-specific maternal depression/anxiety are associated with higher rates of maternal-reported children's destructive and/or oppositional behaviors. Pregnancy-specific mental health was slightly more correlated with children's destructive/oppositional behaviors than postpartum-specific mental health; however, both relationships were weak. Further, when both pregnancy-specific and postpartum-specific depression/anxiety were entered into the same regression equation, neither was individually significant as a predictor.

Analyses with our stress variables highlighted the association between maternal postpartum stress and children's destructive and/or oppositional behaviors. Though postpartum stress was a significant predictor, the overall model failed to predict children's destructive and/or oppositional behaviors. Postpartum role overload thus appears to exert the most influence on mothers' reports of this behavior. This finding mirrors extant research in which higher levels of maternal work-life imbalance are related to children's externalizing behaviors (Hosokawa & Katsura, 2021; Vieira et al., 2016).

Our results confirm that maternal mental health during the perinatal period and postpartum-specific role overload stress are both associated with children's externalizing behaviors; however, the findings are not robust. Ewell Foster et al. (2008) found maternal positivity partially mediated the relation between maternal depression and children's externalizing behaviors. While low maternal sensitivity predicted children's destructive and/or oppositional behaviors in our sample, it failed to moderate the link between maternal mental health and this child outcome. Further, the measurement of maternal and child variables at different times may partially account for our limited findings. However, Kingston et al. (2018) demonstrate that preschool-aged children of mothers who were postnatally depressed, including mothers experiencing subclinical levels of postpartum depression, were at moderate risk of developing externalizing behaviors (i.e., hyperactivity/inattention, physical aggression). Indeed, studies have demonstrated the predictive power of maternal mental health for externalizing behaviors in adolescents (e.g., Hay et al., 2003). Our results might show the beginning trend of these associations, but assessing children's externalizing behaviors at age two is still too early to demonstrate robust associations.

Emotion Dysregulation Behaviors

Maternal mental health was significantly correlated with maternal-reported child emotion dysregulation behaviors, such that mothers who experienced higher rates of depression/anxiety during pregnancy and the postpartum period reported higher rates of children's difficulty regulating emotions (e.g., frequent temper tantrums). Postpartum-specific depression/anxiety demonstrated a stronger relationship with maternal reports of children's dysregulated behaviors than pregnancy-specific depression/anxiety; however, both relationships were weak. The association between maternal factors and children's dysregulated behavior has been well demonstrated. Civic and Holt (2000) found that women with postpartum depression (measured 17 and 36 months after delivery) reported higher rates of temper tantrums in their preschool-aged children. Similarly, Needlman et al. (1991) found toddlers were at a three-fold risk for severe temper tantrum behaviors if their mothers were depressed. However, our results also indicated that both pregnancy and postpartum maternal stress were significantly positively correlated with children's emotion dysregulation behaviors. In all analyses, though, family SES emerged as the main predictor, such that children from families with lower SES levels were reported to exhibit higher rates of dysregulated behaviors. This finding mirrors extant research which indicates children from lower socioeconomic statuses had higher emotion dysregulation behaviors during preschool (Kao et al., 2020) and kindergarten (Olson et al., 2013). Importantly, our SES variable (which is a composite score calculated from annual family income, mother education, and father education) is negatively skewed, reflective of the high mean family income and parental education levels frequently observed in our sample. However, lower family income or parental education levels were not absent from our data; thus, our family SES composite variable does demonstrate some variability, albeit limited. Nevertheless, the limited variability present in our family SES variable appears important when predicting children's dysregulated behaviors, such

that SES level, as opposed to maternal mental health, may be a greater risk factor for children's development of dysregulated behaviors in our sample of two-year-olds. Future work should explore the predictive power of family SES when using a broader range of SES data.

Repetitive and/or Sensory Sensitivity Behaviors

Mothers' lifetime depression/anxiety experiences were negatively, but not significantly, associated with maternal-reported child repetitive and/or sensory sensitivity behaviors. The relationship was weak, and maternal lifetime symptomatology failed to predict children's repetitive and/or sensory sensitivity behaviors in our analyses. However, research has found that maternal depression predicts two-year-olds' sensorimotor repetitive behaviors (Larkin et al., 2019). Our lack of findings may be due to the limited variability (lack of extreme scores) on the items making up our repetitive and/or sensory sensitivity factor score.

Predicting Maternal-Reported Child Competence Behaviors

Social Relatedness/Mastery Motivation Behaviors

The social relatedness/mastery motivation factor score consists of items assessing children's tendency to orient towards parents (e.g., when upset or when their parents say their name) and show pleasure when they succeed. Social mastery motivation reflects one's desire to socially interact with others (MacTurk et al., 1985); indeed, young children share pleasure at mastery to elicit pleasure from other individuals. Redding et al. (1990) suggest that children may show less mastery and pleasure with mothers if mothers are depressed, possibly due to mothers' less responsive engagement (e.g., Fung, 2022). Yan & Dix (2016) extend these findings by demonstrating the impact of maternal postpartum depression on children's social engagement and mastery motivations at 4.5 years old and further highlight how children's low social agency subsequently predicts decreased maternal sensitivity. While our maternal mental health variables

failed to emerge as significant predictors, we did find that maternal stress measured at both timepoints was related to less social relatedness and mastery motivation behaviors. More specifically, postpartum role overload emerged as the most impactful individual stress component. Additionally, our results indicated that children of less sensitive mothers demonstrate less social mastery motivation behaviors; however, maternal sensitivity failed to moderate the association between maternal stress and children's behavior. Nevertheless, our findings highlight the importance of early maternal responsivity in fostering the development of social engagement and mastery motivation behaviors in children as young as two years old.

Rule Following Behaviors

Both maternal pregnancy- and postpartum-specific depression/anxiety demonstrated significant relationships to maternal reports of children's rule-following behavior. Mothers who experienced higher rates of depression/anxiety during the pregnancy and postpartum periods reported having children who exhibited less rule-following behaviors. This relationship was moderately stronger for higher rates of postpartum-specific depression/anxiety. Indeed, regression results highlight the predictive nature of both maternal pregnancy- and postpartum-specific depression/anxiety when considering children's rule-following behaviors. Pregnancy-specific depression/anxiety emerged as the stronger predictor, producing a more significant improvement in the model than postpartum-specific depression/anxiety. However, in the final model incorporating all possible explanatory variables, only postpartum-specific depression/anxiety symptoms remained a significant predictor of maternal-reported child rule-following behaviors. While existing work has found a negative relationship between concurrent maternal depression and 18- to 24-month-old's compliance behaviors (Albright & Tamis-

LeMonda, 2002), our findings suggest that children's rule-following behaviors are impacted by maternal depression/anxiety experienced during the perinatal period.

Maternal stress experienced during pregnancy has been demonstrated to impact children's compliance behaviors (Kok et al., 2013), however, our results did not replicate this finding. Rather, maternal postpartum stress did emerge as a significant predictor of children's rule-following behavior, but this was a weak relationship not driven by any specific individual postpartum stress component. Our results suggest that maternal perinatal mental health exerts more impact on mothers' reports of children's compliance behaviors in toddlerhood than maternal stress experienced during the perinatal period.

Compassion Behaviors

Our findings appear to highlight the tendency for compassionate behaviors to differ between male and female children. Mothers of female children in our sample reported higher rates of compassionate behaviors than mothers of male children did. While some studies have shown an association between maternal depression and offspring's prosocial behaviors (e.g., Civic & Holt, 2000), our study failed to find a relationship between maternal mental health *or* maternal stress variables and mothers' reports of children's compassionate behaviors. Our compassion factor score includes items assessing children's provision of help when someone is hurt, their ability to play well with others, and their demonstration of affectionate care towards toys (e.g., stuffed animals). Notably, the latter behavior had the greatest loading on the factor score. Research has shown gendered play behaviors are evident in toddlerhood, with female children demonstrating more preference for "feminine" toys, including stuffed animals and dolls (Caldera & Sciaraffa, 1998). Perhaps unsurprisingly, our findings appear to replicate the finding that girls exhibit more affectionate, compassionate care towards toys than boys.

Attention/Pointing Behaviors

Similarly, mothers of male children in our sample reported higher rates of attention/pointing behaviors than mothers of female children. Our pointing/attention factor score consisted of items reflecting children's bids for joint attention (e.g., pointing specifically to show the parent something), attention to another's auditory production (e.g., mimicking sounds made by a parent), and sustained attention. These sex-specific findings are somewhat unexpected given existing work suggests female toddlers engage in more frequent joint attention than male toddlers (Saxon & Reilly, 1999). When considering our variables of interest, maternal mental health variables failed to predict children's attention/pointing behaviors. While maternal postpartum stress did significantly predict this behavioral competence, it was overshadowed by the impact of the child's sex. Further, no specific individual stress components demonstrated a relationship with children's attention/pointing behaviors. Wolford et al. (2017) found prenatal maternal depression relates to increased ADHD symptoms in children aged 3-6 years, but our results do not serve to replicate these findings. This could be due to the limited assessment of attention skills, and our findings may change with a more specialized assessment of attention-related competencies.

Predicting Post-Visit Observer Ratings of Child Behaviors

Lab-Observed Positive and Negative Affect

Overall, maternal mental health variables had no predictive power when considering child outcomes assessed via observer-report following the laboratory visit. Rather, a weak relationship emerged between family SES and children's observed positive affect/interest behaviors, such that children from a lower SES were observed to exhibit less positive affect/interest during the laboratory visit. Indeed, regression results indicated that family SES

was the sole significant predictor of children's observed positive affect/interest behaviors when considering all other explanatory variables. Further, post-visit observer ratings of children's positive affect/interest were negatively correlated with maternal postpartum stress, but analyses were mainly driven by family SES, and to a lesser extent, postpartum familial anger expression. Li et al. (2022) found that children from higher SES levels demonstrate higher levels of positive emotion during play activities; our results appear to extend these findings into semi-naturalistic laboratory settings in which children engage in several play-based activities. Similar to analyses predicting children's dysregulated behaviors, it is important to consider the somewhat restricted range of our family SES variable. Future work must examine these relationships in a larger sample of families encompassing a wider range of SES levels.

No significant findings emerged when predicting post-visit observer ratings of children's negative affect. This is perhaps unsurprising when we consider the makeup of this factor score, as it only consists of three items, while the post-visit observer ratings of children's positive affect/interest and compliance factor scores consist of thirteen and twelve items, respectively. Even still, we did find somewhat moderate variability within the three items making up the negative affect factor score, which suggests that children's negative affect was present throughout our laboratory assessments. Regardless, results might change if the factor score was calculated using additional items reflective of negative affect.

Lab-Observed Compliance Behaviors

Though our factor scores created based on maternal report and post-visit observer ratings are qualitatively distinct, and therefore we are unable to directly compare and make inferences between the two sets of variables, we can still assess whether relationships follow similar patterns. Contrary to expectations, our maternal-report of children's rule-following (i.e.,

compliance) behaviors and our post-visit observer ratings of children's compliance behaviors exhibited differential relationships with maternal variables. While maternal mental health was found to significantly predict maternal report of children's compliance, we failed to find similar relationships between maternal mental health variables and post-visit observer ratings of children's compliance. Similarly, while maternal postpartum stress was significantly related to maternal-reported children's compliance behaviors, no specific postpartum stress component emerged as most impactful. Contrary to this finding, postpartum financial stress significantly predicted post-visit observer ratings of children's compliance behaviors. Our financial stress variable is assessed on a more acute basis than, for instance, our family SES variable, which is relatively more stable. As such, our findings may suggest that acute (versus stable) financial stressors exert more influence on children's compliance behaviors. However, it is possible that this finding is spurious; thus, we should continue to assess this with further follow-up.

Additionally, when attempting to compare findings, it is important to note that our maternal-report of children's rule-following behaviors and our post-visit observer ratings of children's compliance behaviors were not significantly correlated with one another. These two scores may be measuring distinct forms of compliance behavior (e.g., committed versus situational compliance; Kochanska et al., 1995). Further, we must be cognizant that children's engagement in compliance behaviors may differ depending on the context; for instance, children may be more likely to comply with strangers (e.g., laboratory observers) compared to well-known others, such as parents (Kochanska et al., 2001). Thus, future work should attempt to understand the impact of maternal variables on distinct compliance behaviors.

Predicting Lab-Observed Child Regulation Behaviors

No significant bivariate relationships emerged between children's regulatory behaviors, though similar correlational patterns emerged when assessing relationships between regulatory behaviors and maternal variables. More specifically, maternal mental health and stress variables were positively (but not significantly) related to children's self- and environment-directed regulation and negatively (but not significantly) related to mother- and toy-directed regulation.

Self-Directed Regulation

Maternal variables failed to predict children's use of self-directed regulatory strategies. Though contrary to expectations, the lack of findings when predicting children's self-directed regulatory strategies is perhaps unsurprising due to the limited variance in these scores. Children demonstrated very few self-directed regulatory behaviors during the SFP. We had assumed self-soothing behaviors would fall into the category of self-directed regulatory strategies; however, rates of self-soothing behaviors (e.g., sucking thumb, twirling hair, playing with clothing) were rare and therefore not included in the creation of a self-directed regulatory variable. Instead, our self-directed variable focused solely on self-directed vocalizations, in which the child was determined to be vocalizing to themselves and not their mother (e.g., the child coaching themselves through the task, singing a song to themselves, et cetera). We reran analyses with a new self-directed regulatory strategy that included the limited occurrence of children's self-soothing behaviors, but the results did not change.

While a strong link exists between maternal mental health and stress and children's developing self-regulation abilities in infancy (e.g., Cole et al., 2004; Manian & Bornstein, 2009), our study failed to find a relation, likely due to the limited occurrence of such regulatory behaviors during our brief assessment. Ekas, Lickenbrock, et al. (2013) note that self-soothing behaviors decrease across the first year of life due to the replacement of such regulatory

behaviors with more effective strategies (e.g., attentional distraction). Children in our sample may have exhibited less self-directed regulation strategies simply because they were using different, more effective strategies.

Environment-Directed Regulation

Maternal depression/anxiety experienced during pregnancy and the postpartum periods was significantly related to children's use of environment-directed regulatory strategies as observed during the distressing still-face and reunion episodes of the SFP. However, maternal mental health variables failed to predict children's environmental-directed regulation in regression analyses. Further, maternal stress at all timepoints did not significantly relate to children's environment-directed regulation behaviors.

Mother-Directed Regulation

Children's mother-directed regulatory strategies were not related to maternal mental health or stress variables. Rather, the use of these strategies was significantly related to child sex, such that female children exhibited more regulatory strategies directed at their mothers. Female children produced mother-directed vocalizations significantly more than male children during the still-face episode of the SFP, but not the reunion episode. No significant sex differences in visually attending to their mothers emerged across the still-face or reunion episodes. Similarly, while no significant sex differences for mother-oriented motor behaviors (i.e., seeking proximity to mothers) were found during the still-face episode, female children did seek proximity more frequently during the play reunion episode than male children. Results from Weinberg et al. (2008), one of the few studies that have examined sex differences in 2-year-old children's responses to the SFP, conflict with the current findings. For instance, while Weinberg et al. find female toddlers utilized more non-verbal behaviors to elicit maternal attention during the SFP,

they also found male children were significantly more likely to use proximity-seeking behaviors. This is in opposition to our findings; thus, we must consider the possibility of spurious findings.

Toy-Directed Regulation

No significant findings emerged when predicting children's use of toy-directed regulatory strategies. There was substantial variability in children's visual attendance to the toy and motor engagement with the toy during the SFP, though no significant sex differences emerged. Children's use of the toy during the SFP may divert attention away from any distress present; indeed, Feldman et al. (2011) indicate that the use of toy-directed regulatory strategies increases when children are two years of age. Results suggest that maternal factors do not impact children's use of toy-directed regulatory strategies in this sample.

In sum, we found limited significant findings when considering children's regulatory behaviors as assessed during the SFP. Thus, we examined children's general behaviors during the entire SFP procedure more closely. Children in our sample did not display robust levels of affective distress during the SFP. Indeed, the mean affective rating during both the still-face and play reunion episodes was essentially neutral. Conceptually, though, children did demonstrate the classic "still-face effect," (e.g., Adamson & Frick, 2003; Ekas et al., 2013; Mesman et al., 2009) in which mother-directed visualizations and engagement decreased during the still-face episode when compared to the play episode, and then increased (but not to the same level as the play episode) during the play reunion episode. Taken together, this suggests that our SFP procedures were effective in eliciting behavioral changes (but perhaps not overt affective distress) in the two-year-old children due to mothers' abrupt discontinuation of interaction.

Further, our coding scheme may not have been adapted enough from the 6-month SFP to account for age-appropriate behavioral changes at the 24-month SFP. Weinberg et al. (2008)

show how 2.5-year-olds demonstrate a wider range of responses during the SFP due to their developing ability to cope with stress. However, this possibility is comparatively less likely because extensive efforts were taken to model the adapted regulatory coding off of existing coding schemes (Braungart-Rieker et al., 2014; Planalp & Braungart-Rieker, 2015).

Predicting Maternal-Reported Child COVID-19 Outcomes

Researchers have rapidly produced work exploring the impacts of the unprecedented global COVID-19 pandemic (Masten, 2021; Qiu et al., 2020). As part of this effort, our study aimed to capitalize on an existing longitudinal dataset by collecting additional measures of child and family functioning during this uniquely stressful period.

While much research has focused on the impact of the pandemic on the family unit, we were curious to explore how mothers perceived the impacts of COVID-19 on their children, who were now aged four to six and transitioning into a structured school setting.

Our data demonstrated moderate variability within pandemic-related domains of mental health, social interactions, and life changes. While most children were reported to not be worried about their mental health due to the pandemic, one-third of the sample did endorse some worry; additionally, around half of the children in our sample were reported to be worried about the potential of becoming infected with the virus. Socially, around two-thirds of the children in our sample had significantly fewer social interactions, which many children found stressful. Some children experienced declines in the quality of their friendships, but most of our sample reported no changes in the quality of friendships or family relationships.

Somewhat surprisingly, our sample did not evidence a particularly strong negative impact of the pandemic. While maternal pregnancy and postpartum stress were both significantly correlated with mothers' reports of children's pandemic-related life changes, subsequent

statistical analyses did not produce compelling results. Further, maternal stress variables were not related to children's pandemic-related worries, but subsequent analyses showed that the pregnancy stress index significantly predicted mothers' reports of children's pandemic-related worries; therefore, this finding should be interpreted with caution.

There are several possible explanations for our findings. First, a large corpus of research suggests that many families experienced positive benefits due to the pandemic-related social distancing and stay-at-home orders. Many families are described as exhibiting resiliency in the face of a significantly disruptive macro-stressor (Bülow et al., 2021; Eales et al., 2021; Jones et al., 2022; Moeck et al., 2023; Pariente et al., 2020). Some individuals have described the pandemic as a "welcome time out from regular life" (Günther-Bel et al., 2020) or report "life slowing down" (Taylor et al., 2022). Indeed, while there was variability in responses, some mothers in our sample did report minor improvements in children's social functioning which mirrors the findings of other researchers who also used the CRISIS instrument (Tombeau Cost et al., 2022).

Further, researchers have noted that negative consequences are often higher at the onset of the pandemic or pandemic-related shutdowns (Ebrahimi et al., 2022). Sun et al. (2022) report higher levels of children's behavior problems in the early days following shutdown orders. With time, levels of distress diminish over the days, months, and years of the pandemic (Park et al., 2021). An important limitation of our study is the range in completion dates of our COVID-19 instrument. More specifically, mothers enrolled in our virtual follow-up at a staggered pace, with some enrolling (and thus completing surveys) earlier than others. The actual range of survey completion spans seven months beginning in September 2021, making it largely impossible to directly compare families' experiences within our sample. Further, this timeframe is quite

removed from the initial pandemic-related shutdowns of March 2020. As such, many of our families had already resumed pre-pandemic routines (e.g., in-person schooling, regular socialization) to some extent, which may have washed out any effects of pandemic disruption. Thus, the pandemic-related analyses need to be interpreted with the understanding that we likely failed to capture true levels of pandemic disruption.

Additionally, maternal bias could be important. Mothers reported on their children's pandemic-related experiences, but it is unclear whether they consulted with their children while completing the survey. Similarly, we are unaware of how frequently or to what extent pandemic-related discussions occurred within the families. Dalton et al. (2020) found that the act of parents openly sharing their emotions with children in a developmentally appropriate, responsive manner during the pandemic led to improved emotional outcomes for children. This may suggest that the high levels of maternal sensitivity in our sample served to buffer against the negative impacts of the pandemic on children. However, maternal sensitivity was not associated with either of the pandemic-related variables in this study. Further, the nature of this study led us to accept the potential for maternal reporting bias given our interest in maternal perceptions of their children. In addition, the young age range of the children in our sample precluded us from using self-report measures. As such, we utilized the appropriate instrument (caregiver reporter form of the CRISIS; Nikolaidis et al., 2020). Future work may aim to continue following up with families, including gathering self-reports from children themselves, to further assess pandemic-related disruptions.

Lastly, families characterized as higher risk (e.g., due to financial insecurity, single-parent households) may indicate more negative impacts related to the pandemic (e.g., Behrens et al., 2021; Russell et al., 2020). While a portion of the mothers in our sample reported financial

concerns during the pandemic, most of our sample did not. Indeed, researchers have demonstrated the protective buffer of financial security on pandemic-related concerns (Peltz et al., 2021). Further, most of our sample comes from two-parent households. The presence of a supportive co-parent is an additional protective buffer from pandemic distress (Giannotti et al., 2022; McRae et al., 2021). However, our pandemic-related variables were not related to any of the demographic variables. While not a focus of this study, our maternal depression/anxiety variables were significantly correlated with children's pandemic-related life changes. Thus, our results may have been more compelling with a more at-risk population. Future work should elucidate the relationships between maternal factors, including mental health and stress, and children's pandemic-related functioning in a more generalizable sample (e.g., Bowleg, 2020).

Clinical Implications

Research has largely agreed upon the importance of developing interventions aimed at improving mother-child functioning and socioemotional outcomes; however, there remains a lack of clarity on specific factors related to said interventions, including but not limited to, the identification of those who would benefit from interventions, the timing of interventions, or the specific targets of interventions (e.g., maternal symptoms or behaviors, mother-child interactions).

Thus, this study was born from the belief that clinical interventions could focus on maternal sensitivity, an identifiable and modifiable parenting behavior, to improve mother-child functioning and promote improved child socioemotional outcomes for those dyads deemed at risk (i.e., due to maternal mental health or stress). However, our study failed to demonstrate a moderating role of sensitive maternal behaviors on the associations between maternal mental health and child outcomes. Importantly, this does not suggest that intervention efforts should

discontinue targeting and improving parental sensitivity. Rather, it may indicate that maternal sensitivity is not the most important behavior to target *in our particular sample*. Indeed, our sample is largely homogenous: most mothers in our sample were White, highly educated, and financially stable; further, mothers consistently scored highly on our particular measure of sensitivity. Research suggests that mothers experiencing higher levels of demographic risk (e.g., younger age, being a member of a historically marginalized group, limited social support, financial insecurity) may index more insensitive behaviors, and thus be more appropriate for interventions targeting sensitivity specifically. For example, using a large, nationally representative sample of mother-child dyads, Gibson-Davis & Gassman-Pines (2010) found that Hispanic mothers living in cohabiting, divorced, or single parent households used more negative and intrusive behaviors when interacting with their children. Similarly, Dotterer et al. (2012) note that the meaning and effects of parenting behaviors (including negative or intrusive behaviors) may vary by racial groups. Our nearly all-White sample restricts us from generalizing our findings to non-White mothers and highlights the importance of exploring a diverse range of parenting behaviors. Thus, future work should aim to identify more appropriate avenues for intervention work within samples characterized by relatively lower risk such as ours.

Additional Limitations

Limitations of Maternal Variables

First, several limitations exist when considering our conceptualization of pregnancy and postpartum maternal depression/anxiety variables. Methodologically, we only assessed for depressive and anxious symptomatology at two timepoints during pregnancy (24 and 34 weeks). The instruments asked mothers to report on their experiences over the prior two weeks; therefore, we are getting only a brief snapshot of depressive/anxious symptomatology during

pregnancy. Our postpartum variable, on the other hand, averaged mothers' scores across three postpartum timepoints (i.e., 1 month, 6 months, and 12 months), producing a more stable and reliable estimate of maternal symptoms over the first postpartum year, similar to existing research (e.g., Pearson et al., 2016; Wang & Dix, 2013). For both timepoints, we opted to utilize a continuous measurement of symptoms to capture the full range of variation, including mothers who scored below the threshold of clinically significant symptoms (as recommended by Ferrari et al., 2021 and similar to procedures used by Davis et al., 2007; Koutra et al., 2013). Nevertheless, future work should collect more frequent symptom measures from participants during the perinatal period to produce a richer understanding of maternal mental health.

Similarly, we constructed our lifetime maternal depression/anxiety variable using data collected from the semi-structured SCID-I/NP interview. Roughly half of our sample met diagnostic criteria for a depression or anxiety disorder within their lifetimes, and the historical presence of depression/anxiety was significantly related to mothers' experiences of pre- and postnatal mental health concerns. However, we failed to find any significant effects of such historical diagnoses when predicting children's socioemotional and behavioral outcomes. Additionally, while the SCID-I/NP is effective at eliciting the recollection of symptomatology, our study failed to collect an adequate assessment of the timing of reported symptomatology. More specifically, our study administered the SCID-I/NP around 12 months postpartum. Thus, mothers are reporting retrospectively, beginning at the 12-month postpartum time point. Therefore, we are unable to determine exactly *when* any reported symptomatology occurred – e.g., one year prior, five years prior, ten years prior, et cetera. Mothers endorsing depressive and anxious symptomatology on the SCID-I/NP may be reporting on symptoms that occurred within pregnancy or the postpartum year. To eliminate the possibility of conflation with our existing

perinatal datasets, all analyses essentially controlled for the existence of the other time points. Regardless, the consideration of preconception mental health (including the specific chronology of symptom episodes) in future studies is likely to improve our understanding of women at risk for the development or persistence of mental health concerns.

Still-Face Paradigm and Maternal Sensitivity Limitations

Our maternal sensitivity variable failed to demonstrate any moderating effects within analyses. There are several methodological limitations. First, the variability of our maternal sensitivity data overall was restricted. Mothers in our sample demonstrated high rates of sensitivity with very few instances of insensitive behaviors. We created our sensitivity composite variable in three-second increments; most instances of insensitive behaviors occurred on such a brief timescale (e.g., one second) that they were washed out by the three-second micro-assessments.

The basis of our sensitivity coding scheme is built upon Ainsworth's original definition of maternal sensitivity; however, when comparing our coding scheme with Ainsworth's coding scheme, several important discrepancies are present. First, Ainsworth's coding scheme utilizes a single global sensitivity scale score (Ainsworth et al., 1974). We did not capture a global rating of maternal sensitivity but rather evaluated specific maternal behaviors that contributed to sensitivity overall, similar to many other sensitivity scales in use (Mesman & Emmen, 2013). We chose to conceptualize sensitivity in this way because sensitivity is a complex construct. Importantly, insensitivity was not absent from our sample, but it was rare. If we had used a global rating, we may have noticed more subtle, time-limited insensitive behaviors that were lost to averaged sensitivity scores.

We had planned to include both 6- and 24-month maternal sensitivity ratings in analyses. However, even with the slight procedural and coding changes done to maintain similarity between the two assessments, the 6- and 24-month sensitivity scores were not correlated with one another (Figure 5). Average maternal sensitivity ratings at child age two were so limited in variability, that the average sensitivity score was essentially at the ceiling of the coding scale. Thus, we decided not to use our 24-month maternal sensitivity data due to the extreme lack of variability in scores. One possible explanation for mothers' high sensitivity scores is that mother-child interactions become more sensitive with time, as mothers gain repeated experience interacting with their children, learning how to identify their children's needs, and engaging in behaviors that have shown efficacy in regulating children's distress in the past. Thus, sensitivity ratings in our sample may be reflective of this potential "experience effect," and highlight the improvements in dynamic maternal-child interactions over time.

It is important to also consider the context within which children's regulatory behaviors and maternal sensitivity behaviors were observed. Specifically, an important limitation of laboratory-based assessments is that the laboratory is not a naturalistic setting (Branger et al., 2019). Mother and child behaviors observed during laboratory assessments are inherently contrived due to the structured nature of the assessment. It is difficult to observe maternal behaviors unobtrusively because a mother may alter her behavior during this procedure due to her awareness that she, and her interactive behaviors more specifically, are being observed (Pederson et al., 2014).

Laboratory Assessment Limitations

An advantage of using maternal-reports of children's behavior is the large "database" of experiences that a mother can pull from; of course, caregivers are around their children most

frequently and will be able to report on what their child is "typically" like (Rothbart & Goldsmith, 1985). Ideally, we would be able to have both mothers and children report on children's socioemotional and behavioral experiences (Ringoot et al., 2015); however, we were limited by the young ages of the children in our study. Thus, we supplemented our maternal-reports with laboratory-observed assessments of children. Laboratory assessments allow for the standardized provision of specifically chosen behavioral tasks and greater precision of coding. However, laboratory observations are not without limitations. Our laboratory visit was only a few hours in length, and while we utilized tasks that mimic everyday experiences in an attempt to produce "typical" emotional responses, we may still have encountered difficulty in eliciting distress in such a limited amount of time (Bernard et al., 2013). Additionally, we must remain aware that the child is encountering these tasks in an unusual setting. Indeed, we may not get the most accurate emotional response due to contextual factors (e.g., unfamiliar surroundings, social inhibition due to an unfamiliar experimenter). Further, observers are trained to complete the post-visit ratings of children's behaviors objectively, but there always remains the possibility for individual biases to influence their ratings. Thus, future data collection would benefit from the inclusion of home-based observations and double rating systems.

Limited Generalizability

While a strength of our study is the multi-method longitudinal design, an important limitation is the restricted generalizability. Our sample is low-risk, community-based, and relatively small. However, we deliberately recruited our sample in such a way as to minimize the potential for confounding factors known to impact mother and child outcomes (e.g., prematurity and other birth complications, severe maternal mental illness). Though diversity in sampling is key for understanding several of the important factors assessed within this study (e.g., maternal

mental health, children's socioemotional outcomes, maternal sensitivity, and maternal perceptions), a benefit of the restricted racial makeup of our sample is the ability to draw clearer conclusions within a specific population (i.e., nearly all White women). Regardless, future work should attempt to replicate our analyses with non-White samples and expand upon results in a more generalizable, non-homogenous sample.

Conclusion

Collectively, these analyses explore how the timing of maternal mental health and stress factors impact both maternal- and observer-reports of children's socioemotional and regulatory competencies. Since maternal mental health and stress variables are often conflated in the literature, this work attempts to parse apart the individual relationships with children's outcomes. Further, this dissertation explores similarities and differences between maternal- and observer-reported child behaviors, given the historical debate on how maternal mental health may bias reporting. Results suggest that perinatal maternal mental health and stress are associated with maternal-reported child problem and competence behaviors, but parallel analyses using observer-reported child behaviors did not replicate these findings. Further, results failed to predict children's regulatory behaviors or responses to the global COVID-19 pandemic, and we failed to show a significant moderating role of maternal sensitivity in all analyses. Interestingly, mothers' preconception mental health did not exert any predictive influence over children's socioemotional or regulatory outcomes, highlighting the relative importance of the perinatal period. We are unable to directly compare maternal- and observer-reports due to procedural differences, though our results lend support to the use of maternal-report due to the wealth of information that may be collected. Our findings may be impacted due to procedural constraints, children's young age, and the overall limited generalizability of our sample. Nevertheless, future

work should continue to explore the links between maternal adversity and children's socioemotional outcomes.

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Tables

Table 1

Pregnancy Stress Components: Raw Score Descriptives

	34 Weeks Marital Conflict	34 Weeks Family Express Negativity	34 Weeks Financial Stress	34 Weeks Role Overload
N Valid	145	145	145	146
N Miss	4	4	4	3
Mean	.255	36.710	1.759	2.729
S.D.	.437	10.030	.581	.578
Skewness	1.976	.493	.814	.183
Kurtosis	4.084	.577	.189	-.223
Min-Max	0 - 2.33	14 - 69	1 - 3.75	1.40 - 4.40

Table 2

Postpartum Familial Anger Expression Raw Score Descriptives

	1m Marital Conflict	1m Anger Expression	1m Family Express Negativity	6m Marital Conflict	6m Anger Expression	6m Family Express Negativity	12m Marital Conflict	12m Anger Expression	12m Family Express Negativity
N Valid	147	149	148	141	142	141	144	144	146
N Miss	2	0	1	8	7	8	5	5	3
Mean	.236	69.631	37.420	.248	69.556	37.690	.322	69.701	38.090
S.D.	.428	5.182	10.026	.417	5.344	9.672	.488	4.974	8.864
Skewness	2.102	.319	.559	1.987	-.022	.199	1.902	-.127	-.032
Kurtosis	4.741	.117	.564	3.836	-.397	-.354	4.143	.153	-.255
Min-Max	0 - 2.33	59 - 88	11 - 71	0 - 2.00	57 - 84	17 - 61	0 - 2.67	54 - 81	15 - 62

Table 2 ***continued***

	Average Postpartum Marital Conflict	Average Postpartum Anger Expression	Average Postpartum Family Express Negativity
N Valid	148	149	149
N Miss	1	0	0
Mean	.276	69.565	37.929
S.D.	.395	4.441	8.787
Skewness	1.900	.146	.330
Kurtosis	3.482	-.689	.140
Min-Max	0 - 1.83	60.33 - 79.67	15.83 - 64.50

Table 3

Postpartum Role Overload Raw Score Descriptives

	1m Role Restriction	1m Role Overload	6m Role Restriction	6m Role Overload	12m Role Restriction	12m Role Overload	Average Postpartum Role Restriction	Average Postpartum Role Overload
N Valid	147	149	142	142	144	146	149	149
N Miss	2	0	7	7	5	3	0	0
Mean	20.150	2.966	20.120	3.247	19.000	3.190	19.811	3.134
S.D.	4.585	.591	5.181	.655	4.956	.609	4.254	.534
Skewness	.147	.123	.259	-.023	.029	-.125	.139	-.001
Kurtosis	-.494	.167	-.285	-.226	-.565	-.203	-.183	-.107
Min-Max	10 - 32	1.6 - 4.8	9 - 33	1.6 - 5	8 - 30	1.6 - 4.6	10 - 30.67	1.87 - 4.53

Table 4

Postpartum Financial Stress Raw Score Descriptives

	1m Financial Stress	6m Financial Stress	12m Financial Stress	Average Postpartum Financial Stress
N Valid	149	142	146	149
N Miss	0	7	3	0
Mean	1.821	1.856	1.863	1.844
S.D.	.675	.643	.672	.618
Skewness	.814	.505	.565	.563
Kurtosis	-.173	-.463	-.773	-.589
Min-Max	1 - 3.5	1 - 3.5	1 - 3.5	1 - 3.5

Table 5

Postpartum Parenting Stress Raw Score Descriptives

	1m Competence	1m Child Reinforces Parent	6m Competence	6m Child Reinforces Parent	12m Competence	12m Child Reinforces Parent	Average Postpartum Competence	Average Postpartum Child Reinforces Parent
N Valid	148	148	142	142	144	144	149	149
N Miss	1	1	7	7	5	5	0	0
Mean	21.514	9.757	20.620	7.880	20.396	8.340	20.812	8.673
S.D.	5.974	3.259	5.801	2.168	5.528	2.363	5.303	2.175
Skewness	.859	1.076	.921	.999	.541	1.033	.877	.754
Kurtosis	1.323	1.478	1.292	.037	.213	1.138	1.029	-.014
Min-Max	11 - 43	6 - 22	11 - 42	6 - 15	11 - 38	6 - 18	11.67 - 40	6 - 15

Table 6

Stress Indices Descriptives

	Pregnancy Stress Index	Postpartum Stress Index
N Valid	146	149
N Miss	3	0
Mean	.001	.003
S.D.	.723	.545
Skewness	.990	.319
Kurtosis	1.523	.085
Min-Max	-1.31 - 2.99	-1.35 - 1.62

Table 7

Correlations Between Stress Composites and Index Scores

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Pregnancy Financial Stress	1								
2. Postpartum Financial Stress	.848**	1							
3. Pregnancy Role Overload	.302**	.271**	1						
4. Postpartum Role Overload	.324**	.297**	.511**	1					
5. Pregnancy Familial Anger Expression	.436**	.338**	.362**	.282**	1				
6. Postpartum Familial Anger Expression	.394**	.357**	.344**	.374**	.732**	1			
7. Postpartum Parenting Stress	.155	.229**	.135	.445**	.040	.193*	1		
8. Pregnancy Stress Index	.772**	.648**	.743**	.496**	.764**	.630**	.150	1	
9. Postpartum Stress Index	.641**	.717**	.439**	.755**	.463**	.638**	.672**	.681**	1

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

Table 8

Descriptive Statistics of BITSEA Competence Behaviors Scale Items

	M	SD	Min.	Max.	Skew.	Std. Error of Skew.	Kurtosis	Std. Error of Kurtosis
Shows pleasure when s/he succeeds	1.86	.344	1	2	-2.156	.223	2.695	.442
Follows rules	1.27	.501	0	2	.401	.223	-.480	.442
Looks for you (or other parent) when upset	1.94	.237	1	2	-3.779	.223	12.494	.442
Looks right at you when you say his/her name	1.78	.416	1	2	-1.367	.223	-.134	.442
Is affectionate with loved ones	1.97	.158	1	2	-6.108	.223	35.914	.442
Plays well with other children	1.78	.436	0	2	-1.677	.223	1.669	.442
Can pay attention for a long time	1.20	.607	0	2	-.128	.223	-.443	.442
Tries to help when someone is hurt	1.47	.580	0	2	-.566	.223	-.628	.442
Imitates playful sounds when you ask him/her to	1.82	.385	1	2	-1.692	.224	.878	.444
Points to show you something far away	1.57	.592	0	2	-1.023	.223	.067	.442
Hugs or feeds dolls or stuffed animals	1.71	.541	0	2	-1.739	.223	2.155	.442

Table 9

Factor Loadings from Principal Axis Factor Analysis with Varimax Rotation for a Four-Factor Solution for BITSEA Competence Behavior Scales (N=118)

Item	Factor Loading				Communality
	1	2	3	4	
Looks for you (or other parent) when upset	.595		-.230		.413
Looks right at you when you say his/her name	.569		.209		.392
Shows pleasure when s/he succeeds	.378				.174
Is affectionate with loved ones	.316				.103
Hugs or feeds dolls or stuffed animals		.897			.827
Tries to help when someone is hurt	.296	.326	.249	.296	.344
Plays well with other children (not including brother/sister)	.228	.269		.211	.175
Points to show you something far away	.236		.581		.408
Can pay attention for a long time (not including TV)			.443	.258	.263
Imitates playful sounds when you ask him/her to			.408		.193
Follows rules				.594	.370
Eigenvalues	2.353	1.450	1.198	1.039	
% of variance	21.387	13.180	10.890	9.443	

Note. Loadings < .20 are omitted.

Table 10

Descriptive Statistics of BITSEA Competence Behaviors Scale Factors (N=117)

	No. of items	M (SD)	Skewness	Kurtosis	Cronbach's Alpha
Social Relatedness/Mastery Motivation	4	0 (.781)	-2.296	5.810	.492
Compassion Towards Others	3	0 (.906)	-1.655	1.867	.5
Pointing/Attention Behaviors	3	0 (.740)	-.877	1.330	.442
Rule Following Behavior	1	0 (.671)	.121	-.542	N/A

Table 11

Descriptive Statistics of BITSEA Problem Behaviors Scale Items

	M	SD	Min.	Max.	Skew.	Std. Error of Skew.	Kurtosis	Std. Error of Kurtosis
Gets hurt so often that you can't take your eyes off him/her	.17	.399	0	2	2.188	.223	3.988	.442
Seems nervous, tense, or fearful	.16	.369	0	1	1.868	.223	1.516	.442
Is restless and can't sit still	.86	.612	0	2	.081	.223	-.368	.442
Wakes up at night and needs help to fall asleep again	.50	.725	0	2	1.095	.223	-.233	.442
Cries or tantrums until s/he is exhausted	.25	.472	0	2	1.673	.224	1.906	.444
Is afraid of certain animals, places, or things	.31	.481	0	2	1.091	.223	-.227	.442
Cries or hangs onto you when you try to leave	.75	.612	0	2	.193	.223	-.539	.442
Worries a lot or is very serious	.13	.335	0	1	2.268	.223	3.197	.442
Does not react when hurt	.26	.442	0	1	1.092	.223	-.821	.442
Won't touch some objects because of how they feel	.15	.384	0	2	2.408	.223	5.177	.442
Has trouble falling asleep or staying asleep	.42	.618	0	2	1.214	.223	.418	.442
Runs away in public places	.42	.619	0	2	1.176	.223	.330	.442
Has trouble adjusting to changes	.40	.525	0	2	.778	.223	-.639	.442
Often gets very upset	.32	.487	0	2	.996	.223	-.457	.442
Gags or chokes on food	.15	.384	0	2	2.408	.223	5.177	.442
Refuses to eat	.40	.541	0	2	.909	.223	-.251	.442
Hits, shoves, kicks, or bites children	.26	.442	0	1	1.092	.223	-.821	.442

Table 11 ***continued***

	M	SD	Min.	Max.	Skew.	Std. Error of Skew.	Kurtosis	Std. Error of Kurtosis
Is destructive; breaks or ruins things on purpose	.16	.369	0	1	1.868	.223	1.516	.442
Hits, bites, or kicks you	.30	.459	0	1	.902	.223	-1.207	.442
When upset, gets very still, freezes, or doesn't move	.11	.314	0	1	2.522	.223	4.437	.442
Puts things in special order, over and over	.18	.465	0	2	2.673	.223	6.594	.442
Repeats the same action or phrase, over and over	.22	.455	0	2	1.904	.223	2.862	.442
Eats or drinks things that are not edible, like paper or paint	.14	.451	0	2	3.406	.223	10.757	.442

Table 12

Factor Loadings from Principal Axis Factor Analysis with Varimax Rotation for a Five-Factor Solution for BITSEA Problem Behaviors Scale (N=118)

Item	Factor Loading					Communality
	1	2	3	4	5	
Is destructive. Breaks or ruins things on purpose	.811					.716
Runs away in public places	.502		.231		-.379	.470
Eats or drinks things that are not edible, like paper or paint	.409					.186
Hits, bites, or kicks you (or other parent)	.402				.218	.258
Is restless and can't sit still	.365					.190
Hits, shoves, kicks, or bites children (not including brother/sister)	.262					.144
Gets hurt so often that you can't take your eyes off him/her	.232	.232	.201			.182
Gags or chokes on food	.215					.058
Has trouble falling asleep or staying asleep		.878				.803
Wakes up at night and needs help to fall asleep again		.769				.604
Cries or tantrums until s/he is exhausted			.649			.454
Often gets very upset			.621			.400
Refuses to eat			.358			.192
Has trouble adjusting to changes			.309	.228		.803
Puts things in special order, over and over				.792	-.258	.722
Won't touch some objects because of how they feel				.470	.288	.315
Repeats the same action or phrase, over and over				.441		.206
Does not react when hurt			.200	-.224		.110
Is afraid of certain animals, places, or things					.488	.260
Cries or hangs onto you when you try to leave					.368	.164

Table 12 ***continued***

Item	Factor Loading					Communality
	1	2	3	4	5	
Seems nervous, tense, or fearful					.363	.170
When upset, gets very still, freezes, or doesn't move					.320	.122
Worries a lot or is very serious					.282	.081
Eigenvalues	2.734	2.122	1.868	1.657	1.567	
% of variance	11.886	9.228	8.121	7.204	6.813	

Note. Loadings < .20 are omitted.

Table 13

Descriptive Statistics for BITSEA Problem Behaviors Scale Factors (N=117)

	No. of items	M (SD)	Skewness	Kurtosis	Cronbach's Alpha
Destructive and/or Oppositional Behaviors	8	.01 (.886)	1.627	1.522	.582
Sleep Problems	2	.00 (.921)	1.300	.889	.815
Emotional Dysregulation	4	.00 (.815)	1.155	1.524	.541
Repetitive and/or Sensory Sensitivity Behaviors	4	-.02 (.844)	2.351	6.675	.504
Fear and Anxiety	5	.01 (.797)	.278	.267	.375

Table 14

Descriptive Statistics of Observer Impressions of Child Scale Items

	M	SD	Min.	Max.	Skew.	Std. Error of Skew.	Kurtosis	Std. Error of Kurtosis
Positive affect	3.70	1.002	1	5	-.367	.226	-.672	.447
Negative affect	2.32	1.081	1	5	.387	.226	-.946	.447
Energy	3.63	.865	2	5	-.124	.226	-.613	.449
Adaptation to change in test materials	3.92	1.019	1	5	-.652	.226	-.449	.447
Interest in test materials and stimuli	3.93	.943	2	5	-.370	.226	-.916	.447
Initiative with test materials and stimuli	3.89	.876	2	5	-.254	.226	-.797	.447
Exploration of objects	3.81	1.008	1	5	-.443	.226	-.431	.447
Attention to tasks	3.86	.936	1	5	-.502	.226	-.271	.447
Persistence in attempting to complete tasks	3.68	.915	1	5	-.244	.226	-.393	.449
Enthusiasm toward tasks	3.77	.974	2	5	-.284	.226	-.922	.447
Fear (not shyness)	2.17	.787	1	4	.672	.226	.390	.447
Frustration with inability to complete tasks	1.83	.794	1	4	.520	.226	-.605	.447
Social engagement with experimenter or other visitors	3.34	1.184	1	5	-.269	.226	-.835	.447
Social engagement with primary caregiver	3.67	1.006	1	5	-.503	.226	-.167	.447
Cooperation with experimenter	4.13	.951	1	5	-1.014	.226	.466	.447
Cooperation with primary caregiver	4.14	.897	1	5	-1.095	.226	1.037	.447
Frenetic movement	1.52	.776	1	4	1.186	.226	.117	.447
Hyperactivity	1.51	.705	1	4	1.326	.226	1.490	.447
Shyness	2.72	1.039	1	5	-.086	.226	-1.065	.447

Table 14 ***continued***

	M	SD	Min.	Max.	Skew.	Std. Error of Skew.	Kurtosis	Std. Error of Kurtosis
Prone to anger/irritability	1.67	.886	1	4	1.244	.226	.734	.447
Prone to sadness	1.90	.878	1	4	.979	.226	.533	.447
Contentment	3.65	.908	2	5	-.107	.226	-.780	.447
Exuberance	3.43	.879	1	5	-.244	.226	-.406	.447
Anticipatory positive affect	3.31	.902	2	5	-.080	.226	-.947	.447
Impulsivity	2.01	.884	1	5	.915	.226	1.145	.447
Compliance with experimenter	4.21	.843	2	5	-.950	.226	.397	.447
Compliance with primary caregiver	4.17	.760	2	5	-1.020	.226	1.443	.447
Avoiding, averting / Resistance with primary caregiver	4.17	.772	2	5	-.644	.226	-.009	.447

Table 15

Factor Loadings from Principal Axis Factor Analysis with Varimax Rotation for a Three-Factor Solution for T7 Observer Impressions of Child Scale (N=118)

Item	Factor Loading			Communality
	1	2	3	
Enthusiasm toward tasks	.876			.802
Positive affect	.870			.773
Interest in test materials and stimuli	.860			.794
Social engagement with experimenter or other visitors	.852			.732
Exuberance	.850			.755
Initiative with test materials and stimuli	.847			.770
Exploration of objects	.842			.760
Anticipatory positive affect	.800			.715
Social engagement with primary caregiver	.799			.714
Shyness	-.744		.400	.715
Energy	.734	-.346		.681
Persistence in attempting to complete tasks	.671	.493		.713
Contentment	.655	.421		.641
Cooperation with experimenter		.875		.794
Compliance with primary caregiver		.869		.761
Compliance with experimenter		.869		.824
Cooperation with primary caregiver		.859		.781
Impulsivity		-.769		.624
Adaptation to change in test materials		.747		.584
Attention to tasks	.426	.696		.670
Hyperactivity		-.695		.576
Prone to anger/irritability		-.604	.467	.587
Avoiding, averting/resistance with primary caregiver	.388	.551		.499
Negative affect		-.531	.457	.548
Frustration with inability to complete tasks		-.467	.424	.404
Prone to sadness			.644	.557
Frenetic movement		-.523	.580	.620
Fear (not shyness)			.469	.310
Eigenvalues	11.354	6.690	1.687	
% of variance	40.550	23.892	6.025	

Note. Loadings < .30 are omitted.

Table 16

Descriptive Statistics for T7 Observer Impressions of Child Scale Factors (N=113)

	No. of items	M (SD)	Skewness	Kurtosis	Cronbach's Alpha
Positive Affect/Interest	13	.00 (.991)	-.399	-.946	.962
Compliance Behaviors	12	.01 (.980)	-1.172	1.385	.934
Negative Affect	3	-.02 (.862)	.835	.071	.625

Table 17

Correlations Between Research Question 1 Variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Child Sex	1										
2. Family SES	-.003	1									
3. Maternal Sensitivity	-.033	-.032	1								
4. Pregnancy Depression/Anxiety	-.178*	-.231**	-.009	1							
5. Postpartum Depression/Anxiety	-.124	-.186*	-.031	.738**	1						
6. Lifetime Depression/Anxiety	-.026	-.092	.101	.215**	.367**	1					
7. BITSEA PF 1: Destructive and/or Oppositional Behaviors	-.087	-.056	-.239*	.220*	.213*	.103	1				
8. BITSEA PF 2: Sleep Problems	-.030	.112	.007	.108	.161	.038	.015	1			
9. BITSEA PF 3: Emotional Dysregulation	-.087	-.273**	-.014	.198*	.222*	.019	.027	.071	1		
10. BITSEA PF 4: Repetitive/Sensory Sensitivity Behaviors	.050	-.007	-.074	-.005	-.007	-.177	.029	.007	-.009	1	
11. BITSEA PF 5: Fear and/or Anxiety Behaviors	.154	.070	.070	-.007	.069	.092	-.027	-.018	.015	-.003	1
12. BITSEA CF 1: Social Relatedness/Mastery Motivation	.076	.022	.236*	-.085	-.187*	-.032	-.282**	-.058	-.015	.115	.075
13. BITSEA CF 2: Compassion towards Others	.254**	.117	-.052	-.102	-.124	-.058	.004	-.137	.040	-.053	.265**
14. BITSEA CF 3: Pointing/Attention Behaviors	-.223*	.105	.049	-.055	-.091	.013	-.123	.072	-.082	-.029	-.019
15. BITSEA CF 4: Rule Following	-.069	-.126	-.005	-.189*	-.249**	-.059	-.209*	-.124	-.233*	.047	.089
16. Lab-Observed Factor 1: Positive Affect/Interest	-.086	.234*	.131	-.022	-.064	-.136	-.032	.022	-.055	-.133	.013
17. Lab-Observed Factor 2: Compliance Behaviors	.177	.031	.090	-.118	-.117	-.138	-.205*	.009	-.170	.197*	.229*
18. Lab-Observed Factor 3: Negative Affect	-.027	.051	-.172	-.064	-.106	.009	-.107	-.079	.040	.081	.038
19. Self-Directed Regulation	-.140	-.036	-.078	.062	.131	.003	.142	-.055	-.058	-.004	.112
20. Mother-Directed Regulation	.204*	.135	.093	-.105	-.062	.002	.114	-.055	-.183	.086	.028
21. Toy-Directed Regulation	-.116	-.004	.030	-.108	-.115	-.075	-.030	-.006	.080	.107	.039
22. Environment-Directed Regulation	-.051	-.033	-.122	.204*	.211*	.044	.070	-.060	-.064	-.087	-.054

Note. Child sex is coded such that 0 = male, 1 = female. PF = Problem Factor. CF = Competence Factor. *$p < .05$. **$p < .01$.

Table 17 ***continued***

	12.	13	14.	15.	16.	17.	18.	19.	20.	21.	22.
12. BITSEA CF 1: Social Relatedness/Mastery Motivation	1										
13. BITSEA CF 2: Compassion towards Others	.058	1									
14. BITSEA CF 3: Pointing/Attention Behaviors	.065	.096	1								
15. BITSEA CF 4: Rule Following	.192*	-.091	.137	1							
16. Lab-Observed Factor 1: Positive Affect/Interest	.085	.092	.172	-.151	1						
17. Lab-Observed Factor 2: Compliance Behaviors	.029	.291**	.105	.182	.002	1					
18. Lab-Observed Factor 3: Negative Affect	.106	-.031	-.027	.090	-.023	-.050	1				
19. Self-Directed Regulation	.004	.101	.129	-.025	-.040	.000	-.102	1			
20. Mother-Directed Regulation	.132	.099	-.096	-.020	.022	.106	.153	-.173	1		
21. Toy-Directed Regulation	-.077	.004	.036	.016	.011	-.016	.038	-.020	-.483**	1	
22. Environment-Directed Regulation	-.122	-.048	-.086	-.081	-.060	-.050	-.095	.229*	.217*	-.688**	1

Note. Child sex is coded such that 0 = male, 1 = female. PF = Problem Factor. CF = Competence Factor. *$p < .05$. **$p < .01$.

Table 18

Summary of Preliminary Regression Analyses Predicting BITSEA Problem and Competence Scales from Maternal Depression/Anxiety Variables

	Unstandardized Estimate	Standard Error	t-value	*p*	Standardized Estimate
BITSEA Problem Scale					
Child Sex	.608	.711	.855	.394	.079
Family SES	-.350	.498	-.702	.484	-.065
Lifetime Depression/Anxiety	-.459	.762	-.603	.548	-.060
Pregnancy Depression/Anxiety	-.121	.600	-.202	.840	-.027
Postpartum Depression/Anxiety	1.914	.695	2.756	.007	.386
BITSEA Competence Scale					
Child Sex	-.429	.426	-1.006	.316	-.095
Family SES	.118	.298	.395	.694	.037
Lifetime Depression/Anxiety	.502	.456	1.100	.274	.111
Pregnancy Depression/Anxiety	.150	.359	.419	.676	.057
Postpartum Depression/Anxiety	-1.101	.416	-2.648	.009	-.377

Note. Child sex is coded such that 0 = male, 1 = female.

Table 19, Part I

Summary of Hierarchical Regression Analysis Predicting BITSEA Problem Factor 1: Destructive and/or Oppositional Behaviors

Variable	Unstandardized Estimate	*t*-value	*R*	R^2	*Adj* R^2	ΔR^2
Step 1			.098	.010	-.008	.010
Child Sex	-.137	-.827				
Family SES	-.068	-.584				
Step 2			.131	.017	-.009	.008
Child Sex	-.137	-.825				
Family SES	-.045	-.382				
Lifetime Depression/Anxiety	.157	.928				
Step 3			.229	.052	.018	.035
Child Sex	-.057	-.337				
Family SES	.009	.071				
Lifetime Depression/Anxiety	.103	.608				
Pregnancy Depression/Anxiety	.211	2.034*				
Step 4			.234	.055	.012	.002
Child Sex	-.046	-.270				
Family SES	.005	.044				
Lifetime Depression/Anxiety	.066	.363				
Pregnancy Depression/Anxiety	.158	1.095				
Postpartum Depression/Anxiety	.089	.535				

Note. $N = 116$.

*$p < .05$.

Table 19, Part II

Model Fit Statistics for Hierarchical Regression Analysis Predicting BITSEA Problem Factor 1: Destructive and/or Oppositional Behaviors

Variable	*Cumulative*		*Simultaneous*	
	ΔR^2	ΔF	β	*p*
Step 1	.010	$F(2,113)=.544$		
Child Sex			-.026	.788
Family SES			.004	.965
Step 2	.008	$F(1,112)=.861$		
Lifetime Depression/Anxiety			.038	.717
Step 3	.035	$F(1,111)=4.136$*		
Pregnancy Depression/Anxiety			.151	.276
Step 4	.002	$F(1,110)=.287$		
Postpartum Depression/Anxiety			.078	.593

Note. $N = 116$; β are standardized coefficients.

*$p < .05$.

Table 20, Part I

Summary of Hierarchical Regression Analysis Predicting BITSEA Problem Factor 2 – Sleep Problems

Variable	Unstandardized Estimate	*t*-value	*R*	R^2	*Adj* R^2	ΔR^2
Step 1			.115	.013	-.004	.013
Child Sex	-.061	-.352				
Family SES	.144	1.197				
Step 2			.128	.017	-.010	.003
Child Sex	-.061	-.350				
Family SES	.159	1.293				
Lifetime Depression/Anxiety	.108	.614				
Step 3			.183	.034	-.001	.017
Child Sex	-.002	-.013				
Family SES	.198	1.576				
Lifetime Depression/Anxiety	.069	.388				
Pregnancy Depression/Anxiety	.153	1.400				
Step 4			.214	.046	.003	.012
Child Sex	.023	.129				
Family SES	.191	1.518				
Lifetime Depression/Anxiety	-.016	-.083				
Pregnancy Depression/Anxiety	.028	.188				
Postpartum Depression/Anxiety	.207	1.193				

Note. $N = 116$.

Table 20, Part II

Model Fit Statistics for Hierarchical Regression Analysis Predicting BITSEA Problem Factor 2 – Sleep Problems

Variable	*Cumulative*		*Simultaneous*	
	ΔR^2	ΔF	β	*p*
Step 1	.013	$F(2,113)=.755$		
Child Sex			.012	.898
Family SES			.148	.132
Step 2	.003	$F(1,112)=.377$		
Lifetime Depression/Anxiety			-.009	.934
Step 3	.017	$F(1,111)=1.959$		
Pregnancy Depression/Anxiety			.026	.851
Step 4	.012	$F(1,110)=1.423$		
Postpartum Depression/Anxiety			.174	.235

Note. $N = 116$. β are standardized coefficients.

Table 21, Part I

Summary of Hierarchical Regression Analysis Predicting BITSEA Problem Factor 3 – Emotion Dysregulation

Variable	Unstandardized Estimate	*t*-value	*R*	R^2	*Adj* R^2	ΔR^2
Step 1			.285	.081	.065	.081
Child Sex	-.104	-.710				
Family SES	-.311	-3.027*				
Step 2			.288	.083	.059	.002
Child Sex	-.105	-.708				
Family SES	-.322	-3.056*				
Lifetime Depression/Anxiety	-.076	-.503				
Step 3			.315	.100	.067	.016
Child Sex	-.054	-.358				
Family SES	-.288	-2.680*				
Lifetime Depression/Anxiety	-.110	-.724				
Pregnancy Depression/Anxiety	.133	1.423				
Step 4			.342	.117	.077	.018
Child Sex	-.027	-.181				
Family SES	-.296	-2.764*				
Lifetime Depression/Anxiety	-.199	-1.225				
Pregnancy Depression/Anxiety	.001	.011				
Postpartum Depression/Anxiety	.218	1.479				

Note. $N = 116$.

*$p < .05$.

Table 21, Part II

Model Fit Statistics for Hierarchical Regression Analysis Predicting BITSEA Problem Factor 3 – Emotion Dysregulation

Variable	*Cumulative*		*Simultaneous*	
	ΔR^2	ΔF	β	*p*
Step 1	.081	$F(2,113)=4.981$*		
Child Sex			-.017	.856
Family SES			-.260	.007
Step 2	.002	$F(1,112)=.253$		
Lifetime Depression/Anxiety			-.122	.223
Step 3	.016	$F(1,111)=2.024$		
Pregnancy Depression/Anxiety			.001	.991
Step 4	.018	$F(1,110)=2.187$		
Postpartum Depression/Anxiety			.207	.142

Note. $N = 116$. β are standardized coefficients.

*$p < .05$.

Table 22, Part I

Summary of Hierarchical Regression Analysis Predicting BITSEA Problem Factor 4 – Repetitive/Sensory Sensitivity Behaviors

Variable	Unstandardized Estimate	*t*-value	*R*	R^2	*Adj* R^2	ΔR^2
Step 1			.054	.003	-.015	.003
Child Sex	.090	.563				
Family SES	-.014	-.122				
Step 2			.193	.037	.011	.034
Child Sex	.089	.567				
Family SES	-.059	-.527				
Lifetime Depression/Anxiety	-.320	-1.998*				
Step 3			.196	.038	.004	.001
Child Sex	.103	.637				
Family SES	-.049	-.429				
Lifetime Depression/Anxiety	-.329	-2.024*				
Pregnancy Depression/Anxiety	.037	.374				
Step 4			.208	.043	.000	.005
Child Sex	.118	.722				
Family SES	-.054	-.466				
Lifetime Depression/Anxiety	-.379	-2.160*				
Pregnancy Depression/Anxiety	-.036	-.258				
Postpartum Depression/Anxiety	.122	.764				

Note. $N = 116$

*$p < .05$.

Table 22, Part II

Model Fit Statistics for Hierarchical Regression Analysis Predicting BITSEA Problem Factor 4 – Repetitive/Sensory Sensitivity Behaviors

Variable	*Cumulative*		*Simultaneous*	
	ΔR^2	ΔF	β	*p*
Step 1	.003	$F(2,113)=.162$		
Child Sex			.070	.472
Family SES			-.046	.642
Step 2	.034	$F(1,112)=3.991$*		
Lifetime Depression/Anxiety			-.224	.033
Step 3	.001	$F(1,111)=.140$		
Pregnancy Depression/Anxiety			-.036	.797
Step 4	.005	$F(1,110)=.584$		
Postpartum Depression/Anxiety			.111	.447

Note. $N = 116$. β are standardized coefficients.

*$p < .05$.

Table 23, Part I

Summary of Hierarchical Regression Analysis Predicting BITSEA Problem Factor 5 – Fear and/or Anxiety Behaviors

Variable	Unstandardized Estimate	*t*-value	*R*	R^2	*Adj* R^2	ΔR^2
Step 1			.167	.028	.011	.028
Child Sex	.242	1.628				
Family SES	.068	.661				
Step 2			.199	.040	.014	.012
Child Sex	.242	1.633				
Family SES	.094	.888				
Lifetime Depression/Anxiety	.178	1.178				
Step 3			.202	.041	.006	.001
Child Sex	.254	1.659				
Family SES	.102	.936				
Lifetime Depression/Anxiety	.170	1.106				
Pregnancy Depression/Anxiety	.031	.333				
Step 4			.222	.049	.006	.009
Child Sex	.272	1.766				
Family SES	.096	.885				
Lifetime Depression/Anxiety	.108	.656				
Pregnancy Depression/Anxiety	-.059	-.449				
Postpartum Depression/Anxiety	.150	.998				

Note. $N = 116$.

Table 23, Part II

Model Fit Statistics for Hierarchical Regression Analysis Predicting BITSEA Problem Factor 5 – Fear and/or Anxiety Behaviors

Variable	*Cumulative*		*Simultaneous*	
	ΔR^2	ΔF	β	*p*
Step 1	.028	$F(2,113)=1.614$		
Child Sex			.170	.080
Family SES			.086	.378
Step 2	.012	$F(1,112)=1.388$		
Lifetime Depression/Anxiety			.068	.513
Step 3	.001	$F(1,111)=.111$		
Pregnancy Depression/Anxiety			-.062	.654
Step 4	.009	$F(1,110)=.995$		
Postpartum Depression/Anxiety			.145	.321

Note. $N = 116$. β are standardized coefficients.

Table 24, Part I

Summary of Hierarchical Regression Analysis Predicting BITSEA Competence Factor 1 – Social Relatedness/Mastery Motivation Behaviors

Variable	Unstandardized Estimate	*t*-value	*R*	R^2	*Adj* R^2	ΔR^2
Step 1			.075	.006	-.012	.006
Child Sex	.112	.765				
Family SES	.021	.202				
Step 2			.079	.006	-.020	.001
Child Sex	.112	.757				
Family SES	.016	.152				
Lifetime Depression/Anxiety	-.037	-.245				
Step 3			.101	.010	-.025	.004
Child Sex	.087	.574				
Family SES	.001	.005				
Lifetime Depression/Anxiety	-.018	-.120				
Pregnancy Depression/Anxiety	-.063	-.672				
Step 4			.209	.044	.000	.034
Child Sex	.049	.322				
Family SES	.013	.125				
Lifetime Depression/Anxiety	.097	.597				
Pregnancy Depression/Anxiety	.115	.891				
Postpartum Depression/Anxiety	-.293	-1.964				

Note. $N = 116$.

Table 24, Part II

Model Fit Statistics for Hierarchical Regression Analysis Predicting BITSEA Competence Factor 1 – Social Relatedness/Mastery Motivation Behaviors

Variable	*Cumulative*		*Simultaneous*	
	ΔR^2	ΔF	β	*p*
Step 1	.006	$F(2,113)=.324$		
Child Sex			.031	.748
Family SES			.012	.901
Step 2	.001	$F(1,112)=.060$		
Lifetime Depression/Anxiety			.062	.552
Step 3	.004	$F(1,111)=.452$		
Pregnancy Depression/Anxiety			.126	.375
Step 4	.034	$F(1,110)=3.856$		
Postpartum Depression/Anxiety			-.291	.052

Note. $N = 116$. β are standardized coefficients.

Table 25, Part I

Summary of Hierarchical Regression Analysis Predicting BITSEA Competence Factor 2 – Compassion Towards Others

Variable	Unstandardized Estimate	*t*-value	*R*	R^2	*Adj* R^2	ΔR^2
Step 1			.273	.074	.058	.074
Child Sex	.446	2.710*				
Family SES	.132	1.152				
Step 2			.274	.075	.050	.001
Child Sex	.445	2.693*				
Family SES	.125	1.068				
Lifetime Depression/Anxiety	-.053	-.315				
Step 3			.274	.075	.042	.000
Child Sex	.440	2.573*				
Family SES	.122	1.011				
Lifetime Depression/Anxiety	-.049	-.285				
Pregnancy Depression/Anxiety	-.014	-.131				
Step 4			.277	.076	.035	.001
Child Sex	.431	2.494*				
Family SES	.125	1.028				
Lifetime Depression/Anxiety	-.024	-.130				
Pregnancy Depression/Anxiety	.025	.168				
Postpartum Depression/Anxiety	-.063	-.372				

Note. $N = 116$.

*$p < .05$.

Table 25, Part II

Model Fit Statistics for Hierarchical Regression Analysis Predicting BITSEA Competence Factor 2 – Compassion Towards Others

Variable	*Cumulative*		*Simultaneous*	
	ΔR^2	ΔF	β	p
Step 1	.074	$F(2,113)=4.539$*		
Child Sex			.238	.014
Family SES			.098	.306
Step 2	.001	$F(1,112)=.099$		
Lifetime Depression/Anxiety			-.013	.897
Step 3	.000	$F(1,111)=.017$		
Pregnancy Depression/Anxiety			.023	.867
Step 4	.001	$F(1,110)=.139$		
Postpartum Depression/Anxiety			-.054	.710

Note. $N = 116$. β are standardized coefficients.

*$p < .05$.

Table 26, Part I

Summary of Hierarchical Regression Analysis Predicting BITSEA Competence Factor 3 – Pointing/Attention Behaviors

Variable	Unstandardized Estimate	*t*-value	*R*	R^2	*Adj* R^2	ΔR^2
Step 1			.257	.066	.049	.066
Child Sex	-.347	-2.571*				
Family SES	.124	1.321				
Step 2			.259	.067	.042	.001
Child Sex	-.346	-2.554*				
Family SES	.131	1.359				
Lifetime Depression/Anxiety	.049	.353				
Step 3			.276	.076	.043	.009
Child Sex	-.381	-2.729*				
Family SES	.109	1.109				
Lifetime Depression/Anxiety	.075	.533				
Pregnancy Depression/Anxiety	-.089	-1.040				
Step 4			.302	.091	.050	.015
Child Sex	-.405	-2.893*				
Family SES	.117	1.194				
Lifetime Depression/Anxiety	.148	.992				
Pregnancy Depression/Anxiety	.025	.212				
Postpartum Depression/Anxiety	-.188	-1.364				

Note. $N = 116$.

*$p < .05$.

Table 26, Part II

Model Fit Statistics for Hierarchical Regression Analysis Predicting BITSEA Competence Factor 3 – Pointing/Attention Behaviors

Variable	*Cumulative*		*Simultaneous*	
	ΔR^2	ΔF	β	*p*
Step 1	.066	$F(2,113)=3.990$*		
Child Sex			-.274	.005
Family SES			.113	.235
Step 2	.001	$F(1,112)=.125$		
Lifetime Depression/Anxiety			.100	.323
Step 3	.009	$F(1,111)=1.082$		
Pregnancy Depression/Anxiety			.029	.833
Step 4	.015	$F(1,110)=1.860$		
Postpartum Depression/Anxiety			-.197	.175

Note. $N = 116$. β are standardized coefficients.

*$p < .05$.

Table 27, Part I

Summary of Hierarchical Regression Analysis Predicting BITSEA Competence Factor 4 – Rule Following Behaviors

Variable	Unstandardized Estimate	*t*-value	*R*	R^2	*Adj* R^2	ΔR^2
Step 1			.140	.020	.002	.020
Child Sex	-.073	-.587				
Family SES	-.118	-1.351				
Step 2			.169	.028	.002	.009
Child Sex	-.076	-.606				
Family SES	-.135	-1.515				
Lifetime Depression/Anxiety	-.128	-1.006				
Step 3			.290	.084	.051	.055
Child Sex	-.153	-1.218				
Family SES	-.183	-2.067*				
Lifetime Depression/Anxiety	-.070	-.554				
Pregnancy Depression/Anxiety	-.199	-2.590*				
Step 4			.344	.118	.078	.034
Child Sex	-.187	-1.494				
Family SES	-.172	-1.967				
Lifetime Depression/Anxiety	.030	.227				
Pregnancy Depression/Anxiety	-.045	-.420				
Postpartum Depression/Anxiety	-.255	-2.074*				

Note. $N = 116$.

*$p < .05$.

Table 27, Part II

Model Fit Statistics for Hierarchical Regression Analysis Predicting BITSEA Competence Factor 4 – Rule Following Behaviors

Variable	*Cumulative*		*Simultaneous*	
	ΔR^2	ΔF	β	p
Step 1	.020	$F(2,113)=1.136$		
Child Sex			-.139	.138
Family SES			-.184	.052
Step 2	.009	$F(1,112)=1.012$		
Lifetime Depression/Anxiety			.023	.821
Step 3	.055	$F(1,111)=6.707$*		
Pregnancy Depression/Anxiety			-.057	.675
Step 4	.034	$F(1,110)=4.301$*		
Postpartum Depression/Anxiety			-.295	.040

Note. $N = 116$. β are standardized coefficients.

*$p < .05$.

Table 28, Part I

Summary of Hierarchical Regression Analysis Predicting Observer-Reported Child Positive Affect/Interest Behaviors

Variable	Unstandardized Estimate	*t*-value	*R*	R^2	*Adj* R^2	ΔR^2
Step 1			.258	.067	.049	.067
Child Sex	-.204	-1.110				
Family SES	.329	2.610*				
Step 2			.272	.074	.048	.007
Child Sex	-.217	-1.179				
Family SES	.300	2.318*				
Lifetime Depression/Anxiety	-.175	-.924				
Step 3			.274	.075	.040	.001
Child Sex	-.205	-1.086				
Family SES	.310	2.329*				
Lifetime Depression/Anxiety	-.185	-.962				
Pregnancy Depression/Anxiety	.038	.341				
Step 4			.276	.076	.033	.001
Child Sex	-.208	-1.094				
Family SES	.313	2.337*				
Lifetime Depression/Anxiety	-.157	-.753				
Pregnancy Depression/Anxiety	.081	.496				
Postpartum Depression/Anxiety	-.070	-.362				

Note. $N = 112$.

*$p < .05$.

Table 28, Part II

Model Fit Statistics for Hierarchical Regression Analysis Predicting Observer-Reported Child Positive Affect/Interest Behaviors

Variable	*Cumulative*		*Simultaneous*	
	ΔR^2	ΔF	β	p
Step 1	.067	$F(2,109)=3.889$*		
Child Sex			-.105	.276
Family SES			.230	.021
Step 2	.007	$F(1,108)=.855$		
Lifetime Depression/Anxiety			-.079	.453
Step 3	.001	$F(1,107)=.116$		
Pregnancy Depression/Anxiety			.072	.621
Step 4	.001	$F(1,106)=.131$		
Postpartum Depression/Anxiety			-.055	.718

Note. $N = 112$. β are standardized coefficients.

*$p < .05$.

Table 29, Part I

Summary of Hierarchical Regression Analysis Predicting Observer-Reported Child Compliance Behaviors

Variable	Unstandardized Estimate	*t*-value	*R*	R^2	*Adj* R^2	ΔR^2
Step 1			.176	.031	.013	.031
Child Sex	.340	1.836				
Family SES	.032	.251				
Step 2			.212	.045	.018	.014
Child Sex	.322	1.737				
Family SES	-.006	-.049				
Lifetime Depression/Anxiety	-.238	-1.253				
Step 3			.221	.049	.013	.004
Child Sex	.297	1.571				
Family SES	-.025	-.188				
Lifetime Depression/Anxiety	-.219	-1.134				
Pregnancy Depression/Anxiety	-.074	-.671				
Step 4			.221	.049	.004	.000
Child Sex	.298	1.566				
Family SES	-.026	-.193				
Lifetime Depression/Anxiety	-.227	-1.087				
Pregnancy Depression/Anxiety	-.087	-.533				
Postpartum Depression/Anxiety	.021	.107				

Note. $N = 112$.

Table 29, Part II

Model Fit Statistics for Hierarchical Regression Analysis Predicting Observer-Reported Child Compliance Behaviors

Variable	*Cumulative*		*Simultaneous*	
	ΔR^2	ΔF	β	*p*
Step 1	.031	$F(2,109)=1.743$		
Child Sex			.152	.120
Family SES			-.019	.847
Step 2	.014	$F(1,108)=1.571$		
Lifetime Depression/Anxiety			-.116	.280
Step 3	.004	$F(1,107)=.450$		
Pregnancy Depression/Anxiety			-.079	.595
Step 4	.000	$F(1,106)=.011$		
Postpartum Depression/Anxiety			.016	.915

Note. $N = 112$. β are standardized coefficients.

Table 30, Part I

Summary of Hierarchical Regression Analysis Predicting Observer-Reported Child Negative Affect Behaviors

Variable	Unstandardized Estimate	*t*-value	*R*	R^2	*Adj* R^2	ΔR^2
Step 1			.054	.003	-.015	.003
Child Sex	-.040	-.243				
Family SES	.059	.520				
Step 2			.055	.003	-.025	.000
Child Sex	-.038	-.231				
Family SES	.062	.534				
Lifetime Depression/Anxiety	.022	.131				
Step 3			.083	.007	-.030	.004
Child Sex	-.060	-.351				
Family SES	.046	.386				
Lifetime Depression/Anxiety	.039	.227				
Pregnancy Depression/Anxiety	-.064	-.648				
Step 4			.145	.021	-.025	.014
Child Sex	-.067	-.398				
Family SES	.055	.461				
Lifetime Depression/Anxiety	.125	.672				
Pregnancy Depression/Anxiety	.066	.457				
Postpartum Depression/Anxiety	-.213	-1.231				

Note. $N = 112$.

Table 30, Part II

Model Fit Statistics for Hierarchical Regression Analysis Predicting Observer-Reported Child Negative Affect Behaviors

Variable	*Cumulative*		*Simultaneous*	
	ΔR^2	ΔF	β	*p*
Step 1	.003	$F(2,109)=.159$		
Child Sex			-.039	.691
Family SES			.047	.646
Step 2	.000	$F(1,108)=.017$		
Lifetime Depression/Anxiety			.073	.503
Step 3	.004	$F(1,107)=.420$		
Pregnancy Depression/Anxiety			.069	.649
Step 4	.014	$F(1,106)=1.517$		
Postpartum Depression/Anxiety			-.193	.221

Note. $N = 112$. β are standardized coefficients.

Table 31, Part I

Summary of Hierarchical Regression Analysis Predicting Child Self-Directed Regulation

Variable	Unstandardized Estimate	*t*-value	*R*	R^2	*Adj* R^2	ΔR^2
Step 1			.137	.019	.001	.019
Child Sex	-.067	-1.380				
Family SES	-.011	-.319				
Step 2			.139	.019	-.008	.001
Child Sex	-.068	-1.390				
Family SES	-.013	-.372				
Lifetime Depression/Anxiety	-.013	-.269				
Step 3			.143	.020	-.016	.001
Child Sex	-.065	-1.296				
Family SES	-.010	-.290				
Lifetime Depression/Anxiety	-.016	-.319				
Pregnancy Depression/Anxiety	.010	.347				
Step 4			.190	.036	-.009	.016
Child Sex	-.061	-1.217				
Family SES	-.012	-.354				
Lifetime Depression/Anxiety	-.043	-.789				
Pregnancy Depression/Anxiety	-.029	-.698				
Postpartum Depression/Anxiety	.065	1.308				

Note. $N = 112$.

Table 31, Part II

Model Fit Statistics for Hierarchical Regression Analysis Predicting Child Self-Directed Regulation

Variable	*Cumulative*		*Simultaneous*	
	ΔR^2	ΔF	β	*p*
Step 1	.019	F(2,109)=1.040		
Child Sex			-.119	.226
Family SES			-.036	.724
Step 2	.001	F(1,108)=.072		
Lifetime Depression/Anxiety			-.085	.432
Step 3	.001	F(1,107)=.120		
Pregnancy Depression/Anxiety			-.102	.486
Step 4	.016	F(1,106)=1.711		
Postpartum Depression/Anxiety			.201	.194

Note. $N = 112$. β are standardized coefficients.

Table 32, Part I

Summary of Hierarchical Regression Analysis Predicting Mother-Directed Regulation

Variable	Unstandardized Estimate	*t*-value	*R*	R^2	*Adj* R^2	ΔR^2
Step 1			.244	.060	.042	.060
Child Sex	.243	2.204*				
Family SES	.095	1.268				
Step 2			.247	.061	.035	.002
Child Sex	.246	2.222*				
Family SES	.103	1.329				
Lifetime Depression/Anxiety	.049	.429				
Step 3			.251	.063	.028	.002
Child Sex	.237	2.094*				
Family SES	.096	1.204				
Lifetime Depression/Anxiety	.057	.491				
Pregnancy Depression/Anxiety	-.029	-.439				
Step 4			.251	.063	.019	.000
Child Sex	.238	2.085*				
Family SES	.095	1.193				
Lifetime Depression/Anxiety	.053	.422				
Pregnancy Depression/Anxiety	-.035	-.363				
Postpartum Depression/Anxiety	.009	.082				

Note. $N = 112$.

Table 32, Part II

Model Fit Statistics for Hierarchical Regression Analysis Predicting Mother-Directed Regulation

Variable	*Cumulative*		*Simultaneous*	
	ΔR^2	ΔF	β	*p*
Step 1	.060	F(2,109)=3.449*		
Child Sex			.201	.039
Family SES			.118	.236
Step 2	.002	F(1,108)=.184		
Lifetime Depression/Anxiety			.045	.674
Step 3	.002	F(1,107)=.193		
Pregnancy Depression/Anxiety			-.052	.717
Step 4	.000	F(1,106)=.007		
Postpartum Depression/Anxiety			.012	.935

Note. $N = 112$. β are standardized coefficients.

Table 33, Part I

Summary of Hierarchical Regression Analysis Predicting Toy-Directed Regulation

Variable	Unstandardized Estimate	*t*-value	*R*	R^2	*Adj* R^2	ΔR^2
Step 1			.128	.016	-.002	.016
Child Sex	-.212	-1.344				
Family SES	.010	.096				
Step 2			.149	.022	-.005	.006
Child Sex	-.222	-1.398				
Family SES	-.010	-.094				
Lifetime Depression/Anxiety	-.131	-.808				
Step 3			.197	.039	.003	.017
Child Sex	-.262	-1.631				
Family SES	-.042	-.374				
Lifetime Depression/Anxiety	-.096	-.587				
Pregnancy Depression/Anxiety	-.128	-1.358				
Step 4			.199	.040	-.006	.001
Child Sex	-.265	-1.640				
Family SES	-.040	-.357				
Lifetime Depression/Anxiety	-.076	-.428				
Pregnancy Depression/Anxiety	-.099	-.724				
Postpartum Depression/Anxiety	-.048	-.300				

Note. $N = 112$.

Table 33, Part II

Model Fit Statistics for Hierarchical Regression Analysis Predicting Toy-Directed Regulation

Variable	*Cumulative*		*Simultaneous*	
	ΔR^2	ΔF	β	p
Step 1	.016	F(2,109)=.903		
Child Sex			-.160	.104
Family SES			-.036	.722
Step 2	.006	F(1,108)=.654		
Lifetime Depression/Anxiety			-.046	.669
Step 3	.017	F(1,107)=1.844		
Pregnancy Depression/Anxiety			-.106	.471
Step 4	.001	F(1,106)=.090		
Postpartum Depression/Anxiety			-.046	.765

Note. $N = 112$. β are standardized coefficients.

Table 34, Part I

Summary of Hierarchical Regression Analysis Predicting Environment-Directed Regulation

Variable	Unstandardized Estimate	*t*-value	*R*	R^2	*Adj* R^2	ΔR^2
Step 1			.055	.003	-.015	.003
Child Sex	-.036	-.442				
Family SES	-.019	-.343				
Step 2			.061	.004	-.024	.001
Child Sex	-.034	-.418				
Family SES	-.015	-.269				
Lifetime Depression/Anxiety	.023	.275				
Step 3			.204	.042	.006	.038
Child Sex	-.003	-.035				
Family SES	.009	.159				
Lifetime Depression/Anxiety	-.004	-.050				
Pregnancy Depression/Anxiety	.100	2.060*				
Step 4			.223	.050	.005	.008
Child Sex	.002	.023				
Family SES	.007	.113				
Lifetime Depression/Anxiety	-.037	-.402				
Pregnancy Depression/Anxiety	.053	.752				
Postpartum Depression/Anxiety	.078	.944				

Note. $N = 112$.

Table 34, Part II

Model Fit Statistics for Hierarchical Regression Analysis Predicting Environment-Directed Regulation

Variable	*Cumulative*		*Simultaneous*	
	ΔR^2	ΔF	β	*p*
Step 1	.003	F(2,109)=.168		
Child Sex			.002	.981
Family SES			.011	.910
Step 2	.001	F(1,108)=.075		
Lifetime Depression/Anxiety			-.043	.688
Step 3	.038	F(1,107)=4.242*		
Pregnancy Depression/Anxiety			.109	.454
Step 4	.008	F(1,106)=.892		
Postpartum Depression/Anxiety			.144	.347

Note. $N = 112$. β are standardized coefficients.

Table 35

Summary of Moderation Analyses

	Unstandardized Estimate	Standard Error	t-value	*p*
BITSEA Problem Factor 4 – Repetitive and/or Sensory Sensitivity Behaviors				
Lifetime Depression/Anxiety	-.299	.188	-1.594	.114
Maternal Sensitivity	-.214	.458	-.466	.642
Lifetime Depression/Anxiety*Maternal Sensitivity	-.003	.708	-.005	.996
Child Sex	.155	.167	.928	.356
Family SES	-.057	.124	-.461	.646
Pregnancy Depression/Anxiety	-.013	.146	-.090	.928
Postpartum Depression/Anxiety	.047	.169	.280	.780
BITSEA Competence Factor 4 – Rule Following Behaviors				
Postpartum Depression/Anxiety	-.352	.131	-2.682	.009
Maternal Sensitivity	.084	.268	.314	.755
Postpartum Depression/Anxiety*Maternal Sensitivity	.618	.404	1.529	.130
Child Sex	-.245	.128	-1.922	.058
Family SES	-.135	.093	-1.457	.148
Pregnancy Depression/Anxiety	-.014	.113	-.120	.905
Lifetime Depression/Anxiety	.025	.142	.180	.858

Note. Child sex is coded such that 0 = male, 1 = female.

Table 36

Correlations Between Research Question 2 Variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Child Sex	1											
2. Family SES	-.003	1										
3. Pregnancy Stress Index	-.172*	-.280**	1									
4. Postpartum Stress Index	-.145	-.259**	.681**	1								
5. Maternal Sensitivity	-.033	-.032	-.011	-.117	1							
6. BITSEA PF 1: Destructive and/or Oppositional Behaviors	-.087	-.056	.166	.278**	-.239*	1						
7. BITSEA PF 2: Sleep Problems	-.030	.112	.081	.062	.007	.015	1					
8. BITSEA PF 3: Emotional Dysregulation	-.087	-.273**	.231*	.247**	-.014	.027	.071	1				
9. BITSEA PF 4: Repetitive/Sensory Sensitivity Behaviors	.050	-.007	.150	.058	-.074	.029	.007	-.009	1			
10. BITSEA PF 5: Fear and/or Anxiety Behaviors	.154	.070	.052	.048	.070	-.027	-.018	.015	-.003	1		
11. BITSEA CF 1: Social Relatedness/Mastery Motivation	.076	.022	.022	-.170	.236*	-.282**	-.058	-.015	.115	.075	1	
12. BITSEA CF 2: Compassion towards Others	.254**	.117	-.069	-.148	-.052	.004	-.137	.040	-.053	.265**	.058	1
13. BITSEA CF 3: Pointing/Attention Behaviors	-.223*	.105	-.023	-.148	.049	-.123	.072	-.082	-.029	-.019	.065	.096
14. BITSEA CF 4: Rule Following	-.069	-.126	-.066	-.174	-.005	-.209*	-.124	-.233*	.047	.089	.192*	-.091
15. Lab-Observed Factor 1: Positive Affect/Interest	-.086	.234*	-.105	-.231*	.131	-.032	.022	-.055	-.133	.013	.085	.092
16. Lab-Observed Factor 2: Compliance Behaviors	.177	.031	.013	-.143	.090	-.205*	.009	-.170	.197*	.229*	.029	.291**
17. Lab-Observed Factor 3: Negative Affect	-.027	.051	-.026	-.048	-.172	-.107	-.079	.040	.081	.038	.106	-.031
18. Self-Directed Regulation	-.140	-.036	.055	.182	-.078	.142	-.055	-.058	-.004	.112	.004	.101
19. Mother-Directed Regulation	.204*	.135	-.087	-.068	.093	.114	-.055	-.183	.086	.028	.132	.099
20. Toy-Directed Regulation	-.116	-.004	-.037	-.028	.030	-.030	-.006	.080	.107	.039	-.077	.004
21. Environment-Directed Regulation	-.051	-.033	.149	.163	-.122	.070	-.060	-.064	-.087	-.054	-.122	-.048
22. Children's COVID-19 Worries	.074	.001	.170	.062	-.065	-.024	.264**	.022	.066	.197	.115	.143
23. Children's COVID-19 Life Changes	.107	-.131	.271**	.317**	.012	.120	.103	.134	.057	.303**	.114	-.025

Note. Child sex is coded such that 0 = male, 1 = female. PF = Problem Factor. CF = Competence Factor. *$p < .05$. **$p < .01$.

Table 36 ***continued***

	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.
13. BITSEA CF 3: Pointing/Attention Behaviors	1										
14. BITSEA CF 4: Rule Following	.137	1									
15. Lab-Observed Factor 1: Positive Affect/Interest	.172	-.151	1								
16. Lab-Observed Factor 2: Compliance Behaviors	.105	.182	.002	1							
17. Lab-Observed Factor 3: Negative Affect	-.027	.090	-.023	-.050	1						
18. Self-Directed Regulation	.129	-.025	-.040	.000	-.102	1					
19. Mother-Directed Regulation	-.096	-.020	.022	.106	.153	-.173	1				
20. Toy-Directed Regulation	.036	.016	.011	-.016	.038	-.020	-.483**	1			
21. Environment-Directed Regulation	-.086	-.081	-.060	-.050	-.095	.229*	.217*	-.688*	1		
22. Children's COVID-19 Worries	.064	-.223*	.221*	.030	-.045	.125	-.131	.035	-.074	1	
23. Children's COVID-19 Life Changes	-.054	-.200	.161	.021	-.034	.167	-.078	-.136	.135	.467**	1

Note. Child sex is coded such that 0 = male, 1 = female. PF = Problem Factor. CF = Competence Factor. *$p < .05$. **$p < .01$.

Table 37

Summary of Preliminary Regression Analyses Predicting BITSEA Problem and Competence Scales from Stress Indices

	Unstandardized Estimate	Standard Error	t-value	*p*	Standardized Estimate
BITSEA Problem Scale					
Child Sex	.669	.703	.952	.343	.088
Family SES	-.182	.484	-.376	.708	-.034
Pregnancy Stress Index	.372	.623	.598	.551	.073
Postpartum Stress Index	2.444	.876	2.780	.006	.343
BITSEA Competence Scale					
Child Sex	-.407	.426	-.954	.342	-.089
Family SES	.048	.293	.164	.870	.015
Pregnancy Stress Index	.775	.377	2.054	.042	.255
Postpartum Stress Index	-2.012	.531	-3.790	<.001	-.474

Note. Child sex is coded such that 0 = male, 1 = female.

Table 38

Summary of Regression Analyses Predicting BITSEA Problem and Competence Factor Scores from Stress Indices

	Unstandardized Estimate	Standard Error	t-value	*p*	Standardized Estimate
BITSEA Problem Factor 1 – Destructive and/or Oppositional Behavior					
Child Sex	.011	.170	.067	.947	.006
Family SES	.000	.118	.002	.998	.000
Pregnancy Stress Index	-.060	.151	-.395	.693	-.050
Postpartum Stress Index	.528	.212	2.488	.014	.318
BITSEA Problem Factor 2 – Sleep Problems					
Child Sex	-.074	.178	-.416	.679	-.041
Family SES	.154	.123	1.252	.213	.123
Pregnancy Stress Index	.148	.157	.942	.348	.123
Postpartum Stress Index	-.055	.221	-.248	.805	-.033
BITSEA Problem Factor 3 – Emotional Dysregulation					
Child Sex	-.012	.154	-.076	.939	-.007
Family SES	-.272	.106	-2.555	.012	-.238
Pregnancy Stress Index	.093	.136	.682	.497	.085
Postpartum Stress Index	.190	.191	.995	.322	.125
BITSEA Problem Factor 4 – Repetitive and/or Sensory Sensitivity Behaviors					
Child Sex	.148	.168	.884	.379	.087
Family SES	.023	.116	.197	.844	.019
Pregnancy Stress Index	.256	.148	1.727	.087	.225
Postpartum Stress Index	-.114	.209	-.549	.584	-.072
BITSEA Problem Factor 5 – Fear and/or Anxiety Behaviors					
Child Sex	.233	.152	1.532	.128	.151
Family SES	.092	.105	.876	.383	.086
Pregnancy Stress Index	.100	.135	.743	.459	.097
Postpartum Stress Index	.028	.189	.150	.881	.020
BITSEA Competence Factor 1 – Social Relatedness/Mastery Motivation					
Child Sex	.064	.151	.422	.674	.041
Family SES	.006	.104	.056	.955	.005
Pregnancy Stress Index	.282	.134	2.105	.038	.269
Postpartum Stress Index	-.502	.188	-2.663	.009	-.343

Table 38 ***continued***

	Unstandardized Estimate	Standard Error	t-value	*p*	Standardized Estimate
BITSEA Competence Factor 2 – Compassion towards Others					
Child Sex	.425	.174	2.438	.016	.233
Family SES	.126	.120	1.050	.296	.099
Pregnancy Stress Index	.129	.154	.835	.406	.106
Postpartum Stress Index	-.227	.217	-1.046	.298	-.134
BITSEA Competence Factor 3 – Pointing/Attention Behaviors					
Child Sex	-.440	.139	-3.176	.002	-.297
Family SES	.079	.095	.827	.410	.076
Pregnancy Stress Index	.138	.123	1.122	.264	.139
Postpartum Stress Index	-.441	.173	-2.558	.012	-.319
BITSEA Competence Factor 4 – Rule Following Behaviors					
Child Sex	-.158	.129	-1.222	.224	-.117
Family SES	-.160	.089	-1.805	.074	-.171
Pregnancy Stress Index	.061	.114	.530	.597	.067
Postpartum Stress Index	-.373	.161	-2.317	.022	-.297

Note. Child sex is coded such that 0 = male, 1 = female.

Table 39

Summary of Regression Analyses Predicting Lab-Observer Impressions of Child Factor Scores from Stress Indices

	Unstandardized Estimate	Standard Error	t-value	*p*	Standardized Estimate
Lab-Observer Impressions of Child Factor 1 – Positive Affect/Interest					
Child Sex	-.305	.188	-1.623	.107	-.153
Family SES	.285	.129	2.205	.030	.209
Pregnancy Stress Index	.149	.165	.904	.368	.113
Postpartum Stress Index	-.550	.233	-2.364	.020	-.294
Lab-Observer Impressions of Child Factor 2 – Compliance Behaviors					
Child Sex	.304	.191	1.589	.115	.154
Family SES	.035	.132	.266	.790	.026
Pregnancy Stress Index	.294	.168	1.751	.083	.225
Postpartum Stress Index	-.473	.237	-2.000	.048	-.257
Lab-Observer Impressions of Child Factor 3 – Negative Affect					
Child Sex	-.024	.173	-.139	.890	-.014
Family SES	.055	.119	.459	.647	.046
Pregnancy Stress Index	.014	.152	.092	.927	.012
Postpartum Stress Index	-.070	.214	-.327	.745	-.043

Note. Child sex is coded such that 0 = male, 1 = female.

Table 40

Summary of Regression Analyses Predicting Child Regulatory Behaviors from Stress Indices

	Unstandardized Estimate	Standard Error	t-value	*p*	Standardized Estimate
Child Self-Regulation					
Child Sex	-.047	.050	-.933	.353	-.092
Family SES	-.005	.034	-.143	.886	-.014
Pregnancy Stress Index	-.045	.044	-1.020	.310	-.133
Postpartum Stress Index	.117	.062	1.876	.063	.246
Child Mother-Directed Regulation					
Child Sex	.266	.115	2.313	.023	.225
Family SES	.094	.079	1.196	.235	.117
Pregnancy Stress Index	-.027	.101	-.272	.786	-.035
Postpartum Stress Index	.040	.143	.277	.782	.036
Child Toy-Directed Regulation					
Child Sex	-.254	.165	-1.542	.126	-.153
Family SES	.006	.113	.050	.960	.005
Pregnancy Stress Index	-.065	.145	-.448	.655	-.059
Postpartum Stress Index	-.019	.205	-.092	.927	-.012
Child Environment-Directed Regulation					
Child Sex	-.001	.085	-.009	.993	-.001
Family SES	-.001	.058	-.022	.982	-.002
Pregnancy Stress Index	.046	.075	.612	.542	.081
Postpartum Stress Index	.079	.105	.751	.454	.099

Note. Child sex is coded such that 0 = male, 1 = female.

Table 41

Summary of Moderation Analyses

	Unstandardized Estimate	Standard Error	t-value	*p*
BITSEA Problem Factor 1 – Destructive and/or Oppositional Behavior				
Child Sex	.011	.173	.066	.948
Family SES	-.013	.122	-.104	.917
Pregnancy Stress Index	-.096	.146	-.659	.512
Postpartum Stress Index	.562	.212	2.644	.010
Maternal Sensitivity	-.768	.351	-2.186	.031
Postpartum Stress Index*Maternal Sensitivity	-.570	.710	-.802	.424
BITSEA Competence Factor 1 – Social Relatedness/Mastery Motivation†				
Child Sex	.008	.167	.050	.960
Family SES	.052	.117	.445	.657
Pregnancy Stress Index	.130	.104	1.255	.213
Postpartum Stress Index	-.232	.110	-2.118	.037
Maternal Sensitivity	.150	.075	1.991	.049
Pregnancy Stress Index*Maternal Sensitivity	-.112	.115	-.973	.333
Postpartum Stress Index*Maternal Sensitivity	.008	.113	.071	.944
BITSEA Competence Factor 3 – Pointing/Attention Behaviors				
Child Sex	-.460	.148	-3.107	.003
Family SES	.078	.104	.752	.454
Pregnancy Stress Index	.127	.125	1.013	.313
Postpartum Stress Index	-.465	.182	-2.558	.012
Maternal Sensitivity	.094	.301	.313	.755
Postpartum Stress Index*Maternal Sensitivity	.527	.609	.867	.388
BITSEA Competence Factor 4 – Rule Following Behaviors				
Child Sex	-.231	.135	-1.714	.090
Family SES	-.128	.094	-1.356	.179
Pregnancy Stress Index	.057	.114	.502	.617
Postpartum Stress Index	-.487	.165	-2.946	.004
Maternal Sensitivity	-.057	.273	-.208	.836
Postpartum Stress Index*Maternal Sensitivity	.915	.554	1.653	.102

Table 41 ***continued***

	Unstandardized Estimate	Standard Error	t-value	*p*
Lab-Observer Impressions of Child Factor 1 – Positive Affect/Interest				
Child Sex	-.279	.200	-1.390	.168
Family SES	.298	.140	2.127	.036
Pregnancy Stress Index	.152	.173	.879	.381
Postpartum Stress Index	-.601	.250	-2.405	.018
Maternal Sensitivity	.545	.414	1.315	.192
Postpartum Stress Index*Maternal Sensitivity	.339	.837	.405	.686
Lab-Observer Impressions of Child Factor 2 – Compliance Behaviors				
Child Sex	.359	.201	1.793	.076
Family SES	.089	.140	.635	.527
Pregnancy Stress Index	.256	.173	1.480	.142
Postpartum Stress Index	-.446	.250	-1.785	.078
Maternal Sensitivity	.349	.415	.842	.402
Postpartum Stress Index*Maternal Sensitivity	1.331	.838	1.589	.116

Note. Child sex is coded such that 0 = male, 1 = female.

† The last two rows show interaction terms for maternal sensitivity and pregnancy stress index and postpartum stress index, respectively.

Table 42

Summary of Regression Analyses Broken Down by Stress Components

	Unstandardized Estimate	Standard Error	t-value	*p*	Absolute Value of Standardized Estimate
BITSEA Problem Factor 1 – Destructive and/or Oppositional Behavior					
Child Sex	.066	.170	.386	.700	.037
Family SES	-.052	.121	-.432	.667	.042
Pregnancy Stress Index	.178	.185	.964	.337	.150
Postpartum Anger Expression	-.183	.170	-1.075	.285	.125
Postpartum Parenting Stress	.249	.120	2.078	.040	.215
Postpartum Role Overload	.274	.141	1.936	.056	.228
Postpartum Financial Stress	-.098	.186	-.528	.598	.069
BITSEA Competence Factor 1 – Social Relatedness/Mastery Motivation					
Child Sex	.100	.150	.664	.508	.063
Family SES	.062	.109	.569	.570	.057
Postpartum Stress Index	-.566	.192	-2.950	.004	.385
Pregnancy Anger Expression	.195	.106	1.850	.067	.208
Pregnancy Role Overload	-.064	.084	-.759	.450	.081
Pregnancy Financial Stress	.202	.104	1.942	.055	.262
BITSEA Competence Factor 1 – Social Relatedness/Mastery Motivation					
Child Sex	.013	.152	.083	.934	.008
Family SES	.058	.108	.538	.592	.053
Pregnancy Stress Index	.151	.166	.911	.364	.144
Postpartum Anger Expression	.082	.153	.539	.591	.064
Postpartum Parenting Stress	-.152	.108	-1.412	.161	.148
Postpartum Role Overload	-.299	.127	-2.356	.020	.284
Postpartum Financial Stress	.025	.167	.150	.881	.020
BITSEA Competence Factor 3 – Pointing/Attention Behaviors					
Child Sex	-.432	.142	-3.037	.003	.292
Family SES	.054	.101	.536	.593	.052
Pregnancy Stress Index	.185	.155	1.196	.234	.187
Postpartum Anger Expression	-.122	.143	-.855	.395	.100
Postpartum Parenting Stress	-.090	.101	-.894	.373	.093
Postpartum Role Overload	-.071	.119	-.595	.553	.071
Postpartum Financial Stress	-.289	.156	-1.854	.066	.240

Table 42 ***continued***

	Unstandardized Estimate	Standard Error	t-value	*p*	Absolute Value of Standardized Estimate
BITSEA Competence Factor 4 – Rule Following Behaviors					
Child Sex	-.170	.132	-1.286	.201	.126
Family SES	-.155	.094	-1.655	.101	.166
Pregnancy Stress Index	-.044	.144	-.306	.760	.049
Postpartum Anger Expression	.040	.132	.303	.762	.036
Postpartum Parenting Stress	-.173	.093	-1.855	.066	.197
Postpartum Role Overload	-.085	.110	-.776	.439	.094
Postpartum Financial Stress	-.063	.145	-.433	.666	.057
Lab-Observer Impressions of Child Factor 1 – Positive Affect/Interest					
Child Sex	-.248	.191	-1.303	.196	.125
Family SES	.362	.135	2.686	.008	.265
Pregnancy Stress Index	.194	.202	.962	.338	.147
Postpartum Anger Expression	-.417	.188	-2.220	.029	.263
Postpartum Parenting Stress	-.077	.139	-.550	.584	.058
Postpartum Role Overload	-.232	.156	-1.495	.138	.175
Postpartum Financial Stress	.087	.197	.442	.659	.056
Lab-Observer Impressions of Child Factor 2 – Compliance Behaviors					
Child Sex	.281	.193	1.459	.148	.143
Family SES	-.071	.136	-.521	.603	.053
Pregnancy Stress Index	.338	.204	1.654	.101	.259
Postpartum Anger Expression	.026	.190	.137	.892	.017
Postpartum Parenting Stress	-.150	.141	-1.065	.289	.115
Postpartum Role Overload	.059	.157	.374	.709	.045
Postpartum Financial Stress	-.582	.199	-2.924	.004	.380

Note. Child sex is coded such that 0 = male, 1 = female.

Table 43

Summary of Regression Analyses Predicting Maternal-Reports of Children's COVID-19 Worries and Life Changes from Stress Indices

	Unstandardized Estimate	Standard Error	t-value	*p*	Standardized Estimate
Children's COVID-19 Worries					
Child Sex	.174	.133	1.315	.192	.136
Family SES	.057	.095	.598	.551	.062
Pregnancy Stress Index	.277	.133	2.082	.040	.301
Postpartum Stress Index	-.124	.169	-.735	.464	-.104
Children's COVID-19 Life Changes					
Child Sex	.197	.103	1.916	.058	.189
Family SES	-.033	.073	-.454	.651	-.045
Pregnancy Stress Index	.092	.103	.892	.375	.123
Postpartum Stress Index	.250	.131	1.915	.058	.260

Note. Child sex is coded such that 0 = male, 1 = female.

Figures

Figure 1

Pregnancy Stress Composites (correlations shown)

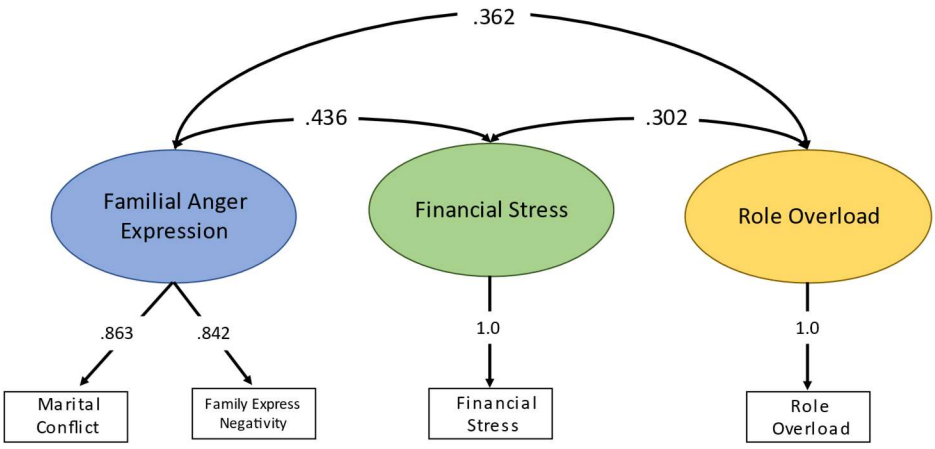


Figure 2

Pregnancy Stress Index (correlations shown)

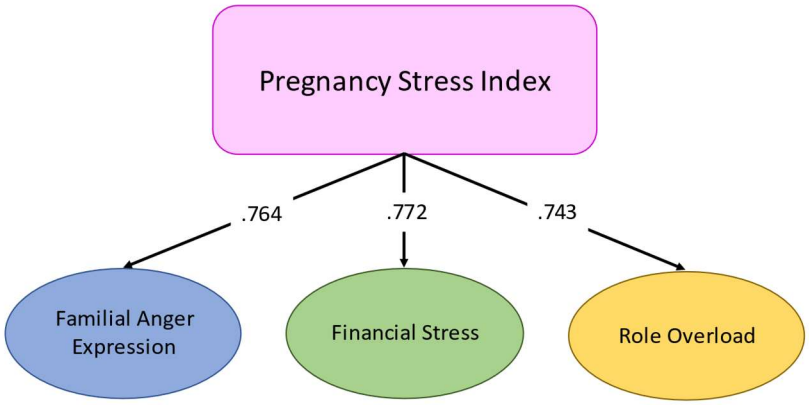


Figure 3

Postpartum Stress Composites (averaged across 1m, 6m, and 12m) (correlations shown)

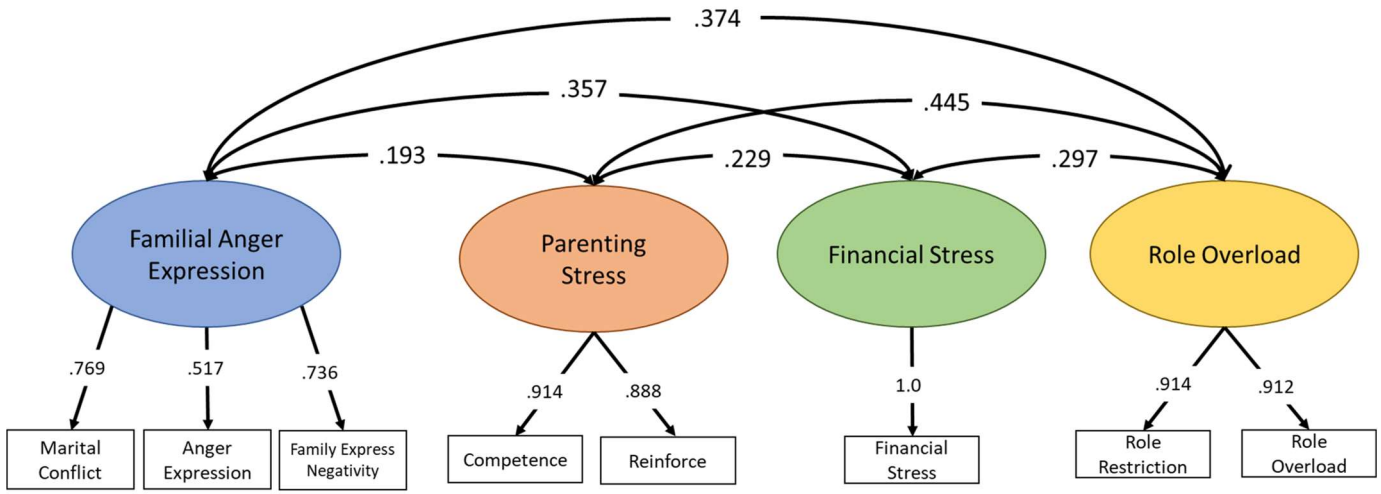


Figure 4

Postpartum Stress Index (averaged across 1m, 6m, and 12m) (correlations shown)

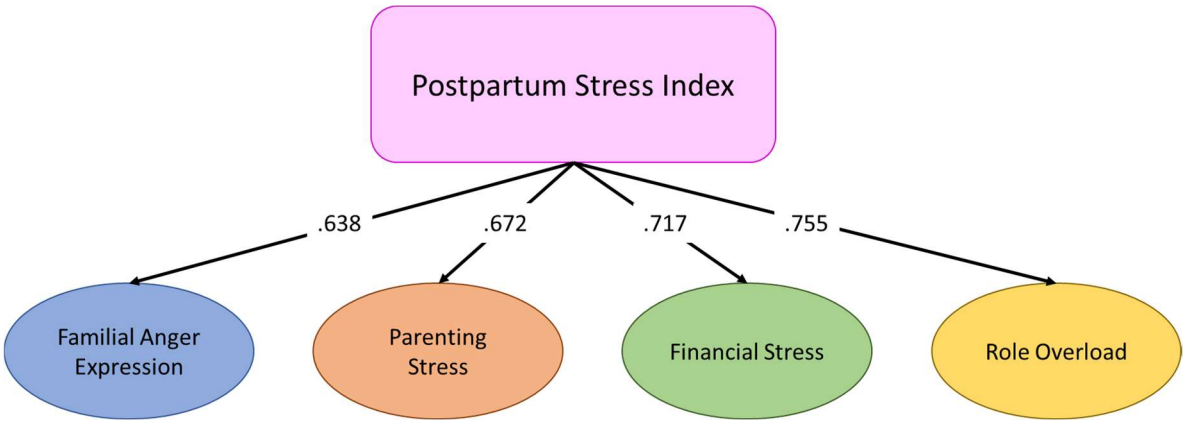
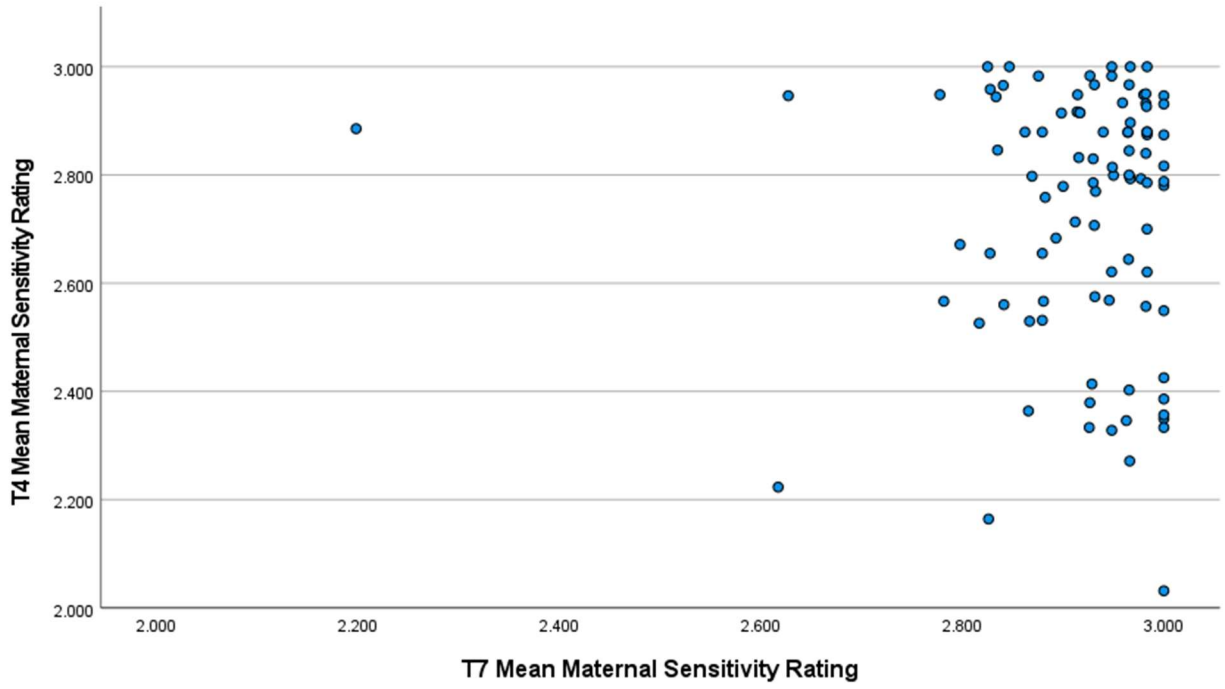


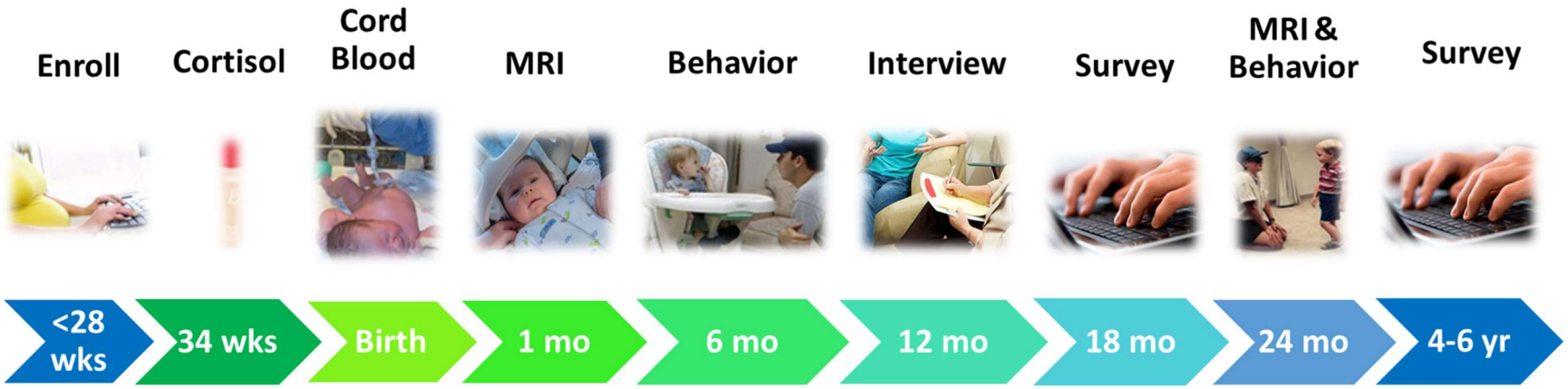
Figure 5

Scatterplot of 6-Month (T4) Mean Maternal Sensitivity by 24-Month (T7) Mean Maternal Sensitivity



Appendices

Appendix A



Appendix A. Outline of Baby Brain & Behavior Project study

Appendix B

Measure	T1 24 wk	T2 34 wk	T3 1 mo	T4 6 mo	T5 12 mo	T6 18 mo	T7 24 mo	T8 4-6 yr
AEI – Anger Expression Inventory		X	X	X	X	X	X	
BPRQS – Barnett Partner Role Quality Scale		X	X	X	X	X	X	
BITSEA – Brief Infant Toddler Social and Emotional Assessment							X	
BRIEF-P – Behavior Rating Inventory of Executive Function - Preschool							X	
BRIEF-2 – Behavior Rating Inventory of Executive Function – 2nd Ed.								X
CBQ – Child Behavior Questionnaire								X
CCQ – Child Care Questionnaire						X	X	
CRISIS – Coronavirus Health Impact Survey								X
CRPR – Child Rearing Practices Report						X	X	X
CTQ – Childhood Trauma Questionnaire						X		
COPE – Cope Inventory		X			X		X	
Demo – Demographics	X	X	X	X	X	X	X	X
EPDS – Edinburgh Postnatal Depression Scale	X	X	X	X	X	X	X	X
EFS – Essex Financial Stress		X	X	X	X	X	X	X
ERO – Essex Role Overload		X	X	X	X	X	X	X
ERQ – Emotion Regulation Questionnaire		X	X	X	X	X	X	X
FEQ – Family Expressiveness Questionnaire		X	X	X	X	X	X	X
Health Questionnaire		X	X	X	X	X	X	
ISP – Infant Sleep Patterns			X	X	X	X	X	
IBQ – Infant Behavior Questionnaire				X	X	X		
IRI – Infant Reactivity Inventory			X					
LES – Life Events Scale		X					X	
LSI – Life Stress Interview					X			
MEQ – Maternal Efficacy Questionnaire			X	X	X	X	X	
Medication Checklist		X	X		X		X	
MIBS – Mother-Infant Bonding Scale			X	X	X	X	X	
MPQ – Multidimensional Personality Questionnaire						X		
MCISQ – Maternal Cognitions about Infant Sleep			X	X	X	X	X	
PII – Parent Involvement with Infants			X	X	X	X	X	
PSC – Parental Sense of Competence			X	X	X	X	X	
PSI – Parenting Stress Index			X	X	X	X	X	X
PTQ – Psychological Treatment Questions		X	X	X	X	X	X	
Retrospective Substance Use			X					
SCID-I/NP – Structured Clinical Interview for DSM-IV-TR Axis I Disorders – Non-Patient Edition					X			
SDQ – Strengths and Difficulties Questionnaire								X
SDS – Sensory Defensiveness Screener							X	
STAI – State Trait Anxiety Inventory	X	X	X	X	X	X	X	
TBAQ – Toddler Behavior Assessment Questionnaire							X	

Appendix B. Questionnaires collected by study timepoint.

Appendix C

Overall Positive Affect	1	Minimal positive affect displayed; rarely, if ever, shows any positive affect
	2	Occasional positive affect displayed; shows some positive affect in a few situations
	3	Typical amount of positive affect displayed
	4	Moderately high positive affect displayed throughout; or typical amount of positive affect with 1-2 instances of intense, heightened, or prolonged displays of positive affect
	5	High positive affect displayed throughout; or at least an amount typical amount of positive affect with several instances of intense, heightened, or prolonged displays of positive affect
Overall Negative Affect	1	Minimal negative affect displayed; rarely, if ever, shows any negative affect
	2	Occasional negative affect displayed; always appropriate to the situation; shows some negative affect in a few situations
	3	Typical amount of negative affect displayed
	4	Moderately high negative affect displayed throughout; or typical amount of negative affect with 1-2 instances of intense, heightened, or prolonged displays of negative affect
	5	High negative affect displayed throughout; or at least a typical amount of negative affect with several instances of intense, heightened, or prolonged displays of negative affect
Energy	1	Consistently lacks animation or energy; (almost) always flat, tired, and/or lackluster
	2	Typically flat, tired, and/or lackluster; several brief periods of animation or energy
	3	Average degree of energy; may be animated or energetic part of the time and flat, tired, and/or lackluster part of the time
	4	Typically animated or energetic; several brief periods of being flat, tired, and/or lackluster
	5	Consistently animated or energetic; rarely, if ever, flat, tired, and/or lackluster
Adaptation to Change in Test Materials	1	Consistently resists relinquishing materials and/or refuses to accept new materials easily; rarely, if ever, makes transitions easily
	2	Typically resists relinquishing materials and/or refuses to accept new materials easily, but makes several transitions easily
	3	Average degree of adaptation; may make easy transitions much of the time, but also somewhat resistant part of the time
	4	Typically relinquishes materials and accepts new materials easily; makes all but a few transitions easily
	5	Consistently relinquishes materials and accepts new materials easily; makes all transitions easily

Interest in Test Materials and Stimuli	1	Consistently shows boredom in test materials and stimuli; only a few instances of some interest noted
	2	Occasional interest; usually interested in most of the materials and stimuli
	3	Typical amount of interest in test materials and stimuli
	4	Much interest; only occasional signs of boredom
	5	Consistent high interest displayed on (almost) every task; rarely, if ever, shows any sign of boredom
Initiative with Test Materials and Stimuli	1	Consistently shows no initiative; passively does what s/he is told; (almost) always requires prompting
	2	Typically shows no initiative; few instances of initiative; sometimes requires prompting
	3	Average degree of initiative shown when given the opportunity; may require a little prompting
	4	Typically shows initiative; few instances of NO initiative; rarely, if ever, requires prompting
	5	Consistently shows initiative at almost every possible chance; never requires prompting
Exploration of Objects	1	No exploration at all; does not ask questions or investigate any item
	2	Occasional exploration; only 1-2 instances noted
	3	Typical degree of exploration
	4	Much exploration; only occasionally does not investigate a new item
	5	Constant exploration; asks lots of questions &/or wants to investigate (almost) every item
Attention to Tasks	1	Consistently off task; rarely, if ever, attends well
	2	Typically off task; attends well in few instances
	3	Average attention to tasks; moderate attention throughout and/or may attend well at least half the time
	4	Typically attends well; attention wanders in only a few instances
	5	Consistently attends well; rarely, if ever, is off task
Persistence in Attempting to Complete Tasks	1	Consistently lacks persistence; stops or gives up before task is completed
	2	Typically lacks persistence; shows some persistence in few instances
	3	Average degree of persistence; moderate persistence throughout and/or may persist to completion at least half the time
	4	Typically persistent; lacks some persistence in a few instances
	5	Consistently persistent; never quits
Enthusiasm Toward Tasks	1	Consistently unenthusiastic; no particular interest beyond attending to tasks
	2	Typically unenthusiastic; some enthusiasm in a few instances
	3	Average degree of enthusiasm; moderate enthusiasm throughout and/or enthusiastic at least half the time
	4	Typically enthusiastic; unenthusiastic in only a few instances
	5	Consistently enthusiastic; rarely, if ever, unenthusiastic

Fear (refers to reactions to objects/situations – NOT shyness)	1	Rarely, if ever, shows any sign of wariness or apprehension, even in appropriate situations
	2	Subtle or ambiguous signs of wariness or apprehension shown in appropriate situations; no overt fear shown
	3	Mild, but definite wariness, apprehension, or fear in appropriate situations (wary looks, decreased activity)
	4	Moderate and clear-cut fear in a few, generally appropriate, situations (body movement, facial fear)
	5	Extreme fear and apprehension (crying, trembling, running away), possibly even in circumstances that don't bother most children
Frustration with Inability to Complete Tasks	1	No sign of frustration when a task cannot be completed (for whatever reason)
	2	Only subtle or ambiguous signs of frustration when a task cannot be completed (fleeting frustrated looks, almost inaudible sighs or verbalizations)
	3	Typical degree of frustration in appropriate situations (clear sighs or verbalizations, unambiguous looks or movements of frustration)
	4	Moderate frustration when a task cannot be completed (hard and abrupt movements, raised voice)
	5	Extreme frustration when a task cannot be completed (yelling, throwing or banging objects, frustrated crying)
Social Engagement with Experimenter or other Visitors	1	Rare, if any, attempts to interact socially
	2	Occasional attempts to interact socially
	3	Typical number of attempts to interact socially
	4	Many attempts to interact socially
	5	Constant attempts to interact socially
Social Engagement with Primary Caregiver	1	Rare, if any, attempts to interact socially
	2	Occasional attempts to interact socially
	3	Typical number of attempts to interact socially
	4	Many attempts to interact socially
	5	Constant attempts to interact socially
Cooperation with Experimenter	1	Consistently shows some resistance to suggestions or requests; seldom, if ever, fully cooperates
	2	Consistently shows some resistance to suggestions or requests; cooperates fully in a few instances
	3	Average degree of resistance; may show some minor resistance less than half the time
	4	Typically cooperates; a few instances of minor resistance
	5	Consistently cooperates; no evidence of any resistance
Cooperation with Primary Caregiver	1	Consistently shows some resistance to suggestions or requests; seldom, if ever, fully cooperates
	2	Consistently shows some resistance to suggestions or requests; cooperates fully in a few instances
	3	Average degree of resistance; may show some minor resistance less than half the time
	4	Typically cooperates; a few instances of minor resistance
	5	Consistently cooperates; no evidence of any resistance

Frenetic Movement	1	Consistently appropriate timing and pacing of movement; never any hint of frenetic movement
	2	Typically appropriate timing and pacing; 1 or 2 instances of mild frenetic movement
	3	Mild, but clear evidence of frenetic movement, and/or 1-2 instances of moderate frenetic movement
	4	Moderate frenetic movement, and/or 1-2 instances of intense heightened or prolonged displays of frenetic movement
	5	Consistently frenetic movement, and/or several intense, heightened, or prolonged displays of frenetic movement
Hyperactivity	1	No signs of hyperactivity; never any fidgety or agitated movement
	2	Typically shows no signs of hyperactivity; shows only subtle or ambiguous signs of hyperactivity in a few instances
	3	Mild, but unambiguous evidence of hyperactivity
	4	Moderately hyperactive; problem severe enough to make testing more difficult than usual
	5	Hyperactive, fidgety, agitated, moving around room throughout visit
Shyness	1	No signs of shyness at all; consistently outgoing and talkative
	2	Only subtle or ambiguous hints of shyness; usually outgoing and talkative
	3	Mild shyness; shown only in appropriate situations
	4	Moderate shyness shown initially shyness never totally dissipates during visit; talks occasionally throughout visit
	5	Extreme shyness shown initially; shyness shown throughout visit; rarely, if ever, talks to visitors
Prone to Anger/Irritability	1	No signs of anger or irritability at all
	2	Only subtle or ambiguous signs of anger/irritability; shows in 1 or 2 fleeting instances
	3	Mild anger or irritability; shown in only appropriate situations
	4	Moderate anger/irritability in 1-3 situations, and/or mild anger throughout
	5	Extreme anger/irritability in 1-3 situations, and/or child frequently shows some anger or even aggressiveness
Prone to Sadness	1	No signs of sadness at all
	2	Only subtle or ambiguous signs of sadness; shows in 1 or 2 fleeting instances
	3	Mild sadness; shown in only appropriate situations
	4	Moderate sadness in 1-3 situations, and/or mild sadness throughout
	5	Extreme sadness in 1-3 situations, and/or child frequently shows some sadness, disappointment
Contentment	1	Rarely, if ever, shows any signs of contentment, even in positive, non-arousing situations
	2	Mild signs of contentment; shown only in positive, non-arousing situations
	3	Moderate contentment; shows clear signs at least half of the time
	4	Typically contented; shows clear signs in most activities where child is not specifically stressed
	5	Contented throughout visit, except in the few situations where child is specifically most stressed; consistently shows quiet smiling

Exuberance	1	No sign of exuberance, ever; always restrained; may appear lethargic
	2	Only slight or ambiguous signs of exuberance, but restrained quickly
	3	Unambiguous tendency toward exuberance; often shows some restraint
	4	Typically exuberant; may show signs of restraint in 1 or 2 situations
	5	Highly exuberant; laughs, squeals, etc., without inhibition
Anticipatory Positive Affect	1	No sign of anticipatory positive affect; no "approach behavior"
	2	Only slight or ambiguous signs of positive anticipation (fleeting smile or glance)
	3	Unambiguous, but mild signs of positive anticipation (sustained smile, slight wiggling)
	4	Moderate signs of positive anticipation (definite wiggling, looks of excitement, big smiles, movement toward object)
	5	Excitedly anticipates all activities; approaches eagerly
Impulsivity	1	No signs of impulsivity, ever
	2	Only slight or ambiguous signs of impulsivity, but restrained quickly
	3	Unambiguous tendency toward impulsivity; often shows some restraint
	4	Typically impulsive; may show signs of restraint in 1 or 2 situations
	5	Consistently impulsive; shows little, if any, inhibition
Compliance with Experimenter	1	Substantial non-compliance; shows enough defiance throughout visit to make testing very difficult
	2	Moderately non-compliant; problem severe enough to make testing more difficult than usual
	3	Mild, but unambiguous signs of non-compliance; compliant at least half the time
	4	Typically compliant; shows subtle or ambiguous signs of non-compliance in 1-3 instances
	5	Totally compliant; no opposition noted
Compliance with Primary Caregiver	1	Substantial non-compliance; few, if any, signs of compliance; may make testing very difficult
	2	Moderately non-compliant; child refuses, ignores, or disregards parent's requests most of the time; may make testing more difficult than usual
	3	Mild, but unambiguous signs of non-compliance; compliant at least half the time
	4	Typically compliant; shows only subtle or ambiguous signs of non-compliance in 1-3 instances
	5	Totally compliant; no opposition noted
Avoiding, Averting / Resistance with Primary Caregiver	1	Substantial signs of averting behavior or avoidance of parent's initiations; few, if any, signs of interest in and responsiveness to parent's initiations
	2	Moderate evidence of avoiding or averting behavior; several instances of interest in and responsiveness to parent's initiations
	3	Mild amount of averting/avoiding behavior with parent; shows interest in and responsiveness to parent's initiations at least half the time
	4	Typically shows interest in and responsiveness to parent's initiations; shows only subtle or ambiguous signs of rejection or avoidance of parent's initiations
	5	Consistently interested in and responsive to parent's initiations; no evidence of avoiding/averting behavior noted

Appendix C. Post-visit observer ratings codes (Gagne et al., 2011).

Appendix D

Code	Description	Definition
1	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 an angry face about something 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.
2	Intrusive	Mother forces her own agenda on infant. This may include verbally encouraging a frightened infant (tone must have forceful or insistent quality), physically moving the infant's arm, head, or body when undesired, distracting the infant with new 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. If intrusive co-occurs with mismatched affect, code mismatched affect.
3	Mismatched affect	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 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.
4	Withdrawn/ Distracted	Mother physically moves away from the infant or abruptly stops interacting with the infant. May be expressionless or withdrawn (e.g., sitting back in chair, not making eye contact, or watching infant). Includes infant-focused behaviors that do not maintain contact/interaction (e.g., moving away, picking up pacifier/strap/cue card without engaging in other ways like vocalizing). Mother may be engaged in activities that are non-infant focused (e.g., reading cue card) or infant focused (e.g., holding object not supposed to be in SFP). This is a short-term, transitional behavior. Do not code for more than 5 seconds. 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.
5	Persistent Ineffective	Mother continues to respond to infant in the same potentially sensitive manner (engaged, support, calming) when it is not effective and alternative responses are available. Examples include repeatedly presenting hand gestures 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. If the mother is playing the same game but makes new subtle changes (e.g., presents it differently, 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., manipulates hand gestures in several ways, but has done them all before).

6	Monitoring/ Supportive	Mother watches infant or monitors situation. May be jointly focused on object with infant. Can include verbal or physical touching, but is not engaging with child.
7	Calm Engagement	Mother interacts with or plays with the infant (typically mother-initiated). May include vocalizing, making faces, singing, etc. Includes any vocalizing that is not covered by other categories. If there is eye contact, code as positive play. Is not necessarily social or reciprocal with the infant.
8	Positive Play	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. Includes responding to infant's affective reaction (e.g., laughing when infant is excited/enthusiastic). More of a reciprocal interaction.
9	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.

Table D1. T4 (6-month) maternal sensitivity codes (Leerkes, 2010).

CODE		Sensitivity Rating if Infant Affect:		
		Positive	Neutral	Negative
1	Negative	1	1	1
2	Intrusive	1	1	1
3	Mismatched Affect	1	1	1
4	Withdrawn/Distracted	1	2	1
5	Persistent Ineffective	2	2	2
6	Monitoring	2	3	1
7	Calm Engagement	3	3	3
8	Positive Play	3	3	2
9	Routine Care	3	3	1

Table D2. Conversion of maternal sensitivity code to final maternal sensitivity rating (Leerkes, 2010). *Note.* 1 = less sensitive, 3 = more sensitive.