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PTSD AND DYSFUNCTIONAL PARENTING:
EMOTIONAL AND BIOLOGICAL MECHANISMS

by

Molly Reis Franz

A DISSERTATION

Presented to the Faculty of
The Graduate College at the University of Nebraska
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Major: Psychology

Under Supervision of Professor David DiLillo

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PTSD AND DYSFUNCTIONAL PARENTING:
EMOTIONAL AND BIOLOGICAL MECHANISMS

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Advisor: David DiLillo

Women are disproportionately at risk for developing PTSD following exposure to trauma. Among its many harmful effects, PTSD is associated with a range of negative family outcomes, including impairments in parenting behaviors. Despite the prevalence of PTSD and its impact on parenting, little is known about the mechanisms responsible for this association. The present project addressed this gap by examining the impact of PTSD on dysfunctional parenting behaviors in a lab setting. Based on prior theory and empirical evidence, I expected that a diagnosis of PTSD would be associated with more dysfunctional parenting (i.e., harsh/overreactive and lax/permissive behaviors) during routine mother-child discipline encounters. Further, drawing on research linking negative emotion and greater cortisol dysregulation to both PTSD and dysfunctional parenting, I expected emotional and physiological reactivity to mediate the relation between PTSD status and parenting behaviors. To test these hypotheses, 78 mothers and their 18- to 36-month-old children completed a task designed to elicit parental responses to typical instances of child misbehavior. Mothers then viewed a video of the interaction and provided in-the-moment ratings of their experienced emotions. Salivary cortisol was collected from mothers prior and subsequent to the lab paradigm to assess stress-related cortisol reactivity. PTSD diagnosis was assessed via the CAPS-5 interview. Findings revealed that mothers with PTSD were more likely to engage in lax parenting behaviors during

the discipline encounter. Contrary to hypotheses, PTSD status was not significantly associated with overreactive parenting behaviors, and negative emotion and cortisol reactivity did not mediate relations between PTSD and dysfunctional parenting, when controlling for important covariates. Findings suggest that PTSD symptoms might increase mothers' tendency to avoid making effortful attempts to manage child misbehavior during challenging parent-child interactions. Mothers with PTSD might benefit from interventions that help them set consistent limits in the context of everyday discipline encounters with their children.

DEDICATION

To my mother and father, Linda and Scott—for striking that perfect balance between always believing in me and encouraging me to never settle for less than my best.

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CHAPTER 1: INTRODUCTION

Women are disproportionately at risk for developing PTSD following exposure to trauma. In fact, given exposure to similar traumatic events, women are twice as likely as men to develop PTSD (Breslau, 2009; Norris, Foster, & Weisshaar, 2002). PTSD is associated with reduced quality of life and impairments across a number of domains, including poorer mental health outcomes and occupational and academic problems, (e.g., Kessler, 2000; Schnurr, Hayes, Lunney, McFall, & Uddo, 2006). Although the psychological effects of trauma exposure are well documented, comparatively less is known about the impact of trauma on interpersonal functioning. Broadly, the psychological sequelae of PTSD include difficulties managing affective responses to provocative situations, particularly those requiring emotion regulation (e.g., Chemtob, Novaco, Hamada, Gross, & Smith, 1997), and these deficits can have a pervasive impact across different kinds of relationships. The present study will examine one important domain of interpersonal functioning—parent-child interactions—that may be disrupted by maternal PTSD. Although significant work has examined the potential impact of trauma and PTSD on parenting behaviors (e.g., Banyard, 1997; Banyard, Williams, & Siegal, 2003; DiLillo & Damashek, 2003; Leen-Feldner, Feldner, Bunaciu, & Blumenthal, 2011; Samper, Taft, King, & King, 2004), few investigations have observed maternal behaviors in the context of a standardized discipline encounter, and virtually no research has examined factors that might mediate the relation between maternal PTSD and observed parenting behaviors. The present study fills this void by: a) clarifying the impact of PTSD on mothers' discipline behaviors with young children, and b) investigating two potential mechanisms underlying this relationship.

Women's Vulnerability to PTSD

Parenthood and PTSD are not mutually exclusive. Nationally representative surveys of adults living in the U.S. indicate that over 15 million people will both develop PTSD in their lifetime and have at least one biological child (Lauterbach et al., 2007; Leen-Feldner et al., 2011). Further, data from the National Comorbidity Study shows that just under three-quarters of individuals meeting criteria for PTSD are mothers (Nicholson, Biebel, Williams, & Katz-Leavy, 2002). Although, compared to women, a greater proportion of men experience traumatic events (61% vs 51%), the lifetime rate of PTSD is approximately twice as high among women (10% of women compared to 5% of men; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Women may have increased vulnerability because they are more likely to experience certain kinds of interpersonal violence (i.e., sexual assault; intimate partner violence), known to yield higher rates of PTSD compared to other events (Breslau, Chilcoat, Kessler, & Davis, 1999). Further, women have a greater conditional probability of developing PTSD following interpersonal trauma compared to men; epidemiological research demonstrates that women exposed to interpersonal violence have a 36% likelihood of developing PTSD compared to 6% of men (Breslau et al., 2002). Women's heightened vulnerability to PTSD, in combination with the fact that mothers serve as the primary caregiver for most young children throughout early life (Vespa, Lewis, & Krieder, 2013), suggest that maternal PTSD has the potential to affect parenting behaviors during a child's early years.

Maternal Mental Health and Parenting

General mental health and depression. Psychopathology of various types can have a detrimental impact on parenting behaviors among mothers of young children (Gerlsma, Emmelkamp, & Arrindell, 1990; McCabe, 2014; Goodman & Brumley, 1990). Impairments in

cognition, affect, and behavior, which accompany many mental health disorders, have the potential to affect mothers' emotional availability, level of responsiveness to a child's needs, and child-rearing practices (e.g., Downey & Coyne, 1990; Levendosky & Graham-Bermann, 2001). Parental depression, anxiety, schizophrenia, personality disorders, and substance use disorders have repeatedly been linked to disruptions in parenting capabilities in the form of greater parental negativity and ineffective discipline behaviors (see Berg-Nielsen, Vikan, & Dahl, 2002 for a review). For example, parental negativity, which may take different forms (e.g., nagging, criticizing, belittling, rejecting), occurs at higher rates among mothers with depression, anxiety, substance use, and personality disorders (e.g., Berg-Nielsen et al., 2002; Eiden, Leonard, Hoyle, & Chavez, 2004; Goodman & Brumley, 1990). Ineffective discipline behavior strategies, which include harsh, inconsistent, and neglectful parenting behaviors, are also observed more frequently in families with mental illness (e.g., Bailey, Hill, Oesterle, & Hawkins, 2009; Berg-Nielsen et al., 2002; Burstein, Stanger, Kamon, & Dumenci, 2006).

In particular, maternal depression, which is highly comorbid with PTSD (Kessler et al., 1995), has been consistently associated with increases in parental negativity, as well as more frequent use of dysfunctional discipline behaviors (see Lovejoy, Graczyk, O'Hare, & Neuman, 2000 for a meta-analysis). The emotional demands of depression may result in mothers withdrawing from challenges or interacting in insensitive ways that hinder effective parenting (e.g., Teti & Cole, 2011). Compared to mothers without major depressive disorder, depressed mothers exchange fewer interactions with their children (e.g., Field et al., 2007; Righetti-Veltima, Conne-Perréard, Bosquet, & Manzano, 2002), use less positive parenting behaviors (e.g., Kavanaugh et al., 2006), and show less sensitivity to child cues and emotions (e.g., Field, 2002). Furthermore, observational studies reveal that mothers with major depressive disorder are

less able to regulate affect or behavior, and demonstrate more negativity, as well as less positivity, during parent-child interactions (e.g., Cohn, Campbell, Matias, & Hopkins, 1990; Radke-Yarrow, Nottelmann, Balmont, & Welsh, 1993).

PTSD. Analogous to the negative impact of depression on parenting behaviors, there is reason to believe that PTSD may pose unique challenges to parenting. Broadly, PTSD is characterized by a persistent sense of current threat that results in experiential, emotional, and behavioral avoidance patterns, as individuals attempt to limit their own exposure to emotionally evocative cues (Marx & Sloan, 2005). However, parent-child interactions are frequently characterized by challenging encounters in which parents must manage their own emotional and behavioral reactions in service of their child's wellbeing. In particular, trauma symptoms characterized by alterations in arousal and reactivity (i.e., hyperarousal), which often manifest in irritability and anger reactions (Orth & Wieland, 2006), may impinge upon a parent's ability to use sensitivity when interacting with children, resulting in more frequent outbursts of negative emotion directed toward the child (i.e., harsh/overreactive parenting). Alternatively, symptoms reflecting emotional avoidance and numbing (characteristic of negative alterations in cognitions and moods associated with PTSD), may influence a parent who is easily overwhelmed by a child's misbehavior to respond by withdrawing from the situation (i.e., lax/permissive parenting).

Qualitative Research on PTSD and Parent-Child Interactions

In support of the above propositions are two qualitative studies in which parents with trauma histories were asked to describe the ways in which their experiences have impacted their parenting (Levendosky, Lynch, & Graham-Bermann, 2000; Sherman et al., 2016). Using a sample of mothers exposed to domestic violence, Levendosky et al. (2000) found that

approximately 75% believed their partner's violence impacted their parenting—for example, citing beliefs that the abuse interfered with their ability to provide love and time to their children. A more recent qualitative study of veteran parents with PTSD revealed themes related to parenting difficulties, as well as emotional and behavioral reactions among their children (Sherman et al., 2016). Specifically, Sherman et al., (2016) asked male and female veterans to share accounts of how their PTSD symptoms negatively impacted the parenting of their 4 to 18-year old children. Veterans reported challenges related to a number of PTSD symptoms, including avoidance of trauma-related reminders (e.g., “So I don’t go out; I don’t do anything; So even socializing with my kids, it’s really hard for me because I can’t say, ‘Hey let’s go play ball or let’s go do whatever’”), negative alterations in cognitions and mood (e.g., “I’m not always in the present; I’m kind of locked in my head...it’s not that I don’t love them; it’s just I’m not really there”), and alterations in arousal reactivity (e.g., “I’m as patient as I can be to a point and then there is an immediate spike; there isn’t really an in-between”). Finally, veterans reported concerning reactions in their children, including both emotional distress (e.g., “They’re afraid to talk to me”), and behavioral concerns (e.g., “They’re learning that behavior too...I can hear how they [my daughters] talk to each other; it’s what or how I talk to them...it’s a learned behavior they are learning”).

Quantitative Research Linking PTSD and Parenting Behaviors

Quantitative research also consistently indicates that parents experiencing PTSD report multiple challenges, including greater family violence, lower parenting satisfaction, poorer parent-child relationships, and greater offspring behavior problems, compared to parents without PTSD (e.g., Lauterbach et al., 2007; Leen-Feldner et al., 2011; Jordan et al., 1992; Ruscio, Weathers, King, & King, 2002; Samper et al., 2004; see Leen-Feldner et al., 2011 and van Ee,

Kleber, & Jongmans, 2015 for reviews). Survey data collected from male combat veterans (Ruscio et al., 2002; Samper et al., 2004) suggests a link between paternal PTSD and poorer perceived relationship quality with children, even after controlling for symptoms of depression (Samper et al., 2004). Further, survey and observational findings reveal positive associations between PTSD symptom severity and dysfunctional parenting behaviors specifically (Ammerman, Putnam, Chard, Stevens, & Van Ginkel, 2012; Hershkowitz, Dekel, Fridkin, & Freedman, 2017; Leen-Feldner et al., 2011; Lyons-Ruth & Block, 1996; Schechter et al., 2008, 2010; van Ee, Kleber, & Mooren, 2012). For example, utilizing epidemiological data from the National Comorbidity Survey-Replication, researchers found a positive association between parental PTSD and moderate physical aggression toward children, even after accounting for socioeconomic status and depression (Leen-Feldner et al., 2011). Similarly, observations of interactions between asylum seekers and their 18 to 36 month old children indicated that higher maternal PTSD predicted more insensitive, unstructured, and hostile parenting behaviors during unstructured free play (van Ee et al., 2012). Further supporting these findings, Ammerman et al. (2012) compared a sample of depressed mothers with and without PTSD to examine the potential influence of symptoms on parenting deficits. Results revealed that among depressed mothers with PTSD, greater PTSD severity was associated with higher parenting stress, as well as increased use of restriction and punishment during naturalistic home visits, even after controlling for depression severity.

To understand how PTSD might negatively affect parenting on a more detailed level, researchers have also assessed whether specific PTSD symptom clusters differentially impact parenting. In particular, emotional numbing and avoidance symptoms, as well as alterations in arousal and reactivity, may increase risk for negative parenting outcomes. PTSD-related

emotional numbing is a strong predictor of interpersonal problems across many types of relationships (e.g., intimate partner, friendships; Kuhn, Blanchard, & Hickling, 2003; Riggs, Byrne, Weathers, & Litz, 1998), and recent survey research suggests these challenges extend to parent-child relationships. Specifically, investigations of both veterans and civilians indicate that increased emotional numbing symptoms predict poorer parenting satisfaction, increased disengagement, reductions in warmth and empathy toward children, and greater parent-child aggression (Lauterbach et al., 2007; Ruscio et al., 2002; Samper et al., 2004). Although observational research is rare, Brockman et al., (2016) found that among 184 male service members, their spouses, and their children, PTSD-related avoidance symptoms predicted less observed positive engagement and more withdrawal and distress avoidance during problem-solving tasks. It is also possible that symptoms reflecting increases in arousal and reactivity negatively impact parental discipline behaviors. Anger outbursts and violence are more common in families with PTSD (e.g., Monson, Taft, & Fredman, 2009) and investigations of high-risk samples demonstrate that anger increases the likelihood of physical abuse and harsh discipline (Peterson, Ewigman, Vandivar, 1994; Shay & Knuston, 2008). Thus, “hostile” parenting tactics may be another pathway through which PTSD-related increases in arousal and reactivity may be linked to parenting outcomes (Leen-Feldner et al., 2013).

Summary of PTSD and Parenting

Decades of research show that parents with mental illness, including PTSD, are more likely to utilize ineffective behaviors in parenting young children. Qualitative, quantitative, and observational research suggests that PTSD negatively impacts myriad parenting outcomes, including parenting satisfaction, parental engagement, and the quality of parent-child relationships. In particular, these findings have begun to elucidate how parental PTSD might

increase the risk of maladaptive parenting behaviors in the context of *discipline encounters* to ultimately negatively impact child outcomes. Despite these findings, the existing research has several methodological limitations. First, most work to date focuses on specific trauma-exposed populations (e.g., combat veterans, mothers exposed to intimate partner violence); less is known about whether community samples of mothers with diverse trauma experiences are similarly affected. Next, in most prior work, PTSD symptoms are assessed via self-report; however, diagnostic interviewing methods (i.e., the gold-standard approach to assessing PTSD) are needed to facilitate more objective measurement of symptoms. Finally, the bulk of existing observational research has examined parenting behaviors in the context of unstructured free play paradigms (i.e., naturalistic parent-child interactions). Yet these paradigms may not generate instances of child misbehavior that enable observation of parental limit-setting, which is likely to be particularly impacted by PTSD; further research using tasks specifically designed to elicit discipline encounters is needed. The present study aims to address these limitations.

PTSD, Experienced Emotion, and Parenting Behaviors

If, as suggested above, PTSD has the potential to interfere with effective parenting behaviors, an important next step is to examine mechanisms that may account for this association. Knowledge of these mechanisms may reveal important processes that can be targeted through intervention to improve parenting behaviors of mothers with PTSD. Evidence from the parenting literature indicates that the emotions mothers experience when engaged in stressful interactions with their children may be an important factor linking PTSD to impaired parenting. Interactions in which mothers must manage child misbehavior that is largely out of their control often elicit negative parental emotions (Arnold & O'Leary, 1995; Dix, 1991; Lorber, 2007). Frequency and intensity of these emotions, in turn, may potentiate or inhibit

certain parenting behaviors in an attempt to maintain or change child behavior (Berg-Nielsen et al., 2002; Dix, 1991; Lorber & Slep, 2005). Consequently, effective parenting responses to child misbehavior are believed to require significant emotion regulation (Deater-Deckard, Sewell, Petrill, & Thompson, 2010; Lorber, 2012).

Research to date consistently reveals predicted associations between experienced emotion, emotion regulation, and parenting behaviors. Recent meta-analyses support broad linkages between negative emotions and hostile parenting and, conversely, between positive emotions and supportive parenting (Rueger, Katz, Risser, & Lovejoy, 2011). Observations of mother-child interactions reveal that mothers who report experiencing greater negative emotion are more likely to engage in harsh/overreactive (Arnold & O'Leary, 1995; Lorber & O'Leary, 2005) and lax/permissive discipline behaviors (Lorber, 2007). For example, Lorber and O'Leary (2005) observed a community sample of mother-child dyads participating in a stressful laboratory interaction, then asked mothers to recall the emotional experience they were having while watching their interaction on video. Results supported a mediational model in which toddler misbehavior resulted in greater negative emotions, which in turn were associated with overreactive discipline behaviors. Research using the same video-recall technique also demonstrates links between maternal experience of negative emotions and greater lax parenting (Lorber, 2007).

With increasing intensity of negative emotion, parents may even experience a sense of emotional flooding. Flooding, a construct originally conceptualized by Gottman (1993), refers to the experience of unexpected negative emotions that are intense, overwhelming, and disorganizing, and sometimes result in the individual terminating that interaction by whatever means necessary. Flooding is associated with the use of negative behaviors in observations of

couples conflict (Gottman, 1993), as well as both overreactive and lax discipline behaviors among parents (e.g., Lorber, Mitnick, & Slep, 2016). When parents are tasked with managing child noncompliance, greater intensity of conflict or child distress (e.g., crying) may result in an overload of negative emotions indicative of flooding. Parents who experience this flooding may resort to a swift, yet ineffective response, such as yelling, or conversely, withdrawing, as a means of terminating the interaction and escaping the experience of overwhelming distress (Lorber & Slep, 2005).

Empirical results support the possibility that maternal PTSD may lead to strong negative emotional responses during challenging parent-child interactions. Compared to individuals without PTSD, those with PTSD report experiencing more negative affect (e.g., fear, anger, sadness) and less happiness, both overall (Finucane, Dima, Ferreira, & Halvorsen, 2012), and on a daily basis (Kashdan, Uswatte, Steger, & Julian, 2006). PTSD is also associated with more intense subjective and physiological reactions to emotionally evocative situations (e.g., Chemtob, Hamada, Roitblat, & Muraoka, 1994; Orsillo, Batten, Plumb, Luterek, & Roessner, 2004). Moreover, attempts to limit or avoid exposure to emotionally activating events, can paradoxically lead to increased distress among individuals with PTSD (e.g., Marx & Sloan, 2005). Because discipline encounters with children can generate negative emotions, the redirection of attention toward reducing one's own emotional distress among individuals with PTSD may result in maladaptive parenting responses. Specifically, mothers with PTSD may engage with children in a more hostile manner in an attempt to suppress emotionally aversive child behavior as quickly as possible, or "give in" to their child in an attempt to spare themselves the experience of negative emotions.

PTSD, Cortisol Reactivity, and Parenting

Although associations between PTSD and parenting difficulties are well established, and may be mediated by mothers' emotional experience, the physiological state of the mother, in the context of a stressful parent-child interaction, may also play an important role in mothers' parenting behaviors (e.g., Gonzales, Jenkins, Steiner, & Fleming, 2012; Juul et al., 2015, Schechter et al., 2004). Support for this supposition comes from research highlighting the impact that various maternal biological factors (e.g., genetics, endocrine functioning) can have on parenting and subsequent child outcomes (e.g., D'onofrio & Lahey, 2010; Hibel, Granger, Blair, & Finegood, 2015). In particular, the hypothalamic-pituitary-adrenal (HPA) axis, part of the neuroendocrine system responsible for regulating human stress reactions, may play a major role in facilitating optimal parent-child interactions (e.g., Hibel et al., 2015). A primary function of the HPA axis is to regulate the release of cortisol, a glucocorticoid (i.e., steroid hormone), produced from cholesterol in the two adrenal glands located on top of the kidney. When an individual encounters a stressful situation, the perception of threat triggers the autonomic nervous system, resulting in a cascade of neurochemical events, starting in the hypothalamus. When the sympathetic nervous system is stimulated (e.g., in response to an environmental stressor), the hypothalamus releases corticotropin releasing hormone (CRH) to the pituitary gland. CRH activates the pituitary gland to release the adrenocorticotrophic hormone (ACTH). ACTH in turn alerts the adrenal glands by stimulating them to release cortisol, which helps maximize one's ability to respond effectively to distress (e.g., by sharpening cognition). After a period of elevation, a negative feedback loop, facilitated by another endogenous steroid known as dehydroepiandrosterone (DHEA), functions to inhibit the release of cortisol, returning the body to homeostasis (i.e., habituation of the cortisol response; for a review see Sapolsky, Romero, & Munck, 2000).

Decades of research reveal bidirectional links between psychopathology and cortisol dysregulation (e.g., Burke, Davis, Otte, & Mohr, 2005; Ruttle et al., 2011). Cortisol dysregulation can originate from, as well as contribute to psychological symptoms, due to the way it affects individual responses to stress. Specifically, both hypersecretion and hyposecretion of cortisol place individuals at greater risk for nonoptimal emotional and behavioral outcomes (e.g. Laurent, Gilliam, Wright, & Fisher, 2015; Ruttle et al., 2011). Much of the research focused on the link between cortisol and behavior utilizes experimental paradigms in which individuals are exposed to a stressor, followed by measurement of change in cortisol prior to, and following the task. Under typical conditions (e.g., in the absence of psychopathology) relatively small stressors that occur with regularity (e.g., child noncompliance) are unlikely to produce major spikes in cortisol reactivity (e.g., Smyth et al., 1998; van Eck, Berkhof, Nicolson, & Sulon, 1996). In contrast, individuals with psychopathology are more likely to produce dysregulated cortisol in response to stress, which in turn predicts maladaptive behavioral and emotional responses (e.g., Juul et al., 2015; Shirtcliff & Essex, 2008).

Individuals with PTSD in particular do not appear to experience the usual habituation of the cortisol response in the face of stress. Rather, trauma appears to place an excessive demand on the HPA axis, which compromises the ability of the HPA axis to mediate stress, thereby contributing to cortisol dysregulation (McEwen, 2000). Multiple explanations have been advanced to clarify the link between cortisol dysregulation and PTSD (Yehuda, 2002). One possibility is that, although cortisol release is usually terminated once a stressor has been addressed, the frequent perceptions of threat associated with PTSD trigger a cascade of cortisol release (e.g., Heim & Nemeroff, 1999; Yehuda, 2002). In this way, the symptoms of PTSD (i.e., hyperarousal) cause the body to remain in a persistent state of threat, resulting in prolonged

activation of the cortisol stress response. A second possibility is suggested by the attenuation hypothesis (Gunnar & Vazquez, 2001; Heim, Ehlert, & Hellhammer, 2000; Yehuda, 2002), which posits that trauma-induced elevations in cortisol result in downregulated HPA functioning over time to protect brain structures from adverse effects associated with prolonged exposure to cortisol. More specifically, the toll on the body resulting from chronic activation of the HPA axis, known as allostatic load (McEwan & Seeman, 1999), may decrease the synthesis of hormones in the HPA axis, downregulating pituitary receptors, and altering glucocorticoid receptor sensitivity (Gunnar & Vazquez, 2001; McEwan & Seeman, 1999). Interestingly, although the body's shift to hyposecretion of cortisol in response to trauma is considered physiologically adaptive, research shows that reduced cortisol secretion can have adverse effects on emotional and behavioral outcomes (e.g., Ruttle et al., 2011).

Supporting both of the above theories, research shows that trauma and PTSD are associated with both cortisol hyperactivity and hyporeactivity. In accordance with the first scenario, researchers examining cortisol levels of trauma-exposed individuals have found evidence of hypersecretion of cortisol both over the course of a day and in response to acute stress (e.g., Elzinga, Schmahl, Vermetten, van Dyck, & Bremner, 2003; Heim et al., 2000; Inslicht et al., 2006; Lemieux & Coe, 1995; Liberzon, Abelson, Flagel, Raz, & Young, 1999). For example, using a sample of women exposed to lifetime intimate partner violence (IPV), researchers compared daily cortisol output of those who had developed PTSD versus those who had not. Women with IPV-related PTSD showed significantly higher cortisol output over the course of a day, compared to women without PTSD, after controlling for age, depression, severity, and latency of the abuse (Inslicht et al., 2006). In contrast, supporting the attenuation hypothesis are findings in which a history of trauma and PTSD are associated with *lower* daily

cortisol and dampened cortisol reactivity (e.g., Brand et al., 2010; Miller, Chen, & Zhou, 2007; Morris, Compas, & Garber, 2012; Yehuda et al., 1990). For example, a significant body of work by Yehuda and colleagues across a variety of populations supports the hypothesis that circulating levels of cortisol decrease in response to trauma exposure (e.g., Yehuda et al., 1995; Yehuda et al., 1990). These findings indicate that trauma exposure may be associated with an enhanced negative feedback function in response to stress.

The above findings, which demonstrate that typical cortisol reactivity is altered among individuals with PTSD, and that cortisol dysfunction is associated with negative behavioral outcomes, suggest the possibility that cortisol dysregulation among mothers with PTSD increases risk for harsh and lax parenting. Reflecting a U-shaped function between cortisol levels and behavioral risk (Aardal-Eriksson, Eriksson, & Thorell, 2001; de Kloet, Oitzl, & Joëls, 1999; Mason et al., 2001), previous research has linked both high and low cortisol reactivity to poor parenting outcomes (e.g., Mills-Koonce et al., 2009, Schechter et al., 2004). More specifically, mothers with both high and low cortisol reactivity have been found to engage in overreactive parenting behaviors (e.g., Mills-Koonce et al. 2009; Martorell & Bugental, 2006) and withdrawal behaviors (e.g., Juul et al., 2015; Schechter et al., 2004). For example, using a sample of 175 mother-child dyads, Mills-Koonce et al. (2009) found that higher baseline salivary cortisol was associated with greater observation of negative-intrusive caregiving behaviors during a free play interaction task. Similarly, Martorell and Bugental (2006) found higher levels of cortisol reactivity during a parent-child interaction to predict greater levels of harsh parenting practices among a high-risk, low income population. In contrast, Schechter et al. (2004) found a trend between lower (rather than higher) cortisol reactivity during a videotaped play session, and disrupted maternal communication, among a sample of mothers with lifetime histories of

interpersonal violence trauma. Similar findings emerged in a study examining parenting style among 225 mother-child dyads; those mothers with a history of child trauma exhibited blunted cortisol reactivity, which was associated with reduced affective expression during an infant stressor paradigm (Juul et al., 2015). Although associations between cortisol reactivity and parenting are complex, and there is not a one-to-one relationship between cortisol reactivity and behavioral responses (e.g., Ursache, Blair, Granger, Stifter, & Voegtline, 2013), on the whole, evidence supports the hypothesis that cortisol hyperactivity and hypoactivity will be associated with nonoptimal parenting outcomes in the form of overreactive and lax parenting.

Summary of Mechanisms

Research showing that PTSD predicts greater negative emotions and cortisol dysregulation in response to acute stress, in combination with findings that greater negative emotion and dysregulated cortisol predict ineffective parenting styles, suggest that experienced emotion and cortisol reactivity might serve as important mechanisms between PTSD and dysfunctional parenting. Thus, one important aim of the present study was to examine the dual mechanisms of experienced emotion and cortisol reactivity in accounting for parenting behaviors among mothers with PTSD. Importantly, in contrast to most prior work, biological, emotional, and behavioral processes were measured as they unfolded during a standardized lab task in the present study. Measuring these processes *in vivo* enabled examination of the real-time relationships among these factors, which is ultimately needed for the development of more targeted interventions.

Differentiating the Effects of a PTSD Diagnosis Versus Partial PTSD

The above theory and research suggest that individuals meeting criteria for PTSD may struggle to parent effectively, in part due to increases in negative emotion and cortisol

dysregulation. A related question, however, is whether similar associations exist among individuals who have experienced a traumatic event but who do not meet full criteria for PTSD. Termed the *threshold dilemma* (Horowitz, Weiss, & Marmar, 1987), experts have long debated what comprises a normal versus pathological response to a traumatic event. Individuals exposed to trauma may experience symptoms below the number and intensity of symptoms meeting diagnostic threshold for PTSD in the DSM-5, yet these symptoms may still be associated with clinically significant distress and psychosocial impairment (Kulka et al., 1990; Weiss et al., 1992). These findings raise questions about the taxonomy of PTSD and have led some researchers to suggest that the line between typical and abnormal responses to trauma is blurred (McGlaughlin et al., 2015; Ramsay, Gorst-Unsworth, & Turner, 1993; Ruscio, Ruscio, & Keane, 2002; Stein, Walker, Hazen, & Forde, 1997). Indeed, although definitions of partial PTSD vary (Bergman, Przeworski, & Feeney, 2017; McGlaughlin et al., 2015), evidence suggests that those whose symptom intensity and count do not fully meet criteria for PTSD still experience intermediate levels of distress and impairment between those with PTSD compared to those with no symptoms (e.g., Breslau, Lucia, & Davis, 2004; Lai, Chang, Connor, Lee, & Davidson, 2004; Jakupcak et al., 2007; Stein et al., 1997; Zlotnick, Franklin, & Zimmerman, 2002). For example, using a sample of 1,002 community participants, Stein et al. (1997) found that while individuals with full PTSD had greater work and school-related functional impairment compared to those with only partial symptoms, the latter group, and women in particular, experienced significantly greater impairment than trauma-exposed participants with zero to minimal symptoms. Individuals with partial PTSD may even experience comparable levels of distress and impairment to those with full PTSD across certain domains, particularly social and family functioning (Stein et al., 1997; Zlotnick et al., 2002). Indeed, Stein et al. (1997) found that

individuals with either full or partial PTSD had equal levels of impairment across social and family functioning domains and endorsed similar levels of help-seeking behaviors.

Thus, there is reason to believe that trauma survivors with sub-clinical symptomatology may also experience parenting difficulties arising from strong negative affect and cortisol reactivity in response to stressful parenting interactions. This possibility is further supported by work finding that trauma exposure, regardless of diagnostic status, predicts negative parenting behaviors, as well as alterations in emotional and physiological reactivity. Specifically, correlational findings reveal increased use of physical and psychological aggression (Cohen, Hien, & Batchelder, 2008; Lyons-Ruth & Block, 1996), as well as decreased parenting satisfaction and child neglect (Banyard et al., 2003), among trauma-exposed mothers, regardless of whether they met full criteria for a diagnosis. Furthermore, trauma exposure, independent of PTSD diagnosis, predicts increased negative emotion (Farris, Zvolensky, Beckham, Vujanovic, & Schmidt, 2014), as well as cortisol dysregulation (see Shea, Walsh, MacMillan, & Steiner, 2004 for a review). Thus, although the primary population of interest in the current study is mothers with a diagnosis of PTSD, I will also incorporate a sample of mothers who have experienced trauma and have developed partial PTSD symptoms (i.e., two or three of the required four symptom clusters; McLaughlin et al., 2015). By running two comparisons: (1) mothers with no PTSD vs. those with partial and full PTSD, and (2) mothers with no and partial PTSD vs. mothers with full PTSD, I will be able to determine the level of PTSD symptomatology (partial vs. full) at which parenting may be affected. This approach will help to more rigorously isolate the impact of a PTSD diagnosis on parenting and findings will provide clarification on the appropriate target population for intervention.

Proposed Model

Theory and empirical research suggest that psychopathology initiated by trauma may result in intensified emotional and biological reactions during challenging parent-child interactions, which, in turn may play distinct roles in shaping *in vivo* parenting behaviors of mothers with PTSD. In the present study, I tested this possibility by examining negative emotion and cortisol reactivity as possible mediators of the association between PTSD and maternal parenting behaviors (see Figure 1.1).

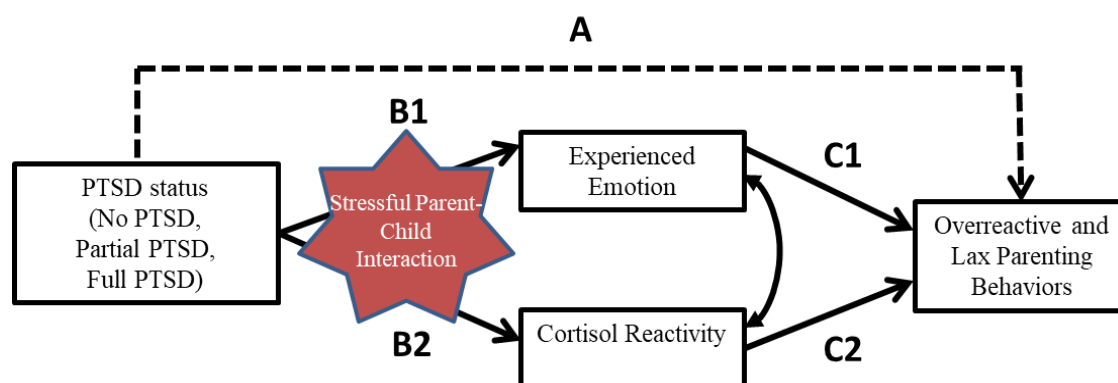


Figure 1.1. Proposed Conceptual Model

A basic premise of this model is that maternal PTSD symptoms following trauma would be directly associated with dysfunctional parenting behaviors (Path A). The influence of PTSD on emotional and biological reactivity during challenging parent-child interactions would inform these overall effects. Specifically, based on literature showing links between psychopathology, including PTSD, and more intense subjective reactions to emotionally evocative situations (e.g., Leung & Slep, 2006; Orsillo et al., 2004), I predicted that PTSD would be associated with increased negative emotions during challenging parent-child interactions (Path B1). These increased negative emotions were expected to result in increased dysfunctional parenting behaviors, as mothers attempt to limit their exposure to the distressing emotions elicited by noncompliant child behaviors (Path C1). Based on literature indicating that individuals exposed

to trauma may not experience the usual habituation of the cortisol stress response to daily stressors (McEwan, 2000), I further predicted that PTSD would be associated with increased cortisol dysregulation (i.e., hyperreactive or hyporeactive responses) during the challenging parent-child interaction (Path B2). Cortisol dysregulation in turn was expected to predict nonoptimal parenting behaviors (Path C2). Finally, testing the overall model, I expected that mothers' subjective experience of negative emotion and cortisol dysregulation would fully mediate relations between PTSD status and dysfunctional parenting (Path A). Given the novelty of this research, I tested separate components of the model and then tested the model in its entirety.

A secondary goal of this project is to clarify at what point PTSD impacts parenting. As mentioned, trauma-exposed individuals experiencing partial PTSD and those meeting full criteria for PTSD may experience similar levels of distress and impairment related to parenting. To test this possibility, I conducted two separate analyses. The first of these compared mothers with no PTSD or partial PTSD (grouped together) to mothers with full PTSD, which enabled me to determine whether full diagnosis of PTSD is the threshold at which mothers' parenting is affected. The second analysis compared mothers with partial or full PTSD (grouped together) to mothers with no PTSD, which enabled me to determine whether partial PTSD is the threshold at which mothers' parenting is affected. Taken together, comparison of results across these two sets of analyses will enable me to determine whether full PTSD, or partial PTSD, is the threshold at which mothers' parenting is affected.

The above aims and hypotheses can be summarized as follows:

Aim 1: Examine the direct effect of PTSD on maternal parenting behaviors during a discipline encounter.

Hypothesis. PTSD status will be associated with more dysfunctional parenting behaviors (i.e., greater use of both overreactive and lax responses to child misbehavior), such that (a) compared to mothers with no trauma symptoms, those with partial or full PTSD will engage in significantly higher levels of dysfunctional parenting, and (b) compared to mothers with no or partial PTSD, those with full PTSD will engage in significantly higher levels of dysfunctional parenting.

Aim 2: Investigate the role of experienced emotion in mediating associations between PTSD and maternal parenting behaviors.

Hypothesis. PTSD status will have an indirect effect on parenting behaviors through negative emotion, such that: (a) compared to mothers with no trauma symptoms, those with partial or full PTSD will report greater negative emotions, (b) compared to mothers with no or partial PTSD, those with full PTSD will report greater negative emotions, and (c) increased negative emotions will be associated with more problematic parenting. The increased negative emotion will partially account for (i.e., mediate) associations between PTSD status and dysfunctional parenting.

Aim 3: Investigate the role of cortisol reactivity in mediating associations between PTSD and maternal parenting behaviors.

Hypothesis. PTSD status will have an indirect effect on parenting behaviors through cortisol reactivity, such that: (a) compared to mothers with no trauma symptoms, those with partial or full PTSD will experience greater dysregulated cortisol reactivity (i.e., high or dampened), (b) compared to mothers with no or partial PTSD, those with full PTSD will experience greater dysregulated cortisol reactivity, and (c) greater dysregulated cortisol reactivity will be

associated with more problematic parenting. Dysregulated cortisol reactivity will partially account for (i.e., mediate) associations between PTSD status and dysfunctional parenting.

Aim 4: Examine a multiple mediator model in which experienced emotion and cortisol reactivity together mediate associations between PTSD and maternal parenting behaviors.

Hypothesis. PTSD status will be associated with more dysfunctional parenting behaviors during a discipline encounter through the mechanisms of increased negative emotions and greater dysregulated cortisol reactivity (i.e., high or dampened). The increased negative emotion and cortisol dysregulation will fully account for (i.e., mediate) associations between PTSD status and dysfunctional parenting.

CHAPTER 2: METHOD

Overall Approach

This investigation examined three groups of mothers (full PTSD, partial PTSD, no PTSD) to understand the potential impact of PTSD on maternal parenting behaviors. Experienced emotion and cortisol reactivity were tested as mediators of the expected associations between PTSD status and parenting. After completing questionnaires online at home to assess parenting-related constructs and other measures of interest (e.g., depression), mother-toddler dyads were invited for a lab visit. Mothers' PTSD status was determined through a structured clinical interview. Mother-child dyads then completed a laboratory paradigm designed to elicit a discipline encounter of the type that commonly occurs between mothers and children. Next, mothers viewed a video of the interaction and continuously rated the degree of negative emotion they experienced during the tasks to obtain in-the-moment emotional experiences. To assess stress-related cortisol reactivity, salivary cortisol was collected prior and subsequent to the lab paradigm.

Participants

Statistical power for testing the proposed models was estimated *a priori* using a Monte Carlo simulation (Muthén & Muthén, 2015; Thoemmes, Mackinnon, & Reiser, 2010). The results of a series of power analyses indicated that 75 mother-child dyads would be sufficient for testing each of the proposed models (assuming medium effect sizes and power > .80). The final sample consisted of 78 adult mothers (full PTSD = 19, partial PTSD = 24, no PTSD = 35) and their 18- to 36-month-old children recruited from Lincoln, NE. This age range is consistent with other work using the proposed mother-child lab paradigm (e.g., Lorber & Slep, 2005; Slep &

O’Leary, 1998) and is ideal because noncompliance is common among toddlers who frequently seek autonomy through limit-testing (Kalb & Loeber, 2003).

Sample demographics are located in Table 2.1. Mothers ranged in age from 21 to 45 ($M = 32.98$; $SD = 5.37$) and children ranged in age from 18-36 months ($M = 30$ months; $SD = 0.34$).

Approximately 91% of mothers identified as White ($n = 71$), while 6% ($n = 5$) identified as multiracial and 3% ($n = 2$) identified as Asian. Approximately 92% of mothers identified as non-Hispanic/Latino ($n = 72$), while 4% identified as Hispanic/Latino ($n = 3$), 3% identified as mixed ethnicity ($n = 2$), and one mother was missing data on this variable. Their children were more ethnically diverse; based on mother report, approximately 85% of children were White ($n = 66$), while 13% ($n = 10$) were multiracial and 3% ($n = 2$) were Asian. Approximately 85% of children were non-Hispanic/Latino ($n = 66$), while 13% were Hispanic/Latino ($n = 10$), 1% was of mixed ethnicity ($n = 1$), and one child was missing data on this variable. The majority of mothers were married, and less than 10% of the sample were not currently in a romantic relationship.

Approximately one third of mothers reported receiving a prior mental health diagnosis. Over three quarters of the sample were currently employed, and the modal level of education achieved was a Bachelor’s degree (approximately half of the sample). The modal combined family income was over \$100,000, but variability was evident, with approximately 34% of the sample earning below the Nebraska median household income of \$50,000 (U.S. Census Bureau, 2011).

Table 2.1

Descriptive Statistics for Demographic Variables (N = 78)

Variable	<i>N</i> or <i>M</i>	<i>SD</i> or %
Mom Age	32.98	5.37

Mom Race		
White	71	91.0%
Asian	2	2.6%
Multiracial	5	6.4%
Mom Ethnicity		
Not Hispanic/Latino	72	92.3%
Hispanic/Latino	3	3.8%
Multiethnic	2	2.6%
Missing	1	1.3%
Mom Marital Status (Married)	61	78.2%
Mom <i>not</i> in romantic relationship	7	9%
Mom ever received mental health diagnosis?	28	35.9%
Mom Currently Employed	60	76.9%
Mom Highest Education		
Less than High School	1	1.3%
High School/GED	4	5.1%
Some college	16	20.5%
Associate's	7	9%
Bachelor's	37	47.4%
Master's	10	12.8%
Professional/Doctorate	3	3.8%

Average Yearly Household Income			
	\$0-\$20,000	10	13.0%
	\$20,000-\$40,000	13	16.9%
	\$40,000-\$60,000	14	18.2%
	\$60,000-\$80,000	13	16.9%
	\$80,000-\$100,000	9	11.7%
	Over \$100,000	18	23.4%
Child Age		30 months	0.34
Child Sex			
	Female	28	35.9%
Child Race			
	White	66	84.6%
	Asian	2	2.6%
	Multiracial	10	12.8%
Child Ethnicity			
	Not Hispanic/Latino	66	84.6%
	Hispanic/Latino	10	12.8%
	Multiethnic	1	1.3%
	Missing	1	1.3%

Recruitment

Mother-child dyads were recruited from several sources. The majority of mothers ($n = 52$) were recruited through birth announcements published in the Lincoln Journal Star newspaper, which maintains an online public archive of all hospital births in Lincoln, NE and surrounding areas from 2007 to present. Each birth entry contains the names of both parents and the town in which they live. Further contact information (i.e., mailing addresses) for the parents

listed in the archive was obtained through searches of other publicly available databases (i.e., Intelius, Lancaster County Assessor website). Recruitment letters for a study of “parent-child interactions” were sent to mothers with children in the proposed age range. Mothers were also recruited via flyers throughout the Lincoln community ($n = 16$), which were predominantly placed in daycares, community centers, grocery stores, and libraries. A minority of mothers were also recruited via word of mouth, ($n = 4$), university websites and listservs ($n = 3$), and Craigslist advertisements ($n = 3$). Participants received \$10 compensation for completing the initial 30-minute online survey, and \$15 per hour during the lab portion of the study. Children received a choice of toy (e.g., stuffed animal, action figure) from a prize box.

Initial Online Screening

Prior to enrollment in the study, all participants were screened online to assess eligibility and then followed up with by phone for scheduling (See Appendix A and B for the online screening interview and scheduling script). Preliminary PTSD status was obtained during the online screen using a modified version of the Life Events Checklist for DSM-5 (LEC-5; Weathers et al., 2013a), followed by the PTSD Checklist for DSM-5 (PCL-5; Blevins, Weathers, Davis, Witte, & Domino, 2015). Consistent with recommendations by Blevins et al. (2015), a provisional PTSD diagnosis was made by following the DSM-5 diagnostic rule which requires at least: one cluster B item (i.e., intrusions; questions 1-5), one cluster C item (i.e., avoidance; questions 6-7), two cluster D items (i.e., negative alterations in cognitions and mood; questions 8-14), and two cluster E items (i.e., alterations in arousal and reactivity; questions 15-20). Each symptom rated as “moderate” or higher was considered an endorsed symptom. Participants whose responses are consistent with: a) no PTSD, b) partial PTSD, or c) full PTSD, were eligible for participation. Pregnant women were excluded from participation due to changes in cortisol

hormones that occur during pregnancy (Nolten, Lindheimer, Rueckert, Oparil, & Ehrlich, 1980). If individuals were classified into a group during the phone screen but upon the lab visit did not meet criteria for that group (e.g., screening positive for PTSD but not meeting criteria on the CAPS-5), they were reclassified into the appropriate group.

Procedures

Following screening procedures, interested participants who meet eligibility criteria were invited to complete a 30-minute online questionnaire from home, and subsequently attend a single lab visit. Data collection took place in Burnett Hall, in three private research rooms containing the necessary equipment required for data collection. Upon arrival, participants underwent informed consent procedures, and then provided the first sample of salivary cortisol. Mothers received the CAPS-5 interview. During this time, an RA supervised the child in an adjacent room with toys to allow the parent privacy. This room was out of earshot of the mother but close enough so that she could quickly and easily visit the child any time she wished. Because the CAPS-5 interview may increase cortisol reactivity, over the next 20 minutes, mothers completed a demographics questionnaire as well as several non-distressing parenting and child relevant questionnaires to allow cortisol to return to baseline. Next, just prior to the lab task, the second saliva sample was taken. Participants then completed the two discipline encounter tasks while being video-recorded in a room containing the appropriate set-up for the parent-child interaction (e.g., low tables with visually appealing objects). This room has an adjacent control room which was equipped with video equipment feeding into the participant room, allowing for recording of the session as well as a live feed in case the experimenters needed to interrupt the tasks. Cortisol was collected for a third time immediately following the parent-child interaction and again 20 minutes later. Next, mother and child had a snack together

and free play to reduce any lingering feelings of distress. Finally, mothers watched their 20-minute video and provided ratings of experienced emotion. To enable mothers to rate continuous emotions while viewing their videotaped interactions, the room was equipped with a computer with video rating software and a joystick apparatus. At the conclusion of the session, all participants underwent a full written and verbal debriefing about the purposes of the study.

Measures of Primary Study Variables

Trauma exposure and PTSD diagnosis. Upon arrival to the session, mothers completed the LEC-5 in full (Weathers et al., 2013a) to definitively determine prior exposure to traumatic events. The LEC-5 assesses exposure to 16 potentially traumatic events (e.g., *natural disaster, sexual assault, combat or exposure to a war zone*) and asks participants to endorse the manner in which they were exposed to the event (i.e., *happened to me, witnessed it, learned about it, part of my job, not sure*). The LEC demonstrates convergent validity with measures assessing exposure to potentially traumatic events, as well as stable test-retest reliability (Gray, Litz, Hsu, & Lombardo, 2004). Next, mothers who had experienced a Criterion A trauma were administered the Clinician-Administered PTSD Scale for DSM-5 (CAPS-5; Weathers et al., 2013b). The CAPS-5 was used for the final classification of participants into no PTSD, partial PTSD, or full PTSD groups. In the current study, partial PTSD was defined as meeting criteria on any two or three symptom clusters. This operationalization was based on research comparing diverse definitions of partial PTSD, which found greater adverse outcomes among those with subthreshold profiles meeting two or three symptom clusters, compared to those meeting one of the four symptom clusters (McGlaughlin et al., 2015). The CAPS-5 yields a current (past month) diagnosis, symptom cluster severity, and overall symptom severity, and is considered the gold-standard clinical interview for assessing PTSD. The measure has demonstrated strong interrater

reliability ($K = .78$ to 1.00 depending on the scoring rule) and good test-retest reliability ($ICC = .78$), as well as strong convergent validity with a variety of related measures (e.g., CAPS-IV, PCL-5, anxiety, depression, somatization, functional impairment (Weathers et al., 2017)).

Parenting behavior. To obtain an observational measure of maternal overreactive and lax discipline, mothers-child dyads completed a standardized discipline encounter protocol developed by Arnold and O’Leary (1995). This protocol has been used in several prior studies (e.g., Lorber & Slep, 2005; Slep & O’Leary, 1998) as a means of eliciting the type of parent-child conflicts that are commonplace with children of this age range. The paradigm consists of two 10-minute tasks that are video recorded. During each task, mothers were asked to instruct their children not to touch an assortment of visually appealing objects (e.g., a jar of candy, an orange bell, colorful sunglasses) placed on low tables throughout the room. In the first task, mothers gave their child a set of unattractive toys (e.g., blocks, toy fruit) and asked the child to play independently while she was on the phone with the experimenter. In the second task, mothers placed a mat and book on the floor and asked the child to rest while she completed questionnaires. Throughout these tasks the experimenter cued the mother to proceed to the next task but provided no advice on how to manage the child.

A team of coders viewed the video interactions of mothers during the parent-child discipline encounter and coded global ratings on 7-point scales ($1 = \textit{good or effective}$ to $7 = \textit{bad or ineffective}$) of two maternal parenting behaviors: *harshness* and *laxness*. Harshness reflects the degree and frequency of reacting to child misbehavior in a hostile way either verbally (e.g., yelling) or behaviorally (e.g., grabbing an arm) while laxness reflects the degree and frequency of mothers’ permissive responses to child misbehavior (e.g., giving in). Research indicates convergent validity between discipline behaviors observed during this protocol and self-report

measures of overreactive ($r = .61$) and lax parenting behaviors ($r = .65$; Arnold, O'Leary, Wolff, & Acker, 1993), as well as high interrater reliability (r s ranging from .86 to .91; Arnold & O'Leary, 1995). Moreover, the global coding scheme provides an advantage over event-based coding with respect to lax parenting (i.e., not following through) because behavioral omissions are easier to capture (Lorber & Slep, 2005).

Child behavior. Although the primary focus of the current study is on maternal parenting behaviors, child behaviors were also assessed to allow us to examine parental discipline behaviors beyond those attributable to individual differences in child noncompliance. Thus, a second set of blind raters coded child rule breaking and negative expressed affect in ten-second intervals. Rule-breaking is defined by violations of the rules for the interaction (e.g., touching forbidden objects, noncompliance with commands), and negative affect is coded if the child whimpers, whines, cries, screams, or tantrums. This child behavior coding system has been used in previous research using the same laboratory-based discipline tasks described above (e.g., Lorber & Slep, 2005; Slep & O'Leary, 1998).

Coder Training and Assessment of Inter-Rater Reliability. A stringent training protocol was followed to assure calibration of behavioral coding procedures. Consultant Amy Smith Slep, Ph.D. provided training materials for the observational coding system and was available for consultation throughout data collection. While coding videos, research assistants were blind to participant trauma history and PTSD diagnosis. Parenting behaviors of interest (i.e., maternal laxness and overreactivity) were coded using global scores (range = 1-7; higher scores indicate more dysfunctional parenting) by a team of three research assistants. A global score was given for each of the two separate tasks (i.e., phone task, quiet time task) and were subsequently averaged. Child behaviors of interest (i.e., child rule breaking and child negative affect) were

each coded in 10 second increments (1 = *presence of behavior*, 0 = *absence of behavior*) by a separate team of three research assistants. Both teams of research assistants attended weekly trainings for approximately three months, until achieving intraclass correlation coefficients (ICCs) of at least .70 prior to coding videos (Cicchetti & Sparrow, 1981). A random sample of 25% of videos were double-coded and used to report inter-coder agreement. Across parenting codes, the intraclass correlations were .91 for laxness and .77 for overreactivity, indicating strong interrater agreement (values between .75-1.0; Cicchetti, 1994). Across child codes, the intraclass correlations were .96 for rule breaking and .98 for negative affect, again indicating strong interrater agreement (Cicchetti, 1994).

Experienced emotion. Following the stressful parent-child interaction, mothers viewed the video of the tasks and made continuous ratings of the intensity of their emotional experience using a Logitech joystick. The joystick is divided into three parts, with increasing negative scores as the joystick is lowered, increasing positive scores as the joystick is raised, and neutral scores when the joystick is centered (ratings range from -500 to +500). The number of seconds the joystick is in the negative, neutral, and positive regions as well as the average position of the joystick for the time it is in the negative and positive regions, is recorded by a computer. The mean of all five-second interval scores establish the average emotion intensity score. The joystick apparatus has been used in previous research assessing self-ratings of emotion (e.g., Lorber & Slep, 2005; Lorber, 2007). This video-mediated recall procedure has demonstrated good construct validity as indicated by significant associations between mothers' video recall emotions and autonomic reactivity, as well as child misbehavior during live interactions (Lorber, 2007).

Cortisol reactivity. Following procedures used by consultant Granger and colleagues (2012), salivary cortisol samples were obtained from mothers at four time points during the lab visit. An initial sample was collected immediately following informed consent procedures in order to acclimate participants to cortisol procedures; this sample was not used in data analyses. The second sample was collected five minutes prior to the parent-child discipline encounter and served as a pre-task baseline measure of cortisol. The third and fourth samples were collected 25 and 45 minutes after initiation of the parent-child discipline encounter, respectively. Analyses were run using area under the curve with respect to the increase (AUC_I ; Pruessner, Kirschbaum, Meinlschmid, & Hellhammer, 2003), which incorporates information across samples into one score, allowing for maximizing information while sacrificing few degrees of freedom. AUC_I is calculated with reference to the baseline measurement and ignores the distance from zero for all measurements. Thus, AUC_I emphasizes change over time, as opposed to total hormonal output (Fekedulegn et al., 2007). Participants were scheduled no earlier than 1pm, to limit the influence of diurnal fluctuations in cortisol levels (personal communication with consultant Doug Granger, 08/12/2016). Data on participants' general physical activity level, food intake, menstrual cycle, oral contraceptive use, as well as alcohol, nicotine, caffeine, and medication use, were collected to include as covariates (see Salivary Collection Questionnaire in Appendix C). Participants were also asked to refrain from eating, drinking caffeine, or smoking in the 60 minutes prior to the study session, and were instructed to rinse their mouths thoroughly with water 10 minutes before the first saliva samples were collected. Saliva was collected via passive drool, with participants providing enough saliva (at least 200 uL) for assaying of cortisol. Samples were stored at -80°C and analyzed using a commercially available immunoassay for salivary cortisol without modification to the manufacturer's recommended protocol (Salimetrics, Carlsbad, CA). Test

volume is 25 ul, and range of sensitivity from .007 to 3.0 ug/dL. All samples were assayed in duplicate at UNL's Center for Brain, Biology, and Behavior, with the average of the duplicate used in statistical analyses.

Demographics. During the study session, mothers completed a demographics questionnaire including questions about their target child (i.e., child developmental milestones), additional children (i.e., age and gender), and other primary caretakers of the child (see Appendix D).

Comorbid problems. To assess maternal depression, which is highly comorbid with PTSD and associated with dysfunctional parenting (Ammerman et al., 2012; Kessler et al., 1995), mothers completed the Beck Depression Inventory-II, which has strong reliability and validity as a measure of depressive symptoms (Beck, Steer, & Brown, 1996). The 21-item BDI-II assesses symptoms of depression over the past two weeks. Response options range from 0 to 3, with higher scores indicating greater levels of depression (e.g., 0 = *I do not feel like a failure*, 1 = *I have failed more than I should have*, 2 = *As I look back, I see a lot of failures*, 3 = *I feel I am a total failure as a person*). Items are summed to create a total score. Internal consistency for the current sample was .92. The Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, De la Fuente, & Grant, 1993) was used to assess problem drinking, also highly comorbid with PTSD and associated with dysfunctional parenting (Dube et al., 2001; Kessler et al., 1995). The AUDIT contains 10 items and demonstrates internal consistency in the .80s (Allen, Litten, Fertig, & Babor, 1997), as well as convergent validity with other measures of alcohol use (Babor, Higgins, Biddle, Saunders, & Monteiro, 2001). Response options range from range from 0 to 4, and reflect either frequency of drinking, or frequency of drinking-related problems (e.g., *How often do you have a drink containing alcohol? How often during the last*

year have you failed to do what was normally expected of you because of drinking?). Items are summed to create a total score. Internal consistency for the current sample was .68.

Data Analytic Plan

After cleaning the data and examining descriptive statistics, univariate ANOVAs were conducted to examine differences across PTSD groups, and bivariate correlations were examined to measure associations among the main variables of interest. Next, specific aims, which focus on the direct and indirect effects of PTSD on parenting behaviors (i.e., overreactivity and laxness) as mediated through experienced emotion and cortisol reactivity were tested (see Figure 1.1). First, the total effect between PTSD and parenting outcomes without either mediator in the model was examined (Aim 1). Next, the independent contributions of each indirect effect were measured by examining experienced emotion and cortisol reactivity as mediators in separate models (Aims 2 and 3). Finally, by including both mediators in the model and allowing the residuals to covary, the joint influence of both mediators was measured for each of my parenting outcomes (Aim 4). These aims (1-4) were tested in *Mplus* (Muthén & Muthén, 2015) using a nonparametric resampling method (bias-corrected bootstrap) with 5000 resamples drawn to derive the 95% CIs for the effects (Shrout & Bolger, 2002). This approach performs well in small samples by maximizing power while minimizing Type 1 error rate and was used for estimating direct and indirect effects in each of the models. This approach is optimal for the proposed design because it allows for analysis of zero-inflated data and accounts for non-normal distribution of indirect effects. To examine the threshold at which PTSD symptoms predicted study outcomes (i.e., either at partial or full PTSD, two variables were created: (1) no PTSD = 0 versus partial or full PTSD = 1, and (2) no PTSD or partial PTSD = 0 versus full PTSD = 1.

CHAPTER 3: RESULTS

Preliminary Analyses

The data were carefully screened for accuracy and missingness. Two participants were missing data on the video rated parenting behaviors due to technical malfunction of the video recording software. As a result, these participants were also missing data on the emotion ratings task, and an additional participant also decided to opt out of the emotion ratings task ($n = 3$). Two participants' cortisol data were removed because assays revealed cortisol ranges greater than four standard deviations out from the range displayed by the remainder of the participants. The cortisol levels of one of these participants were so high that the usual procedures for assaying could not be performed (i.e., could not be diluted within range of the assay). Regarding the other participant, closer examination of cortisol-related covariates revealed that this mother was taking a prenatal vitamin (despite not being pregnant), was noticing signs of oral health problems (e.g., inflammation of the gums, loosening of the teeth), and endorsed a pinkish-red color when brushing; it is possible that these factors may have resulted in abnormal cortisol levels. Because the data analytic approach accounts for missing data, presuming information on at least one variable, the entire sample of 78 participants was retained.

Descriptive Statistics and Univariate ANOVAs

Across the full sample, 19 mothers met criteria for full PTSD, 24 met the criteria for partial PTSD (i.e., 2 or 3 symptoms clusters; McGlaughlin et al., 2015), and 35 evidenced no significant PTSD pathology. Participants in the partial and full PTSD groups reported a range of traumas on the LEC-5. Across these 43 participants, the following events were identified as the “worst” index trauma: physical and/or sexual domestic violence ($n = 7$; 16%), sexual assault by a stranger or friend ($n = 6$; 14%), physical and/or sexual child abuse ($n = 4$; 9%), witnessing a life threatening illness ($n = 4$; 9%), witnessing a sudden accidental death ($n = 4$; 9%), sexual assault

by a stranger or friend ($n = 3$; 7%), transportation accident ($n = 3$; 7%), learning about a sudden accidental death ($n = 3$; 7%), assault with a weapon by a stranger ($n = 2$; 5%), physical assault by a stranger ($n = 1$; 2%), life-threatening injury ($n = 1$; 2%); exposure to a war zone as a civilian ($n = 1$; 2%); exposure to fire ($n = 1$; 2%); experiencing captivity ($n = 1$; 2%), witnessing a suicide ($n = 1$; 2%), learning about the sexual assault of a loved one ($n = 2$; 5%), learning about a sudden violent death ($n = 1$; 2%), and learning about an assault with a weapon ($n = 1$; 2%). See Table 3.1 for index events broken down by partial vs. full PTSD groups. The average PTSD symptom count and severity scores across participants with partial PTSD was 5.25 ($SD = 1.92$), and 14.46 ($SD = 4.44$), respectively. The average PTSD symptom count and severity scores across participants with full PTSD was 12.74 ($SD = 3.16$), and 31.95 ($SD = 8.95$), respectively. Taken together, the average PTSD symptom count across participants with partial *or* full PTSD was 8.56 ($SD = 4.52$), and the average symptom severity was 22.19 ($SD = 11.06$).

Table 3.1

Index Trauma Event for Participants in Partial and Full PTSD Groups

	Partial PTSD ($n = 24$)	Full PTSD ($n = 19$)
	n (%)	n (%)
Experienced	12 (50%)	15 (78.9%)
Physical/Sexual domestic violence	2 (8.3%)	5 (26.3%)
Experienced		
Sexual Assault	4 (16.7%)	2 (10.5%)
Physical/Sexual child abuse	--	4 (21.1%)

Assault with a weapon	2 (8.3%)	--
Physical assault	1 (4.2%)	--
Transportation accident	2 (8.3%)	1 (5.3%)
Kidnapping/Captivity	--	1 (5.3%)
Fire	1 (4.2%)	--
Exposure to war-zone	--	1 (5.3%)
Life-threatening illness/injury	--	1 (5.3%)
Witnessed	7 (29.2%)	2 (10.5%)
Sudden accidental death	4 (16.7%)	--
Life-threatening illness/injury	2 (8.3%)	2 (10.5%)
Sudden violent death	1 (4.2%)	--
Learned about	5 (20.8%)	2 (10.5%)
Sudden accidental death	3 (12.5%)	--
Assault with weapon	1 (4.2%)	--
Sexual assault	1 (4.2%)	1 (5.3%)
Sudden violent death	--	1 (5.3%)

Across the sample, mothers received mean laxness scores of 2.72 ($SD = 1.14$) and overreactivity scores of 1.62 ($SD = .98$), reflecting on average, moderate lax parenting behaviors, and low levels of overreactive parenting. While watching the videos of their interactions, mothers

indicated an average emotion rating of 37.69 ($SD = 100.12$), reflecting on average, mildly positive mood during the playback of the discipline interaction video, although significant variability is evident. Mothers' received mean cortisol reactivity scores of -1.39 ($SD = 2.01$). Average cortisol reactivity trajectories (i.e., AUC_1 scores) broken down by groups are displayed in Figures 3.1 and 3.2. On average, participants experienced a sharp decrease in cortisol between samples 1 and 2 (i.e., 5 minutes prior to the start of the task to 25 minutes following initiation of the task), and a smaller decrease in cortisol during the recovery between samples 2 and 3 (i.e., 25 minutes following initiation of the task to 45 minutes following initiation of the task). Parental laxness, overreactivity, experienced emotion, cortisol reactivity, and additional covariates of interest are displayed by group in Tables 3.2 and 3.3. Table 3.2 displays means and significant differences (ANOVAs) across the full PTSD group versus partial and no PTSD groups, while Table 3.3 displays results across the full and partial PTSD versus no PTSD group.

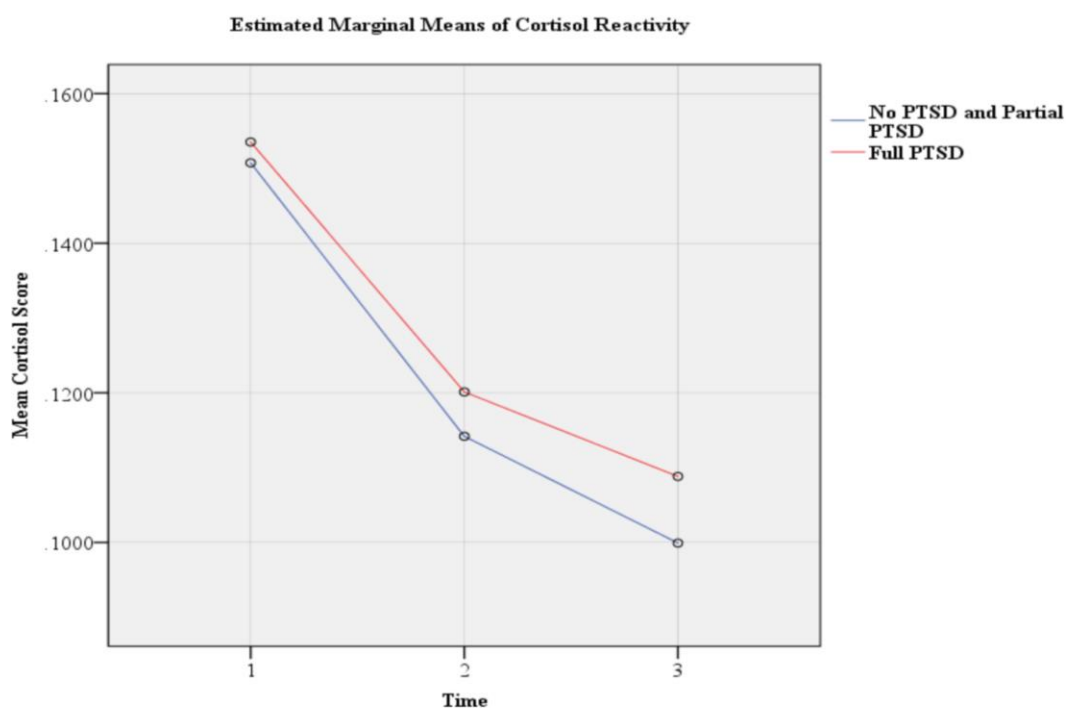


Figure 3.1. Cortisol samples for No PTSD and Partial PTSD Groups Versus Full PTSD.

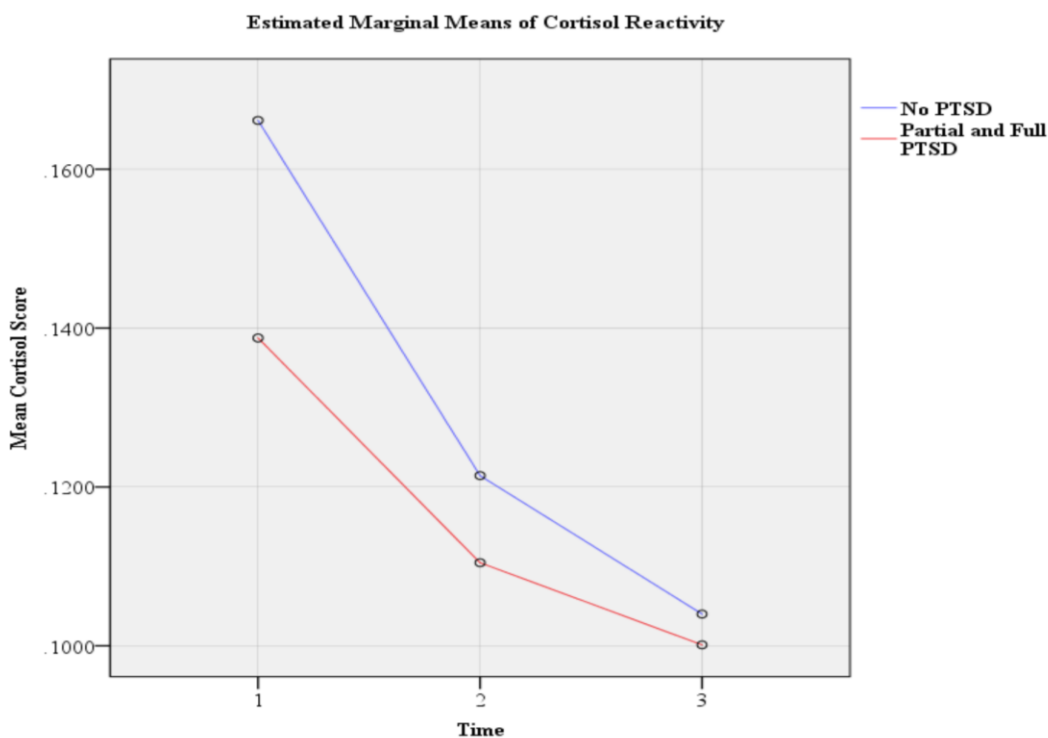


Figure 3.2. Cortisol samples for No PTSD Versus Partial and Full PTSD.

Table 3.2

Descriptive Statistics and Univariate ANOVAs of Main Variables and Covariates of Interest for No PTSD and Partial PTSD Groups Versus Full PTSD

	Range	No PTSD and Partial PTSD		Full PTSD	F/χ^2 (df)
		M (SD)	M (SD)	M (SD)	
Lax Parenting	1 - 7	2.51 (.96)	3.36 (1.46)	-2.93 (74)**	
Overreactive Parenting	1 - 5	1.44 (.79)	2.19 (1.29)	-3.02 (74)**	
Experienced Emotion	-257.29 – 300.13	41.36 (107.41)	25.16 (71.00)	.58 (73)	
Cortisol Reactivity	-9.76 – 3.52	-1.42 (1.79)	-1.28 (2.69)	-.25 (74)	
Proportion of Rule Breaking	.05 - .95	.30 (.15)	.40 (.20)	-2.10 (73)*	

Proportion of Negative Affect	.00 - .89	.14 (.22)	.09 (.15)	.93 (73)
Maternal Depression	1-48	10.97 (8.76)	17.53 (9.17)	-2.81 (76)**
Maternal Alcohol Use	0-11	2.94 (2.42)	3.00 (2.85)	-.09 (76)
Maternal Age	21-45	33.75 (4.92)	30.58 (6.09)	2.30 (76)*
Maternal Minority Status	--	6 minority (10.2% of group)	6 minority (31.6% of group)	5.06 (1)*
Maternal Highest Education	1 = <i>less than college to 7 = Professional degree</i>	4.64 (1.16)	4.05 (1.54)	3.17 (76)
Total Household Income	1 = <i>\$0-\$10,000 to 12 = <i>over \$100,000</i></i>	8.49 (3.22)	5.39 (3.03)	13.15 (75)**
Child Age	18-36 months	2.50 (.34)	2.53 (.36)	-.28 (76)
Child Sex	--	23 female (39.0% of group)	5 female (26.3% of group)	1.00 (1)

Note. Due to missing data, *n*'s for the no and partial PTSD group ranged from 57 to 59; *n*'s for the PTSD group ranged from 17 to 19. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 3.3

Descriptive Statistics and Univariate ANOVAs of Main Variables and Covariates of Interest for No PTSD Versus Partial and Full PTSD

	No PTSD	Partial and Full PTSD	
Range	<i>M (SD)</i>	<i>M (SD)</i>	<i>F/χ² (df)</i>

Lax Parenting	1 - 7	2.49 (.98)	2.89 (1.25)	-1.55 (74)
Overreactive Parenting	1 - 5	1.46 (.81)	1.74 (1.10)	-1.22 (74)
Experienced Emotion	-257.29 – 300.13	62.50 (92.38)	17.11 (102.69)	1.99 (73)
Cortisol Reactivity	-9.76 – 3.52	-1.74 (2.10)	-1.09 (1.90)	-1.41 (74)
Proportion of Rule Breaking	.05 - .95	.28 (.15)	.36 (.18)	-1.90 (73)
Proportion of Negative Affect	.00 - .89	.09 (.17)	.16 (.23)	-1.58 (73)
Maternal Depression	1-48	9.03 (8.80)	15.44 (8.66)	-3.23 (76)**
Maternal Alcohol Use	0-11	3.20 (2.82)	2.75 (2.25)	.78 (76)
Maternal Age	21-45	34.22 (4.46)	31.97 (5.86)	1.87 (76)
Maternal Minority Status	--	4 (11.4% of group)	8 (18.6% of group)	.76 (1)
Maternal Highest Education	1= <i>less than college to 7 = Professional degree</i>	5.03 (1.04)	4.07 (1.30)	12.51 (76)**
Total Household Income	1 = <i>\$0-\$10,000 to 12 = over \$100,000)</i>	8.97 (3.12)	6.76 (3.37)	8.78 (75)**
Child Age	18-36 months	2.57 (.21)	2.46 (.41)	1.50 (76)
Child Sex	--	12 female (34.3% of group)	16 female (37.2% of group)	.072 (1)

Note. Due to missing data, *n*'s for the no PTSD group ranged from 33 to 35; *n*'s for the partial and full PTSD group ranged from 41 to 43. * $p < .05$, ** $p < .005$, *** $p < .001$.

Bivariate Correlations

Correlations among main variables of interest and possible covariates are displayed in Table 3.4. All correlations were estimated using Pearson's formula, with the exception of

maternal education and household income, which were estimated using Spearman's rho for ordered categories. All the variables were sufficiently distinct, and thus there were no concerns about multicollinearity ($r_s < .70$; Tabachnick & Fidell, 1996).

Table 3.4.

Correlations of Main Variables and Covariates of Interest

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. No PTSD vs. Partial and Full PTSD	--															
2. No and Partial PTSD vs. Full PTSD	.51***	--														
3. Maternal Laxness	.18	.32**	--													
4. Maternal Overreactivity	.14	.33**	.17	--												
5. Experienced Emotion	-.23	-.07	-.29*	-.15	--											
6. Cortisol Reactivity	.16	.03	.08	.06	-.23	--										
7. Child Rule Breaking	.22	.24*	.64***	.13	-.21	.02	--									
8. Child Negative Affect	.18	-.11	.06	.18	-.45***	.02	.10	--								
9. Maternal Depression	.35**	.31**	.04	.43***	-.13	.16	.06	-.07	--							
10. Maternal Alcohol Use	-.09	.01	-.07	.21	-.01	.14	.00	.15	-.00	--						

11. Maternal Age	-.21	-.26*	-.07	-.30**	.17	-.02	-.12	-.16	-.18	-.21	--							
12. Maternal Minority Status	.10	.25*	-.04	.37**	-.01	.24*	-.01	.10	.11	.15	-.25*	--						
13. Maternal Education	-.36**	-.15	-.13	-.27*	.13	-.08	-.17	-.22	-.44***	-.08	.35**	-.11	--					
14. Household Income	-.33**	-.39***	-.21	-.33**	.34**	-.18	-.25*	-.10	-.37**	.02	.42***	-.36**	.48***	--				
15. Child Age	-.17	.03	-.38**	-.06	.31**	-.02	-.39***	-.22	-.06	.07	.11	.03	.13	.21	--			
16. Child Sex	.03	-.11	.04	-.10	-.04	-.02	.12	.06	-.01	.06	.13	-.02	.13	.00	-.05	--		

Note: Estimated in SPSS with pairwise deletion for missing data (N ranged from 73 to 78). * $p < .05$; ** $p < .01$; *** $p < .001$.

Covariates

Table 3.4 displays associations among independent variables (full and partial PTSD vs. no PTSD, partial and no PTSD vs. full PTSD), mediators (experienced emotion, cortisol reactivity), outcomes (lax and overreactive parenting), and theoretically meaningful covariates. I examined whether age of the mother, age of the child, gender of the child, average household income, highest level of education, minority status (racial ethnic minority vs. White non-Hispanic), maternal depression, maternal alcohol use, child rule breaking during the discipline task, and child negative affect during the discipline task correlated significantly with any predictor variable (i.e., PTSD groups, experienced emotion, cortisol reactivity) and either outcome variable (i.e., lax and overreactive parenting). Income significantly correlated with both PTSD status and experienced emotion, and minority status significantly correlated with both PTSD status and cortisol reactivity; thus, both were controlled for in path analyses predicting lax and overreactive parenting. Additionally, child age significantly correlated with both experienced emotion and maternal laxness, and proportion of rule breaking during the discipline task significantly correlated with both PTSD status and laxness; thus, both these variables were controlled for in path analyses predicting lax parenting. Finally, maternal age, maternal depression, and education significantly correlated with both PTSD status and overreactive parenting and thus were also controlled for in path analyses predicting overreactive parenting.

In sum, the following variables were controlled for in path analyses predicting maternal laxness: income, minority status, child age, and proportion of rule breaking. In path analyses predicting maternal overreactivity, the following variables were controlled for: income, minority status, highest education, maternal age, and maternal depression.

Path Analyses

As noted above, Aims 1-4 were tested to examine whether the relation between PTSD status and parenting was mediated by experienced emotion and cortisol reactivity. Using a step-wise approach, the total effect between PTSD and parenting outcomes without either mediator in the model was examined first (Aim 1). Next, the independent contributions of each indirect effect were measured by examining experienced emotion and cortisol reactivity as mediators in separate models (Aims 2 and 3). Finally, by including both mediators in the model and allowing the residuals to covary, the joint influence of both mediators was measured for each of my parenting outcomes (Aim 4). Aims and corresponding hypotheses were tested using path analysis in *Mplus* (Muthén & Muthén, 2015) using a nonparametric resampling method (bias-corrected bootstrap approach; Shrout & Bolger, 2002) for estimating 95% CIs for the direct and indirect effects in each of the models. Consistent with the threshold approach described above, results are separated into analyses examining differences among mothers with (1) full PTSD (vs. partial and no PTSD), and (2) no PTSD (vs. full and partial PTSD).

Aim 1: Examine the total effect of PTSD on maternal parenting behaviors.

Lax parenting. Consistent with hypotheses, PTSD status was associated with greater lax parenting behaviors, such that mothers with full PTSD, compared to those with partial and no PTSD, were more likely to use lax parenting behaviors during the discipline encounter, $b = .59$, $SE = .28$, 95% CI [.10, 1.21], controlling for child age, child rule breaking, household income, and minority status. Regarding the covariates, child rule breaking was also significantly associated with greater lax parenting behaviors, $b = 3.42$, $SE = .88$, 95% CI [1.76, 5.05]. The model accounted for 47.1% of the variance in lax parenting behaviors.

No significant differences in lax parenting were found between mothers with no PTSD and those with partial or full PTSD. Regarding the covariates, child rule breaking was

significantly associated with greater lax parenting behaviors, $b = 3.75$, $SE = .86$, 95% CI [1.90, 5.29]. The model accounted for 43.5% of the variance in lax parenting behaviors.

Overreactive parenting. Contrary to hypotheses, no significant differences in overreactive parenting were found between mothers with full PTSD and those with partial or no PTSD, when controlling for maternal depression, maternal age, household income, maternal education, and minority status. Regarding the covariates, minority status significantly predicted greater overreactive parenting behaviors, $b = .71$, $SE = .35$, 95% CI [.16, 1.60]. The model accounted for 33.4% of the variance in overreactive parenting behaviors.

No significant differences in overreactive parenting were found between mothers with no PTSD and those with partial or full PTSD. Regarding the covariates, maternal depression, $b = .03$, $SE = .01$, 95% CI [.01, .06], and minority status, $b = .76$, $SE = .36$, 95% CI [.19, 1.64] significantly predicted greater overreactive parenting. The model accounted for 33.1% of the variance in overreactive parenting behaviors.

Aim 2: Investigate the role of experienced emotion in mediating associations between PTSD and maternal parenting behaviors.

Lax parenting. When controlling for experienced emotion in addition to child rule breaking, child age, household income, and minority status, the direct effect between PTSD status and greater lax parenting behaviors remained, such that mothers with full PTSD, compared to those with partial and no PTSD, were more likely to use lax parenting behaviors during the discipline encounter, $b = .60$, $SE = .28$, 95% CI [.10, 1.23]. However, contrary to hypotheses, PTSD status did not predict lax parenting behaviors indirectly via greater negative emotion during the stressful parent-child discipline encounter. Regarding the covariates, child rule breaking continued to significantly predict greater lax parenting behaviors, $b = 3.32$, $SE = .88$,

95% CI [1.59, 4.98]. Further, higher child age, $b = 72.63$, $SE = 28.73$, 95% CI [13.14, 126.02], and higher household income, $b = 10.04$, $SE = 3.67$, 95% CI [2.76, 17.24] significantly predicted more positive emotion. The model accounted for 23.0% of the variance in experienced emotion and 48.6% of the variance in lax parenting behaviors.

No significant differences in lax parenting were found between mothers with no PTSD and those with partial or full PTSD, and PTSD status did not predict lax parenting behaviors indirectly via greater negative emotion during the stressful parent-child discipline encounter. Regarding the covariates, child rule breaking continued to significantly predict greater lax parenting behaviors, $b = 3.67$, $SE = .21$, 95% CI [1.86, 5.23]. Further, higher child age, $b = 71.23$, $SE = 27.71$, 95% CI [17.68, 129.15], and higher household income, $b = 9.08$, $SE = 3.95$, 95% CI [.94, 16.51] significantly predicted more positive emotion. The model accounted for 23.8% of the variance in experienced emotion and 45.0% of the variance in lax parenting behaviors.

Overreactive parenting. No significant differences in overreactive parenting were found between mothers with full PTSD and those with no or partial PTSD, and PTSD status did not predict overreactive parenting behaviors indirectly via greater negative emotion during the stressful parent-child discipline encounter, when controlling for maternal depression, maternal age, household income, maternal education, and minority status. Regarding the covariates, minority status continued to significantly predict greater overreactive parenting behaviors, $b = .75$, $SE = .36$, 95% CI [.18, 1.65]. Further, higher household income, $b = 13.04$, $SE = 4.89$, 95% CI [3.80, 23.02] significantly predicted more positive emotion. The model accounted for 14.3% of the variance in experienced emotion and 34.4% of the variance in overreactive parenting behaviors.

No significant differences in overreactive parenting were found between mothers with no PTSD and those with partial or full PTSD, and PTSD status did not predict overreactive parenting behaviors indirectly via greater negative emotion during the stressful parent-child discipline encounter. Regarding the covariates, maternal depression, $b = .04$, $SE = .01$, 95% CI [.01, .06], and minority status, $b = .81$, $SE = .37$, 95% CI [.22, 1.72] continued to predict greater overreactive parenting behaviors. Further, higher household income, $b = 12.22$, $SE = 4.95$, 95% CI [2.55, 22.22] continued to predict more positive emotion. The model accounted for 17.0% of the variance in experienced emotion and 34.2% of the variance in overreactive parenting behaviors.

Aim 3: Investigate the role of cortisol reactivity in mediating associations between PTSD and maternal parenting behaviors.

Lax parenting. When controlling for cortisol reactivity in addition to child rule breaking, child age, household income, and minority status, the direct effect between PTSD status and greater lax parenting behaviors remained, such that mothers with full PTSD compared to those with partial and no PTSD were more likely to use lax parenting behaviors during the discipline encounter, $b = .59$, $SE = .28$, 95% CI [.08, 1.20]. However, contrary to hypotheses, PTSD status did not predict lax parenting behaviors indirectly via cortisol reactivity during the stressful parent-child discipline encounter. Regarding the covariates, child rule breaking continued to significantly predict greater lax parenting behaviors, $b = 3.42$, $SE = .88$, 95% CI [1.68, 5.05]. Further, minority status, $b = 1.17$, $SE = .62$, 95% CI [15.3, 2.64] significantly predicted greater cortisol reactivity. The model accounted for 8.0% of the variance in cortisol reactivity and 47.6% of the variance in lax parenting behaviors.

No significant differences in lax parenting were found between mothers with no PTSD and those with partial or full PTSD, and PTSD status did not predict lax parenting behaviors indirectly via cortisol reactivity during the stressful parent-child discipline encounter. Regarding the covariates, child rule breaking continued to significantly predict greater lax parenting behaviors, $b = 3.76$, $SE = .86$, 95% CI [1.96, 5.33]. Further, minority status, $b = 1.04$, $SE = .56$, 95% CI [.04, 2.27] significantly predicted greater cortisol reactivity. The model accounted for 8.4% of the variance in cortisol reactivity and 44.2% of the variance in lax parenting behaviors.

Overreactive parenting. No significant differences in overreactive parenting were found between mothers with full PTSD and those with partial or no PTSD, and PTSD status did not predict overreactive parenting behaviors indirectly via cortisol reactivity during the stressful parent-child discipline encounter, when controlling for maternal depression, maternal age, household income, maternal education, and minority status. Regarding the covariates, minority status continued to significantly predict greater overreactive parenting behaviors, $b = .76$, $SE = .34$, 95% CI [.22, 1.67]. Further, minority status, $b = 1.27$, $SE = .63$, 95% CI [.20, 2.70] significantly predicted greater cortisol reactivity. The model accounted for 9.6% of the variance in experienced emotion and 34.1% of the variance in overreactive parenting behaviors.

No significant differences in overreactive parenting were found between mothers with no PTSD and those with partial or full PTSD, and PTSD status did not predict overreactive parenting behaviors indirectly via cortisol reactivity during the stressful parent-child discipline encounter. Regarding the covariates, maternal depression, $b = .03$, $SE = .01$, 95% CI [.01, .06], and minority status, $b = .80$, $SE = .37$, 95% CI [.22, 1.71] continued to significantly predict greater overreactive parenting behaviors. Further, minority status, $b = 1.71$, $SE = .56$, 95% CI [.15, 2.41] significantly predicted greater cortisol reactivity. The model accounted for 9.8% of

the variance in experienced emotion and 33.4% of the variance in overreactive parenting behaviors.

Aim 4: Examine a multiple mediator model in which experienced emotion and cortisol reactivity together mediate associations between PTSD and maternal parenting behaviors. See Figures 3.3 and 3.4 for depictions of the final multiple mediator models for maternal lax and overreactive parenting behaviors.

Lax parenting. When controlling for experienced emotion and cortisol reactivity in addition to child rule breaking, child age, household income, and maternal minority status, the direct effect between PTSD status and greater lax parenting behaviors remained, such that mothers with full PTSD compared to those with partial and no PTSD were more likely to use lax parenting behaviors during the discipline encounter, $b = .60$, $SE = .29$, 95% CI [.09, 1.23]. However, contrary to hypotheses, experienced emotion and cortisol reactivity did not together mediate associations between PTSD status and lax parenting. Regarding the covariates, child rule breaking continued to significantly predict greater lax parenting behaviors, $b = 3.34$, $SE = .88$, 95% CI [1.61, 5.02]. Further, higher child age, $b = 73.05$, $SE = 28.70$, 95% CI [12.81, 125.96], and higher household income, $b = 10.39$, $SE = 3.70$, 95% CI [.94, 17.61] continued to predict more positive emotion, and minority status, $b = 1.18$, $SE = .62$, 95% CI [.17, 2.64] continued to predict greater cortisol reactivity. The model accounted for 23.2% of the variance in experienced emotion, 8.0% of the variance in cortisol reactivity, and 48.8% of the variance in lax parenting behaviors.

No significant differences in lax parenting were found between mothers with no PTSD and those with partial or full PTSD, and experienced emotion and cortisol reactivity did not together mediate associations between PTSD status and lax parenting. Regarding the covariates,

child rule breaking continued to significantly predict greater lax parenting behaviors, $b = 3.69$, $SE = .86$, 95% CI [1.93, 5.28]. Further, higher child age, $b = 73.00$, $SE = 27.36$, 95% CI [20.11, 130.31], and higher household income, $b = 9.31$, $SE = 3.97$, 95% CI [1.30, 16.87] continued to predict more positive emotion, and minority status, $b = 1.06$, $SE = .56$, 95% CI [.06, 2.29] continued to predict greater cortisol reactivity. The model accounted for 23.8% of the variance in experienced emotion, 8.4% of the variance in cortisol reactivity, and 45.4% of the variance in lax parenting.

Overreactive parenting. No significant differences in overreactive parenting were found between mothers with full PTSD and those with partial or no PTSD, and experienced emotion and cortisol reactivity did not together mediate associations between PTSD status and overreactive parenting, when controlling for maternal depression, maternal age, household income, maternal education, and minority status. Regarding the covariates, minority status continued to significantly predict greater overreactive parenting behaviors, $b = .82$, $SE = .36$, 95% CI [.26, 1.77]. Further, greater household income continued to predict more positive emotion, $b = 13.43$, $SE = 4.95$, 95% CI [4.18, 23.54], and minority status continued to predict greater cortisol reactivity, $b = 1.29$, $SE = .62$, 95% CI [.24, 2.71]. The model accounted for 14.7% of the variance in experienced emotion, 9.8% of the variance in cortisol reactivity, and 35.3% of the variance in overreactive parenting.

No significant differences in overreactive parenting were found between mothers with no PTSD and those with partial or full PTSD, and experienced emotion and cortisol reactivity did not together mediate associations between PTSD status and overreactive parenting. Regarding the covariates, maternal depression, $b = .04$, $SE = .01$, 95% CI [.01, .06], and minority status, $b = .87$, $SE = .39$, 95% CI [.26, 1.79] continued to significantly predict greater overreactive parenting

behaviors. Further, greater household income continued to predict more positive emotion, $b = 12.42$, $SE = 4.96$, 95% CI [2.72, 22.43], and minority status continued to predict greater cortisol reactivity, $b = 1.19$, $SE = .56$, 95% CI [.16, 2.41]. The model accounted 16.7% of the variance in experienced emotion, 9.8% of the variance in cortisol reactivity, and 34.8% of the variance in overreactive parenting.

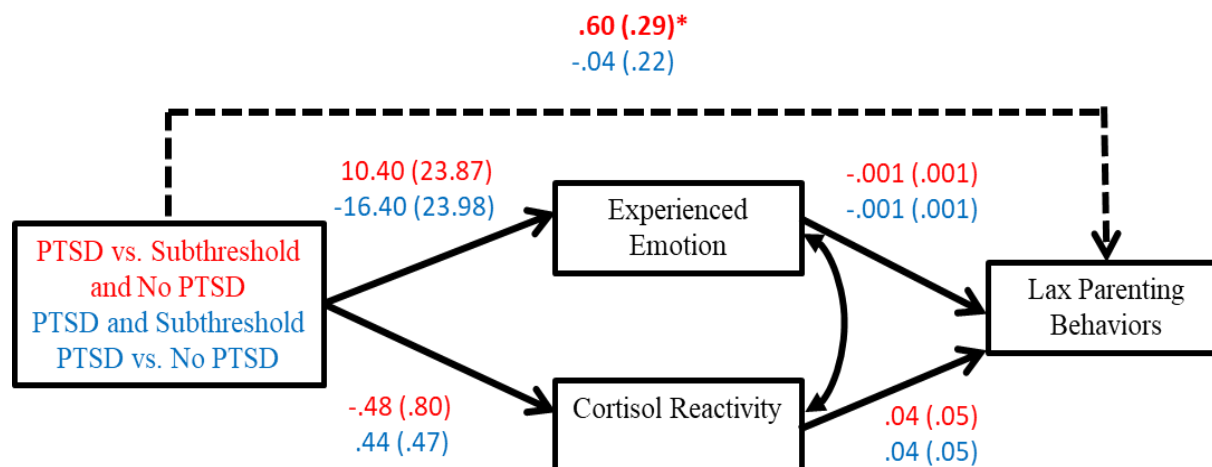


Figure 3.3. Path model for PTSD status (red = PTSD vs. subthreshold and no PTSD estimates; blue = PTSD and subthreshold vs. no PTSD) predicting lax parenting behaviors through experienced emotion and cortisol reactivity, controlling for child rule breaking, child age, household income, and maternal minority status. Bolded estimates with asterisks are significant at $p < .05$.

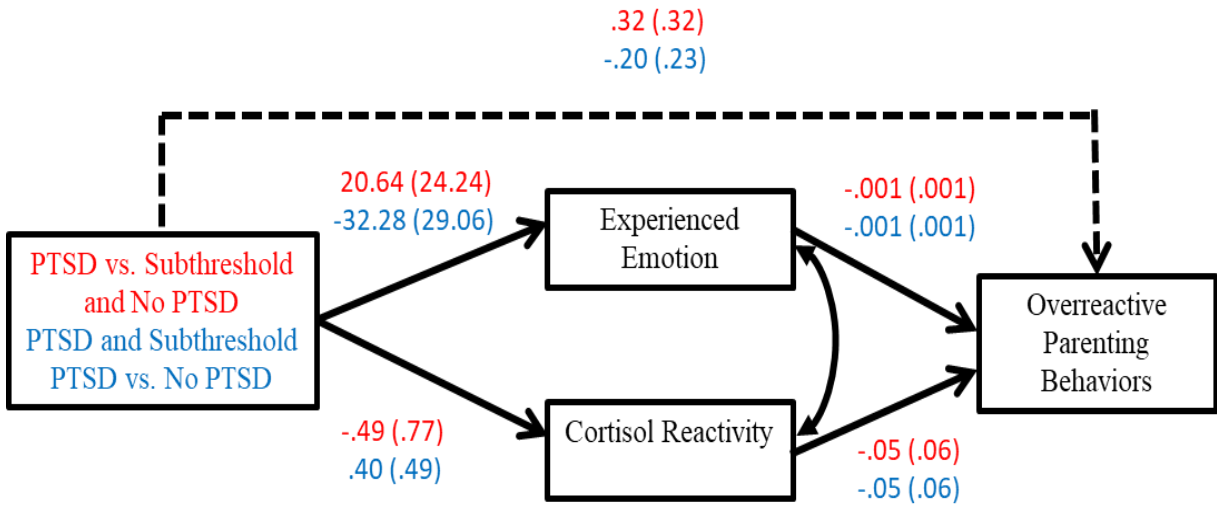


Figure 3.4. Path model for PTSD status (red = PTSD vs. subthreshold and no PTSD estimates; blue = PTSD and subthreshold vs. no PTSD) predicting overreactive parenting behaviors through experienced emotion and cortisol reactivity, controlling for maternal age, maternal depression, household income, maternal education, and maternal minority status.

CHAPTER 4: DISCUSSION

The present study investigated the impact of PTSD on maternal parenting behaviors and examined the influence of two potential mechanisms of this association—experienced emotion and cortisol reactivity. More specifically, mothers with toddler-aged children were recruited to participate in an observational study of parenting. Mothers received the CAPS-5 interview to determine their PTSD status and subsequently took part in a standardized stressful parent-child interaction. Mothers next watched a video of their interaction while rating their emotions and salivary cortisol was measured prior to and following the interaction. A parallel mediation model was tested to determine if mothers with partial or full PTSD were more likely to utilize ineffective parenting behaviors (i.e., overreactivity, laxness) to manage their child's behavior and to examine whether dysregulated cortisol and greater negative emotion facilitated this association. Overall, findings indicated a significant direct effect of PTSD status on lax parenting behaviors, such that mothers with PTSD, compared to those with partial and no PTSD, were more likely to utilize lax parenting behaviors during observed parent-child interactions, when controlling for child rule breaking, child age, household income, and maternal minority status. However, neither cortisol reactivity nor experienced emotion mediated this relation. Further, PTSD status did not predict overreactive parenting when accounting for maternal depression, maternal age, maternal education, household income, and maternal minority status, and the proposed mediators were related to neither PTSD status nor overreactive parenting behaviors.

What follows is a detailed discussion of the primary findings relevant to each independent variable: PTSD status, experienced emotion, and cortisol reactivity. Current findings are placed in context of existing theory and research. I will describe results that were consistent with hypotheses and suggest possible reasons why nonsignificant findings emerged.

Finally, I will discuss limitations of the current study, directions for future research, and potential clinical implications.

PTSD and Lax Parenting

In Aim 1, I hypothesized that PTSD status would be associated with greater lax parenting during the stressful parent-child discipline encounter. I found, when controlling for household income, maternal minority status, child age, and child rule breaking, that mothers with PTSD (compared to those with partial or no PTSD) were more likely to utilize lax parenting behaviors (i.e., less likely to intervene) when their child misbehaved or broke the rules of the task. Results are in line with cross-sectional and observational research revealing links between PTSD and greater parental disengagement and withdrawal-avoidant behaviors when interacting with children (e.g., Brockman et al., 2016; Samper et al., 2004). Further, the link between PTSD and lax parenting, specifically, suggests that PTSD symptoms might increase mothers' tendency to avoid making effortful attempts to manage child misbehavior during situations that elicit rule-breaking. It is possible that PTSD symptoms such as emotional numbing, as well as closely associated symptoms such as experiential avoidance, could result in mothers withdrawing from situations they perceive to be overwhelming, even when the situation calls for effective intervention. Findings also align with the notion that maternal trauma increases the likelihood of permissive parenting styles (see DiLillo & Damashek, 2003 for a review), possibly as a result of mothers having diminished emotional resources to enforce discipline or to communicate consistent behavioral expectations to their children.

PTSD status did not predict lax parenting behaviors when comparing mothers with partial and full PTSD to mothers with no PTSD. Thus, mothers with partial and full PTSD were equally likely to utilize lax parenting compared to mothers with no PTSD. It is possible that mothers

with partial PTSD have a greater ability to compensate for mild symptoms persisting following trauma exposure. Further, the fact that these mothers have partial symptoms despite experiencing trauma may reflect a kind of resiliency; mothers with partial PTSD may have been able to overcome distress and impairment emerging closer to the time of trauma exposure, resulting in milder symptom levels over time. However, a more likely alternative is that mothers with partial PTSD experienced less severe index traumas; indeed, while 79% of mothers with full PTSD had directly experienced their index trauma (as opposed to witnessed or learned about it), this was the case for only 50% of mothers with partial PTSD. Further, while 63% of mothers with full PTSD experienced interpersonal trauma, this was the case for only 38% of mothers with partial PTSD. Thus, mothers with partial PTSD might display less impaired parenting because their trauma exposure less frequently involved the kinds of experiences known to have a particularly pernicious effect on survivors (e.g., betrayal at the hands of a loved one; van der Kolk, Roth, Pelcovitz, Sunday, & Spinazzola, 2005).

PTSD and Overreactive Parenting

In Aim 1, I also hypothesized that PTSD status would predict greater overreactive parenting during the stressful parent-child discipline encounter. I found, when controlling for maternal depression, maternal age, maternal education, maternal minority status, and household income, that mothers with full or partial PTSD were *not* more likely to utilize overreactive parenting behaviors. These findings contrast with theory suggesting that trauma symptoms are associated with greater irritability and anger reactions, which in turn may increase mothers' tendency to react to child misbehavior by engaging in verbal or behavioral displays of harshness (Leen-Feldner et al., 2013). Further, prior research has shown links between PTSD and family violence (Monson et al., 2009), including greater physical aggression toward children and greater

hostile parenting behaviors (e.g., Chemtob & Carlson, 2004; Leen-Feldner et al., 2011; van Ee et al., 2012).

One reason why the link between PTSD and overreactive parenting did not emerge may stem from the relatively low rates of overreactive parenting observed across the entire study sample. Anecdotally, mothers rarely raised their voice, made harsh/disparaging comments toward their child, threatened to spank their child, or forcefully restrained their child during the interaction task. Although the analytic technique used in here accounted for non-normal data, there may have been a floor effect for maternal overreactivity, which in turn limited the ability to predict higher levels across the sample.

Alternatively, there is evidence from prior work that a portion of mothers exposed to trauma—particularly interpersonal forms such as IPV—compensate for potential effects of interpersonal trauma by increasing positive parenting behaviors (e.g., Letourneau, Fedick, & Willms, 2007; Levendosky & Graham-Bermann, 2000; Levendosky, Huth-Bocks, Shapiro, & Semel, 2003), including greater attentiveness and sensitivity to children. In particular, some researchers have hypothesized that women exposed to interpersonal violence, particularly those who are no longer current IPV victims (Casaneuva, Martin, Runyan, Barth, & Bradley, 2008), may redouble their efforts to develop close attachments to their children. For example, in their qualitative analysis of women exposed to IPV, Levendosky and Graham-Bermann (2000) described the mothers as “strengthening their defenses by increasing their sense of competency though parenting and focusing on parenting” (p. 257). Likewise, it is possible that mothers with PTSD in the current study—particularly those who experienced interpersonal violence—may have compensated for their trauma histories through an increased focus on effective parenting practices.

Additional explanations for the lack of a direct effect between PTSD and overreactive parenting warrant consideration. Notably, PTSD status was significantly correlated with overreactive parenting, such that mothers with PTSD (compared to those with partial or no PTSD) were more likely to use harsh parenting techniques to manage their child's behavior during the observational task. However, this bivariate effect disappeared when controlling for maternal depression, maternal age, maternal minority status, maternal education, and household income in the path model. Instead, only minority status predicted greater overreactive parenting in the analyses comparing mothers with PTSD to those with partial and no PTSD. Both minority status and maternal depression predicted more overreactive parenting in the analyses comparing mothers with partial and full PTSD to those with no PTSD.

The direct effect between maternal depression and overreactive parenting is consistent with a large body of research showing that depression negatively impacts parenting in myriad ways, such as by increasing hostility (see Lovejoy et al., 2000 for a meta-analysis). Considerable symptom overlap between PTSD and depression (10 of the 20 symptoms of PTSD overlap with a diagnosis of depression) suggests that the facets of PTSD most strongly interfering with parenting behaviors may be those reflective of dysphoria—the non-specific or general distress factor of PTSD (Simms, Watson, & Doebbell, 2002). This possibility is also supported by research revealing that avoidance and numbing symptoms, which are closely related to anhedonic and withdrawal symptoms of depression, are most predictive of parenting outcomes (Brockman et al., 2016; Lauterbach et al., 2007; Ruscio et al., 2002; Samper et al., 2004), as opposed to more hallmark PTSD symptoms such as traumatic intrusions or hyperarousal.

Nevertheless, a number of researchers have found that PTSD predicts parenting outcomes, even when controlling for symptoms of depression. For example, survey data from

male combat veterans found that the effect between paternal PTSD and poorer perceived relationship quality with children remained after controlling for fathers' depression (Samper et al., 2004). Epidemiological research on civilians shows that the association between parental PTSD and greater physical aggression persisted after controlling for depression (Leen-Feldner et al., 2011). Further supporting the unique role of PTSD in increasing risk for determinantal parenting outcomes, observational research demonstrates that mothers with comorbid depression and PTSD use greater restriction and punishment, even after controlling for depression severity (Ammerman et al., 2012). In sum, prior literature suggests direct effects between PTSD and harsh parenting, over and above the influence of depression symptoms; however, findings contrast with results of the present study.

Although not a primary focus of the study, the direct effect between maternal minority status and overreactivity is consistent with prior literature suggesting that authoritarian parenting practices may be more acceptable to and used more among families of color (see McLoyd, Cauce, Takeuchi, & Wilson, 2000 for a review). Interestingly, although overreactive parenting is typically considered to have a detrimental impact on child development, parents' use of physical discipline is correlated less strongly with externalizing symptoms among African American children, compared to White children (Deater-Deckard, Dodge, Bates, & Petit, 1996; Stacks, Oshio, Gerard, & Roe, 2009), potentially because physical punishment is considered less culturally sanctioned among White families (Lansford et al., 2005). Further, observational studies suggest that when both African-American and non-African-American coders rate mothers' parenting behaviors, outgroup observers rate African-American mothers' parenting behaviors as more conflictual (Gonzales, Cauce, & Mason, 1996), suggesting that coder biases could have influenced scoring in the current sample (all coders for the current study were White).

Above all, it is challenging to draw conclusions in the current study because the sample was too small to examine differences in parenting outcomes according to specific racial and ethnic categories.

Experienced Emotion

In Aim 2, I hypothesized that greater negative emotion during the parent-child discipline encounter would mediate the relation between PTSD and more dysfunctional parenting behaviors. However, I found that when controlling for child age, child rule breaking, maternal minority status, and household income, PTSD status did not predict greater negative emotion, and greater negative emotion did not predict lax parenting. Similarly, when examining direct and indirect effects of overreactive parenting and controlling for maternal age, maternal depression, maternal minority status, maternal education, and household income, PTSD status did not predict greater negative emotion, and greater negative emotion did not predict overreactive parenting. Thus, similar levels of dysfunctional parenting behaviors were observed, regardless of the intensity of negative emotions experienced by mothers. These findings contrast with theory suggesting that PTSD is associated with increased negative affect during emotionally evocative situations (e.g., Chemtob et al., 1994; Orsillo et al., 2004). These results also contrast with prior research finding that greater intensity of negative emotions increases the likelihood parents will engage in ineffective parenting behaviors (Dix, 1991; Lorber & Slep, 2005; see Rueger et al., 2011 for a review). Notably, researchers using the identical parent-child interaction task that was employed here *did* find associations between greater negative emotion and high maternal laxness and overreactivity (Lorber, 2007; Lorber & O'Leary, 2005; Lorber & Slep, 2005).

Though unexpected, there are several possible explanations for why PTSD was not associated with either lax or overreactive parenting indirectly via greater negative emotion. First,

it is possible that PTSD does not increase negative emotions in the context of parenting. Although research reveals links between PTSD and negative emotion more broadly (e.g., Finucane et al., 2012; Kashdan et al., 2006), no prior studies have specifically examined moment-to-moment emotional experiences among those with PTSD in the context of parenting. It is possible that mothers with PTSD may experience greater negative emotion on a day-to-day basis and in response to particular stressors, yet feel similar levels of positive and negative emotion as those without PTSD when interacting with their children. Indeed, during the CAPS-5 interview, mothers with symptoms of PTSD occasionally described their child to be among their greatest sources of happiness, spontaneously stating that being a mother gave them strength to be resilient through the more difficult moments. Thus, it is possible that mothers with PTSD in the current study experienced similar levels of positive emotion as mothers with partial or no PTSD, which in turn mitigated the impact of symptoms on parenting outcomes.

Alternatively, mothers with partial or full PTSD may have underreported negative emotions they experienced during the parent-child interaction task, due to societal expectations that they should be happy when spending time with their children. Termed “New Momism,” for many mothers, unrealistic, romanticized expectations of parenting as the most gratifying role in a woman’s life may contrast with the harsh realities of daily parent-child interactions, which can be emotionally taxing (Douglas & Michaels, 2004; Eibach & Mock, 2011). Indeed, despite the fact that parents with more children experience less frequent positive emotions (Simon & Nath, 2004) and more frequent negative emotions (Ross & Van Willigen, 1996) than those with fewer children, the notion that offspring are among the greatest sources of happiness and satisfaction remains (Jones & Brayfield, 1997; Simon, 2008). If mothers in the current study internalized these societal pressures and attempted to depict themselves in an idealized state of maternal joy

(perhaps enhanced due to the demand characteristics of the study), this could have resulted in underreporting of negative emotions.

It is also possible that the task used in the current study was not sufficiently stressful to generate strong negative emotions in mothers, which would interfere with the ability to detect whether negative affect impacts parenting. Indeed, on average, mothers experienced mildly positive emotion across the task, which may indicate that the paradigm generally did not elicit the kind of negative emotions that might typically arise among mothers during discipline encounters. Informal observation during the task revealed that mothers most often displayed more mild manifestations of annoyance and irritation when managing child misbehavior, rather than strong negative reactions to their children. Consistent with this, it is possible mothers experienced a boost in positive mood during this task as it coincided with the reunification of mother and child after a 30 to 90-minute separation. Further, a sizeable minority of child participants engaged in little to no misbehavior and emitted little to no negative affect. Mothers of children who behaved according to the rules of the task likely did not experience the level of negative emotion they might typically experience when their child is displaying higher levels of misbehavior and negative mood (e.g., tantrums).

Cortisol Reactivity

In Aim 3, I hypothesized that more dysregulated cortisol during the parent-child discipline encounter would mediate the relation between PTSD and more dysfunctional parenting behaviors. However, I found that when controlling for child age, child rule breaking, maternal minority status, and household income, PTSD status did not predict dysregulated cortisol, and dysregulated cortisol did not predict lax parenting. Similarly, when examining direct and indirect effects of overreactive parenting and controlling for maternal depression,

maternal age, maternal minority status, maternal education, and household income, PTSD status did not predict dysregulated cortisol, and more dysregulated cortisol did not predict overreactive parenting. Thus, in the current study, similar levels of dysfunctional parenting behaviors were demonstrated, regardless of PTSD status or the degree of cortisol reactivity experienced by mothers. These findings contrast with theory suggesting that those with PTSD experience altered HPA axis functioning following trauma exposure, resulting in either hypersecretion (e.g., Elzinga et al., 2003; Inslicht et al., 2006) or hyosecretion of cortisol (e.g., Brand et al., 2010; Morris et al., 2012) in response to acute stressors. These findings also contrast with prior research linking both high and dampened cortisol reactivity to poor parenting outcomes, including greater harshness (e.g., Mills-Koonce et al., 2009; Martorell & Bugental, 2006), as well as withdrawal behaviors (e.g., Juul et al., 2015; Schechter et al., 2004).

Though unexpected, there are several possible explanations for why PTSD did not indirectly impact either lax or overreactive parenting behaviors via cortisol dysregulation. First, comprehensive reviews on the link between PTSD and cortisol reactivity paint a complicated picture in which differences exist among: (1) comorbidly depressed individuals with PTSD versus individuals with PTSD-only, (2) those exposed to single versus multi-event traumas, and (3) those exposed to recent trauma versus exposure occurring during childhood (see Handwerker, 2009 and Jones & Moller, 2011 for reviews). As such, investigations of the association between PTSD and cortisol reactivity are mixed, and a number of studies have found null associations between PTSD and cortisol reactivity (see Meewisse, Reitsma, De Vries, Gersons, & Olf, 2007 for a meta-analysis). The small sample size of the current study did not provide sufficient statistical power to examine potential moderators of cortisol reactivity, such as single versus multiple trauma events, length of time since trauma exposure, and comorbid depression. It is also

important to note that there is not a one-to-one association between cortisol reactivity and behavioral responses, such that cortisol reactivity inevitably leads to behavioral responses (Ursache et al., 2013). Relations between cortisol and parenting behaviors, which can be subtle and varied, are undoubtedly complex. Indeed, researchers have cautioned that although hormone levels might increase the likelihood of engaging in preexisting behavioral tendencies, it is erroneous to assume that hormones *cause* these behaviors (Sapolsky et al., 2000).

Understanding methodological limitations related to cortisol collection in the current study may also help to explain the lack of significant findings. A multitude of third variables are known to impact cortisol output (Granger et al., 2012). In the current study, mothers provided answers to 36 items querying about covariates that impact cortisol levels (e.g., general physical activity level, food intake, menstrual cycle, substance use, medication use). Still, other than excluding women who were currently pregnant due to substantial hormonal changes (Nolten et al., 1980), and removing the scores of the two women with cortisol levels greater than four standard deviations above the mean, the small sample size did not afford the exclusion of participants who endorsed items that could have impacted cortisol to a lesser extent (e.g., currently taking medication for a cold, currently on birth control). Next, in accordance with guidelines from consultant Doug Granger (personal communication, 08/12/2016), all mothers were scheduled for their appointments after 1:00pm to limit the diurnal fluctuations of cortisol occurring in the morning, and mothers were informed they should not eat for one hour prior to arriving for their session. However, the timing of meals over the course of the day, differences in mothers' sleep schedules, and the range of afternoon hours in which appointments were scheduled all may have added extraneous variance to cortisol levels. Further, although I attempted to obtain cortisol samples as close to the ideal time intervals as possible, there were

times when cortisol samples had to be delayed due to diaper changes or because mothers wanted breaks to soothe their children. Individual difference variables might also have impacted cortisol levels, including the level of stress mothers experienced in making the lab appointment on time and mothers' level of comfort and anxiety during study participation. Finally, mothers who received the CAPS-5 interview were asked to recount anxiety-provoking trauma memories, which could have influenced cortisol levels. To address this concern, the study procedures included a 20-minute buffer during which mothers completed non-stressful questionnaires, to allow cortisol levels to return to baseline prior to obtaining the first sample of cortisol used in the present analyses. Nevertheless, it is possible that mothers who received the CAPS-5 interview continued to experience alterations in cortisol beyond the 20-minute buffer, which ultimately could have influenced the trajectory of cortisol samples over the course of the discipline encounter.

Finally, as mentioned above, it is possible the parent-child interaction task was not sufficiently stressful to elicit alterations in cortisol, making it challenging to examine whether cortisol dysregulation impacted parenting behaviors. There were no significant differences by PTSD status across any change score including Time 2 – Time 1 (i.e., the rate at which cortisol changed between prior to the start of the stressful task and immediately following the task), nor any change between Time 3 – Time 2 (i.e., the rate at which cortisol reactivity “recovered” across the 45 minutes following cessation of the task). Indeed, on average, mothers experienced a mild decrease in cortisol reactivity across the task, which suggests that the paradigm was not adequate to elicit cortisol reactivity. Taken together, this provides further evidence that the task may not have been experienced as particularly stressful by mothers. Notably, the strongest cortisol responses observed in lab environments occur following paradigms involving

uncontrollability, and in particular, during tasks eliciting “social evaluative threats” in which one’s identity is negatively judged by others (Dickerson & Kemeny, 2004). Although the task in the current study introduced elements of uncontrollability (i.e., child misbehavior), it was not developed to elicit social evaluative threat.

While not a specific focus of the study, there was a direct effect between maternal minority status and cortisol reactivity. Although absolute levels of cortisol did not differ across any of the three time points by minority status, cortisol decreased at a steeper rate among mothers who identified as White and non-Hispanic compared to racial/ethnic minority participants. Although it is challenging to draw conclusions due to the small sample size, it is possible that minority participants experienced greater stress during the parent-child interaction task compared to White mothers; however, the non-significant associations between minority status and child rule breaking suggest that children of minority mothers did not necessarily misbehave more. Alternatively, it is possible that race-related stressors including experiences of discrimination may impact cortisol stress reactivity (Richman & Jonassaint, 2008). For example, due to historical and continuing patterns of negative interactions with the medical research community, it is possible that minority mothers experienced greater mistrust and anxiety during the lab session (Brandon, Issac, & LaVeist, 2005); these perceptions could theoretically have resulted in a smaller decline in stress-related cortisol reactivity over the course of the stressful parent-child interaction.

Limitations and Future Directions

The present study has several limitations that should be considered. First, the sample consisted of mothers recruited from the community, rather than individuals recruited specifically at risk for PTSD. This approach likely resulted in symptom count and severity scores on the

lower end of that required for diagnosis. Specifically, mothers with partial PTSD had a mean symptom count of 5.25 ($SD = 1.92$) out of 20 and mean severity ratings of 14.46 ($SD = 4.44$) out of 80, while mothers with full PTSD had a symptom count of 12.74 ($SD = 3.16$) and severity rating of 31.95 ($SD = 8.95$). The moderate severity score for the CAPS-5 ranges from 23 to 34 (Weathers et al., 2017), suggesting that mothers in our sample meeting criteria for diagnosis were typically experiencing moderate symptoms of PTSD. It is possible that mothers with more severe PTSD symptoms experience greater challenges with parenting, which could result in more frequent utilization of overreactive and lax behaviors, compared to those shown in the current study. These mothers might also experience greater negative emotion during routine discipline encounters with their children, as well as more dysregulated cortisol in response to parenting challenges. Future research should examine relations among PTSD, experienced emotion, cortisol dysregulation, and parenting behaviors among more severely traumatized populations (e.g., refugees, prisoners of war, mothers living in domestic violence shelters).

Relatedly, the generalizability of the current findings may be limited by the characteristics of the current sample. The mailing strategy used for the bulk of recruitment efforts may have contributed to relatively homogenous makeup of the sample. Searching for contact information based on publicly available birth announcements yielded more accurate addresses for homeowners, as opposed to renters, which likely increased recruitment of mothers from higher SES backgrounds. A more heterogenous subset of mothers were recruited following initiation of other methods of recruitment, including posting of flyers around the Lincoln community and Craigslist ads. Nevertheless, the majority of participants were non-Hispanic, White (84.6%), came from a high socioeconomic status (SES) background (modal family income above \$100,000), and had achieved a high level of education (modal attainment of a bachelor's

degree). Thus, findings from the current study cannot be generalized to Hispanic, racially diverse mothers from low SES backgrounds with lower levels of educational attainment. Notably, prior investigations using the same parent-child interaction task used participants with similar characteristics as the current study (i.e., predominantly White, middle to upper-middle class, modal educational attainment of some college (Arnold & O'Leary, 1997; Lorber, O'Leary, & Kendziora, 2003), although these studies did not sample mothers with PTSD. The link between PTSD and dysfunctional parenting may be more robust among mothers from disadvantaged backgrounds, given reduced access to resources, including poorer mental healthcare and increased exposure to daily stressors (Myers, 2008; Santiago, Wadsworth, & Stump, 2011). Indeed, findings from the current study are in line with this possibility. Specifically, mothers with lower household incomes were more likely to experience negative emotions during the parent-child discipline encounter, and racial/ethnic minorities were more likely to experience greater cortisol reactivity as well as demonstrate more overreactive parenting behaviors.

Another aspect of the study that may have limited my ability to detect significant effects is that the inclusion criteria did not stipulate mothers must have experienced a specific type of trauma. Thus, mothers with exposure to *any* traumatic event were included, resulting in a heterogenous sample comprised of mothers with diverse trauma backgrounds (e.g., car accident survivors, victims of sexual abuse or domestic violence, those who learned about the accidental death of a loved one). Although including mothers with heterogenous trauma backgrounds increases the generalizability of findings, it is possible that certain kinds of traumatic experiences are more likely to impact parenting. Much of the existing literature on PTSD and maternal parenting has focused on women exposed to interpersonal trauma, such as child sexual abuse and intimate partner violence, based on the notion that these women may be uniquely affected by the

sense of betrayal that arises from the experience of being victimized by a loved one (Finkelhor, 1987; Levendosky & Graham-Bermann, 2000). Investigations of these populations find that intimate partner violence and early experiences of child abuse, even in the absence of PTSD diagnosis, may increase the likelihood of problematic parent-child relations (Banyard et al., 2003; Cohen et al., 2008). Thus, there is reason to believe that mothers with PTSD stemming from these experiences might be especially at risk for parenting problems. Future research should examine whether particular trauma characteristics (e.g., trauma type, chronicity of trauma, length of time since trauma) differentially impact parenting behaviors.

Next, as mentioned, it is possible that the standardized lab task used here fell short of what was needed to emulate a stressful discipline encounter. On average, mothers did not experience a significant increase in cortisol, nor did they endorse strong negative emotions during the video playback of the task, suggesting that the task did not elicit the level of negative emotion or physiological reactivity that might arise in more extreme discipline encounters. This is likely due, in part, to the relative infrequency with which children displayed strong oppositional behaviors or intense negative affect. Indeed, on occasion, child participants displayed little to no oppositional behaviors, which subsequently decreased the likelihood that either positive or negative parenting behaviors would be displayed. In sum, children who followed most of the rules of the task and generally remained quiet did not display the kinds of behaviors requiring higher levels of parent management, and thus, changes in cortisol reactivity and emotion may not have had the opportunity to take place. Future research should utilize a more stressful parent-child interaction task. For example, the task used here could be modified to increase the desirability of objects displayed around the room. Rather than displaying candy in a jar, a plate of cookies could be left within reach of the child. Alternatively, perhaps children

could have access to desirable objects (e.g., musical instruments) for a period of time, before being told to stop touching them, despite the objects remaining in the room. It may be useful for researchers to conduct a pilot study with children in the proposed age range to examine the optimal environmental constraints for increasing child misbehavior to levels more typically seen during power struggles within the home.

Additional mechanisms beyond cortisol reactivity and experienced emotion could mediate the relation between PTSD and parenting and warrant consideration in future studies. Undoubtedly, there are numerous other biological and physiological correlates of PTSD with downstream effects on parenting. For example, researchers studying epigenetic factors pertaining to HPA axis responses have found that mothers with IPV-related PTSD have a greater risk of NR3C1 epigenetic signatures characterized by low-methylation, which in turn increases risk for parenting stress and decreases maternal sensitivity (Schechter et al., 2015). Further, although the continuous assessment of emotion during video playback is a methodological strength, this measure does not distinguish between different kinds of positive and negative emotions (e.g., anger versus sadness). Given evidence that specific emotions may have differential impacts on parenting (Dix, Gershoff, Meunier, & Miller, 2004), future research could benefit from using a more fine-grained analysis of emotion.

It would also be worthwhile to examine whether emotion *regulation*—a multifaceted construct reflecting the processes by which individuals experience, influence, and express their emotions (Gross & Thompson, 2007)—more robustly predicts parenting outcomes. Although parents' emotional experience is one aspect of emotion regulation, the strategies that parents use to influence and express their emotions may play a more central role in affecting discipline behaviors (Lorber, 2012). Parents who do not regulate emotion appropriately may ultimately

resort to expressing their emotions toward their children in an uncontrolled and ineffective manner (Dix, 1991). For example, parents who use reappraisal techniques to think differently about the reason why their child is misbehaving (e.g., not taking child oppositional behaviors personally, but instead attributing them to the child being tired), may have better success in downregulating negative emotions, reducing the likelihood that they will engage in overly harsh or permissive parenting behaviors. Another possibility is that parents who use more suppression may dampen their expression of anger (Gross, 1998), resulting in fewer displays of negative emotion toward their child; alternatively, links between greater suppression and increased internal and physiological indices of anger (Gross, 1998) suggest that these parents could ultimately erupt in strong negative emotion toward their child. A substantial body of work revealing links between PTSD and emotion dysregulation (e.g., Ehring & Quack, 2010; Seligowski, Lee, Bardeen, & Orcutt, 2015) further supports the possibility that symptoms of PTSD, such as irritability and avoidance, may heighten emotional dysregulation in the context of parenting.

Finally, a number of individual differences—including more stable factors such as attitudes, personality, and cognitions—may moderate the impact of PTSD on parenting. For example, research has demonstrated that parents' beliefs about spanking and cognitive processes, such as hostile attributions and poorer knowledge of alternative disciplinary strategies predict dysfunctional discipline styles (Pinderhughes, Dodge, Bates, Pettit, & Zelli, 2000; see DiLillo & Damashek for a review). Parenting values, which are shaped by a range of demographic characteristics such as education, socioeconomic status, and race/ethnicity, may profoundly impact parents' orientation to childrearing, including discipline practices (Darling & Steinberg, 1993). Although the small sample size of this study precluded my ability to examine potential

moderators of interest, future research should continue to explore whether the influence of PTSD on parenting differs based on more stable individual differences.

Clinical Implications

Several clinical implications stem from the current findings. Although the results of this study preclude certainty regarding *why* mothers with PTSD have trouble setting limits on their children, findings suggest a number of possible avenues for intervention. First, providing trauma-exposed mothers empirically supported individual treatments for PTSD, such as Cognitive Processing Therapy (CPT; Resick, Monson, & Chard, 2017) or Prolonged Exposure (Foa, Hembree, & Rothbaum, 2007), could improve mothers' parenting abilities by decreasing symptoms, lessening subjective distress, and increasing mothers' social and occupational functioning. Parenting-focused interventions are also likely to be useful for mothers with PTSD. For example, if PTSD symptoms such as avoidance and numbing interfere with mothers' ability to identify when their children are breaking rules in the first place, a focus on improving mothers' ability to detect child misbehavior may increase their awareness of behavioral problems, enabling them to respond accordingly. Alternatively, mothers with PTSD may notice child oppositional behaviors, but lack the skills to effectively carry out discipline behaviors, resulting in a sense of helplessness when tasked with responding to their child. In this case, interventions focused on teaching mothers with PTSD skills to effectively intervene and engage with their children in an optimal manner may increase their repertoire of responses and improve their sense of self-efficacy. Similarly, if parents with PTSD disengage during particularly challenging discipline encounters with children due to difficulty regulating negative emotions, mother may benefit from receiving training in emotion regulation and distress tolerance, for

example, by using principles of Dialectical Behavioral Therapy (Robins, Ivanoff, & Linehan, 2001).

A number of interventions have already been developed to assist parents who have been exposed to major stressors in more effectively managing children's behaviors. For example, the After Deployment, Adaptive Parenting Tools/ADAPT program is a web-enhanced, group-based parent training intervention developed to help military families reintegrate following deployment (Gewirtz, DeGarmo, & Zamir, 2017; Gewirtz, Pinna, Hanson, & Brockberg, 2014). ADAPT is largely based on Parent Management Training-Oregon Model (PTMO; Dishion, Forgatch, Chamberlain, & Pelham, 2015; Forgatch & Patterson, 2010), which targets the reduction of inconsistent discipline in parent-child interactions. This intervention addresses a range of parenting skills, including monitoring, positive involvement with children, teaching through encouragement, problem solving, discipline, and emotion socialization. Military families randomized to the ADAPT program show improved coder-rated parenting behaviors, decreases in parental depression and PTSD symptoms, and better child adjustment up to one year following the intervention (Gewirtz et al., 2016). Further research is needed to determine whether the ADAPT program could be modified to aid civilian families with PTSD.

Other interventions have been developed for mothers from high risk families. For example, Mom Power (MP) is a parenting and self-care skills group program for mothers and their young children that focuses on enhancing maternal mental health, parenting competence, and treatment engagement (Muzik et al., 2015). The goal of the intervention is to increase trust-building, self-efficacy, and help mothers build skills related to self-care, mental health, problem-solving, emotion regulation, and parenting competence. The treatment incorporates principles of child-parent psychotherapy, trauma-informed care, solution-focused therapy, motivational

interviewing, cognitive-behavioral therapy, and Dialectical Behavior Therapy (Robins et al., 2001). Preliminary outcomes show that mothers who completed treatment (73% of whom had been exposed to interpersonal trauma and 45% of whom had a diagnosis of PTSD) experienced improvements in mental health symptoms, including PTSD, as well as improvements in coder-rated parenting outcomes (Muzik et al., 2015).

Because inconsistent parenting is associated with negative child outcomes, including the development of child behavioral problems (Acker & O'Leary, 1995; Gardner, 1989), decreasing overly lax or permissive parenting behaviors among mothers with PTSD has the potential to improve child trajectories. Ultimately however, it is challenging to develop interventions aimed at targeting processes underlying PTSD and lax parenting if the mediators explaining this link remain unclear. Future research yielding more knowledge regarding specific mechanisms underlying this link will undoubtedly suggest potential points of intervention.

Conclusions

Mothers with PTSD may have difficulty carrying out effective discipline strategies during challenging interactions with their children. In particular, it is possible that symptoms of PTSD (including partial symptoms) may increase negative emotional reactions and interfere with effective HPA regulation responsible for facilitating healthy stress responses. This study used an observational paradigm to investigate the threshold at which PTSD symptoms might give rise to overreactive and lax parenting behaviors and examined whether mothers who experienced greater negative emotions during the task, as well as dysregulated cortisol reactivity, displayed worse parenting behaviors. Findings revealed that mothers with full PTSD are more likely to exhibit lax/permissive parenting behaviors during stressful interactions with their toddlers, compared to mothers with partial or no PTSD. However, PTSD showed no association with

overreactive parenting behaviors, when important covariates were controlled for, and the proposed mediators did not facilitate the link between PTSD and either parenting outcome. Together, these findings suggest that mothers with PTSD may struggle to use consistent parenting behaviors when their children misbehave, and interventions that target mothers' tendency to respond permissively to child noncompliance may be useful in teaching mothers to parent more effectively.

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APPENDICES

APPENDIX A: Project CARE Online Screen

Thank you for your interest in Project CARE (Caregivers, Responses, and Emotions)! Are you willing to answer some questions to see if you are initially eligible to participate? All the information that you provide will remain confidential.

_____ Yes, I am willing to answer questions in order to determine my initial eligibility for the study.

_____ No, I'm am not willing to answer questions regarding my initial eligibility for the study.

[If no:] You have indicated you are no longer interested in participating in the study. Please feel free to contact Molly Franz at XXX-XXX-XXXX or email UNLprojectCARE@gmail.com if you have any questions.

What is your age?: _____ (**exclude if under 19**)

What is your sex?: M _____ F _____ (**exclude if male**)

Are you Latino, Hispanic, or of Spanish origin?

0 = No

1 = Yes

Which of the following best describes you?

1 = American Indian or Alaskan Native

Specify: _____

2 = Asian

3 = Black or African American

4 = Native Hawaiian or Other Pacific Islander

Specify: _____

5 = White

6 = Other

Specify: _____

How many children do you have and what are their ages?: _____
(exclude if no children between age 18-36 months)

Are you the legal guardian of your child(ren)? _____ **(exclude if not legal guardian)**

Are you currently pregnant? _____ **(exclude if pregnant)**

[If not eligible to participate]: Thank you for your responses to these questions. Unfortunately, you don't meet the requirements for the study. Many people are not eligible to participate for one reason or another. However, we appreciate you taking the time to answer our questions. Please feel free to contact Molly Franz at XXX-XXX-XXXX or email UNLprojectCARE@gmail.com if you have any questions.

In order to determine if you are eligible to participate in the study, we will need to ask you some more questions. These questions will take between 5-10 minutes to complete.

Before you complete these questions, it may be helpful to learn a little more about the study. If you are eligible for the study, participation will involve two parts. The first part involves filling out a questionnaire online that takes approximately 30 minutes to complete. Next, participation involves both you and your child attending an appointment lasting approximately 2 to 3 hours at the Project CARE Lab at UNL.

During this appointment you will (a) participate in an interview about stressful life events and psychological symptoms, (b) complete a series of questionnaires including demographics and questions about your child's functioning, (c) engage in several interactions with your child, (d) watch a video of your interactions with child and rate your emotions, and (e) provide four saliva samples. Childcare for your participating child will be provided during all parts of the study when you are not engaging in interactions with your child.

You will earn \$10 for completing the 30-minute online questionnaire, and \$15 an hour for participating in the study, for **up to \$55 total**. Your participating child will be presented with a prize box and will be able to self-select the toy he or she would like.

Are you still interested in participating in the study?

_____ Yes: Please take me to the next page to complete the remainder of the questions to determine whether I am eligible to participate.

_____ No: I am not longer interested.

[If no]: You have indicated you are no longer interested in participating in the study. Please feel free to contact Molly at XXX-XXX-XXXX or email UNLprojectCARE@gmail.com if you have any questions.

[If yes]: First, please provide us with the following information so that we can reach you if you are eligible to participate.

Name:

Phone:

Email:

Best times and dates for us to contact you:

In this research study, we are interested in looking at the way certain stressful life experiences might influence your interactions with your child. Thus, the purpose of the next series of questions is to determine whether you have had certain difficult or stressful life experiences. All information you provide will be kept strictly confidential. You may stop at any time or choose not to answer specific questions if you wish. This information is used to determine whether you are eligible for the study.

Are you in a private situation and feel you can answer questions freely?

_____ Yes

_____ No

[If no]: You have indicated you are not currently in a private situation and do not feel you can answer questions freely. Please return to complete this survey when you are in a private situation

Modified LEC-5

Listed below are a number of difficult or stressful things that sometimes happen to people. For each event check one or more of the boxes to the right to indicate that: (a) it happened to you personally; (b) you witnessed it happen to someone else; (c) *if you learned about it happening to a close family members or close friend*, or (d) *if it doesn't apply*.

Please choose at least one checkbox per item. If you have never experienced the event, please mark "Doesn't Apply."

Be sure to **consider your entire life** (growing up as well as adulthood) as you go through the list of events.

1. Natural disaster (for example, flood, hurricane, tornado, earthquake)
2. Fire or explosion
3. Transportation accident (for example, car accident, boat accident, train wreck, plane crash)
4. Serious accident at work, home, or during recreational activity
5. Exposure to toxic substance (for example, dangerous chemicals, radiation)
6. Physical assault (for example, being attacked, hit, slapped, kicked, beaten up)
7. Assault with a weapon partner (for example, being shot, stabbed, threatened with a knife, gun, bomb)
8. Sexual assault (rape, attempted rape, made to perform any type of sexual act through force or threat of harm)
9. Other unwanted or uncomfortable sexual experience
10. Combat or exposure to a war-zone (in the military or as a civilian)
11. Captivity (for example, being kidnapped, abducted, held hostage, prisoner of war)
12. Life-threatening illness or injury
13. Severe human suffering
14. Sudden violent death (for example, homicide, suicide)
15. Sudden accidental death
16. Serious injury, harm, or death you caused to someone else

LEC-5 follow-up questions (Administered only if participant endorsed an event on Part 1)

If you have experienced more than one of the events described on the previous page, think about the event you consider the worst event, which for this questionnaire means **the event that currently bothers you the most**. If you have experienced only one of the events in PART 1, please select that one as the worst event. Which event do you consider the worst event?:

How did you experience that event?

____: It happened to me directly

____: I witnessed it

____: I learned about it happening to a close family member or a close friend

Was someone's life in danger?

____: Yes, my life

____: Yes, someone else's life

____: No

Was someone seriously injured or killed? If so, who?

____: Yes I was seriously injured

____: Yes, someone else was seriously injured or killed

____: No

Did it involve sexual violence?

____: Yes

____: No

If the event involved the death of a close family member or close friend, was it due to some kind of accident or violence, or was it due to natural causes?

____: Accident or Violence

____: Natural Causes

____: Not applicable (the event did not involve the death of a close family member or close friend)

Modified PCL-5 (Administered only if the participant endorsed an event on the LEC-5 and the following criteria were met: Someone's life was in danger OR someone was seriously injured or killed OR it involved sexual violence OR it involved a death due to accident or violence)

Below is a list of problems that people sometimes have in response to experiences like that.

Keeping the event you just indicated was the "worst event" in mind, please read each problem carefully and then indicate how much you have been bothered by that problem in the past month.

"In the past month, how much were you bothered by..."

(Options: Not at all, A little Bit, Moderately, Quite a Bit, Extremely)

1. Repeated, disturbing, and unwanted memories of the stressful experience?
2. Repeated, disturbing dreams of the stressful experience?
3. Suddenly feeling or acting as if the stressful experience were actually happening again (as if you were actually back there reliving it)?
4. Feeling very upset when something reminded you of the stressful experience?
5. Having strong physical reactions when something reminded you of the stressful experience (for example, heart pounding, trouble breathing, sweating)?
6. Avoiding memories, thoughts, or feelings related to the stressful experience?
7. Avoiding external reminders of the stressful experience (for example, people, places, conversations, activities, objects, or situations)?
8. Trouble remembering important parts of the stressful experience?
9. Having strong negative beliefs about yourself, other people, or the world (for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous)?
10. Blaming yourself or someone else for the stressful experience or what happened after it?
11. Having strong negative feelings such as fear, horror, anger, guilt, or shame?
12. Loss of interest in activities that you used to enjoy?
13. Feeling distant or cut off from other people?
14. Trouble experiencing positive feelings (for example, being unable to feel happiness or have loving feelings for people close to you)?
15. Irritable behavior, angry outbursts, or acting aggressively?
16. Taking too many risks or doing things that could cause you harm?
17. Being “superalert” or watchful or on guard?
18. Feeling jumpy or easily startled?
19. Having difficulty concentrating?
20. Trouble falling or staying asleep?

Thank you for your responses to these questions.

We will be carefully reviewing your answers. If you are eligible to participate, we will use your contact information to get in touch with you about the next steps within a few days.

Occasionally, upon careful review of your answers, we may determine you do not meet the requirements for our study. If this is the case, we will use your contact information to let you

know you do not meet eligibility criteria.

Please feel free to contact Molly Franz at XXX-XXX-XXXX or email UNLprojectCARE@gmail.com if you have any questions.

APPENDIX B: Project CARE Scheduling Script

Screening ID#: _____

Date: _____

Voicemail:

“Hello _____. My name is _____. I am calling to talk to you about Project CARE, the research study taking place at the University of Nebraska-Lincoln. If you could call me back at XXX-XXX-XXXX, then I can tell you a little more about the study, and if you’re interested, I can schedule you to come in. Thanks and have a good day.

First contact:

“Hello. My name is _____. I am calling to talk to you about Project CARE, a research study taking place at the University of Nebraska-Lincoln.

“How are you today?”

I want to thank you for your responses to those questions online and let you know that you are eligible to participate in the study.

[OR] “I want to thank you for your responses to those questions online and let you know that you may be eligible to participate, but I would first like to ask you a few additional questions. Would now be a good time to do that?” [If yes, continue. If not, reschedule].

“I would like to follow-up about one of the questionnaires that asked about stressful life events. You said you experienced X. Would you feel comfortable briefly describing that event?”

[If eligible] “I’m sorry to hear that, but I appreciate you sharing with me that additional information. You are eligible to participate in the study.”

[If not eligible] “I’m sorry to hear that, but I appreciate you sharing with me that additional information. Unfortunately, at this time, you are not eligible to participate in the study. Many people are not eligible to participate for one reason or another. However, we appreciate your time and effort. If our eligibility criteria changes in the future, would it be alright for us to contact you to let you know?”

[If ask why – Say we’re interested in folks who have had certain stressful life events and right now what you just described falls under the category of what we’re excluding for].

Are you interested in scheduling an appointment to participate in the study?

Great! As a reminder, participation involves two parts. First, you would fill out a questionnaire online that takes approximately 30 minutes to complete. Next, both you and your child would be asked to attend an appointment lasting approximately 2 to 3 hours (although sometimes appointments have lasted 3.5 hours) at the Project CARE Lab at UNL. The session will involve you filling out questionnaires, completing some interactions with your child,

watching the video of that interactions while rating your emotions, completing an interview about psychological symptoms, and providing saliva samples. If you participate, you will be paid \$10 for completing the online questionnaire at home, and \$15 an hour for the in-person session.”

Do you have any questions?

In order to participate in the study, we would need you (but not your child) to refrain from eating, drinking caffeine, or smoking in the 60 minutes prior to the study session. This is so we can get an accurate measurement of your cortisol. Is that okay?

Furthermore, we ask that you do not eat during the lab session until the final collection of salivary cortisol (which will occur about 1.5 to 2.5 hours into the session). There will however be a snack provided for your child (or you may bring your own snack for your child).”

“We have excellent research assistants who have received extensive training in handling children. We have both male and female research assistants, one of whom will be spending time with your child while I meet with you alone. Do you have any special concerns about that?

“Would you like to schedule an appointment?”

[If “no – I am not interested”]: *That is perfectly fine. Thank you for your time. Have a great day.*

[If yes]: *“Great!*

“Before we do that, can I just get the name, sex, and birth date of the child you’ll be bringing with you?” **[Record on Participant Log]**

“Can I also confirm with you that you’ll only be bringing your toddler with you to the appointment?”

“Also pregnant women are not eligible to participate, so if you become pregnant before your scheduled appointment with us, please let me know”

[Over phone]: Settle on a day and time for them to come in (must be 1PM or later). Ask mother about child nap time and make efforts to schedule lab session around that time. Schedule appointment on Google Calendar by recording date, RA responsible, and screening ID.

*“At this time, I will also send you a link to the 30-minute online survey. **I will include in this email your ID number.** Please know that when you complete the survey, you will be asked to enter in this ID number. You must complete this online questionnaire prior to your scheduled lab appointment in order to participate in the study.*

Do you have any questions?”

“We look forward to seeing you and your child on [date, time]! The session will take place in the basement of Burnett Hall on the UNL City campus. The day before, we will call and email you a reminder about the time and location of your session, along with a map and information about parking.”

Schedule reminder to be sent 24 hours prior to the session.

APPENDIX C: Salivary Collection Questionnaire

Saliva Collection Questionnaire

Do you currently **SMOKE** or use other forms of **TABACCO** or **NICOTINE**?

(This includes, but is not limited to social smoking, chewing tobacco, cigars, pipe, nicotine patch or gum, vaporizers, e-cigarettes, smokeless cigarettes, hookahs, etc.)

Yes No

If **Yes** When was the last time you smoked?

Date: _____

If **No** Have you ever smoked or used other forms of tobacco or nicotine (including those mentioned above) in the last 6 months?

Yes No

If **Yes**

Date _____

2. Have you had any **dental work in the past 48 hours**?

Yes No

3. Do you have any dental work or devices? (This includes braces, bridges, false teeth, dental implants, etc.)

Yes No

Describe

a) If **Yes**

Date

4. Do you currently have any open sores or abrasions in your mouth?

Yes No

5. Do you have any signs of oral health problems, inflammation of the gums, and/or loosening of the teeth (periodontitis, gingivitis)? Yes No

6. Do you notice a pinkish-red color when you brush your teeth? Yes No

7. Have you ever had a **Salivary Gland Disease or Disorder (dry mouth, lack of production of saliva)**? Yes No

8. Are you currently under a physician's care for any acute (e.g., bacterial infection, influenza) or chronic (e.g., seizures, hepatitis, cancer, HIV/AIDS) conditions? Yes No

If Yes

Describe _____

9. Do you take any prescription medication other than contraception? Yes No

If Yes

Describe _____

10. Do you have any allergies? Yes No

If Yes

Describe _____

11. Do you use decongestants? Yes No

a) If Yes

Describe

Runny nose Cough Congestion None of these

Have you:

- | | | |
|---|----|-----|
| 18. Consumed caffeine in the past hour? | No | Yes |
| 19. Brushed your teeth within the last 45 minutes? | No | Yes |
| 20. Had a sugary drink within the past 20 minutes? | No | Yes |
| 21. Had anything (including water) to drink within the past 10 minutes? | No | Yes |

In the past 12 hours, have you:

- | | | |
|---|----|-----|
| 22. Consumed caffeine? | No | Yes |
| 23. Used nicotine products of any kind? | No | Yes |
| 24. Taken any medications? | No | Yes |

25. Describe your level of physical activity for the past hour:

1	2	3	4	5
Very Low (sitting still)	Low-level activity	Moderate (walking for 10- 15 minutes)	Somewhat Active	Very Active (full work-out)

- | | | |
|--|----|-----|
| 26. Have you had a meal in the past hour?
If yes, what was the size of your meal? | No | Yes |
|--|----|-----|

0	1	2	3	4
---	---	---	---	---

Not applicable Snack Small Meal Medium Meal Large Meal

27. How many hours of sleep did you get last night?

Please give an exact number (e.g., 8.5 or 3). _____

28. What time did you wake up this morning? _____

29. Have you slept in the past 2 hours? No Yes

If yes, for how long?

Please give an exact number (e.g., 8.5 or 3). _____

30. What is your mood for the past hour?

1	2	3	4	5
Very Negative	Somewhat Negative	Neutral	Somewhat Positive	Very Positive

31. Have you had any social problems (problems related to other people) in the past 3 hours?

No Yes

If yes, did you discuss this problem with a friend? No Yes

32. Please rate your current level of anxiety.

1	2	3	4	5
No Anxiety	Low	Moderate	Somewhat	Extreme

APPENDIX D: Demographics Questionnaire

1. What is your age (in years)? _____

2. Are you Latino, Hispanic, or of Spanish origin?

0 = No

1 = Yes

3. Which of the following best describes you? (You may check more than one.)

1 = American Indian or Alaskan Native

Specify: _____

2 = Asian

3 = Black or African American

4 = Native Hawaiian or Other Pacific Islander

Specify: _____

5 = White

6 = Other

Specify: _____

4a. What is your current legal marital status?

1 = Single

2 = Married (or in a Civil Commitment)

3 = Separated

4 = Divorced

5 = Widowed

4b. If you are/were married, for how long? _____

4c. If separated or divorced, when did you separated? _____

5. [For those who are not married:] Are you currently in a romantic relationship?

0 = No

1 = Yes

6a. [For those married or in a relationship:] Do you live with your romantic partner?

0 = No

1 = Yes

6b. If you are living with someone, for how long? _____

7. [For those married or in a relationship:] What is the gender of your romantic partner?

1 = Female

2 = Male

3 = Other – Please specify _____

8. Please fill out the following to describe all children living under your care. **Do not include** the child you brought with you today.

Child 1

Gender (circle) Male Female

Age _____

Living in the home? (circle) Yes No

Child 2

Gender (circle) Male Female

Age _____

Living in the home? (circle) Yes No

Child 3

Gender (circle) Male Female

Age _____

Living in the home? (circle) Yes No

Child 4

Child 5

Gender (circle) Male Female

Age _____

Living in the home? (circle) Yes No

Child 6

Gender (circle) Male Female

Age _____

Living in the home? (circle) Yes No

Child 7

Gender (circle) Male Female

Age _____

Living in the home? (circle) Yes No

Child 8

Gender (circle) Male Female

Age _____

Living in the home? (circle) Yes No

Gender (circle) Male Female

Age _____

Living in the home? (circle) Yes No

9. Please fill out the following to describe all other adults living in your home.

Adult 1

Gender (circle) Male Female

Age _____

Relationship to you: _____

Relationship to your child: _____

Adult 4

Gender (circle) Male Female

Age _____

Relationship to you: _____

Relationship to your child: _____

Adult 2

Gender (circle) Male Female

Age _____

Relationship to you: _____

Relationship to your child: _____

Adult 5

Gender (circle) Male Female

Age _____

Relationship to you: _____

Relationship to your child: _____

Adult 3

Gender (circle) Male Female

Age _____

Relationship to you: _____

Relationship to your child: _____

Adult 6

Gender (circle) Male Female

Age _____

Relationship to you: _____

Relationship to your child: _____

10a. What is the highest level of education you completed?

1 = Less than High School

2 = High School/G.E.D

3 = Some college

4 = Bachelor's Degree

5 = Master's Degree

6 = Professional (e.g., JD, MD) or Doctorate Degree

7 = Other (Please describe): _____

10b. [If you answered Less than High School] What was the highest grade in school you completed? _____

11a. Are you employed now? Yes No

11b. What is your usual occupation?

12a. [For those married or in a relationship] Is your partner currently employed? Yes No

12b. What is his/her usual occupation? _____

13. Your average yearly household income (please check one).

- | | |
|--|--|
| <input type="checkbox"/> \$0-\$5,000 | <input type="checkbox"/> \$40,000-\$50,000 |
| <input type="checkbox"/> \$5,000-\$10,000 | <input type="checkbox"/> \$50,000-\$60,000 |
| <input type="checkbox"/> \$10,000-\$20,000 | <input type="checkbox"/> \$60,000-\$70,000 |
| <input type="checkbox"/> \$20,000-\$30,000 | <input type="checkbox"/> \$70,000+ |
| <input type="checkbox"/> \$30,000-\$40,000 | |

14. How old is the child you brought with you today (in months)? _____

15. Child's gender: Male Female

16. Is your child Latino, Hispanic, or of Spanish origin?

0 = No

1 = Yes

17. Which of the following best describes your child? (You may check more than one.)

1 = American Indian or Alaskan Native

Specify: _____

2 = Asian

3 = Black or African American

4 = Native Hawaiian or Other Pacific Islander

Specify: _____

5 = White

6 = Other

Specify: _____

18. Your relationship to the child:

1 – Biological Mother

2 – Step Mother or Adoptive Mother

3 – Aunt

4 – Foster Mother

5 – Grandmother

6 – Other (Please describe: _____)

19. Please list all other primary caregivers of the child. For each caregiver, please list their relationship to you and their relationship to the child. For example, (Name, child's step-father, my current husband).

20. What grade is your child in? _____

21. Was he/she born before he/she was due (premature)?

No Yes Unsure

22. Were the doctors worried about his/her medical condition immediately after he/she was born?

No Yes Unsure

23. Did he/she have to spend any time in a neonatal intensive care unit (NICU)?

No Yes Unsure

24. Could he/she walk on his/her own by the age of 18 months?

No Yes Unsure

25. Has he/she ever had a seizure?

No Yes Unsure

26. Did he/she ever lose consciousness for more than a few minutes after an accident?

No Yes Unsure

27. Have you ever been concerned about his/her hearing or eyesight?

No Yes Unsure

28. [If child is 2 or older] By the time he/she was age 2, could he/she put several words together when speaking?

No Yes Unsure