INTIMATE PARTNER VIOLENCE, DEVELOPMENTAL TRAUMA, AND IMPAIRED EXECUTIVE FUNCTIONING IN PRESCHOOL-AGE CHILDREN

By

Joseph "Audie" S. Black

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ABSTRACT

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The current research integrates Perry et al.'s (1995) traumatic stress theory, De Bellis et al.'s (1999a/1999b) developmental trauma theory, and Blair's (2010) contextual stress and executive function theory to investigate *why* exposure to chronic traumatic events in early childhood is often related to deleterious social, emotional, and behavioral outcomes. Intimate partner violence (IPV) is considered a prototypic traumatic event for consideration in the present research due to IPV's chronic course and that young children are disproportionately exposed to IPV. The current study tested a novel model in which preschool-age children's executive functioning (EF) mediated the relationship between IPV exposure, dissociative and hypervigilant traumatic stress symptoms, and behavior problems. The study recruited 143 child-mother dyads from the local CACS Head Start preschools, which provided a sample of high-risk preschool-age children. Maternal and teacher report measures of the children's executive functioning was assessed using developmentally sensitive lab-based tasks.

Several notable findings emerged in the present study. Preschool-age children's traumatic stress reactions were differentially related to maternal and teacher reported behavior problems, such that greater levels of hypervigilance predicted teacher reported externalizing behavior problems, whereas greater levels of dissociation predicted both maternal reported internalizing and externalizing behavior problems. Exploratory and confirmatory analyses were used to examine the underlying structure of the children's EF. Contrary to expectations, the children's EF was best explained by a single, global EF factor that was highly contextually dependent (i.e., at home, school, and in the lab), rather than the three hypothesized sub-components (i.e., attentional control, working memory, and inhibitory control). Dissociation predicted worse maternal reported EF, but no direct relationships between traumatic stress symptoms and either teacher reported EF or lab-assessed EF emerged. However, structural models testing whether EF mediated the relationship between IPV exposure, traumatic stress reactions, and behavior problems at home and schools revealed a more nuanced picture. Consistent with predictions, EF fully mediated the proposed relationships when EF and behavior problems were considered within a single context (e.g., at home or at school). Models evaluating the mediational relationship for EF and behavior problems measured across contexts (e.g., maternal reported EF and teacher reported behavior problems) offered mixed support for EF as a mediator. Results from the lab-assessed EF suggest that in novel environments, preschool-age children's hypervigilance may temporarily improve their EF performance on highly structured tasks, presumably due to increased physiological arousal.

Overall, the pattern of results indicated that EF is an important mediating variable between exposure to IPV, traumatic stress symptoms, and preschool-age children's behavior problems reported at home and school. Clinical implications for the assessment of preschool-age children exposed to chronic family violence and future research directions are discussed.

DEDICATION

To my wonderful and loving wife, Jessica: This work would not have been possible without your constant support, encouragement, and inspiration...

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This manuscript represents the pinnacle achievement of my professional career to date; however, the research detailed within represents only one of the many turning points along the way to becoming a clinical psychologist. Although complete – and much deserved – recognition of every person who has contributed to my personal and professional development is beyond the scope of what is possible in these brief remarks, I would like to acknowledge the following individuals and organizations:

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The research detailed in this manuscript culminated in a study that was the result of a unique collaboration with the CACS Head Start organization. Three Head Start administrators, in

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Which reminds me, "I've been thinking..."

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CHAPTER 1

Introduction

Intimate partner violence (IPV) is a common form of violence. Within the past two decades, several national studies were conducted to determine the prevalence rate of IPV in the United States. Based on best estimates, approximately 25% of women will experience IPV within their lifetime (Breiding, Black, & Ryan, 2008; Tjaden & Thoennes, 2000). Although IPV is traditionally defined as male-to-female partner violence (e.g., Marshall, 1992), there is considerable evidence that both men and women perpetrate IPV (e.g., Breiding et al., 2008; Fantuzzo, Fusco, Mohr, & Perry, 2007; Fusco & Fantuzzo, 2009; McDonald, Jouriles, Ramisetty-Mikler, Caetano, & Green, 2006) and that the violence may be unidirectional (i.e., male-to-female or female-to-male) or bidirectional (Caetano, Vaeth, & Ramisetty-Mikler, 2008; Goodlin & Dunn, 2010). Furthermore, longitudinal studies suggest that most families experience multiple incidences of IPV over a period of several years (Caetano, Field, Ramisetty-Mikler, & McGrath, 2005). The current research defines IPV as any incident of physical assault, sexual violence, psychological control/coercion, or threats of physical and/or sexual violence perpetrated by either a male or female partner, consistent with previous investigators (Breiding et al., 2008; Marshall, 1992).

Young children under the age of five are disproportionately at risk for being exposed to IPV (Fantuzzo, Boruch, Beriama, Atkins, & Marcus, 1997), with approximately 7.5 million preschool-age children exposed to IPV each year in the United States (based on figures provided by Fantuzzo et al., 1997; Fusco & Fantuzzo, 2009; McDonald et al., 2006). Preschool-age children exposed to IPV appear to be particularly deleteriously impacted by the violence. According to two recent meta-analyses (Evans, Davies, & DiLillo, 2008; Wolfe, Crooks, Lee,

McIntyre-Smith, & Jaffe, 2003), preschool-age children exposed to IPV are at an increased risk for developing both internalizing and externalizing behavior problems. Furthermore, preschoolage children frequently experience significant traumatic stress reactions in response to the violence (e.g., Levendosky, Huth-Bocks, Semel, & Shapiro, 2002; Margolin & Vickerman, 2008; Zerk, Mertin, & Proeve, 2009). What is not well understood, however, is why children exposed to IPV in early life develop such widespread behavior problems and what mechanisms may mediate this relationship. The current research argues that the relationship between IPV exposure in early childhood, subsequent traumatic stress symptoms, and behavior problems are mediated by children's executive functioning (Note: 'EF' will hereafter represent executive function, executive functions, or executive functioning).

The impetus for such a model comes from the integration of the traumatic stress literatures (both psychological and physiological) and the broader neuropsychology literature. According to Perry, Pollard, Blakley, Baker, and Vigilante's (1995) traumatic stress theory, children's psychological traumatic stress responses are best conceptualized as occurring on a continuum anchored by dissociative experiences on one end and hypervigilance on the other. Dissociative and hypervigilant responses to traumatic events are proposed to influence young children's EF through the cognitive correlates of these traumatic stress reactions which influence children's capacity to engage with their environments. Understanding the distinction between these two types of traumatic stress is critical, as these reactions are proposed to have different biological and psychological mechanisms and behavioral outcomes (e.g., Hankin, Badanes, Abela, & Watamura, 2010). In particular, dissociative experiences are marked by a withdrawal from the sensory environment and an experienced fragmentation of sensory perception, cognition, and memory (APA, 2000; DePrince & Freyd, 2007). In contrast, children who are

hypervigilant in response to a traumatic event are on constant physiological alert for potential threats (e.g., Levendosky, 2002; Levendosky et al., 2011).

Additionally, these two psychological stress responses are differentially related to children's biological stress systems. For instance, dissociative symptoms are associated with a suppressed physiological stress response, expressed as hypocortisol (Simeon et al., 2007), whereas hypervigilance is associated with a hypercortisol response (MacMillan et al., 2009). Children may experience both dissociative and hypervigilant responses over the course of chronic traumatic stress (e.g., Mertin & Mohr, 2002); however, the relationship between this mixed response and the physiological stress systems is not well understood. Chronic activation of the physiological stress systems is associated with both structural and functional changes in a wide-variety of cortical and sub-cortical sites, including the prefrontal cortex, limbic system, hippocampus, corpus callosum, and temporal lobes (Brewin, 2008; Jackowski, de Araujo, de Lacerda, Mari, & Kaufman, 2009; Karl et al., 2006; Schore, 2002). These neurological sites are implicated in EF (e.g., Diamond, 2002) and thus impaired development in these regions would be expected to result in executive dysfunction (e.g., Blair, 2010).

Executive dysfunction does not represent a single, discrete construct, but rather refers to impaired functioning across one or more sub-components of EF (Anderson, 2002; Gioia, Isquith, & Guy, 2001). Executive dysfunction is related to a wide variety of internalizing and externalizing problems in young children (e.g., see Anderson, 2002, for a review; Kusche, Cook, & Greenberg, 1993; Zhou et al., 2007). In particular, three sub-components of EF in preschoolage children (attentional control, working memory, and inhibitory control) have each been shown to predict young children's social, emotional, and behavioral functioning (e.g., Eisenberg et al.,

2010; Hughes & Ensor, 2008; Rueda, Checa, & Rothbart, 2010) and thus represent important sub-components of EF for further investigation.

IPV is considered a prototypic traumatic event for the current empirical investigation for three reasons. First, IPV is one of the most salient traumatic events children can experience (Margolin & Gordis, 2000; Margolin & Vickerman, 2008) and as a result, is often associated with greater impaired functioning than other forms of traumatic events (Ybarra, Wilkens, & Lieberman, 2007). Second, IPV is usually chronic in duration (Caetano et al., 2005), often resulting in long-term traumatic stress responses (Briggs-Gowan, Carter, Clark, Augustyn, McCarthy, & Ford, 2010; Levendosky et al., 2002; Zerk et al., 2009). This chronic traumatic stress response is associated with greater activation across both physiological stress systems, which subsequently result in substantive neurological changes. In turn, these changes are proposed to result in more disrupted EF development. Studying a chronic traumatic event resulting in long-term traumatic stress responses provides the opportunity for a clearer picture for the current exploratory research. Third, children are usually first exposed to the violence in their early years (Fantuzzo et al., 1997), which is considered a critical neurodevelopmental period for emerging EF (e.g., Diamond, 2002).

Similarly, the preschool years represent an ideal developmental period for the current research for several reasons. As noted before, children under the age of five are disproportionately exposed to IPV (Fantuzzo et al., 1997). Although EF development begins in infancy (Diamond & Taylor, 1996), the preschool period is marked by some of the greatest advances in EF abilities during childhood (Carlson, 2005; Garon, Bryson, & Smith, 2008). Chronic traumatic stress during this critical developmental period is proposed to be a significant risk factor that may alter a child's neuropsychological trajectory. Lastly, for many children, the

preschool period marks the first time they begin spending significant amounts of time away from their caregivers, form peer groups, and enter an academic environment. Therefore, it is important to understand how chronic traumatic stressors, such as IPV exposure, impacts children's social, emotional, and behavioral development, as these novel experiences will lay important foundations for later social and academic success.

The current research study tests the following theoretical model (see Figure 1 below): Preschool-age children exposed to IPV frequently exhibit dissociative and/or hypervigilant responses (e.g., Levendosky et al., 2002; Rossman, Bingham, & Emde, 1997; Perry & Pollard, 1998; Perry et al., 1995), which are differentially related to children's biological stress systems' reactivity. These transactional psychological and physiological stress responses (De Bellis et al., 1999a/1999b; Perry & Pollard, 1998; Perry et al., 1995) are related to children's executive dysfunction (Blair, 2010). Thus, preschool-age children's dissociative and hypervigilant responses are hypothesized to be differentially related to their attentional control, working memory, and inhibitory control. Specifically, dissociative symptoms are hypothesized to be related to impairments in attentional control and working memory, which mediate the relationship between the children's traumatic stress symptoms and their internalizing behavior problems across several environments (e.g., at preschool and at home). In contrast, symptoms of hypervigilance are proposed to be associated with executive dysfunction across all three EF subcomponents - most notably a combination of attentional control and inhibitory control problems - which is thought to mediate the relationship between traumatic stress symptoms and externalizing behavior problems at home and at school.

Figure 1

Proposed Mediational Model of Preschool-age Children's Behavior Problems



The current research is novel and makes several important theoretical and empirical contributions. Theoretically, the research integrates Perry et al.'s (1995) traumatic stress theory with De Bellis et al.'s (1999a/1999b) developmental trauma theory, and Blair's (2010) contextual stress and EF theory. The current research extends these theories by testing whether EF mediates the relationship between preschool-age children's dissociative and/or hypervigilant traumatic stress responses to IPV and their behavioral functioning. This is the first study to examine this mediational pathway. The current study also has several methodological strengths, including assessing multiple aspects of IPV, the use of developmentally appropriate traumatic stress symptom measures, and a comprehensive examination of preschool-age children's emotional, behavioral, and EF functioning through multiple methods and reporters, including lab-based assessments, and maternal and teacher reports.

The following manuscript is organized into 9 additional chapters. Chapter 2 provides background information by detailing preschool-age children's IPV exposure and the association between early childhood IPV exposure and observed behavior problems. Chapter 3 reviews Perry et al.'s (1995) traumatic stress theory and the empirical literature regarding preschool-age children's dissociative and/or hypervigilant responses to IPV. Additionally, Chapter 3 examines the relationship between children's psychological traumatic stress responses and subsequent behavior problems. Chapter 4 introduces EF and the theoretical models for each of the three subcomponents considered in the current research. Chapter 4 also reviews the empirical literature regarding the association between EF and differential child behavior problems. Chapter 5 provides a theoretical argument for how chronic traumatic stress may be related to executive dysfunction in preschool-age children and reviews the limited, available evidence establishing a relationship between children's traumatic stress reactions and impairments in attentional control, working memory, and inhibitory control. Chapter 6 provides an overall summary of the findings presented in the previous four chapters and proposes a mediational model of IPV exposure in early childhood, subsequent traumatic stress, EF, and behavior problems. Chapters 7-9 detail the study's rationale and hypotheses, methods, and results. Chapter 10 provides an in-depth discussion of the study's results, including possible clinical implications and future directions for research.

CHAPTER 2

IPV Exposure and Preschool-age Children's Behavior Problems

Children are frequently exposed to IPV (e.g., Edleson, 1999; McDonald et al., 2006) and children under the age of five are exposed to disproportionally more IPV than older children (Fantuzzo et al., 1997). These first few years of life are a period of critical biopsychosocial development (e.g., Camille, Vargas, Ryan, & Barnett, 2010; Romine & Reynolds, 2005). Unfortunately, research programs examining the effects of IPV exposure on children are relatively new, only having been widely established within the past fifteen years (Fantuzzo & Mohr, 1999). Furthermore, despite the advances in examining childhood exposure to IPV especially in school-age children and adolescents (e.g., Edleson, 1999; Wolfe et al., 2003) contemporary researchers have only recently began to research the effects of IPV exposure with preschool-age children (e.g., Levendosky et al., 2002; Zerk et al., 2009). Early childhood IPV exposure is associated with significantly higher risk of developing later psychopathology (e.g., Briggs-Gowan et al., 2010), including both internalizing and externalizing behavior problems. The current chapter examines the relationship between preschool-age children's IPV exposure and subsequent behavior problems as this relationship forms one of the foundational paths of the current model.

Preschool-age Children's Exposure to IPV

McDonald and colleagues (2006) provided the best estimate of the total number of children (ages 0 - 17) living in households with IPV. The authors randomly selected a very large sample across 48 states, oversampling for Blacks and Hispanics, and assessed for incidences of unidirectional and bidirectional violence that occurred the previous year. They extrapolated their figures to match the US Census and determined that nearly 15 million children were exposed to

some form of IPV in the previous year, with 7 million children residing in households in which severe IPV was reported (McDonald et al., 2006). As the authors note, these figures are likely an underestimate as they are based exclusively on dual-parent households and thus do not include incidences of children exposed to IPV in single parent households (McDonald et al., 2006). One of the notable strengths of McDonald and colleagues' study is the assessment of both unidirectional and bidirectional IPV. Unfortunately, McDonald et al. do not provide a breakdown of IPV exposure by age; however, other independent samples have reported that nearly 50% of all children exposed to IPV are preschool-age and younger (e.g., Fantuzzo et al., 1997; Fusco & Fantuzzo, 2009). Thus, based on the three studies cited (i.e., Fantuzzo et al., 1997; Fusco & Fantuzzo, 2009; McDonald et al., 2006) it is possible that nearly 7.5 million preschool-age children live in households with IPV each year.

Historically, research examining the effects of IPV on children usually relies on a parent's endorsement – typically maternal report (e.g., Levendosky et al., 2002) – of the child directly witnessing one or more incidences of violence. This approach likely underestimates the number of children exposed to IPV (Fusco & Fantuzzo, 2009) and also misidentifies children categorized in research studies based on their exposure status. Edleson (1999) noted that parents often assume that their children are unaware of IPV if they do not directly witness any of the violent acts themselves. However, Edleson and others (Fantuzzo & Mohr, 1999) have documented additional ways in which children may be exposed to IPV other than directly witnessing the event, including other sensory exposure to the event (e.g., hearing the violence, but not seeing it), hearing about the violence after it has occurred from a sibling or caregiver, seeing the effects of the violence (e.g., seeing injuries caused by the violence, police intervention), or being used as a weapon within psychological violence (e.g., being interrogated

by a parent about the other parent). Fusco and Fantuzzo (2009) used a novel research method in examining the empirical evidence for the many ways in which children are exposed to IPV. They had police officers responding to IPV calls record whether children were present at the time of the violence and what form of sensory exposure the children experienced. Fusco and Fantuzzo reported that in 95% of the cases in which IPV occurred and children were present in the home, the children had at least one type of sensory exposure to the violence. Most of the children both witnessed and heard the violence, while nearly one quarter of the children only heard the violence (Fusco & Fantuzzo, 2009).

Previous findings of preschool-age children's behavior problems following exposure to IPV also offer supporting evidence that classifying children based upon maternal reports of the child witnessing incidences of IPV are likely unreliable (e.g., Fusco & Fantuzzo, 2009). For instance, in one sample, there was no difference for either externalizing or internalizing behavior problem scores when comparing groups of children dichotomized based upon maternal reports witnessing or not incidences of IPV, when all of the children lived in households in which IPV occurred (Levendosky et al., 2002).

Based upon these findings, the current research endorses Fantuzzo and Mohr's (1999) call for examining 'exposure to' IPV rather than only assessing for and considering incidences of IPV that the children directly witness. Additionally, the current research assumes that children living in homes in which IPV occurs will have at least one type of sensory exposure to the violence at some point in the child's lifetime.

Observed Behavior Problems and Preschool-age Children's Exposure to IPV

Two recent meta-analyses have examined the relationship between childhood exposure to IPV and subsequent behavior problems. Wolfe et al. (2003) included data from 41 studies and

found that IPV exposure in early childhood was associated with the second-largest effect size for both internalizing and externalizing behavior problems, second only to school-age children. More recently, Evans et al. (2008) examined data from 60 studies. The authors also included studies that assessed for bidirectional IPV, rather than only including studies with unidirectional male-to-female partner violence. Evans et al. reported a medium effect size for IPV exposure and preschool-age children's behavior problems. The relationship was partially moderated by gender, with preschool girls exposed to IPV experiencing significantly more internalizing, but not externalizing, problems; whereas preschool boys exposed to IPV had significantly higher rates of both types of behavior problems (Evan et al., 2008).

One limitation with both Wolfe et al.'s (2003) and Evans et al.'s (2008) meta-analyses is that we cannot determine the course of the children's behavior problems relative to the trajectory of their IPV exposure. Two longitudinal studies address this gap in the literature. Litrownik, Newton, Hunter, English, and Everson (2003) examined the association between children's behavior problems at age six with their IPV exposure, controlling for their behavior problems at age four. The authors reported that exposure to IPV during the preschool years is predictive of aggressive behavior problems, and anxious/depression-related symptoms two years later (Litrownik et al., 2003). Huang, Wang, and Warrener (2010) conducted a large, multisite five year longitudinal study and reported that maternal experiences of IPV that occurred before the children were age one had a direct effect on the children's internalizing and externalizing behavior problems five years later, even after controlling for possible mediating factors. Although the findings from this particular study are limited by the fact that Huang et al. only assessed unidirectional male-to-female partner violence at one time point, the results converge

with Litrownik et al.'s findings that early exposure to IPV can have long-lasting and pernicious effects on children's functioning.

As many children exposed to IPV are also maltreated (e.g., Finkelhor, Ormrod, & Turner, 2007; Hamby, Finkelhor, Turner, & Ormrod, 2010), it is possible that the observed behavior problems (e.g., Evans et al., 2008; Wolfe et al., 2003) are the result of maltreatment, not IPV exposure (Lieberman, van Horn, & Ozer, 2005). To control for this possibility, Ybarra et al. (2007) recruited a sample of preschool-age children exposed to IPV but who were not maltreated, as well as a demographically matched control group of children not exposed to IPV. Their results suggest that IPV exposed only (i.e., not maltreated) preschool-age children had significantly elevated internalizing problems compared with controls. Lieberman et al. (2005) used a similar approach and reported that severity of IPV significantly accounted for a significant portion of the variance in preschool-age children's internalizing and externalizing problems. Lieberman et al. may have found more wide-spread behavior problems in their sample (i.e., both internalizing and externalizing problems) than Ybarra et al., due to their use of a clinical sample and thus the children, on average, displayed higher levels of behavior problems than those reported in Ybarra et al.'s sample. However, the findings from Lieberman et al. and Ybarra et al. indicate that IPV exposure alone (i.e., in the absence of possible co-morbid maltreatment) is related to elevated behavior problems.

In summary, IPV consists of both perpetrated and threatened physical, sexual, and psychological violence (e.g., Breiding et al., 2008; Marshall, 1992), is perpetrated by both men and women (Fusco & Fantuzzo, 2009; McDonald et al., 2006), and disproportionately impacts children during the preschool years (Fantuzzo et al., 1997; Fusco & Fantuzzo, 2009). Preschool-age children are exposed to IPV through a variety of ways, including direct and indirect sensory

exposure to the violence (Edelson, 1999; Fantuzzo & Mohr, 1999; Fusco & Fantuzzo, 2009). IPV exposure is associated with high levels of both internalizing and externalizing behavior problems in preschool-age children (Evans et al., 2008; Wolfe et al., 2003), above and beyond controlling for possible comorbid maltreatment (e.g., Ybarra et al., 2007). These effects are observed across time (Huang et al., 2010) and suggest that early exposure to IPV has pernicious, long-lasting effects on child social-emotional development. Beyond documented behavior problems, early IPV exposure is also a salient traumatic event and frequently results in clinically significant traumatic stress symptoms (e.g., Levendosky et al., 2002; Zerk et al., 2009), which will be reviewed in-depth in the next chapter.

CHAPTER 3

IPV Exposure and Preschool-age Children's Traumatic Stress

It is an ultimate irony that at the time when the human is most vulnerable to the effects of trauma – during infancy and childhood – adults generally presume the most resilience. -(Perry et al., 1995; pg. 272)

The findings from the past two decades of research provide clear evidence that preschoolage children who have been exposed to IPV are at an increased risk of experiencing significant traumatic stress (see Margolin & Gordis, 2000, and Margolin & Vickerman, 2008, for two reviews). The current research applies Perry et al.'s (1995) traumatic stress theory that argues psychological traumatic stress responses occur on a continuum anchored by dissociative experiences on one end and hypervigilance on the other. Although additional aspects of young children's traumatic stress responses have been well documented and constitute significant problems, such as distorted representations of self and others (e.g., Cook et al., 2005; van der Kolk et al., 2009), these domains of impaired functioning are considered to be less related to behavioral problems and thus not of central focus of the current research. This chapter distinguishes IPV as a traumatic event, reviews Perry et al.'s traumatic stress theory, examines the extant evidence for preschool-age children's traumatic stress responses following exposure to IPV, and documents the associations between these stress responses and observed behavior problems.

Before proceeding, a distinction between the terms 'posttraumatic stress' and 'traumatic stress' is necessary. Throughout much of the trauma literature, an individual's affective and behavioral response following the traumatic event is classified as 'posttraumatic," most notably in the case of Posttraumatic Stress Disorder (PTSD) (APA, 2000). However, for the purposes of the current research, traumatic stress is argued as the most appropriate term, as IPV is not

generally a single, easily demarcated incident, but rather a systematic pattern of behavior that continues for a significant period of time (Caetano et al., 2005). PTSD criteria, by definition, require a marked change in functioning from a clearly defined pre-trauma baseline period (APA. 2000). Most preschool-age children who have previously been exposed to IPV will continue to be raised within the same violent family and thus the children's behavior and functioning is concurrent to the violence itself and not easily demarcated from a baseline level of functioning pre-traumatic event (Margolin & Vickerman, 2008). Therefore, the term 'traumatic stress' is argued to be the most appropriate description of children's affective and behavioral responses to the IPV exposure, which does not necessitate a *post*-traumatic event reaction. Hereafter, traumatic stress will be used as the default term, except when referring to the specific PTSD literature.

IPV Exposure as a Traumatic Event

Unlike other potentially traumatic events (e.g., non-violent death of a family member or natural disaster), IPV exposure in early childhood has been identified as one of the most salient forms of traumatic events a young child can experience (e.g., Cook et al., 2005; Margolin & Vickerman, 2008; Terr, 1991). Three reasons underlie the salience of IPV as a traumatic event, compared to other events: (1) the violence is interpersonal in nature, which is related to the most deleterious outcomes for both children and adults across all types of traumatic events (Cloitre et al., 2009; Cook et al., 2005; Spinazzola et al., 2005), (2) the violence involves caregivers (attachment figures) to the child, which means the child must simultaneously depend on the caregiver while managing his/her fear and negative affect towards the caregiver (Freyd, 1996; Margolin & Vickerman, 2008), and (3) the violence is usually chronic, occurring many times

over a lengthy period (Caetano et al., 2005; Margolin & Vickerman, 2008). As a result of these unique characteristics, IPV exposure is particularly traumatic.

As noted in the previous chapter, much of the prominent IPV research conducted over the past two decades (e.g., Tjaden & Thoennes, 2000) only examined male-to-female partner violence and did not assess any female-to-male violent incidences. From the child's perspective, however, incidences of unidirectional female-to-male or bidirectional violence are plausibly just as distressing than male-to-female partner violence due to conflict arising from the mother serving simultaneously as the principal attachment figure (Bowlby, 1979) and the aggressor. In the case of bidirectional violence, the child might be especially vulnerable given the lack of a safe, non-violent, protective caregiver that could help buffer the child from the deleterious effects of the violence (e.g., Belsky, 1984). Unfortunately, no empirical research to date has examined the relative breadth and severity of children's traumatic stress responses to these different forms of IPV. At minimum, future research examining child outcomes associated with IPV exposure must assess both unidirectional and bidirectional violence.

The Nature of Preschool-age Children's Traumatic Stress: Dissociative and/or Hypervigilant Responses

The current research applies Perry et al.'s (1995) traumatic stress theory, which posits that traumatic stress responses to perceived threat, whether real or imagined, occur on a continuum anchored by dissociative experiences on one end and hypervigilance on the other. Thus, according to Perry et al.'s, traumatic stress responses are not categorical typologies, but rather idiosyncratic traumatic stress profiles consisting of both dissociative and hypervigilant symptoms, the proportion of which varies across individuals. Dissociative experiences are characterized by a widespread breakdown across multiple aspects of cognitive processing

(DePrince & Freyd, 2007), including memory systems (DePrince & Freyd, 2001) and perception of the environment (APA, 2000). This systemic breakdown often results in a fragmented sense of self-identity (Macfie, Cicchetti, & Toth, 2001a/200b; Ogawa et al., 1997). Dissociative experiences are first identifiable in preschool-age children (Putnam, 1991) and are not readily dichotomized (i.e., dissociated versus not-dissociated). Dissociation occurs on a continuum from developmentally normative dissociative behaviors (e.g., having an imaginary friend, engaging in extensive imaginary play) in early childhood (Macfie et al., 2001b; Ogawa et al., 1997) to severe dissociative experiences that can impair an individual's functioning throughout the lifespan (APA, 2000). In young children, dissociation is often expressed as "freezing" behavior (Perry & Pollard, 1998; Perry et al., 1995), which is analogous to animals feigning death in the face of imminent threat (Porges, 2007).

In contrast to the suppressed physiological response that characterizes dissociative experiences (e.g., freezing behavior), children's hypervigilance is marked by increased central nervous system activity across several areas of the brain associated with basic survival strategies (e.g., "fight or flight") (e.g., Kearny et al., 2010; Perry & Pollard, 1998; Perry et al., 1995; Porges, 2007). Behaviorally, children experiencing hypervigilance will startle more easily in response to common stimuli (e.g., loud noises, quick moving visual objects) and may appear more physically restless than before the traumatic event (APA, 2000).

Perry et al. (1995) further hypothesized that an individual's idiosyncratic traumatic stress response to an original traumatic event is a salient psychological and physiological organizational experience (covered in greater detail in Chapter 5), which subsequently predisposes an individual to respond similarly to perceived threats in the future. Over time, the authors argue, these traumatic stress responses begin to generalize to other, milder stressors.

Because young children's brains are sensitive to external experiences during critical structural and functional neural developmental periods, Perry et al. noted that young children's immediate traumatic stress "states" are likely to become semi-permanent "traits" though the process of increasing sensitization and generalization of the traumatic stress responses. Consistent with this prediction, Scheeringa (2008) noted that traumatic stress symptoms that begin in early life appear to be more unremitting and entrenched than those observed in adults.

Based upon their extensive clinical work with a large group of children exhibiting high levels of traumatic stress, Perry et al. (1995) observed that young children exposed to repeated traumatic events – especially those that involve ineffectual caregivers, such as in IPV – will frequently move into the dissociative end of the continuum. The authors hypothesized that young children may be particularly prone to dissociative states due to children's greater reliance on their caregivers to help them regulate their stress responses to real or perceived threats. However, in the case of violent caregivers, young children are unable to benefit from their caregiver(s)' assistance and thus may be particularly prone to perceive the situation as hopeless and to freeze in response (Perry et al., 1995). In order to assess these claims, the empirical evidence for preschool-age children's traumatic stress responses following exposure to IPV will be reviewed next.

IPV Exposure and Young Children's Traumatic Stress Responses

The most significant limitation to Perry et al.'s (1995) traumatic stress theory at the time of publication was the authors' reliance on experimental animal research due to the paucity of reliable human data other than the author's own clinical samples of severely traumatized children. Fortunately, additional researchers have paid increasing attention to these research questions during the past fifteen years. Evidence from cross-sectional studies indicate that

preschool-age children exhibit both dissociative and hypervigilant traumatic stress responses when exposed to IPV. One of the earliest studies to assess dissociative symptoms in preschoolage children exposed to IPV reported elevated dissociative symptoms in children who witnessed IPV (Rossman et al., 1997). Macfie et al. (2001a) provided a more detailed picture in their research. They reported that both severity and chronicity of family violence was positively correlated with dissociative symptoms. Furthermore, nearly 20% of preschool-age children exposed to family violence in Macfie et al.'s sample exhibited clinical levels of dissociation. In contrast, not a single child spared from experiencing family violence exhibited clinical levels of dissociation (Macfie et al., 2001a). This finding has been replicated in other samples within the same population, as well (e.g., Macfie et al., 2001b).

Two longitudinal studies have examined the nature and development of dissociative symptoms in preschool-age children exposed to family violence. Ogawa et al. (1997) reported that exposure to family violence in infancy through early childhood is associated with later dissociative symptoms in preschool and school age children. Although the authors did not assess children's exposure to IPV specifically during their first several waves of data, the authors measured IPV exposure beginning during the early elementary years and reported that IPV exposure predicated dissociative symptoms above and beyond other forms of family violence (Ogawa et al., 1997). These results should be interpreted as preliminary evidence, however, as the authors measured dissociative symptoms based upon selectively chosen items from several other child outcome measures and thus did not employ a well-validated measure of dissociation. Extending Ogawa et al.'s findings using a better measure of child dissociative symptoms, Macfie and colleagues (2001b) conducted a longitudinal examination of dissociative experiences in preschool-age children exposed to family violence. Macfie et al. documented a normative decline

in dissociative symptoms for children not exposed to family violence (e.g., having imaginary friends) in contrast to a significant increase in dissociation for preschool-age children exposed to family violence over the same period of time. This finding is consistent with Perry et al.'s (1995) assertion that children's traumatic stress responses are likely to become more sensitive and thus generalize from immediate threats to more varied environments.

Findings from cross-sectional studies indicate that a substantial portion of preschool-age children also exhibit hypervigilance following exposure to IPV. Using a maternal-report questionnaire of hypervigilant symptoms based upon Scheeringa, Zeanah, Drell, and Larrieu's (1995) modified, developmentally appropriate criteria, Levendosky et al. (2002) reported that 91% of their sample of preschool-age children exposed to IPV exhibited two or more symptoms of hypervigilance. Although this figure is the highest prevalence rate of clinically significant hypervigilance reported in the literature, other independent samples have also documented high levels of hypervigilance in preschool-age children exposed to IPV (e.g., Graham-Bermann et al., 2008; Zerk et al., 2009). A recent, unpublished investigation found that hypervigilant responses were the most common PTSD-related traumatic stress symptoms for young children (Levendosky et al., 2011).

No longitudinal studies have investigated the predictors or course of young children's hypervigilance. Thus, it is not possible to conclusively determine whether children's hypervigilant response to traumatic events increases over time (i.e., becomes more sensitized) or generalizes to other, milder stressors, as Perry et al. (1995) predicted. Despite the lack of longitudinal data, it is clear that hypervigilance is a prevalent traumatic stress response in older children. For instance, clinically significant hypervigilance has been reported in 25% to 89% of school-age children exposed to IPV (Graham-Bermann & Levendosky, 1998; Mertin & Mohr,

2002). Although we currently lack longitudinal evidence for symptoms of hypervigilance generalizing beyond immediate traumatic events (e.g., Perry & Pollard, 1998; Perry et al., 1995), evidence from cross sectional studies suggest that a substantial sub-set of young children who are repeatedly exposed to a traumatic event, such as IPV, develop new fears than they exhibited before the traumatic event (e.g., Graham-Bermann et al., 2008; Scheeringa, 2008; Zerk et al., 2009). These findings indicate that children's immediate traumatic stress responses to the original traumatic event may, in some children, generalize to other perceived threats consistent with Perry et al.'s theory.

According to Perry et al.'s (1995) traumatic stress theory, it is possible for children to experience both dissociative and hypervigilant symptoms; however, there are no reliable estimates for the degree of overlap between these responses. For instance, although Mertin and Mohr (2002) assessed both dissociative and hypervigilant symptoms, they did not report the degree of overlap between these symptoms within the same children and it is not possible to determine the overlap using the results (e.g., tables, graphs) they provide. The authors did report that dissociative symptoms were moderately correlated with total PTSD symptoms in their sample (Mertin & Mohr, 2002). A similar relationship is reported in other samples (e.g., Rossman et al., 1997). In the absence of empirical data, the degree of co-morbidity between dissociative and hypervigilant responses to IPV remains unknown.

Relation between Preschool-age Children's Traumatic Stress Symptoms and Child Behavior Problems

Few extant studies of preschool-age children have investigated the association between chronic traumatic stress and child behavior problems, which is likely an artifact of the general paucity of research on young children's responses to traumatic events (e.g., Levendosky et al.,

2002; Zerk et al., 2009). Of the few studies that have assessed both child behavior problems and preschool-age children's traumatic stress symptoms in the same sample (e.g., Levendosky et al., 2002; Zerk et al., 2009), the findings indicate that increased traumatic stress symptoms are associated with high rates of clinically significant internalizing (Levendosky et al, 2002) and externalizing (Zerk et al., 2009) behavior problems. Research with older children provides clear evidence for a relationship between chronic traumatic stress and both internalizing and externalizing behavior problems (e.g., Cook et al., 2005; Terr, 1991; van der Kolk, 2005; van der Kolk et al., 2009). What remains unclear, however, is the differential relationship between dissociative and hypervigilant responses and internalizing and/or externalizing problems. In Macfie et al.'s (2001b) study of preschool-age children exposed to several forms of family violence, dissociative symptoms were associated with elevated internalizing and externalizing behavior problems, with no gender differences reported.

Milot and colleagues (2010) examined whether preschool-age children's traumatic stress symptoms mediate the relationship between childhood maltreatment and teacher-reported behavior problems. The authors used a total PTSD score in their models and found that PTSD symptoms fully mediate the relationship between maltreatment and both internalizing and externalizing behavior problems, even after removing items on the behavior checklist that overlap with PTSD symptoms (Milot et al., 2010). Furthermore, the authors reported that they found similar results when they examined each of the PTSD clusters as independent mediators; however, they did not provide any figures to support this assertion, thus it is not possible to determine from their published results how well hypervigilance mediated the relationship between maltreatment and observed behavior problems. Additionally, Milot et al. did not assess for dissociative symptoms, thus it is unclear whether dissociative symptoms following a

traumatic event (e.g., Perry & Pollard, 1998; Perry et al., 1995) would also mediate the relationship.

In summary, preschool-age children exposed to IPV often exhibit clinically significant traumatic stress symptoms (e.g., Graham-Bermann et al., 2008; Levendosky et al., 2002; Zerk et al., 2009). These symptoms occur on a continuum anchored by dissociation and hypervigilance (Perry & Pollard, 1998; Perry et al., 1995). Young children's traumatic stress responses are associated with externalizing and internalizing behavior problems (e.g., Levendosky et al., 2002; Zerk et al., 2009). Preliminary evidence indicates that preschool-age children's traumatic stress responses may mediate the relationship between exposure to a repeated traumatic event, such as IPV, and observed behavior problems across several environments (e.g., Milot et al., 2010). What remains unknown, however, is whether dissociative versus hypervigilant symptoms are differentially related to internalizing and/or externalizing behavior problems.

A final overall critique of the traumatic stress literature is warranted. Despite the documented incidences of preschool-age children developing clinically significant dissociative symptoms in response to incidences of family violence (e.g., Macfie et al., 2001a/2001b; Ogawa et al., 1997; Rossman et al., 1997), dissociation is frequently not assessed in empirical research. In part, this likely reflects the current psychiatric nosology, which clearly demarcates posttraumatic stress symptoms from dissociative symptoms (see APA, 2000). As others (e.g., Bremner, 1999) have noted, the DSM-IV-TR (APA, 2000) currently includes dissociative symptoms as a core feature of Acute Stress Disorder and yet does not require a single dissociative symptom for PTSD. As a result, researchers who investigate the long-term traumatic stress reactions of individuals (e.g., children exposed to IPV) using the current diagnostic nosology alone will not assess for dissociative experiences, unless they intentionally add an
additional measure to do so. The failure to measure dissociative symptoms in young children exposed to repeated traumatic events results in an incomplete picture of children's traumatic stress responses. The current research assesses dissociative symptoms, in addition to symptoms of hypervigilance, in order to attempt to answer these research questions.

CHAPTER 4

Executive Dysfunction and Child Behavior Problems

As reviewed in Chapter 2, early childhood exposure to IPV frequently results in high levels of internalizing and/or externalizing behavior problems in preschool-age children (see Wolfe et al., 2003, and Evans et al., 2008 for two meta-analyses). IPV exposure also constitutes a traumatic event that precipitates a psychological traumatic stress response in a significant portion of preschool-age children exposed to family violence (Briggs-Gowan et al., 2010; Levendosky et al., 2002; Zerk et al., 2009). Prior research, however, lacks an adequate model for understanding *how* and *why* exposure to a repeated traumatic event during early childhood, such as IPV, and subsequent dissociative and/or hypervigilant responses result in the observed behavior problems. The current research argues that preschool-age children's EF mediates the relationship between exposure to IPV (as a traumatic event), traumatic stress, and observed behavior problems.

The following three chapters further develop the theoretical groundwork for the current research. This chapter provides a theoretical overview of EF, argues for the examination of three EF sub-components, details their normative development in early life, and briefly reviews the available research documenting the associations between EF and behavior problems in young children. Chapter 5 presents two possible pathways (one psychological and the other biological) between children's stress responses systems and EF and then reviews the few studies that have previously investigated EF in traumatized children (e.g., DePrince, Weinzierl, & Combs, 2009). Lastly, chapter 6 integrates the findings from the previous chapters and proposes a model of traumatic stress and EF in preschool-age children exposed to IPV.

Definition of EF in Preschool-age Children

EF research began in earnest after it was recognized that individuals with frontal lobe damage often had significant difficulty organizing their behavior, planning ahead, regulating their negative affect, focusing their attention, and exhibited numerous other changes in functioning (Anderson, 2002; Anderson, Damasio, Tranel, & Damasio, 2000). As a result, for several decades executive dysfunction was thought to be a syndrome related to frontal lobe dysfunction or injury (e.g., Anderson, 2002; Carlson, 2005). We now know that EF is functionally connected to almost every lobe in the brain (see Gazzinga, Ivy, & Mangun, 2009; Semrud-Clikeman & Ellison, 2009, for two overviews). The close connection between EF abilities and neural development has important implications for EF research, which will be discussed in greater depth in the next chapter.

Contemporary researchers generally agree that EF comprises all of the abilities to effectively marshal one's internal cognitive, affective, sensory, and other physiological resources in a coherent, purposeful pursuit of one's internal or external goals (e.g., Gazzinga et al., 2009; Lezak, 1995). In particular, EF is activated in novel situations that require an unlearned response or render automatic responses inappropriate/ineffectual (e.g., Diamond, 2006). Thus, demands on EF are reduced in situations where a highly skilled or practiced response is required (Diamond, 2006), such as when a violinist is performing a piece that she has extensively practiced.

Although many different abilities have been identified as sub-components of EF (see Anderson, 2002, for a review), the current research focuses on three: attentional control (AC), working memory (WM), and inhibitory control (IC). These three sub-components are ideal for the current research as AC, WM, and IC are considered the building blocks of more complex EF, such as planning and organizational abilities (e.g., Miyake, Friedman, Emerson, Witzki, &

Howerter, 2000) and have been implicated in children's behavior problems (e.g., Hughes & Ensor, 2008; Olson, Lopez-Duran, Lunkenheimer, Chang, & Sameroff, 2011; Raaijmakers et al., 2008). AC is defined as an individual's ability to intentionally focus his/her attention on relevant tasks and to simultaneously ignore non-relevant stimuli in the service of accomplishing a goal (Gazzinga et al., 2009). One of the primary tasks for the AC system is to shift an individual's attention (Hanania & Smith, 2010; Posner & Petersen, 1990), from one stimulus to another, as required by external demands (e.g., a teacher asking a child to look at a different problem on the board) or in accordance with internal goals. Throughout the literature, several terms are used for this AC task, including set-shifting (e.g., Miyake et al., 2000) or attention-shifting (e.g., Hanania & Smith, 2010). WM consists of a short-term information system that processes novel sensory information or manipulates recalled information (e.g., retrieved previously learned facts that require synthesization in a novel manner) (e.g., Gathercole, 1998). Information in WM must be continuously updated (Baddeley & Hitch, 1974) in order for the quality of the information not to rapidly degrade and cease to be processed in WM. IC is defined as the capacity to intentionally inhibit a prepotent (e.g., dominant or habitual) cognitive or behavioral response, and, when required, to provide a non-dominant response (Barkley, 2001; Carlson, 2005). For instance, IC is required during several classic children's games (e.g., Simon Says) in which children are required to inhibit a natural response (e.g., copying another person's behavior) unless given the command to do so. Each of these three sub-components of EF will be reviewed next. Three Sub-Components of EF: Attentional Control, Working Memory, and Inhibitory Control

Attentional Control

Posner and Petersen (1990) proposed the most widely accepted model of AC. According to Posner and Petersen's model, AC is comprised of three major tasks: disengagement, shifting,

and re-engagement. For instance, we must be able to disengage our attention at will, re-orient or shift our attention to the stimuli of interest/importance, and then focus our attention towards the new stimulus or task (Posner & Petersen, 1990). Gazzinga et al. (2009) proposed that AC can be considered the "source" of attention, while the sensory or cognitive system the attention is directed towards can be considered the "site" of attention. Thus, AC represents the executive aspect of the attentional system (Konrad et al., 2005).

For the purposes of the current research, attentional shifting will be examined as an indicator of AC. In part, this decision reflects one of the primary challenges facing researchers investigating preschool-age children's EF i.e. the relative paucity of well-validated, reliable measures of AC and other domains of EF for young participants (e.g., Anderson, 1998; Anderson, 2002; Carlson, 2005). For instance, until the mid-1990's no nationally-normed parent or teacher report questionnaire of EF existed. Gioia, Isquith, Guy, and Kenworthy's (2000) Behavior Rating Inventory of Executive Functioning provided the first easy, reliable, and widely available measure of EF for young children. The preschool-age measure contains a 'shifting' subscale, which assesses both attentional shifting and behavioral shifting (Gioia, Espy, & Isquith, 2003). Unfortunately, no standardized clinician-administered batteries of other aspects of AC for preschool-age children exist. For instance, AC is often measured through continuous performance tests; however, none of these computerized measures are available for this age group. Thus, researchers rely on published experimental tasks, such as the Dimensional Change Card Sort (Frye, Zelazo, & Palfai, 1995), which assesses children's ability to shift their attention between competing relevant stimuli as they sort cards according to the examiner's directions. In large part, the lack of EF assessment batteries for preschool-age children reflects the relatively

recent (e.g., Diamond & Taylor, 1996; Garon et al., 2008) acknowledgement that young children have EF abilities, which can be measured.

Working Memory

Memory disturbances are one of the more commonly studied aspects of neurocognitive impairment associated with traumatic stress in both adults and children (see Golier & Yehuda, 2002, for a thorough review; and Brewin, Kleiner, Vasterling, & Field, 2007, for a metaanalysis), which is not surprising given that memory disturbances are an essential feature of PTSD (APA, 2000). However, virtually all of the previous research has focused on aspects of long-term memory, which is not considered a sub-component of EF. Contrary to long-term memory, information in WM can only be maintained for approximately two seconds before it begins to quickly degrade and, without further updating, will be permanently lost before it can stored in our long-term memory (Gathercole, 1998). WM is considered an essential sub-component of the overall human memory system, involved in some capacity or another, at each of the three major steps in memory formation and learning: (1) the initial encoding of incoming, new information or stimuli, (2) storage, and (3) the later retrieval of the information at the requisite time (Gazzinga et al., 2009).

Baddeley and Hitch (1974) proposed what is widely considered the most influential model of WM (Garon et al., 2008) that continues to receive empirical support, albeit with adjustments (e.g., Gathercole, 1998; Wolters & Raffone, 2008). Baddeley and Hitch proposed that WM is comprised of three basic components: (1) a phonological loop, which is responsible for processing verbally encoded information (e.g., words, or individual units of language), (2) a visuo-spatial sketchpad, which processes both visual and spatial information, and (3) a central executive, responsible for commanding the various operations within the other two components,

including a critical task of employing memory strategies designed to help us more efficiently and effectively process information. More recently, Baddeley (2000/2003) added a fourth component to the WM model: an episodic buffer that is responsible for connecting with long-term storage and integrating information from different sources into the WM. Information that is processed in either the phonological loop or visuo-spatial sketchpad (Baddeley & Hitch, 1974) comes from two primary sources: representations retrieved from our long-term memory that is relevant to current tasks (Palmer, 2000; Pickering, 2001; Wolters & Raffone, 2008), and novel information that enters our WM via our five senses (Wolters & Raffone, 2008). WM abilities are closely related with the capacity to achieve goal-directed behavior. For instance, children who have WM impairments often fail to complete a task, despite understanding the directions and the necessary steps for completing the task (Marcovitch, Boseovski, & Knapp, 2007).

Inhibitory Control

Inhibition has been investigated as both a quality of temperament (e.g., Kagan, Reznick, Clarke, Snidman, & Garcia-Coll, 1984) and EF. Rothbart (1989) distinguished between effortful and passive inhibition (e.g., fearfulness). According to this distinction, passive inhibition is a feature of children's temperament (e.g., Rothbart, Ahadi, Hersey, & Fisher, 2001) and bears resemblance to Carver and White's (1994) theory of behavioral inhibition/activation systems (Blair & Peters, 2003). In contrast, IC is defined as the capacity to intentionally inhibit a prepotent response, and, when required, to provide a non-dominant response (e.g., Barkley, 2001; Carlson, 2005). The current research focuses on this second type of inhibition. IC is the most widely researched EF component in preschool-age children (Garon et al., 2008), which reflects its central importance in self-regulation that is rapidly developing during the preschool years. Eisenberg et al. (2009) further clarified the distinction between temperamental inhibition

and IC by noting that negative reactivity is considered a temperamental trait, whereas IC is a central component of self-regulation.

Tasks measuring IC can be classified according to several different criteria. For instance, Metcalfe and Mischel (1999) proposed the distinction between "hot" and "cool" tasks, referring to whether the inhibition required taps into the reward/motivation system. A common example of a "hot" IC measure is the delayed gratification task, in which a child is presented with a tempting food item (e.g., a cookie or marshmallow) and told that they can eat the food item now or wait a few minutes and get two of the items (see Mischel's 1972 marshmallow experiment for the classic version of this task). In contrast, "cool" IC tasks do not tap the reward/motivation system and require children to engage in neutral stimuli (Garon et al., 2008). These tasks are further divided into those that require simple motor inhibition and those that require the inhibition of a prepotent response and for children to provide a non-dominant response. For instance, on the Day/Night task (Gerstadt, Hong, & Diamond, 1994), participants are shown two different cards: one depicts a sun and a daytime scene, and the other is painted black with a moon to represent nighttime. When the children are shown the daytime card, they must respond "night," and vice versa.

There is substantial empirical support for classifying IC into "hot" and "cool" systems (Garon et al., 2008; see Willoughby, Kupersmidt, Voegler-Lee, & Bryant, 2011 for a recent factor analysis); however, the two IC factors are only minimally correlated (e.g., Crone, Vendel, & van der Molen, 2003; Geurts, van der Oord, & Crone, 2006). The current research examines preschool-age children's "cool" IC, as these forms of IC reflect cognitive processes rather than motivational states (Garon et al.). Prepotent and motor inhibitions are also more theoretically

related to AC and WM, as defined in the present research (i.e., as sub-domains of EF, rather than facets of temperament).

Developmental Trajectories and Structure of EF in Preschool-age Children

Recent developmental studies have subsequently demonstrated that all three subcomponents of EF considered in the current research begin to emerge in infancy (e.g., Diamond, 2006; Klenberg et al., 2001) and continue to develop in domain-specific 'spurts' (Anderson, 2002) thereafter until nearly the third decade of life (e.g., De Luca et al., 2003). For AC, young preschool-age children are able to attend to relevant stimuli (Diamond, 2002) and orient their attention when WM and IC demands are minimized (Hanania & Smith, 2010). By about 4 years of age, children are able to demonstrate significantly better AC in more complex tasks (e.g., Diamond, 2006; Hanania & Smith, 2010; Zelazo, 2006).

The development of WM follows a different, more complicated pattern than the relatively linear development demonstrated for AC. For instance, Palmer (2000) reported that 3 year-old children utilized no verbal WM strategies and were unable to articulate how they completed WM tasks; whereas 6 and 7 year-old children utilized both verbal and visual WM and were able to verbally reflect what strategies they used. Based on her findings, Palmer concluded that children's WM development (at least from preschool age through part of middle childhood) is accomplished in three primary stages: (1) young preschool-age children rely almost exclusively on visual WM, which automatically retrieves information from the children's long-term memory with little control, (2) school-age children enter a stage of what Palmer describes as 'dual encoding', where they are simultaneously encoding information using both visual and verbal WM strategies, which is inefficient but important for future mastery over coding strategies, and (3) after a period of dual encoding, when the children are approximately 6.5 years old, they begin

exclusively using automatic, efficient verbal encoding in the phonological loop (Palmer, 2000), marking a permanent shift towards a primary utilization of auditory WM observed in most adults (Gathercole, 1998).

In a sample comprised of over 600 preschool-age children drawn from several of the author's previous studies, Carlson (2005) reported significant age effects on tasks of IC during the preschool period. In particular, on tasks that require participants to inhibit a prepotent response and to respond with a non-dominant response (e.g., the Day/Night task; Gerstadt et al., 1994), 3 year olds perform significantly worse than 4 or 5 year olds, with less than half of the 3 year olds performing the task correctly (Carlson, 2005). Reflecting the rapid neural development occurring during the preschool age period (Diamond, 2002), preschool-age children evidence significant gains in IC performance from 3 - 5 years old (Carlson, 2005).

Despite the evidence for unique AC, WM, and IC development during the preschool-age period, there is considerable disagreement among prominent EF researchers regarding the structure of EF (e.g., Anderson, 2002; Barkley, 1997; Diamond, 2006; Garon et al., 2008; Miller & Cohen, 2001). As Garon and colleagues (2008) noted in their comprehensive review of the EF literature, this disagreement can be distilled down to the question of whether EF constitutes a single unitary construct, as advocated by Rothbart & Posner (2001), or is an umbrella term for several distinct, but related constructs that are associated with higher-order cognitive functioning (e.g., Diamond, 2002). Recent empirical attempts to resolve these divergent positions have shed needed light on the issue. In the most widely-cited factor analytic study of EF structure, Miyake et al. (2000) used a college-age sample and nine lab-based EF tasks to evaluate alternative factor structures. The authors reported that EF is comprised of three independent, but highly correlated constructs (attentional set shifting, working memory, and inhibitory control). Due to the

substantial portion of variance shared by these three constructs, the authors argue that EF should be considered a unitary construct comprised of dissociable sub-components (Miyake et al., 2000). In their review, Garon et al. argue that the unitary construct identified by Miyake et al. represents a central attention system, similar to earlier models of EF (Posner & Rothbart, 1998). The rationale for specifying the unitary construct as a central attention system is the overwhelming evidence that AC influences nearly every other domain of EF (Garon et al., 2008; Posner & Rothbart, 1998).

While groundbreaking, Miyake et al.'s (2000) factor analytic study used a questionable analytic technique that may reduce the reliability of their findings. Specifically, the authors first tested a three-factor model and then for the second model, they fixed the correlations between the three factors to one, arguing this was the best technique to test whether a unitary EF factor best described the data. However, setting the correlations between the three latent factors is different than specifying a model with a single latent construct with all (9) indicators loading onto a single factor. Miyake et al. tested a much more stringent, and arguably unrealistic, model that presumes each of the factors perfectly correlated with each other, which is not theoretically or empirically equivalent to testing whether all nine indicators load onto a single latent factor. Although the model with the three latent factor correlations set to one demonstrated significantly worse fit than the three-factor model, the fit indices were close to those suggested by Hu and Bentler (1999), suggesting that a single factor model (e.g., loading all nine indicators onto a single factor) may demonstrate adequate fit. If this alternative model were tested and demonstrated adequate fit, as hypothesized, then the unitary EF model would be more parsimonious.

Miyake et al.'s (2000) sample also consisted exclusively of college students. Factor analytic results are strongly contingent upon the samples from which the data is drawn and thus the underlying factor structure of EF identified by the authors may not represent the factor structure in young children due to developmental processes. Lehto, Juujarvi, Kooistra, and Pulkkinen (2003) addressed this possibility and largely replicated Miyake et al.'s results using a sample of school-age children (ages 8 – 13). The few studies (e.g., Shing et al., 2010; Wiebe et al., 2008/2011) that have examined the structure of EF in preschool-age children offer initial evidence that a single construct best describes EF abilities. For instance, Wiebe et al. (2008) examined the underlying structure of EF in 2-6 year olds using measures of WM and IC. The authors used confirmatory factor analyses to test two alternative models and found strong evidence suggesting that a single EF factor best described the observed data over models that separated IC and WM. Given the significant cognitive developmental that takes place from two to six years old, which could impact EF (e.g., Diamond, 2002), the authors subsequently reevaluated the latent EF structure using a sample comprised entirely of 3 year olds and confirmed a single EF factor best described the children's performance across nine lab tasks (Wiebe et al., 2011). Shing, Lindenberger, Diamond, Li, and Davidson (2010) empirically examined whether the factor structure for WM and IC tasks is developmentally dependent with children ranging in age from 4 to 14. They found significant developmental differences in the underlying EF structure, such that before 9.5 years old, WM and IC loaded onto a single factor, while for older children a two-factor solution provided optimal fit to the data, consistent with other factor analytic studies (Lehto et al., 2003; Miyake et al., 2000).

The results of these previous factor analytic studies with preschool-age children must be treated cautiously and may not generalize to the present study for two reasons. First, the question

remains whether the single latent factor reported for WM and IC (Shing et al., 2010; Wiebe et al., 2008/2011) represents the actual underlying structure of EF in preschool-age children or is an artifact of the specific measures used to assess EF. For instance, tasks commonly used to assess IC in preschool-age children often require substantial WM abilities, as well (e.g., Carlson, 2005; Diamond, 2006). These tasks are termed "complex inhibitory control" measures, because of this demand on WM (Garon et al., 2008). A common feature of these complex tasks is that participants are required to remember two or more simultaneous rules that govern their responses. Young preschool-age children (i.e., approximately 3 – 3.5 years old) often perform poorly on these complex tasks of IC, because the WM demands may exceed their developmental abilities (Carlson & Moses, 2001; Davidson, Amso, Anderson, & Diamond, 2006; Diamond, 2006). By approximately 4 years old, preschool-age children are able to demonstrate better (although not perfect) performance on tasks of IC, including the more complex tasks that require significant WM (Garon et al., 2008).

The results from the previous factor analytic studies (i.e., Shing et al., 2010; Wiebe et al., 2008/2011) with preschool-age children may also not generalize to the present study, as the other researchers only assessed two sub-domains of EF and did not include measures of AC. Hrabok, Kerns, & Muller (2007) examined aspects of AC using a preschool-age sample and found significant age-related differences in performance, but only for higher-order AC tasks that also require substantial inhibition. For lower-order AC tasks that did not require as much IC, the authors found that even young preschool-age children were able to complete the tasks with a reasonable degree of success (Hrabok et al., 2007), suggesting that AC and IC are differentiated in young preschool-age children and can specifically be measured if the correct measures are given. Hrabok et al.'s results underscore the importance of using basic EF tasks when assessing

individual EF sub-components during the preschool-age period. Their results indicate that it is possible that if more basic EF measures of AC, WM, and IC were administered to a preschool-age sample, a factor analysis would reveal more than one latent variable, consistent with EF factor analyses with older populations (e.g., Lehto et al., 2003; Miyake et al., 2000).

In summary, despite the high correlations reported for tasks of AC, WM, and IC in preschool-age children (e.g., Hrabok et al., 2007; Shing et al., 2010; Wiebe et al., 2008/2011), it is important to assess all three sub-components during this critical period when differential EF abilities begin to emerge. The consistent findings of rapid age-related increases in EF performance for AC (e.g., Hanania et al., 2010), WM (e.g., Palmer, 2000; Shing et al., 2010), and IC (Carlson, 2005; Shing et al., 2010) during the preschool period also underscore the importance of accounting for proportion of EF performance due to age-related development, before examining the unique proportion of variance due to other variables, such as traumatic stress symptoms.

Executive Dysfunction and Preschool-age Children's Behavior Problems

Internalizing and externalizing behavior problems can be conceptualized as differential failures of self-regulation, in terms of either over- or under-modulation (Derryberry & Rothbart, 1997). Self-regulation involves both passive and active processes (Rothbart, 1989). Consistent with this model, Lezak (1995) documents two neural routes of the affect regulation system. The first involves a rapid, automatic response to reflexive signals mediated via the amygdala and thalamus. Individuals have minimal control over this automatic affective response and may not be conscious of their affect in the moment (Lezak, 1995). In contrast to this automatic and thus passive system, the second path involves active, effortful control of our affective system (Lezak, 1995). EF has thus been implicated as one of the most salient processes involved in effortful

control (e.g., Eisenberg et al., 2010; Liebermann, Giesbrecht, & Muller, 2007). In this regard, it is unsurprising that executive dysfunction has been associated with both internalizing and externalizing problems (e.g., Hughes & Ensor, 2008), and is considered a robust predictor of later behavior problems in longitudinal studies (e.g., Eisenberg et al., 2009; Hughes & Ensor, 2008).

AC has been argued to be one of the most important EF sub-components involved in effortful control as part of the broader self-regulatory system (e.g., Rueda et al., 2010). A breakdown within any of the three AC tasks i.e., disengaging, re-orienting/shifting, and then reengaging (e.g., Posner & Petersen, 1990) can become highly problematic for young children in a wide-variety of settings. AC has not only been shown to predict academic preparedness (see Duncan et al., 2007, for a meta-analysis), but is also an important factor in young children's socialization (Rueda et al., 2010). Impaired AC has widely been investigated as an important factor in internalizing problems, specifically anxiety-related symptoms. Unfortunately, no research has explicitly examined the relationship between preschool-age children's AC and internalizing problems. However, evidence from research using older children and adolescents suggests AC may play a role in the regulation of internalizing experiences, such as anxiety. For instance, in a study of school-age children, Muris, de Jong, and Engelen (2004) reported that children's AC predicted internalizing behavior problems above and beyond the children's levels of neuroticism. Derryberry and Reed (2002) reported that college students who evidenced good AC were better able to manage their anxiety during a threat-related experimental paradigm; whereas those students with poor AC had greater difficulty voluntarily shifting their attention away from the threat related stimuli. These results suggest that AC plays an important role in internalizing behavior problems. It is also possible that AC is related to externalizing problems,

as well, which will be reviewed near the end of the current chapter along with the evidence for IC.

WM is not only an essential feature in cognitive processes (e.g., manipulation of information; Gazzinga et al., 2009), but WM also plays an important role in children's social and affective functioning. For instance, social interactions are often governed by a complex system of explicit and implicit rules, which an individual must follow if he/she hopes to have a successful experience. However, these rules must be held in an individual's WM when engaging in an interaction (e.g., remembering who holds what position in a group situation marked by a clear hierarchy). Difficulties maintaining this information in WM may reflect goal neglect, which occurs when a child understands the directions for a given task, but fails to complete the task, because he/she cannot maintain the goal in his/her mind (e.g., Marcovitch, Boseovski, Knapp, & Kane, 2010). Marcovitch et al. (2007/2010) conducted a series of studies examining goal neglect in preschool-age children and found that when children are presented with a task in which they are required to constantly update the information in the their WM (Baddeley & Hitch, 1974), the children actually performed better than when they were faced with seemingly easy tasks that did not require as frequent memory updating to be successful. These results suggest that when young children are not required and unable to maintain pertinent information (e.g., rules, directions) in their WM – either due to the task demands or underlying executive dysfunction – they will exhibit worse performance on goal-directed behaviors.

In a longitudinal study, Hughes & Ensor (2008) measured preschool-age children's WM and tasks of IC and found that executive dysfunction at age three significantly predicted overall behavior problems at age four, even after controlling for other possible predictors, including socioeconomic status, verbal ability, and behavior functioning at age three. Unfortunately, due to

a small sample size, the authors created composite scores for EF and behavior problems and thus the differential predictive effects of WM versus IC could not be ascertained from their data. Nor could separate effects for internalizing versus externalizing behavior problems be examined. Despite these limitations, however, Hughes and Ensor's findings indicate that preschool-age children's EF may be a salient predictor of later social and emotional functioning.

Externalizing problems are marked by under-modulated affect and behavior (Derryberry & Rothbart, 1997), which is likely associated with impaired IC. Socially desirable behavior is substantially dependent on an individual's ability to inhibit their impulses long enough to consciously chose the appropriate response (Diamond, 2006; Liebermann et al., 2007). Unsurprisingly, preschool-age children who exhibit low IC are more likely to be highly aggressive with their peers (Raaijmakers et al., 2008) and to engage in other forms of inappropriate social behavior. This pattern (i.e., low IC associated with high levels of aggression) has been reported in other, independent samples, as well (e.g., Dennis & Brotman, 2003).

Three longitudinal studies have examined the relationship between preschool-age children's IC and their social and behavioral outcomes. Brocki, Nyberg, Thorell, and Bohlin (2007) administered several tasks of IC found that poor IC was both concurrently and predictively associated with greater levels of externalizing behavior problems, as measured by symptoms of ADHD. In a separate study, Thorell, Bohlin, & Rydell (2004) assessed preschool-age children's IC and their externalizing problems, three years later when the children were in elementary school. The authors reported that low IC at age five significantly predicted externalizing behavior problems three years later, after taking into account temperamental inhibition. Ciairano, Visu-Petra, and Settanni (2007) investigated the relationship between school-age children's IC and their level of peer cooperation (as measured by a joint task) one

year later. They reported that children's IC levels predicted later peer cooperation, in the expected direction, such that children with worse IC were less cooperative during the joint task compared with children who exhibited higher levels of IC. Taken together, these results (Brocki et al., 2007; Ciairano et al., 2007; Thorell et al., 2004) suggest that children's emerging IC abilities (e.g., Carlson, 2005) may be particularly important to understand given their role in later externalizing problems.

Recently, researchers have started to examine whether different patterns of EF (as opposed to unitary EF sub-components) may alternatively predict internalizing versus externalizing behavior problems. For example, in addition to IC, AC may also play a role in preschool-age children's externalizing problems, rather than just being associated with regulation of anxiety (e.g., Derryberry & Reed, 2002; Muris et al., 2004). Children who are unable to control their attention in learning environments or in peer-interactions may be disruptive if they also have low IC (e.g., acting out while not attending to a teacher), which establishes a negative social developmental trajectory. In a longitudinal study beginning during the preschool years, Olson and colleagues (2011) examined predictors of peer aggression using measures of temperamental affectivity and a composite measure of effortful control, which measured both AC and IC. They authors reported a significant interaction, such that children with medium to high levels of maternal reported anger and poor effortful control had the highest rates of peer aggression. In a separate, longitudinal study of older children and preadolescents, Eisenberg et al. (2009) reported that poor AC and IC together predicted high levels of externalizing behavior problems, whereas poor AC only was related to high levels of internalizing behavior problems. The findings from these two longitudinal studies (Eisenberg et al., 2009; Olson et al., 2011)

indicate that unique EF profiles may differentially be related to both internalizing and externalizing behavior problems in preschool-age children.

In summary, there is evidence to suggest that AC, WM, and IC may be differentially related to internalizing and externalizing behavior problems in preschool-age children. Specifically, impaired AC in the absence of IC problems is likely associated with internalizing problems (e.g., anxiety-related symptoms) (e.g., Eisenberg et al., 2009), whereas the combination of impaired AC and low IC is plausibly associated with externalizing behavior problems (e.g., Olson et al., 2011). Because WM abilities are strongly related to AC (e.g., Garon et al., 2008), it seems likely that WM deficits may be related to both internalizing and externalizing problems, although this possibility has not been previously investigated. Additional studies are needed to investigate the various EF profiles that are associated with varied behavior problems – particularly in preschool-age children. Such lines of inquiry are especially salient to the current research, as different profiles of EF performance may be related to the heterogeneous traumatic stress responses observed following repeated traumatic events in early childhood, such as exposure to IPV (e.g., Evans et al., 2008; Wolfe et al., 2003).

CHAPTER 5

Traumatic Stress and Preschool-age Children's Executive Dysfunction

The following chapter proposes how preschool-age children's experiences of chronic traumatic stress, such as exposure to repeated IPV, might be related to executive dysfunction. The theoretical underpinnings for this chapter come from three primary sources (i.e., Blair, 2010; De Bellis et al, 1999a/1999b; Perry et al., 1995). Based primarily on the animal literature and their own clinical research with severely traumatized children, Perry et al. (1995) observed that immediate traumatic stress "states" (i.e., either dissociative or hypervigilance) would generalize to become enduring "traits" over time. The authors hypothesized that this was due to complex changes within the developing brain in which the neural developmental trajectories might be responding to the demands of the external environment (i.e., the traumatic events). De Bellis et al. (1999a/1999b) further advanced our understanding of how chronic traumatic stress can impair individual's cognitive functioning by detailing the relationship between individual's psychological traumatic stress responses, subsequent alterations in their physiological stress responses, and long-term neural changes in the brain. Blair (2010) recently applied these theories to EF specifically. Blair argued that early exposure to poverty is a chronically stressful experience that is likely related to alterations in young children's stress response systems, which further impair healthy neural development (e.g., De Bellis et al., 1999b) in regions that are associated with EF. Notably, however, the evidence Blair reviewed for such pathways in children living in poverty was mixed. As Blair noted, poverty may not elicit a strong enough stress response to result in the hypothesized relationships. In essence, Blair's theory may be correct, but only for children exposed to sufficiently salient, repeated stressors.

The current research extends the previous theoretical work of Perry et al. (1995), De Bellis et al. (1999b), and Blair (2010) by arguing that preschool-age children exposed to a repeated traumatic event, such as IPV, are at significant risk for developmental trauma (e.g., De Bellis et al., 199b). Contrary to Blair who considered poverty as a contextual stressor, exposure to IPV may be more appropriate stressor for this research for two primary reasons: (1) IPV exposure in early childhood has been found to increase preschool-age children's risk of developing clinically significant traumatic stress symptoms (Briggs-Gowan et al., 2010; Levendosky et al., 2002; Zerk et al., 2009), and (2) IPV frequently occurs repeatedly, over a long period of time (Caetano et al., 2005).

Theory of Dissociative and/or Hypervigilant Responses and Executive Dysfunction

Young children who have experienced chronic traumatic stress are proposed to be at greater risk for executive dysfunction through two independent, yet highly related pathways: one psychological (e.g., Perry & Pollard, 1998; Perry et al., 1995) and the other biological (e.g., De Bellis et al., 1999a/1999b). The psychological pathway between traumatic stress and executive dysfunction has received little attention. In contrast, the physiological pathways are better understood and will be briefly reviewed second. Although both the psychological and physiological pathways between traumatic stress responses and executive dysfunction are recognized, the current research is primarily concerned with the psychological pathways, as these are the variables that are most likely to be assessed in a clinical setting when a child is evaluated by a mental health professional. The physiological mechanisms are briefly discussed, but are not measured in the current research.

The first pathway by which dissociative and hypervigilant responses (Perry et al., 1995) may be related to executive dysfunction in preschool-age children is through the psychological

correlates of these responses and AC, WM, and IC tasks. By definition, traumatic stress implies that children are responding to perceived threats in their environment. As Perry et al. (1995) posited, chronic traumatic stress alters the organizational experiences of young children and predisposes them to respond to future stressors, including mild stressors, in ways consistent with previous responses. It is plausible that for children confronted with repeated traumatic events in their caregiving environment, such as IPV, their responses will generalize even further and begin to represent approach styles to their everyday environment. If so, this would have profound impact on children's EF in everyday contexts. For instance, children who exhibit dissociative responses in response to repeated traumatic evens may be less engaged with their immediate environment (DePrince & Freyd, 2001/2007). Thus, these children may have greater difficulty with their AC, when they are required to shift their internal resources according to environmental demands (e.g., a teacher or parent asking the child to execute a task) or to accomplish a goal (e.g., the engage in a new, desirable activity). These hypothesized AC difficulties would be related to WM deficits, as individuals cannot properly encode information into their WM without appropriate attentional resources (e.g., Baddeley & Hitch, 1974; Gazzinga et al., 2009). In contrast, children who exhibit predominantly hypervigilant responses to an immediate threat may begin to feel more anxious in general (Perry et al., 1995) and be on constant alert for perceived threats. When hypervigilant, children's primary behavioral inclination may be to either "fight or flight" (e.g., Perry & Pollard, 1998; Perry et al., 1995) and thus their attention is likely to be focused on salient stimuli related to the perceived threats. In addition, children experiencing hypervigilance may be less behaviorally inhibited, as their bodies are preparing for immediate action. Therefore, it seems possible that children who exhibit predominantly hypervigilant responses will exhibit potential disruptions in all three sub-components of EF.

The second pathway by which young children's chronic traumatic stress responses may be related to executive dysfunction is via the biological stress response systems and associated neural functioning (e.g., Blair, 2010; De Bellis, 2001; De Bellis et al., 1999a/1999b). EF is inextricably connected to complex neural systems (e.g., Anderson, 2002; Diamond, 2002; Gazzinga et al., 2009), including nearly every lobe of the brain and many sub-cortical structures. Therefore, any external or internal conditions that might alter the developmental trajectory or impair these neural systems (e.g., De Bellis et al., 2002) would arguably result in executive dysfunction. Although a complete review of these physiological pathways is beyond the scope of the current research, we have better evidence compared to the psychological pathways for how children's biological responses to chronic traumatic stress may be related to executive dysfunction in young children. Briefly, perceived threats activate two independent, but highly related nervous systems. First, the sympathetic nervous system releases epinephrine and norepinephrine (a.k.a noradrenaline), which allows for quick fight or flight responses (Heim, Meinlschmidt, Nemeroff, 2003). Second, the hypothalamic-pituitary-adrenal (HPA) axis releases glucocorticoids (Heim et al., 2003), which bind to receptor sites throughout the brain. The most widely-studied glucocorticoid, cortisol, alerts the brain to switch critical energy expenditures over to the fight or flight response, while also setting off a cascading-effect throughout the body that prepares it for action (e.g., increasing blood flow to critical muscle groups) (Teicher, Andersen, Polcari, Anderson, & Navalta, 2002). These two biological stress response systems are jointly moderated by cortropin-releasing factor, which is diffuse throughout the brain, including within the amygdala and hippocampus (Heim et al., 2003). However, these two systems are biologically indicated for *acute* stress responses (Cicchetti & Rogosh, 2001); that is, these systems are not designed to respond to chronic stressors, such as IPV.

Children exposed to family violence have consistently shown significant alterations in their biological stress response systems, particularly relating to the HPA axis (Cicchetti & Rogosh, 2001; for a comprehensive reviews on the role of cortisol in stress-related psychopathology, see Heim, Ehlert, & Helmhammer, 2000). Some research indicates that individuals exposed to traumatic events exhibit marked cortisol elevations, thus indicating an overactive HPA-axis (e.g., Bruce, Fisher, Pears, & Levine, 2009); whereas other research indicates that individuals exhibit depressed cortisol levels (e.g., MacMillan et al., 2009). These seemingly contradictory findings may reflect children's varied psychological responses to a traumatic event (i.e., dissociative and/or hypervigilant responses), which may be differentially related to HPA-axis activity. For instance, preliminary research indicates that individuals with high levels of dissociative symptoms show a blunted HPA-axis response to a stressful task, as indicated by hypocortisolism (e.g., Simeon et al., 2007; Simeon, Yehuda, Knutelska, & Schmeidler, 2008), whereas individuals with significant hypervigilance exhibit hypercortisolism (e.g., Simeon et al., 2008). In addition to HPA-axis dysregulation, children exposed to family violence may have altered sympathetic nervous systems, including the release of high levels of epinephrine and norepinephrine when exposed to a potential threat (De Bellis, Baum, Birmaher, Keshavan, Eccard, Boring, et al., 1999a). Thus, there is mounting evidence that in contrast to low-grade stressful situations (e.g., poverty; Blair, 2010), chronic exposure to family violence is likely to result in an altered stress response across both the HPA-axis and sympathetic nervous systems.

As De Bellis (2001) and others (e.g., Blair, 2010; Weber & Reynolds, 2004; Weiss, 2007) have previously noted, chronic activation of biological stress responses is associated with numerous, profuse structural and functional neurological impairments in both adults and

children. For instance, in adults, clinically significant levels of psychological traumatic stress have been associated with decreased white matter volume (Karl et al., 2006), reflecting fewer and/or demyelinated axonal tracts that are responsible for connecting the various structures/regions of the cortex with each other (Gazzinga et al., 2009). Reviews of the child trauma literature suggest that chronic psychological traumatic stress is associated with significantly smaller frontal lobes, decreased white matter, and greater ventricle volume (see Jackowski et al., 2009, for a comprehensive review). Altered biological stress response systems may not be linearly related to changes in neural structures, however. In their review of the rodent literature, Holmes and Wellman (2009) determined that the relationship between glucocorticoid levels and changes observed in the prefrontal cortex follows a U-shape, with either hypo- or hyper-cortisol levels resulting in significant alterations in the prefrontal cortex, which is one of the primary areas of the brain associated with EF (e.g., Diamond, 2002; Struss & Alexander, 2000).

In one of the few neuroimaging studies to date that assessed both dissociative symptoms and hypervigilance in children exposed to family violence, De Bellis et al. (1999b) reported that dissociative symptoms were negatively correlated with adjusted volumetric differences in the corpus callosum (regions 4, 6, and 7, as well as total volume). In contrast, hypervigilant symptoms were negatively correlated with total ventricle volume and one different region of the corpus callosum (region 5). These preliminary results indicate that children's chronic psychological traumatic stress responses (i.e., dissociation and/or hypervigilance; Perry et al., 1995) may be differentially related to neural developmental trajectories. These differential trajectories are likely related to children's psychological and biological stress responses (e.g., Blair, 2010; De Bellis et al., 1999a; Perry & Pollard, 1998; Perry et al., 1995) through a complex

transactional process. Following this theoretical review of the possible pathways between children's chronic traumatic stress responses and executive dysfunction, the available empirical evidence relating to executive dysfunction in traumatized children is reviewed next. Review of Extant EF Studies in Children Experiencing Chronic Traumatic Stress

Attentional Control

The majority of the extant research examining attention in children exposed to traumatic events has relied on affective experimental paradigms that measure children's ability to control their attention when faced with threatening cues. These studies suggest that school-age and older maltreated children may *over*-attend to threat related cues (i.e., angry faces) in their environments compared to non-maltreated peers (Pollak, Vardi, Bechner, & Curtin, 2005; Pollak & Tolley-Schell, 2003). Furthermore, maltreated children have been shown to disengage their attention from these cues just as quickly as non-abused children, but required more cognitive energy to do so, as measured by Event-Related Potentials (Pollak & Tolley-Schell, 2003). In two different studies, maltreated children responded to threat-related cues significantly faster than non-abused children, suggesting a natural benefit of hypervigilance in potentially threatening environments (Pine et al., 2005; Pollak & Tolley-Schell, 2003).

Much less is known about children's AC in response to neutral stimuli, however, or how AC performance may be impaired in preschool-age children. Only two studies have examined traumatized children's attention to neutral stimuli and both studies measured elements of sustained attention and thus do not provide good evidence regarding AC, as a sub-component of EF. DePrince et al. (2009) reported that school-age children (mean age = 10 years old) exposed to family violence had significantly worse performance on a measure of sustained auditory attention than either children exposed to non-familial traumatic events, or children who had not

experienced any type of traumatic event. DePrince et al. also measured both PTSD symptoms and dissociative symptoms. They reported that both PTSD symptoms and dissociative symptoms independently predicted poorer auditory attention across the overall sample, providing supporting evidence that there may be multiple pathways to executive dysfunction in children experiencing chronic traumatic stress (e.g., Perry et al., 1995). De Bellis, Hooper, Spratt, and Woolley (2010a) measured sustained visual attention performance in younger school age children (mean age = 7) and found that visual attention performance is moderately impaired in the presence of PTSD, but was not related to PTSD symptom severity.

Taken together, these two studies (De Bellis et al., 2010a; DePrince et al., 2009) suggest that traumatic stress symptoms, specifically PTSD and/or dissociative symptoms, may be related to impaired attention in school-age children. However, the generalizability of the results from both of these studies to the current research is constrained by several important limitations. First, neither sample assessed preschool-age children. In light of the findings from previous developmental studies (e.g., Carlson, 2005; Shing et al., 2010) of EF that demonstrate significant age-related differences in EF performance, as well as rapidly developing neural structures associated with AC (e.g., Diamond, 2002), it is possible that preschool-age children's AC will be differentially impacted compared to older children. Second, neither study (De Bellis et al., 2010a; DePrince et al., 2009) measured AC, as a sub-component of EF. Both of the studies used measures of sustained attention, which does not assess for executive components of attention, such as attention shifting (e.g., Garon et al., 2008). Thus, future research must employ different measures to better understand EF in children who are exposed to chronic traumatic events, such as IPV.

Working Memory

Six studies (Beers & De Bellis, 2002; De Bellis, Hooper, Woolley, & Shenk, 2010b; DePrince et al., 2009; Jouriles et al., 2008; Samuelson, Krueger, Burnett, & Wilson, 2010; Yasik, Saigh, Oberfield, & Halamandaris, 2007) have explicitly measured WM in children experiencing chronic traumatic stress. Overall, the WM findings reported are inconsistent with some researchers finding significantly worse WM performance in children who experienced a traumatic event and subsequent traumatic stress (De Bellis et al., 2010b; DePrince et al., 2009; Jouriles et al., 2008; Yasik et al., 2007), whereas other researchers have reported no differences (Beers & De Bellis, 2002; Samuelson et al., 2010). It is likely that these divergent findings are due to methodological differences and problematic operational definitions of EF and associated measures. For instance, Beers and De Bellis (2002) used a very small sample (N = 14) and assessed WM with the California Verbal Learning Test (CVLT), which contains an indicator of short-term memory (Strauss, Sherman, & Spreen, 2006), and a digit span subtest from an intelligence battery. The null finding reported in the authors' study may be due to the limited power afforded by the small sample size (i.e., increasing the risk of a Type-II error) or the result of using a less robust indicator of WM compared to those administered by other studies (DePrince et al., 2009).

In addition to the problems associated with using a small sample size, several of the extant studies use problematic measures of EF. For instance, De Bellis et al. (2010b) stated that they were examining EF performance in a sample of maltreated children and adolescents; however, the authors used a long-term visual memory task as a proxy for visuo-spatial WM, which is not equivalent to using a WM task that assesses information that must be continuously updated (Baddeley & Hitch, 1974) in order to be retained. Thus, although the authors reported

that maltreated children's' performance on visual memory tasks accounted for a significant portion of the variance in observed PTSD symptoms, the results cannot be generalized to WM performance. Similarly, Jouriles et al. (2008) measured explicit memory functioning in a preschool sample exposed to IPV and found that children exposed to IPV (including bidirectional IPV) is associated with worse explicit memory functioning, above and beyond controlling for harsh parenting. However, WM and explicit memory are two different, albeit related constructs that are differentially impacted by stress-related changes (e.g., Luethi, Meier, & Sandi, 2011). WM is a sub-component of EF (e.g., Gazzinga et al., 2009; Miyake et al., 2000), while explicit memory is a component of long-term memory and each use different neural networks (e.g., Rugg et al., 1998).

In contrast to the problematic definitions and associated measures of WM used in the research reviewed previously (e.g., Beers & De Bellis, 2002; De Bellis et al., 2010b; Jouriles et al., 2008), two other studies administered more valid and robust measures of WM in larger samples. Yasik et al. (2007) examined three groups of children: (1) children exposed to traumatic events, including interpersonal violence, with PTSD, (2) children who experienced a traumatic event, but did not have PTSD, and (3) non-trauma exposed children and found that the children with PTSD performed significantly worse on several measures of WM. DePrince et al. (2009) reported that children exposed to family violence exhibited significantly worse performance across the WM subtests compared to children who had not experienced a traumatic event and those that were exposed to single-incident, non-interpersonal traumatic event. In addition, WM performance was also deleteriously related to PTSD symptoms (DePrince et al., 2009). Taken together, the findings from these two studies suggest that WM performance may be worse in

children experiencing high levels of traumatic stress, consistent with the model advanced by the current research.

Inhibitory Control

Despite IC's widely acknowledged importance in self-regulation processes (e.g., Barkely, 2001; Eisenberg et al., 2009), only two studies have examined children experiencing chronic traumatic stress and their IC performance and neither study examined young children. In the same sample reported previously, DePrince et al. (2009) used a variant of a go/ no-go task to measure school-age children's ability to inhibit a prepotent motor response. Similar to their other reported findings from the study, the children who were exposed to family violence performed significantly worse on the two IC tasks than the other two groups of children. Carrion, Garrett, Menon, Weems, and Reiss (2008) examined a small sample of adolescents exposed to different forms of family violence using an event related fMRI paradigm coupled with a go/ no-go task. In contrast to DePrince et al., the authors reported that the maltreated adolescents performed equally well on the IC task, but exhibited a different pattern of neuronal activation compared to controls (Carrion et al., 2008). In particular, their results suggested that while the adolescents exposed to chronic traumatic stress may require a more profuse neural network to experience the same degree of motor inhibition (Carrion et al., 2008).

The apparent discrepancy between the findings reported from DePrince et al. (2009) and Carrion et al. (2008) should be interpreted with caution. In particular, Carrion et al. used a very small sample that increases the chance of a Type II error (e.g., Field, 2009). Both samples offer converging evidence, however, that some aspect of IC may be impaired in children exposed to chronic traumatic stress in terms of either poorer performance (DePrince et al., 2009) on tasks of IC or in terms of requiring greater cognitive resources to accomplish the same degree of

inhibition observed in children not experiencing to traumatic stress (Carrion et al., 2008). To date, nothing is known about preschool-age children's IC performance on laboratory tasks. However, given the strong association between exposure to a chronic traumatic event, such as IPV, traumatic stress, and subsequent externalizing behavior problems (Evans et al., 2008; Wolfe et al., 2003), it seems plausible that young children may experience some deficits in IC. Future Directions of EF Research for Preschool-age Children Experiencing Traumatic Stress

In summary, several researchers have recently begun to investigate the neuropsychological functioning of children exposed to chronic traumatic stress (usually in the form of family violence) (e.g., De Bellis et al., 2010a/2010b; DePrince et al., 2009; Samuelson et al., 2010). These investigations provide preliminary evidence for disruptions across the three sub-components of EF considered in the current research. However these previous studies have been marked by numerous, significant limitations, including the use of very small sample sizes (Beers & De Bellis, 2002), overreliance on PTSD as the sole indicator of traumatic stress (e.g., De Bellis et al., 2010a/2010b; Samuelson et al., 2010), poor operalization of EF and thus inadequate measures of the domains of EF examined (e.g., De Bellis et al., 2010a), and little to no measurement of the children's social-emotional behavior problems (e.g., De Bellis et al., 2010a/2010b; DePrince et al., 2009; Jouriles et al., 2008; Samuelson et al., 2010).

In addition to the above limitations, two problems persist in the literature. First, with two notable exceptions (i.e., De Bellis et al., 2010b; Jouriles et al., 2008), there is minimal understanding for how chronic traumatic stress may be related to preschool-age children's executive dysfunction. With rapid developmental changes in the structural and functional networks associated with EF occurring during the preschool period (e.g., Carlson, 2005; Diamond, 2006), any deleterious impact on typical neural development (e.g., due to exposure to

traumatic stress) should be carefully studied. Preschool-age children are disproportionately exposed to IPV (e.g., Fantuzzo et al., 1997) and thus at risk for experiencing chronic traumatic stress. As a result, the void in the literature regarding the lack of empirical evidence for how chronic traumatic stress is related to executive functioning is particularly problematic. The second major limitation of the extant research is the troubling absence of empirical work grounded in trauma theory. Many of the studies reviewed (e.g., De Bellis et al., 2010a; Samuelson et al., 2010) relied on PTSD as the sole indicator of traumatic stress and in doing so, considered traumatic stress to be a unitary construct measurable by a single sum score. However, the current research argues that traumatic stress represents a heterogeneous response to a potentially traumatic event and is experienced on a continuum of dissociative symptoms on one end and hypervigilance on the other (Bremner, 1999; Lanius et al., 2010; Perry et al., 1995). Of the studies reviewed, only two (DePrince et al., 2009; Jouriles et al., 2008) examined executive dysfunction in the context of current traumatic stress theory. DePrince et al. measured dissociative symptoms in their sample, representing the only research reviewed to do so; while Jouriles et al. measured hypervigilance and tested whether this sub-facet of traumatic stress mediated the relationship between family violence exposure and observed executive dysfunction. Based upon the preliminary results of these findings, it is too early to determine whether predominantly dissociative versus hypervigilant responses will result in different patters of dysfunction within the three sub-components (as opposed to across the sub-components). The current research builds upon these recent advances, while also examining whether EF mediates the relationship between chronic traumatic stress and children's behavior problems.

CHAPTER 6

Towards an Integrated Model: Summary of Extant Findings and Future Directions

The current chapter transitions from reviewing the extant literature to proposing the model guiding the current study. To facilitate this transition, the current chapter first provides a global summary of the extant research and then provides an in-depth critique of two previous, and particularly noteworthy, studies that have established valuable precedent. Then, the chapter considers several remaining research questions left unanswered by prior investigators and proposes a future direction for the current research guided by an integrative theoretical model. Global Summary of Previous Research: Establishing What We Already Know

Young children are disproportionately exposed to IPV (Fantuzzo et al., 1997), which is perpetrated by both men and women (Caetano et al., 2008; Goodlin & Dunn, 2010), and often occurs over many years (Caetano et al., 2005). IPV involves incidents of physical, sexual, and/or psychological violence or the threats of such violence (Breiding et al., 2008; Marshall, 1992). Unfortunately, IPV is a common form of family violence with an estimated 7.5 million preschool-age children living in households with IPV each year (i.e., Fantuzzo et al., 1997; Fusco & Fantuzzo, 2009; McDonald et al., 2006). Young children living in homes with IPV are likely to be exposed to the violence through one or more sensory modalities (Fantuzzo & Mohr, 1999; Fusco & Fantuzzo, 2009). Findings from recent meta-analyses of cross-sectional research (Evans et al., 2008; Wolfe et al., 2003), as well as longitudinal studies (e.g., Huang et al., 2010; Martinez-Torteya et al., 2009), provide clear evidence that preschool-age children exposed to IPV in early childhood are at increased risk for developing significant internalizing and/or externalizing behavior problems. Exposure to IPV during early childhood is also predictive of clinically significant traumatic stress symptoms (e.g., Levendosky et al., 2002; Margolin & Gordis, 2000; Margolin & Vickerman, 2008). According to Perry et al.'s (1995/1998) theory, two particularly salient aspects of preschool-age children's traumatic stress responses that may be related to IPV exposure are dissociative and hypervigilant symptoms. Exposure to general family violence (e.g., Macfie et al., 2001a), and IPV specifically (e.g., Rossman et al., 1997), is associated with concurrent dissociative symptoms and predictive of longitudinal levels of dissociation (Ogawa et al., 1997). Additionally, exposure to IPV has consistently been documented to result in hypervigilance in a substantial portion of preschool-age children (Graham-Bermann et al., 2008; Levendosky et al., 2002; Zerk et al., 2009). These heterogeneous traumatic stress responses are also associated with young children's observed behavior problems (e.g., Macfie et al., 2001b) and may partially mediate the relationship between IPV exposure and children's behavior problems (Milot et al., 2010).

In the broader clinical literature, executive dysfunction has also been implicated in children's behavior problems (e.g., Anderson, 2002; Gioia et al., 2000). In particular, EF is considered one of the most salient domains involved in effortful control (e.g., Eisenberg et al., 2010; Liebermann et al., 2007). Thus, it is unsurprising that executive dysfunction has been associated with both internalizing and externalizing problems (e.g., Hughes & Ensor, 2008), and is considered a robust predictor of later behavior problems in longitudinal studies (e.g., Eisenberg et al., 2009; Hughes & Ensor, 2008). The preschool period is a critical period for emerging EF (Carlson, 2005; Diamond, 2002) and thus any disruption to EF development is argued to have a more pernicious effect than later disruptions. Within the EF domain, three sub-

components appear particularly associated with young children's behavior problems: AC (e.g., Rueda et al., 2010), WM (Hughes & Ensor, 2008), and IC (e.g., Raaijmakers et al., 2008).

Preschool-age children's heterogeneous traumatic stress responses to IPV exposure may be differentially related to executive dysfunction. This relationship is likely mediated through a complex transactional process between psychological processes and physiological stress systems (e.g., Blair, 2010; De Bellis et al., 2002). Preliminary empirical investigations indicate that school-age children with significant traumatic stress symptoms may have greater AC problems (De Bellis et al., 2010a; DePrince et al., 2009), WM impairment (e.g., De Bellis et al., 2010b; Yasik et al., 2007), and IC deficits (DePrince et al., 2009). Taken together, these findings indicate that preschool-age children exposed to IPV may develop executive dysfunction that might further mediate the relationship between the traumatic event, their traumatic stress response, and observed behavior problems.

Critique of Two Previous, Noteworthy Studies

Two studies (DePrince et al., 2009; Jouriles et al., 2008) detailed in the previous chapter, represent the most noteworthy attempts yet to examine EF in children exposed to chronic traumatic stress. However, both studies suffer from significant theoretical and methodological constraints that limit the ability to generalize their findings to the current research. DePrince et al. (2009) assessed three sub-components of EF (attention, WM, and IC) in school-age children (mean age = 10.39); however, the authors' measure of attention appeared to lack internal validity, loading more on WM than AC.

Jouriles et al. (2008) conducted the first EF study of preschool-age children exposed to IPV. The authors assessed bidirectional IPV – representing the only EF study to do so – using a well-validated measure of physical IPV in contrast to DePrince et al. (2009) who relied on a

single question to determine IPV exposure. Despite its strengths, Jouriles et al.'s research design limits its generalizability to the current research. First, the researchers collected a relatively small sample size (N = 69), which may partially explain some of their null findings due to the increased likelihood of Type II error (e.g., Field, 2009). Second, Jouriles et al. only assessed older preschool-age children and early school-age children (4 - 6 year olds) and thus their results may not apply to younger preschool-age children given the rapid EF and neurological development that occurs during the early preschool years (Carlson, 2005; Diamond, 2002/2006). Additionally, the authors' measure of memory assessed more long-term memory than WM and thus their findings cannot be validly extrapolated to WM performance in preschool-age children.

One of the primary critiques advanced in the previous chapter for EF studies in general was the lack of grounding in adequate trauma theory. Fortunately, DePrince et al. (2009) and Jouriles et al. (2008) made important advances on this point, yet each did so incompletely. DePrince et al. measured dissociative symptoms in their sample, which represents the first study of EF in IPV exposed children to do so; however, rather than also assessing hypervigilance (e.g., Perry & Pollard, 1998; Perry et al., 1995) the authors used a global measure of PTSD and did not examine hypervigilance separately form the other two PTSD symptom clusters (i.e., re-experiencing and avoidance symptoms). In contrast, Jouriles et al. assessed symptoms of hypervigilance, but failed to assess dissociative symptoms. In addition, Jouriles et al.'s measure of hypervigilance had low internal consistency (per the authors' acknowledgement) and thus did not seem to be a reliable measure of the construct. This is likely due to the authors' use of the DSM-IV-TR hypervigilance criteria as the basis of their measure, which does not evidence adequate validity for preschool-age children due to lack of developmentally appropriate items (e.g., Scheeringa et al., 2003; Scheeringa et al., 1995).
Lastly, neither DePrince et al. (2009) nor Jouriles et al. (2008) measured child behavior problems (Note: DePrince et al. assessed an anxiety problems subscale, but no other forms of internalizing or externalizing problems), and thus the nature of the relationship between IPV exposure, traumatic stress, EF, and behavior problems within the population of IPV exposed children remains unknown.

Future Directions: Towards an Integrated Model

Despite the advances made in recent years towards understanding the effects of children's repeated exposure to traumatic events, such as IPV, on their psychological functioning and social-emotional development, several important research questions remain. Specifically, are preschool-age children's dissociative and/or hypervigilant responses to IPV exposure differentially related to their behavior outcomes? Are preschool-age children's dissociative and/or hypervigilant traumatic stress responses differentially related to levels of AC, WM, and IC? If so, do AC, WM, and/or IC functioning mediate the relationship between exposure to IPV, subsequent dissociative and/or hypervigilant symptoms, and observed behavior problems?

The current research seeks to address these questions by integrating Perry et al.'s (1995) traumatic stress theory, De Bellis et al.'s (1999a/1999b) developmental trauma theory, and Blair's (2010) chronic contextual stress and executive dysfunction theory. Each of these three theories describe the possible relationships between exposure to a salient stressor, children's chronic, psychological traumatic stress responses, and how these responses are related to deleterious alterations of the body's physiological stress response systems and subsequent neurological development. However, Perry et al.'s theory was developed largely in response to the extant animal literature and has not been adequately tested in humans. De Bellis et al. (1999a/1999b) focused exclusively on overall PTSD symptoms in order to further advance the

psychiatric conceptualization of childhood trauma. In doing so, the authors failed to adequately address other traumatic stress symptoms that play an important role in children's responses, namely dissociation. Blair's theory advanced the literature by considering the possible effects of chronic psychological and physiological stress responses on EF; however, Blair applied his model to a contextual stressor that failed to elicit a strong enough response (i.e., poverty). The current research extends these three theories beyond their specified application by examining the possible mediational role young children's EF may play between their exposure to early childhood IPV, subsequent psychological traumatic stress symptoms, and observed behavior problems.

According to this novel model guiding the current research, early childhood exposure to repeated IPV, whether unidirectional or bidirectional (e.g., Breiding et al., 2008), psychological, physical, or sexual (e.g., Breiding et al., 2008; Marshall, 1992) represents a particularly salient series of traumatic events (Margolin & Vickerman, 2008) that has profound implications for an exposed child's biopsychosocial development (e.g., Evans et al., 2008; Huang et al., 2010; Wolfe et al., 2003). Preschool-age children exposed to this form of family violence are both psychologically and physiologically vulnerable to the cascading effects of the traumatic stress responses that ensue (Cicchetti & Rogosh, 2001). However, not all children respond to IPV exposure in the same manner. Some of the children experience dissociative symptoms (Ogawa et al., 1997; Macfie et al., 2001a/2001b; Rossman et al., 1997) as they struggle to make sense of the overwhelming violence within the caregiving system. These children may feel utterly hopeless in the face of such terror as they watch or hear one or both of their caregivers assault each other (e.g., DePrince & Freyd, 1999; Perry et al., 1995). The implied message clearly indicates that no one is safe in the home. Unable to adequately intervene and stop the violence, or terrified that the

violence will result in serious harm to either caregiver or the child himself/herself (Perry et al., 1995), a child may psychologically retreat from harsh reality and depersonalize the event (e.g., watching the event unfold as if from a safe bystander's perspective) and/or derealize the situation (e.g., the event appears to be a scene from a movie, not reality) (e.g., APA, 2000; DePrince & Freyd, 2001/2007).

Other children when faced with the overwhelming terror of watching or hearing the violence between their caregivers unfold may feel a sudden surge of energy. These children may feel compelled to physically intervene in the conflict by possibly attacking one/or more of the perpetrators of the violence, or to run away from the situation (e.g., Perry & Pollard, 1998; Perry et al., 1995). These children experience a rapid escalation in heart rate (e.g., Heim et al., 2003) and seem to have acute sensory perception – they are only able to focus on salient aspects of the conflict itself while all other visual or auditory stimuli fades into the background.

Other children are thought to experience a combination of these two responses (Perry et al., 1995). Perhaps in the immediate context of a severely violent episode, they freeze, unable able to move and hoping their father does not remember they are in the next room. Later, when a flashback of the fight pops into their mind, while at school, they experience a sudden urge of energy and quickly become either affectively or behaviorally dysregulated. In this manner, a child experiences an oscillating psychological and physiological response, depending on the level of threat present and who is responsible for a threat (e.g., another child or a seemingly omnipotent caregiver). For instance, when they perceive a slight from another child on the playground (e.g., accidentally bumped while waiting in line), they may become angry and reactively attack the child.

As young children are repeatedly exposed to varying incidences of IPV that wax and wane in both severity and frequency (e.g., Caetano et al., 2005), their original psychological reactions to the particularly salient episodes of violence appear to strengthen with each successive incident and begin to generalize to other, milder stressors (e.g., a challenging task at home or school) (Perry et al., 1995). Children with predominantly dissociative experiences perhaps begin to "check out" more frequently across multiple environments. These daydreams begin to interfere with their ability to socialize properly or to accomplish their tasks at school (e.g. Rueda et al., 2010). As they begin to experience the negative consequences associated with not properly attending to their immediate environments (e.g., a teacher constantly reminds the child to follow the established rules), these children perceive the negative environmental feedback as a threat to their self-esteem and thus are even more inclined to psychologically distance themselves from the potential pain. Even in situations when they want to be more engaged, such as when playing with a close friend, these children may notice that it is difficult to remain engaged in the desirable activity or to shift their attention along with the rapidly changing nature of the task (e.g., an evolving, impromptu playground game). Parents and teachers also note that their "daydreamer" has difficulty remembering basic directions or fails to complete tasks, despite knowing the steps necessary to complete the task (e.g., putting a coat up on the hook) (e.g., Marcovitch et al., 2010). When prompted, the child is able to follow explicit directions, but appears to have difficulty focus his/her attention long enough to follow-through with the directions before either drifting off into his/her own world or being distracted by another stimulus.

In contrast, other children exposed to repeated incidences of IPV who appear affectively and behaviorally reactive to their environments seem to have greater trouble self-regulating.

These children also appear to perceive threats where they might not actually exist (e.g., misinterpreting a peer's neutral comment or a teacher's ambiguous gesture as threatening) (e.g., Pollak et al., 2005). In response, these children may overreact to the situation, either rapidly distancing themselves from the apparent threat (e.g., "this game is stupid, I don't want to play anymore") or inappropriately engaging the perpetrator of the threat with aggression (e.g., kicking another child). Similarly to the children who experience more dissociative symptoms in response to the original traumatic events, these hypervigilant children appear to have significant difficulty controlling their attention compared to most other children. As a result, they too, have problems remembering information, even for a very short period of time and thus their learning begins to suffer. When they are able to appropriate attend to information for a more sustained period of time, they seem to learn the material as well as the other children; however, their difficulty shifting and then re-engaging their attention as required appears impaired. Physically on edge and exhibiting difficulty following the rules either at home or at school, these children may be disciplined more often for their acting out behavior.

As described above, the model assumes that preschool-age children exposed to IPV will experience a wide variety of psychological and biological stress responses to the traumatic events. The psychological responses involve dissociative and/or hypervigilant symptoms (Perry & Pollard, 1998; Perry et al., 1995), which are differentially related to children's biological stress systems' reactivity. Children who predominantly dissociate in the face of significant stressors may exhibit an attenuated HPA-axis and sympathetic nervous response (e.g., Simeon et al., 2007) akin to animals feigning death when under threat (e.g., Porges, 2007). Children who experience a strong "fight or flight" response (e.g., Perry et al., 1995), may experience an elevated biological stress response (e.g., Bruce et al., 2009) and general physiological arousal as

they prepare to either confront the treat or to quickly escape the situation (e.g., Cicchetti & Rogosh, 2001). These transactional psychological and physiological stress responses (De Bellis et al., 1999a/1999b; Perry & Pollard, 1998; Perry et al., 1995) are related to children's executive dysfunction (Blair, 2010), as their initial stress reactions occur repeatedly in response to chronic IPV at home begin to generalize to other environments and milder stressors (Perry et al., 1995). As children's EF becomes disrupted their internalizing and/or externalizing behavior problems become more pronounced across several environments (e.g., at preschool and at home). Specifically, dissociative symptoms are expected to be related to AC and WM impairments and thus mediate the relationship between dissociative symptoms and internalizing behavior problems. In contrast, hypervigilance is expected to be related to EF across all three sub-components – most notably AC and IC – which is proposed to mediate the relationship between symptoms of hypervigilance and externalizing behavior problems.

CHAPTER 7

Rationale & Hypotheses

The current study is guided by three primary research questions: (1) are preschool-age children's dissociative and/or hypervigilant responses to IPV exposure differentially related to their behavior outcomes, (2) are preschool-age children's dissociative and/or hypervigilant responses differentially related to levels of AC, WM, and IC, and (3) do AC, WM, and/or IC functioning mediate the relationship between exposure to IPV, dissociative and/or hypervigilant traumatic stress responses, and observed behavior problems?

The current research is unique in several ways. Theoretically, the study integrates Perry et al.'s (1995) traumatic stress theory, De Bellis et al.'s (1999a/1999b) developmental trauma theory, and Blair's (2010) contextual stress and EF theory. Furthermore, the study extends these theories by proposing EF mediates the relationship between exposure to IPV, children's dissociative and/or hypervigilant responses, and their internalizing and/or externalizing behavior problems. The current research is the first time a study has tested this mediational model.

The current study has several methodological strengths. First, the study examines children during the preschool period, which is a critical period for emerging EF (e.g., Carlson, 2005; Diamond, 2002/2006; Shing et al., 2010). In addition, the sample consists of predominantly low-income families, providing a natural control for possible covarying effects of everyday stressors associated with poverty (e.g., Blair, 2010). Multiple methods and reporters are also used in the current research. For instance, both maternal and teacher reports of the children's EF and behavior problems were collected, which provides a comprehensive view of the children's functioning across multiple environments. EF was also assessed using lab-based paradigms using well-validated tasks. In regards to assessing traumatic events and traumatic

stress responses, the current study applies the knowledge gained from recent advances in the field. For instance, a more complete picture of IPV was obtained through assessment of bidirectional violence (e.g., Breiding et al., 2008) – as opposed to male-to-female violence only – and multiple forms of IPV, including psychological, physical, and sexual violence. Developmentally appropriate measures of dissociation and hypervigilance (e.g., Putnam, Helmers, & Trickett, 1993; Scheeringa et al., 1995) were also assessed.

Specific Hypotheses

The following hypotheses are organized according to the primary research questions.

Primary Research Question 1: Are preschool-age children's dissociative and/or hypervigilant responses to IPV exposure differentially related to behavior outcomes?

- 1.a Dissociation will predict greater levels of internalizing behavior problems, whereas hypervigilance will not.
- 1.b Hypervigilance will predict greater levels of externalizing behavior problems, whereas dissociation will not.

Primary Research Question 2: *Are preschool-age children's dissociative and/or hypervigilant responses differentially related to levels of AC, WM, and IC (measured by parent report and teacher reports, and lab-based tasks) after controlling for the children's age?*

- 2.a Dissociative and hypervigilant symptoms will each predict lower AC.
- 2.b Dissociative and hypervigilant symptoms will each predict lower WM.
- 2.c Only hypervigilant symptoms will predict lower IC.

Primary Research Question 3: *Do AC, WM, and/or IC (measured by parent report and teacher reports, and lab-based tasks) mediate the relationship between IPV exposure, dissociative and/or hypervigilant traumatic stress responses, and observed behavior problems?*

- 3.a.i EF (as indicated by AC, WM, and IC) will partially mediate the relationship between IPV exposure, traumatic stress symptoms, and reported internalizing problems at home and at school.
 - 3.a.ii. Dissociative, but not hypervigilant, symptoms will significantly load onto the traumatic stress latent variable in the internalizing behavior problems model.
 - 3.a.iii. AC and WM, but not IC, will significantly load onto the EF latent variable in the internalizing behavior problems model.
- 3.b.i EF (as measured by AC, WM, and IC) will partially mediate the relationship between IPV exposure, traumatic stress symptoms, and reported externalizing problems at home and at school.
 - 3.b.ii. Hypervigilance, but not dissociation, will significantly load onto the traumatic stress latent variable in the externalizing behavior problems model.
 - 3.b.iii. AC, WM, and IC will significantly load onto the EF latent variable in the externalizing behavior problems model.

CHAPTER 8

<u>Methods</u>

The Healthy Moms – Healthy Kids Study was a collaborative research project between the author and a fellow graduate student principal investigator, Lia Field. While the study jointly recruited participants and used data from many of the same measures, the ultimate product is two separate dissertations. All information contained within the current methods section only pertains to the current research, unless noted.

Participant Recruitment

From June 2011 through December 2011, the Healthy Moms - Healthy Kids study recruited 156 child-mother dyads from the Capital Area Community Services Head Start (hereafter referred to as Head Start) preschool locations in the greater Lansing metropolitan area, per a signed agreement with Head Start. The local Head Start preschools serve approximately 1600 children across Ingham, Eaton, Clinton, and Shiawasee County (CACS Head Start and Early Childhood Programs Annual Report, 2008 – 2009). Identification of potential participants involved several closely-coordinated efforts, including in-person recruitment by the two graduate principal investigators at fall orientation meetings, parent information meetings, and meetings with the classroom social services liasons. One of the most effective recruitment methods involved school bus drivers personally distributing recruitment flyers to parents from each the Head Start schools (see Appendix A for a copy of the recruitment flyer). Importantly, at no point during recruitment, either in-person or via the flyer, was IPV mentioned to potential participants. Thus, the participants were not self-selecting on the basis of this criterion. Through each recruitment method, a confidential phone number and study e-mail address were provided for

interested participants to contact the study staff. Alternatively, at in-person recruiting events, interested participants were also provided an option to leave their contact information and have a research assistant call or e-mail with additional information.

The following inclusion and exclusion criteria were used to identify possible participants: the child had to be between the ages of 3:0 and 5:11 years old and attend one of the Head Start locations; the mother had to be a biological parent and have legal custody of her child; the child must have resided with his/her biological mother for a majority of the previous year; the mother spoke English as a first language OR was reasonably fluent in reading and writing English (e.g., 6th grade level); and, the child had not been diagnosed with mental retardation or another significant developmental delay. Out of the 156 mother-child dyads that attended the in-person interview at MSU, 12 of the research visits terminated prematurely due to a child either refusing assent or withdrawing his/her assent during the visit. Another child was suspected of having an unidentified developmental delay based upon stereotypic movements and a lack of appropriate social communication. Therefore, these 13 children and their mothers were excluded from all subsequent analyses, resulting in a final sample size of 143 dyads (see Table 1 below for a breakdown of the sample's demographics).

Table 1

Age of Mother $M = 29.02$ (SD =	4.87)
Age of Child $M = 4.25$ (SD = 0).66)
)
Gender of Child	
Boy 72 (50.3%)	
Girl 71 (49.7%)	
Racial/Ethnic Group of Mother	
Caucasian, White 61 (42.7%)	
Black, African	
American 48 (33.6%)	
Multiracial 16 (11.2%)	
Latina, Hispanic 12 (8.4%)	
Asian American,	
Pacific Islander 4 (2.8%)	
Native American 2 (1.4%)	
Racial/Ethnic Group of Child	
Multiracial 47 (32.9%)	
Black, African	
American 44 (30.8%)	
Caucasian, White 42 (29.4%)	
Latina, Hispanic 6 (4.2%)	
Asian American,	
Pacific Islander 3 (2.1%)	
Native American 1 (0.7%)	
Mother's Marital Status	
Single, never married 94 (65.7%)	
Married 31 (21.7%)	
Divorced 11 (4.9%)	
Separated 7 (4.9%)	
Mother's Occupation Status	
Unemployed 74 (51.7%)	
Full-time employment 32 (22.4%)	
Part-timeemployment 28 (19.6%)	
SSI Disability 9 (6.3%)	
· ()	

Demographic Characteristics of Study Participants (N = 143)

Procedures

The current study received all necessary approvals from Michigan State University's Institutional Review Board and CACS Head Start's Executive Director before recruiting any participants or conducting research interviews.

When interested participants contacted the study, they were read a brief description of the study and asked to verbally consent before completing the initial intake screening interview (see Appendix B for a copy of the telephone screening interview). The women were informed that they had the right to not answer any item, as well as to terminate the intake interview at any point without reprecussion from either MSU or Head Start. The intake interview assessed basic demographic information, as well as inclusion/exclusion criteria. Additionally, the intake interview assessed several items from the Revised Conflict Tactics Scales (Straus, Hamby, Boney-McCoy, & Sugarman, 1996) to ensure adequate representation of women who had experienced IPV in the sample.

Eligible mother-child dyads attended a 2 - 2.5 hour interview at the MSU Psychology builing. All interviews were conducted by a team of graduate and undergraduate research assistants. Graduate students always interviewed the mothers, per Head Start's request, as the interviewers assessed experiences of IPV and were responsible for obtaining consent. The children worked with either graduate or undergraduate research assistants. At the start of the interview, the mothers were read an introduction to the study and signed a written consent form (see Appendices C and D). The mothers were informed that they had the right to not answer any of the questions and that they could stop the interview at any point and would still receive financial compensation. In addition, the mothers were informed that any decisions they made during the interview would not impact their relationship with MSU or Head Start. To ensure the

women fully understood their rights, they were explicitely asked if they had any questions about the interview. All questions were answered by the training graduate research assistants or one of the graduate principal investigators.

As the study also collected data on preschool-age children, the mothers were asked to sign a written consent agreeing to let their children participate in the interview. After a brief (5 - 10) warm-up period to let the children acclimate to the novel environment, the children were asked if they would like to play games and spend time with the research assistant (see Appendix G for the verbal assent form). The children were informed that they did not have to do any task that they did not want to and that they could stop the visit at any time. As previously noted, 12 children either refused to provide initial assent or withdrew their assent during the visit. In each case, the research staff emphasized to the mothers that this was a normative response given the strange, novel environment (in order to reduce any possible anxiety or frustration) and the families were financially compensated per the study's procedures.

After the consenting/assenting procedures, the mothers filled out questionnaires (see "Measures" section below), while the children played with a research assistant to further acclimate to the novel environment. Approximately 20 minutes into the interview, the dyads completed a saliva collection procedure, as part of the data collection for another dissertation study. As part of this other study, the children then completed a mild stress task (walking on a balance beam) and subsequent reunion with their mothers, which lasted approximately 10 minutes. Following the reunion, the children were provided non-structured play time with the research assistant for approximately 5 - 10 minutes. The children then completed the EF tasks, with brief play breaks, as necessary. During this time, the children also took two breaks to complete two additional saliva collections for the other study.

At the completion of each interview, the mothers were financially compensated for their time with a cash payment (\$75 for a completed visit; \$30 for an incomplete visit). A receipt of payment was signed by each of the mothers in accordance with University guidelines. In addition, each child received a gift bag with several small toys, juice, and a snack (approximate value \$5). All participants were provided with a comprehensive community resources referral list. In addition to the financial compensation, participants were provided parking passes, which enabled them to park in the lot closest to the Psychology building free of charge for the duration of the visit. Participants without their own vehicles, or who could not secure a ride with a family member or friend, were reimbursed bus fare for each member of the family attending the visit. Undergraduate research assistants also provided childcare during the visits for any additional children.

Each mother was also asked to sign a release form giving the study permission to contact her child's teacher (see Appendix E). The mothers were informed that they had the right to refuse participation in this part of the study without reprecussion, as well; however, despite this option, all 143 mothers consented for the study staff to contact their child's teacher. The teachers received a copy of the mother's signed release form along with a teacher specific consent form (see Appendix F). In their consent form, the teachers were informed of their right to refuse participation in the study. Additionally, the consent form noted that no information provided by the mothers or children would be shared with Head Start under any condition. Only five teachers chose not to participate in the study (96.5% response rate). The remaining 138 teachers filled out two rating forms: one assessing the child's EF and the other assessing the child's behavior problems at school. Each teacher who returned the completed consent form and rating forms

promptly received \$10 cash per child (e.g., if a teacher had more than one child in the study, he/she earned \$10 for each child).

Measures

Mother & Teacher Reports

Demographics: A demographic questionnaire assessed a wide-variety of socio-economic variables pertaining to the mother-child dyad (e.g., maternal level of education, family monthly income, and assistance received from social service organizations), information about the mother's past and current romantic partners, and basic demographic information about her child. See Appendix H for copies of all measures.

Intimate Partner Violence: The mother's experiences of physical, sexual, and psychological violence (both receiving and perpetrating) since her child was born were assessed with the 78-tem Revised Conflict Tactics Scales (Straus et al., 1996). Each item was scored on a seven-point scale ranging from "Never" to "More than 20 times." All items were used, except the Negotiation subscale items, which are indicative of positive dyadic interactions. Additional items assessed the mother's experience of psychological violence (both receiving, as well as perpetrating) since her child was born with the Psychological Maltreatment of Women Inventory – Short Version (PMWI-S; Tolman, 1995). The original PMWI-S has 14 items; however, the mother also reported tactics she may have used towards her partner(s), resulting in a total of 28 items. Mothers rated the frequency of her experiences on a 5-point scale ranging from "Never" to "Very Frequently." For the purposes of the present study, the CTS2 items were weighted according to their severity (mild, moderate, or severe) according to the authors' suggested guidelines (Straus et al., 1996), which have demonstrated good validity for previous research applications. Two sum scores were calculated across all of the weighted items from the CTS2 and the raw PMWI-S items. The first score represents the total violence perpetrated by the mother against her romantic partner(s) since her child was born, while the second score represents the total violence perpetrated by the mother's partner(s) since her child was born. Straus et al. (1996) reported good internal consistency for the CTS2 sub-scales (range .79 for psychological aggression to .95 for injury). Tolman (1999) reported good internal consistency for the PMWI-S (range of .88 for the domination/isolation subscale and .92 for the verbal/emotional subscale). Internal consistency across all items for each measure in the present sample was excellent for items assessing maternal perpetration (CTS2 α = .90; PMWI-S α = .89) and partner(s) perpetration (CTS2 α = .93; PMWI-S α = .96).

Executive Functioning: The Behavior Rating Inventory of Executive Functioning – Preschool version (BRIEF-P; Gioia et al., 2003) is a 63-item, caregiver and teacher report of young children's executive functioning measured by their observable behavior. Scores from three BRIEF-P subscales were used: (1) inhibition, (2) shifting (a measure of AC), and (3) working memory. All subscale raw scores were converted to t-scores using age-adjusted norms (Gioia et al., 2003). In a community sample, the BRIEF-P indices demonstrated good to excellent internal consistency for parent report (.80 - .95) and for teacher report (.90 - .97) (Gioia et al., 2003). In the present sample, internal consistency across the three subscales ranged from good for shifting (maternal report $\alpha = .83$; teacher report $\alpha = .82$) to excellent for inhibition (maternal report $\alpha = .88$; teacher report $\alpha = .94$) and WM (maternal report $\alpha = .91$; teacher report $\alpha = .92$).

Emotional and Behavioral Functioning: The children's emotional and behavioral functioning was assessed using a parent and teacher report version of the Child Behavior Checklist. The parent report version of the Child Behavior Checklist - Preschool (CBCL1 ½ - 5;

Achenbach & Rescorla, 2000) is a 99-item measure of internalizing and externalizing behavior problems. The teacher report version of the Child Behavior Checklist – Teacher Report Form (TRF; Achenbach & Rescorla, 2000) is a 99-item measure resulting in the same two broadband scores. The four raw broadband scores (two parent and teacher reported scores) were converted into age and gender normed t-scores (Achenbach & Rescorla, 2000). In a preschool-age sample of children exposed to IPV, Zerk et al. (2009) reported excellent internal consistency for both the internalizing and externalizing scales (.90 and .91, respectively). In the present sample, internal consistency across all items ranged from very good to excellent for both maternal report (internalizing $\alpha = .85$; externalizing $\alpha = .90$) and teacher report (internalizing $\alpha = .90$; externalizing $\alpha = .95$).

Traumatic Stress Symptoms: The children's traumatic stress symptoms were assessed with two measures. Six items from Posttraumatic Stress Disorder Semi-Structured Interview and Observational Record (PTSDSSI; Scheeringa et al., 1995) assessed for hypervigilance according to the authors' modified DSM-IV criteria for preschool-age children (items P45 – P50). Each of these items was dichotomized (i.e., presence/absence) and then a sum score was calculated to result in a 6-point continuous scale, with higher values indicating greater hypervigilance. The PTSDSSI has shown adequate interrater reliability (Cohen's $\kappa = .75$) in a previous study of young children (Scheeringa et al., 2003). Interrater reliability was not calculated for the current research interviews due to logistical restraints; however, all of the graduate research assistants were previously trained clinicians who also received extensive training on the current protocol. Additionally, the two graduate principal investigators either conducted or observed nearly three quarters of the research interviews, thus intterater reliability for the PTSDSSI is presumed to be within acceptable limits.

Dissociative symptoms were assessed by maternal report on the Child Dissociative Checklist (CDC; Putnam et al., 1993). The CDC is a 20-item measure of behaviors a child may have exhibited in the past six months. Items were scored on a three-point scale from "Not True" to "Very True." Sample items include, "Child goes into a daze or trance-like state at times or often appears 'spaced-out'," and "Child is unusually forgetful or confused about things that he or she should know, e.g. may forget the names of friends, teachers or other important people, loses possessions or gets easily lost." A sum score of dissociative symptoms was used. The CDC has demonstrated good internal consistency (.82) in a previous sample of preschool-age children exposed to family violence (Macfie et al., 2001a). In the present sample, internal consistency across all items was good ($\alpha = .78$).

Child Lab-Administered Assessments

Attentional Control: The children's AC was assessed with the Dimensional Change Card Sort (DCCS; Frye et al., 1995), according to a recent updated protocol (Zelazo, 2006). The DCCS used two target cards depicting a blue rabbit and a red rowboat. The children sorted an additional 14 cards (2 practice cards, 12 trial cards), evenly dived into eight red rabbits and either blue rowboats (i.e., the opposite color/shape combination from the target cards). Following two learning trials, the DCCS required the children to sort six cards into two trays according to a single rule (i.e., by color) and then sort six additional cards according to the second rule (i.e., by shape). This task required substantial AC and cognitive flexibility. The total number of incorrect trials was used in the present study (range 0 - 12), so a higher score indicated worse AC performance. The DCCS has good reliability and is highly correlated with other measures of executive functioning (Zelazo, 2006). In the present sample, internal consistency across all trials was good ($\alpha = .79$).

Working Memory: Non-verbal and verbal working memory were assessed using Working Memory Index tests from the Early Stanford-Binet, 5th edition (Early SB5) (Roid, 2003). Two sub-tests assessed non-verbal working memory: (1) a delayed response task, where the child watched the examiner hide an object and then waited before indicating where the hidden object was located, and (2) a block span task that measured the children's ability to observe and mimic a motor-spatial sequence. Two sub-tests assessed the preschool-age children's verbal working memory. The first required the children to remember progressively longer sentences they heard the examiner read out loud and then repeat the sentences back to the examiner verbatim. The second sub-test of verbal working memory required the participants to listen to a sentence posed as a question and repeat only the last word of the sentence back to the examiner. A WM Index Score standard score was calculated using age-adjusted norms (Roid, 2003) and then reverse coded, so a higher score equaled worse WM. The Working Memory Index from the Early SB5 has excellent reported validity and internal reliability (> .90) (Strauss et al., 2006). In the current sample, the children completed widely different number of items based upon their performance on the WM tasks (e.g., some children completed as few as 8 items and others completed more than 20 items); therefore, alpha was unable to be calculated.

Inhibitory Control: Two tasks of IC were administered. First, a peg tapping task (Diamond & Taylor, 1996), required the children to observe the examiner tapping a wooden peg once or twice and then respond with the opposite action (e.g., if the examiner taped twice, the child was told to tap once). After the initial learning trials, the children completed 16 Peg-Tapping trials. The second measure of IC was a Stroop-like Day–Night measure developed by Gerstadt et al. (1994). The Day/Night task used two illustrated cards: one black, depicting a nighttime scene (moon and stars), and the other painted brightly, depicting daytime (blue-sky

and clouds). When the children were shown the nighttime card, they were told to verbally respond, "day" and vice versa when shown the opposite card. The Day/Night task measures children's ability to inhibit a pre-potent response in favor of a secondary, less automatic response (Gerstadt et al., 1994). After the initial learning trials, the children completed 16 additional trials. For both the Peg-Tapping task and the Day/Night task, the total number of incorrect trials for each task was used in the analyses, so a higher score indicated worse IC. In the present sample, internal consistency for the Peg Tapping Task ($\alpha = .93$) and Day/Night Task ($\alpha = .92$) was excellent.

CHAPTER 9

<u>Results</u>

A multi-step analytic plan was employed, including imputation for missing data, bivariate analyses, principal components analysis, linear regressions, and structural equation modeling. As the present study uses numerous variables in the analyses, an overall list of variable acronyms and associated descriptions is provided in Table 2 below. Additionally, variables listed within individual tables are defined in the table notes for quick reference.

Table 2

Variable	Description
CBCL	All CBCL items – used to examine pattern of missingness
CBCL Ext.	CBCL Externalizing Problems t-score
CBCL Int.	CBCL Internalizing Problems t-score
CDC	All CDC items – used to examine pattern of missingness
CTS2	All CTS2 items – used to examine pattern of missingness
Day/Night	Sum of Day/Night incorrect trials controlling for child's age
Day/Night sum score	Sum of Day/Night incorrect trials
DCCS	Sum of DCCS incorrect trials controlling for child's age
DCCS sum score	Sum of DCCS incorrect trials
Dissociation	Sum of CDC items
Early SB5	All Early SB5 items – used to examine pattern of missingness
Hypervig.	Sum of PTSDSSI hypervigilance items
IPV Mom	Sum of all mother perpetrated CTS2 and PMWI-S items
IPV Partner	Sum of all partner perpetrated CTS2 and PMWI-S items
LA EF	Component score of lab-assessed EF
MR AC	Maternal reported shifting score on BRIEF-P
MR EF	Component score of maternal reported EF
MR IC	Maternal reported inhibition score on BRIEF-P
MR WM	Maternal reported working memory score on BRIEF-P
Peg-Tapping	Sum of Peg-Tapping incorrect trials controlling for child's age
Peg-Tapping sum score	Sum of Peg-Tapping incorrect trials
PMSI-S	All PMWI-S items – used to examine pattern of missingness
SB5 WM	Lab-assessed Working Memory Index score from Early SB5
TR AC	Teacher reported shifting score on BRIEF-P
TR BRIEF-P	All teacher report items on the BRIEF-P
TR EF	Component score of teacher reported EF
TR IC	Teacher reported inhibition score on BRIEF-P
TR WM	Teacher reported working memory score on BRIEF-P
TRF	All TRF items – used to examine pattern of missingness
TRF Ext.	TRF Externalizing Problems t-score
TRF Int.	TRF Internalizing Problems t-score

Alphabetical List of Variables Used in Present Study's Analyses

Missing Data and Imputation

There were three sources of missing data in the current study: (1) during the lab-based mother-child visits, some mothers failed to complete all of the items and some children declined to complete all tasks, (2) five teachers declined to participate in the study; thus, for these teachers, none of the TRF (Achenbach & Rescorla, 2000) and BRIEF-P (Gioia et al., 2003) data were available, and (3) several teachers failed to complete all of the items in their returned packets. Overall, the amount of missing data in the present study was very small (i.e., < 0.50 % of all data points used in the current analyses). Despite the small percentage of missing data, a careful imputation strategy was implemented in order to increase the power available for all analyses, as case-wise deletion of all participants with any missing data would have likely biased the findings and resulted in an unacceptably high number of discarded dyads.

Missing data was imputed for individual measures separately. This approach enabled a more nuanced examination of the pattern of missingness for individual measures than imputing all of the missing values at once. Across individual measures with any missing data, the percent of data points estimated ranged from 0.035% for the CDC (Putnam et al., 1993) to 3.56% for the TRF (Achenbach & Rescorla, 2000) and BRIEF-P Teacher Report forms (Gioia et al., 2003). For applicable measures, correlations between items with missing values and complete items that loaded onto the same subscale were examined. Complete items that correlated most highly were selected as matching variables. Some cases were missing all items on a measure (i.e., for the five cases with teachers who declined to participate). For these cases, subscale level scores were imputed, rather than all raw items, using other subscale scores that correlated significantly.

All missing values were estimated using maximum likelihood procedures. Imputation for most measures was conducted using STATA SE 11 (StataCorp, 2009). In some instances,

matching variables with a small percentage of missing data were used (e.g., subscales within the same measure) in order to use highly correlated and theoretically related matching variables. For these cases, maximum likelihood estimation in LISREL 8.7 (Jöreskog & Sörbom, 2001) was used, as STATA SE 11 (StataCorp, 2009) does not impute from variables with missing data. Following imputation, all estimated values were examined to determine whether they fell within the range of possible values for that specific item or subscale; all imputed values met this criterion.

To determine whether the pattern of missingness within each measure occurred at random, cases were dichotomously coded as having complete data or missing any data at either the item or subscale level. Each measure with this dichotomous pattern of missingness was correlated with all other measures for which data was imputed, as well as with key demographic variables (age of mother, age of child, child's gender, mother's education, monthly family income, and mother's reported experience of IPV at intake). The pattern of missingness for three measures (CTS2, Straus et al., 1996; PMWI-S, Tolman 1995; Day/Night Task, Gerstadt et al., 1994) was not correlated with the pattern of missingness for any other imputed data, or the demographic variables, thus these data are considered missing at random. See Table 3 below, for correlations between the pattern of missingness for all imputed variables and key demographic variables.

The patterns of missingness for eight measures significantly correlated with the patterns of missingness for other imputed measures and demographic variables, suggesting non-random missingness. Some of these correlations can be meaningfully interpreted. For instance, the patterns of missingness for the TRF (Achenbach & Rescorla, 2000) and BRIEF-P Teacher Report forms (Gioia et al., 2003) are naturally correlated (r = 0.410, p = .000), as teachers who

failed to complete all items on one measure were also likely to fail to complete all items on the other measure. Furthermore, for five children, teacher report data were not available, thus the subscale scores for both measures were imputed for these children, increasing the strength of the correlation. Age of the child was negatively correlated with the pattern of missingness on the Early SB5 (Roid, 2003) (r = -0.228, p = .006). The Early SB5 was the last task of the lab-based assessment, suggesting that younger children became tired or non-compliant by the end of the 2hour protocol. The patterns of missingness for the Peg-Tapping Task (Diamond & Taylor, 1996) and the Early SB5 were correlated (r = 0.401, p = .000). As with the Early SB5, the Peg-Tapping Task was completed near the end of the child assessment, suggesting the children became fatigued. A similar age-associated pattern of missingness for younger children has been reported in other samples of preschool-age children (e.g., Wiebe et al., 2008). The pattern of missingness for the CDC (Putnam et al., 1993) was significantly correlated with maternal education (r = -0.171, p = .040). This may indicate that mothers with lower education had difficulty understanding some of the items on CDC measure. The remaining correlations do not appear conceptually explainable. In summary, although some of these data are missing systematically, the number of significant correlations is small and the patterns of missingness are unlikely to significantly bias the results of any hypothesis testing, given the minimal percentage of the overall data that was estimated (< 0.05%).

Table 3

Variable	1	2	3	4	5	6	7	8	9	10
1. CBCL		020	020	020	.345*	.345*	029	.101	.023	073
2. CTS2			007	007	007	007	010	017	027	025
3. PMWI-S				007	007	007	010	017	027	025
4. CDC					007	007	010	017	027	025
5. DCCS						007	010	017	027	025
6. Peg-Tapping							010	.401*	.255*	025
7. Day/Night								025	039	036
8. Early SB5									.049	063
9. TRF										.410*
10. TR BRIEF-P										
11. Mother's Age										
12. Child's Age										
13. Child's Gender										
14. IPV Reported at Intake										
15. Mother's Education										
16. Family Monthly Income										

Correlation Matrix of Pattern of Missingness for Imputed Measures and Key Demographic Variables

Tał	ble	31	(cont'	(b)
Iut	10	5	Com	u)

Variable	11	12	13	14	15	16
1. CBCL	003	089	.057	.106	.019	103
2. CTS2	.023	.103	.082	070	.032	.024
3. PMWI-S	005	.047	.082	.100	.032	.054
4. CDC	138	104	085	.100	171*	.024
5. DCCS	.049	.052	.082	070	.167*	007
6. Peg-Tapping	.018	130	.082	.100	.032	076
7. Day/Night	019	.003	002	.022	.045	.108
8. Early SB5	.112	228*	003	.038	.080	.073
9. TRF	.087	.030	.136	.060	.050	107
10. TR BRIEF-P	071	.109	.147	.106	.095	065
11. Mother's Age						
12. Child's Age						
13. Child's Gender						
14. IPV Reported at Intake						
15. Mother's Education						
16. Family Monthly Income						

Note. CBCL = Child Behavior Checklist; CTS2 = Revised Conflict Tactics Scales; PMWI-S = Psychological Maltreatment of Women Inventory – Short Form; CDC = Child Dissociative Checklist; DCCS = Dimensional Change Card Sort; Early SB5 = Early Stanford-Binet – 5th Edition; TRF = Child Behavior Checklist, Teacher Report Form; TR BRIEF-P = Behavior Rating Inventory of Executive Functioning, Teacher Report version. *p < .05.

Basic Descriptives

Means, standard deviations, and ranges of values for all variables included in the

preliminary and hypotheses testing analyses are presented below, in Table 4.

Table 4

Means, Standard Deviations, and Ranges of Values for Variables in Preliminary and Hypotheses Testing Analyses

Variable	М	SD	Possible Values	Observed Values
CBCL Ext.	50.04	9.40	28 - 100	28 - 77
CBCL Int.	50.04	9.66	29 - 100	29 - 75
Day/Night	0.00	4.70	-16 - 16	-9.32 - 10.20
Day/Night sum score	8.75	5.19	0 - 16	0 – 16
DCCS	0.00	2.17	-12 - 12	-5.62 - 4.24
DCCS sum score	4.81	2.32	0 - 12	0 - 9
Dissociation	3.40	3.70	0 - 40	0-16
Hypervig.	0.60	1.01	0 - 6	0 - 5
IPV Mom	16.17	14.94	0 - 234	0 - 63
IPV Partner	24.04	25.16	0 - 234	0 - 103
LA EF	0.00	1.00	-5 - 5	-3.19 - 2.92
MR AC	46.72	8.40	37 - 98	37 - 74
MR EF	0.00	1.00	-5 - 5	-1.58 - 2.78
MR IC	51.57	10.29	34 - 104	34 - 78
MR WM	53.26	12.49	36 - 110	36 - 98
Peg-Tapping	0.00	4.79	-16 - 16	-10.48 - 10.28
Peg-Tapping sum score	9.80	5.36	0-16	0 - 16
SB5 WM	95.48	13.38	-15248	-12354
TR AC	44.76	6.35	40 - 100	40 - 79
TR EF	0.00	1.00	-5 - 5	-1.32 - 4.05
TR IC	50.59	10.79	39 - 113	39 - 90
TR WM	50.40	9.22	40 - 103	40 - 84
TRF Ext.	50.94	9.08	36 - 100	36 - 82
TRF Int.	47.90	9.69	34 - 100	34 - 91

Relationship between Dissociative Symptoms and Hypervigilance

One of the aims of the present study was to explore the basic associative nature between symptoms of dissociation and hypervigilance, in order to evaluate Perry et al.'s (1995) traumatic stress theory that argues these two traumatic stress reactions occur on a continuum. As the

present study did not offer specific hypotheses for this aim, the results are presented here, as basic descriptives, before the preliminary analyses and hypotheses testing results. In the present sample, dissociative and hypervigilant symptoms were moderately-highly correlated (r = .517), consistent with Mertin and Mohr's (2002) findings; however, a more nuanced understanding of the relationship between the two symptoms is possible. Dissociative and hypervigilant symptoms were categorized according to published clinical norms. According to Scheeringa et al.'s (1995) alternative, developmentally sensitive PTSD criteria for preschool-age children, one or more symptoms of hypervigilance identify children who develop clinically significant PTSD and thus represent an acceptable clinical cut-off. For dissociative symptoms, Putnam et al. (1993) suggested a clinical cutoff of 12 or more symptoms. The cross-tabulations for clinically significant dissociation and hypervigilance are presented below, in Table 5.

Table 5

			Hypervigilance	
		No Symptoms	Clinically Sig. Symptoms	Row Count (%)
Dissociation	No Symptoms	21 (14.7%)	7 (4.9%)	28 (19.6%)
	Sub-clinical Symptoms	69 (48.3%)	39 (27.3%)	108 (75.5%)
	Clinically Sig. Symptoms	0 (0%)	7 (4.9%)	7 (4.9%)
	Column Count (%)	90 (62.9%)	53 (37.1%)	143 (100%)

Co-morbidity between Dissociation and Hypervigilance

As shown in the table, 62.9% (n = 90) of the sample had no reported lifetime symptoms of hypervigilance, whereas 37.1% (n = 53) of the children in the present sample met Scheeringa et al.'s suggested clinical cut-off for hypervigilance. For the 53 children with clinicallysignificant hypervigilance, 23.8% (n = 34) of the children had one reported symptom; 7.7% (n = 11) had two reported symptoms, and 5.6% (n = 7) had 3 or more reported symptoms of hypervigilance. For the 53 children with clinically significant hypervigilance, 13.2% of this subsample (n = 7) had no reported dissociative symptoms and only 13.2% (n = 7) had clinically significant co-morbid dissociative symptoms. The remaining 73.6% (n = 39) of the children with clinically significant hypervigilance exhibited varying levels of sub-clinical dissociative symptoms.

Given the moderately high, positive correlation between dissociative and hypervigilant symptoms in the present sample, the possibility of collinearity was examined in order to determine whether the two traumatic stress reactions are best represented by a single indicator or separate metrics. In the study's regression models, the variance inflation factor, which formally assesses the degree of collinearity was small in each model (i.e., < 1.5 for dissociative and hypervigilant symptoms), suggesting that although the two constructs are correlated, they each contribute unique variance to predicted outcomes and are not linear dependent. Therefore, dissociation and hypervigilance were entered into all future analyses as separate predictors/indicators.

Preliminary Analyses

Controlling for Effects of Child's Age on Lab-Assessed EF Performance

EF performance is strongly, positively correlated with chronological age (e.g., Carlson, 2005; Diamond, 2002/2006). Thus, before any further analyses were conducted, the children's EF scores were age adjusted. The raw maternal and teacher report EF scores from the BRIEF-P (Gioia et al., 2003) were converted to age-normed t-scores. Likewise, age-normed standard scores were calculated for the WM Index from the Early SB5 manual (Roid, 2003). No age-adjusted norms are available for the other three lab-based EF tasks (i.e., DCCS, Peg-Tapping,

and Day/Night). Therefore, three linear regression equations (see Figure 2) were estimated regressing the children's EF scores onto their age (in years). The residuals were saved, which represent the remaining variance of the children's EF performance not associated with age. See Table 6 for the regression results. The three residual scores were used in all subsequent analyses. Figure 2

Regression Equations for Controlling for Effects of Child's Age on Lab-Assessed EF

DCCS sum score = $\beta_0 + \beta_1 Age + \varepsilon$

Day/Night sum score = $\beta_0 + \beta_1 Age + \varepsilon$

Peg-Tapping sum score = $\beta_0 + \beta_1 Age + \varepsilon$

Table 6

Predicting Lab-Assessed EF Scores by Child's Chronological Age

	DCCS sum score ^a		Peg-Tapping	g sum score ^b	Day/Night sum score ^c		
Predictor	В	SE B	В	SE B	В	SE B	
Age in Years	-1.255*	.278	-3.670*	.614	-3.343*	.603	

Note. ${}^{*}p \le .05$; ${}^{a}R^{2} = .13$; ${}^{b}R^{2} = .20$; ${}^{c}R^{2} = .18$.

Examining the Underlying Structure of EF

A principal components analysis (PCA) was conducted to determine the number of underlying components derivable from the six maternal and teacher reported BRIEF-P scores (Gioia et al., 2003) and the four lab-based measures of EF. Based upon previous factor analytic findings (e.g., Miyake et al., 2000), an a-priori assumption was that the PCA model would reveal a three-component solution, with a single component representing each of the three sub-domains of EF reviewed in the literature (i.e., AC, WM, and IC). These predicted components would thus represent the children's EF performance on that EF sub-component across multiple environments (i.e., home, school, and in the lab).

The ten EF scores were entered into a PCA model (see Table 7 below, for correlations) and three components with eigenvalues > 1 emerged (Barlett's Test of Sphericity = 386.575, p =.000). The resulting components were rotated using the direct oblimin method, as the components should theoretically correlate. Contrary to expectations, however, the three components did not represent the three sub-domains of EF (AC, WM, and IC), but clearly represented the children's EF within each of the child's environments (i.e., school, home, and lab) (see Tables 8 and 9 below, for the pattern and structure matrices). The first component explained the shared variance across the three teacher reported EF scores (26.03% of the total variance across the 10 EF scores). The second component explained the shared variance across the three maternal reported EF scores (19.50% of the total variance). The third component explained the shared variance across the four lab-based EF assessments (13.83% of the total variance). Together, the three components explained 59.36% of the total EF variance (see Table 10 below, for correlations between the three rotated component scores). For the lab-assessed EF component, one variable had a relatively low component loading (DCCS = .485). Thus, an alternative PCA model was estimated excluding this measure; however, an identical component solution emerged. Therefore, the results from the first PCA model (with the DCCS score entered) were retained in order to capture the partial variance of EF performance associated with the labassessed AC task. For each of the three components, a separate component score was estimated and used for hypothesis testing. Note: higher values on the teacher reported EF and lab-assessed EF components equaled greater executive dysfunction; however, higher scores on the second component score, representing maternal reported EF, were associated with better EF

performance. Thus, this component score was reverse-coded before any hypothesis testing, so higher values across all three components equaled greater executive dysfunction.

Table 7

Variable	1	2	3	4	5	6	7	8	9	10
1. MR IC		.446*	.774*	.265*	.105	.184*	137	081	.035	.012
2. MR AC			.526*	.081	.175*	.104	.042	011	020	063
3. MR WM				.146*	.091	.188*	079	012	002	.022
4. TR IC					.322*	.720*	006	.256*	.033	.063
5. TR AC						.383*	022	.257*	.050	.006
6. TR WM							042	.309*	.027	.065
7. DCCS								.216*	.105	.093
8. Day/Night									.295*	.308*
9. Peg-Tapping										.264*
10. SB5 WM										

Correlation Matrix of 10 EF Variables Entered Into the PCA Model

Note. All EF scores were coded, so that a higher score equals worse performance; MR = Maternal Reported; TR = Teacher Reported; IC = BRIEF-P Inhibition T-Score; AC = BRIEF-P Attention Shifting T-Score; WM = BRIEF-P Working Memory T-Score; DCCS = Dimensional Change Card Sort Age-adjusted Residual Score; Peg-Tapping = Peg-Tapping Task Age-adjusted Residual Score; SB5 WM = Early Stanford-Binet V Reverse Scored Working Memory Index Score. *p < .05.

Table 8

Pattern Matrix for PCA Model

		Component	
Variable	1	2	3
1. MR IC	.065	876	027
2. MR AC	017	742	.025
3. MR WM	.004	913	.029
4. TR IC	.852	038	043
5. TR AC	.636	020	002
6. TR WM	.887	021	039
7. DCCS	091	.058	.485
8. Day/Night	.421	.117	.625
9. Peg-Tapping	043	087	.705
10. SB5 WM	003	053	.690

Note. Primary component loadings are bolded; MR = Maternal Reported; TR = Teacher Reported; IC = BRIEF-P Inhibition T-Score; AC = BRIEF-P Attention Shifting T-Score; WM = BRIEF-P Working Memory T-Score; DCCS = Dimensional Change Card Sort Age-adjusted Residual Score; Peg-Tapping = Peg-Tapping Task Age-adjusted Residual Score; SB5 WM = Early Stanford-Binet V Reverse Scored Working Memory Index Score.
Table 9

Structure	Matrix for	PCA Model
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		Component	
Variable	1	2	3
1. MR IC	.211	889	084
2. MR AC	.111	738	030
3. MR WM	.163	912	036
4. TR IC	.855	186	.033
5. TR AC	.639	128	.056
6. TR WM	.887	175	.042
7. DCCS	056	.108	.481
8. Day/Night	.459	.090	.672
9. Peg-Tapping	.037	030	.694
10. SB5 WM	.069	003	.685

Note. Primary component loadings are bolded; MR = Maternal Reported; TR = Teacher Reported; IC = BRIEF-P Inhibition T-Score; AC = BRIEF-P Attention Shifting T-Score; WM = BRIEF-P Working Memory T-Score; DCCS = Dimensional Change Card Sort Age-adjusted Residual Score; Peg-Tapping = Peg-Tapping Task Age-adjusted Residual Score; SB5 WM = Early Stanford-Binet V Reverse Scored Working Memory Index Score.

Table 10

Components	1	2	3
1. TR EF		.170*	.092
2. MR EF			071
3. LA EF			

Correlations between Three Rotated EF Components

Note. All scores coded, so that a higher score equals worse EF; TR EF = Teacher Reported EF Component Score; MR EF = Maternal Reported EF Component Score; LA EF = Lab Assessed EF Component Score. *p < .05.

Confirmatory Factor Analyses: Evaluating Two Alternative EF Latent Models

Following the unexpected PCA results, which clearly indicated that a single underlying EF component best explained the shared variance across the children's EF scores within specific contexts, two confirmatory factory analysis (CFA) models were estimated in LISREL 8.7 (Jöreskog & Sörbom, 2001). These two CFA models were estimated to empirically compare two alternative theoretical models of EF structure in the present sample. The first CFA model tested the original, hypothesized model that AC, WM, and IC latent factors would best describe the shared variance across the EF tasks, whereas the second CFA model evaluated the PCA results indicating that the children's EF was contextually dependent. Whereas PCA makes no *a priori* assumptions about the underlying latent structure of the data and thus is exploratory in nature, CFA assesses whether observed data are consistent with a theorized latent structure. By using CFA to test two alternative models following the PCA results, the current study is able to draw stronger conclusions regarding the structure of preschool-age children's EF.

Both CFA models were specified using maximum likelihood estimation from covariance matrices and all manifest and latent variables were placed on the x-side (see Table 11, below, for a list of the modifications that were necessary for model convergence and optimal fit). For both models, all three latent factors were allowed to correlate based on theoretical rationale. Five fit indices were chosen *a-priori* to evaluate the adequacy of the models specified, according to Hu and Bentler's (1999) cut-off recommendations: the Chi-square test (Chi-square, p > .05), the Root Mean Square Error of Approximation (RMSEA $\leq .06$), Comparative Fit Index (CFI $\geq .95$), the Goodness-of-Fit Index (GFI $\geq .95$), and the Standardized Root Mean-squared Residual (SRMR $\leq .08$). Following model specification, the estimated parameters for each model were examined as a final plausibility check (e.g., ensuring variances and residuals were > 0). Table 11

	EF Latent Factors	Matrix	Estimation Method	Modifications Required
Model #1	AC, WM, IC	Covariance	ML	Residuals for TR AC and TR IC were not estimated (residuals < 0)
Model #2	MR, TR, LA	Covariance	ML	None

CFA Model Modifications Required

Note. MR = Maternal Report; TR = Teacher Report; LA = Lab-assessed; ML = Maximum Likelihood.

Model 1, which evaluated whether preschool-age children's EF is best described by three sub-domains of EF (AC, WM, and IC), demonstrated poor fit across all five indices recommended by Hu and Bentler (1999) (see Figure 3, below, for standardized coefficients and fit information). In contrast, model 2, which evaluated whether EF is contextually based and best described by a single, global EF construct in each environment as suggested by the PCA results, demonstrated excellent fit according to all five indices (see Figure 4). T-scores for parameter estimates for both models are displayed in Figures 11 and 12 in Appendix I, as well as a complete list of fit indices for both models (Tables 17 and 18). Taken together, these results strongly suggest that preschool-age children's EF is a unitary construct that is contextually dependent and thus must be examined within individual environments.





Note. Standardized coefficients reported; Chi-Square = 216.26 (df = 34), p = 0.000; RMSEA = 0.194 (90% C.I. = 0.17 - 0.22); CFI = 0.38; GFI = 0.77; SRMR = 0.16. *p < .05.



CFA Model #2: MR, TR, and LA Latent Factors

Note. Standardized coefficients reported; Chi-Square = 36.84 (df = 32), p = 0.255; RMSEA = 0.033 (90% C.I. = 0.00 - 0.07); CFI = 0.98; GFI = 0.95; SRMR = 0.05. *p < .05.

Hypotheses Testing

The results of the PCA – confirmed by the two comparative CFA models – indicated that a single EF construct represented the children's global EF within individual contexts (i.e., at home, school, and in the lab). As a result, several of the hypotheses (i.e., 2.a. – 3.b.iii.) proposed by the current study either no longer applied or required modification. In addition, the non-significant/small correlations between maternal and teacher reported behavior problems (see Table 12, below) suggested that the preschool-age children's behaviors were also context dependent. In light of this new empirical information, a modified analytic strategy was necessary.

First, two original hypotheses (i.e., 1.a.i. – 1.b.i.) concerning the relationship between traumatic stress symptoms and behavior problems remained relevant and were tested, as planned. The hypotheses (i.e., 2.a.i. – 2.c.i.) regarding the relationship between traumatic stress symptoms and the three sub-domains of EF (AC, WM, and IC) no longer applied. Instead, a series of exploratory analyses examined the relationships between traumatic stress symptoms and the children's EF in the three environments (i.e., at school, home, and in the lab). No specific predictions were made regarding the nature of these relationships, based on the lack of previous empirical evidence to guide hypothesis generation. Lastly, the original hypotheses (i.e., 3.a.i. – 3.b.iii.) positing that the three sub-domains of EF would partially mediate the relationship between IPV exposure, traumatic stress symptoms, and behavior problems required modification. Structural equation modeling was used to examine whether EF mediated the relationship between IPV exposure, traumatic stress symptoms, and behavior problems within and across environmental contexts (e.g., maternal reported EF and behavior problems; maternal reported EF and teacher reported behavior problems). It was hypothesized that EF would mediate

the relationship between IPV exposure, traumatic stress symptoms, and behavior problems within single environmental contexts (e.g., teacher reported EF and behavior problems); whereas, models that tested these relationships across multiple contexts (e.g., teacher reported EF and maternal reported behavior problems) were not expected to demonstrate evidence for mediation given the highly contextual nature of the children's EF and behavior problems. No specific hypotheses were offered regarding the possible mediational effects of the lab-assessed EF and behavior problems at home or school.

Table 12

Variable	1	2	3	4	5	6	7	8	9	10	11
1. IPV Mom		.759*	.114	.339*	.003	.312*	.076	.233*	.268*	053	.047
2. IPV Partner			.251*	.293*	015	.320*	.056	.276*	.266*	051	001
3. Hypervig.				.517*	.039	.350*	009	.331*	.320*	.087	.138
4. Dissociation					.145	.701*	085	.556*	.594*	.173*	.199*
5. TR EF						.170*	.092	.028	.104	.626*	.750*
6. MR EF							071	.700*	.707*	.174*	.204*
7. LA EF								125	171*	.056	.069
8. CBCL Int.									.693*	.048	021
9. CBCL Ext.										.162	.185*
10. TRF Int.											.558*
11. TRF Ext.											

Correlation Matrix of 11 Variables Used in Hypothesis Testing Analyses

Note. All scores coded, so that a higher score equals worse outcomes/performance; IPV Mom = Sum of Mom Perpetrated IPV; IPV Partner = Sum of Partner(s) Perpetrated IPV; Hypervig. = Sum of Hypervigilant Symptoms; Dissociation = Sum of Dissociative Symptoms; TR EF = Teacher Reported EF Component Score; MR EF = Maternal Reported EF Component Score; LA EF = Lab Assessed EF Component Score; CBCL Int. = Maternal Reported Internalizing Problems; CBCL Ext. = Maternal Reported Externalizing Problems; TRF Int. = Teacher Reported Internalizing Problems; TRF Ext. = Teacher Reported Externalizing Problems. *p < .05.

Hypothesis 1.a.i: Dissociative symptoms will predict greater levels of internalizing behavior problems, whereas hypervigilant symptoms will not.

Two hierarchical regression models were estimated predicting maternal and teacher reported internalizing behavior problems separately. The variables were entered into the models in the following order: hypervigilance (block 1) and then hypervigilance and dissociative symptoms (block 2). This order was based on previous studies, which almost invariably have assessed PTSD-related symptoms (e.g., hypervigilance), rather than dissociation. The ordering of the blocks in the current hierarchical regression models allowed for an explicit test of whether dissociation uniquely predicted internalizing behavior problems above and beyond the effects of hypervigilance.

As shown in Table 13, below, the results from block 1 indicated that hypervigilance significantly predicted maternal reported internalizing problems [F(1, 141) = 19.19, p < .01] accounting for 12% of the variance. In contrast, hypervigilance did not predict teacher reported internalizing problems [F(1, 141) = 1.67, p = .20]. Consistent with the hypothesis, when dissociation was added to the model, hypervigilance no longer predicted maternal reported internalizing problems, but dissociation emerged as the sole significant predictor [F(2, 140) = 30.38, p < .01] accounting for an additional 18.3% of the variance above and beyond hypervigilance. However, neither hypervigilance nor dissociation emerged as significant predictors for teacher reported internalizing problems [F(2, 140) = 1.50, p = .23]. Thus, hypothesis 1.a.i. was partially supported (i.e., for maternal reported internalizing problems only).

Table 13

	CBCL – I	nternalizing	Problems ^a	TRF – Int	ernalizing	Problems ^b
Predictor	ΔR^2	В	SE B	ΔR^2	В	SE B
Block 1	.120*			.012		
Hypervigilance		.137*	.031		.043	.034
Block 2	.183*			.009		
Hypervigilance		.049	.031		.023	.038
Dissociation		.113*	.019		.026	.022

Predicting Internalizing Behavior Problems by Traumatic Stress Symptoms

Note. All scores were LOG10 transformed to correct for non-normal distributions. ${}^{a}R^{2}_{Total} = .30; {}^{b}R^{2}_{Total} = .02.$ * $p \le .05.$

Hypothesis 1.b.i: Hypervigilant symptoms will predict greater levels of externalizing behavior problems, whereas dissociative symptoms will not.

Two hierarchical regression models were estimated predicting maternal and teacher reported externalizing behavior problems separately. The variables were entered into the models in the same order as the previous analyses (i.e., hypervigilance, then hypervigilance and dissociative symptoms). As shown in Table 14, below, the results from block 1 indicated that hypervigilance significantly predicted maternal reported externalizing problems [F(1, 141) = 17.86, p < .01] accounting for 11% of the variance. Similarly, hypervigilance predicted teacher reported externalizing problems [F(1, 141) = 4.43, p < .05] accounting for 3% of the variance. Contrary with the hypothesis, however, when dissociation was added to the model, hypervigilance no longer predicted maternal reported externalizing problems, but dissociation emerged as the sole significant predictor [F(2, 140) = 30.10, p < .01] accounting for an additional 18.8% of the variance above and beyond hypervigilance. In the final model, neither

hypervigilance nor dissociation emerged as significant predictors for teacher reported internalizing problems [F(2, 140) = 2.42, p = .09]. Together, these results suggested that hypervigilance was a significant predictor of maternal and teacher reported externalizing problems, as predicted; however, when dissociative symptoms were also considered, dissociation emerged as the sole predictor of maternal reported externalizing problems. When considered simultaneously, neither hypervigilance nor dissociation significantly predicted teacher reported behavior problems.

Table 14

	CBCL – E	Externalizing	Problems ^a	TRF – Ex	ternalizing	Problems ^b
Predictor	ΔR^2	В	SE B	ΔR^2	В	SE B
Block 1	.112*			.030*		
Hypervigilance		.131*	.031		.064*	.031
Block 2	.188*			.003		
Hypervigilance		.043	.031		.054	.034
Dissociation		.113*	.018		.013	.020

Predicting Externalizing Behavior Problems by Traumatic Stress Symptoms

Note. All scores were LOG10 transformed to correct for non-normal distributions. ${}^{a}R^{2}_{Total} = .30; {}^{b}R^{2}_{Total} = .033.$ * $p \le .05.$

Exploratory Analyses Predicting EF from Hypervigilance and Dissociative Symptoms

Three hierarchical regression models were estimated predicting maternal reported EF, teacher reported EF, and lab-assessed EF separately. The traumatic stress variables were entered into the models in the same order as the previous analyses (i.e., hypervigilance, then hypervigilance and dissociative symptoms). As shown in Table 15, below, the results from block 1 indicated that hypervigilance significantly predicted worse maternal reported EF [F(1, 141) = 22.42, p < .01] accounting for 13.7% of the variance. In contrast, hypervigilance did not predict either teacher reported EF [F(1, 141) = 0.90, p = .35] or lab-assessed EF [F(1, 141) = 0.00, p = .96]. When dissociation was added to the model, hypervigilance no longer predicted maternal reported EF, but dissociation emerged as a significant predictor [F(2, 140) = 55.48, p < .01] accounting for an additional 30.5% of the variance above and beyond hypervigilance. In the final model, neither hypervigilance nor dissociation emerged as significant predictors for teacher reported EF [F(2, 140) = 1.36, p = .26] or lab-assessed EF [F(2, 140) = 0.18, p = .84].

Table 15

Predicting Executive Functioning by Traumatic Stress Symptoms

	Mate	rnal Reporte	d EF ^a	Teach	ner Reporte	ed EF ^b	Lat	Assessed	EF ^c
Predictor	ΔR^2	В	SE B	ΔR^2	В	SE B	ΔR^2	В	SE B
Block 1	.137*			.006			.000		
Hypervigilance		.075*	.016		.016	.016		001	.018
Block 2	.305*			.013			.003		
Hypervigilance		.017	.014		.004	.018		.005	.020
Dissociation		.075*	.009		.015	.011		007	.012

Note. All scores were LOG10 transformed to correct for non-normal distributions. ${}^{a}R^{2}_{Total} = .44; {}^{b}R^{2}_{Total} = .02; {}^{c}R^{2}_{Total} = .00.$ ${}^{*}p \le .05.$

Modified Hypotheses 3.a. – 3 b.: EF will mediate the relationship between IPV exposure, traumatic stress symptoms, and behavior problems within single environmental contexts (e.g., at home), but not across environments (e.g., teacher reported EF and maternal reported behavior problems).

In order to test the modified hypotheses 3.a. – 3.b., a series of six structural equation models (SEM) were estimated in LISREL 8.7 (Jöreskog & Sörbom, 2001). In SEM, one approach to determine the minimum number of participants required for a specified model is to multiply the number of manifest variables and latent constructs by 10 (von Eye, personal communication, 2011). The six SEM models each specified a total of 11 indicators and latent constructs and thus required a minimum sample size of 110 participants. The current study has 143 mother-child dyads and therefore has sufficient power to reveal any true effects in the models.

In SEM, the strength of the relationship between the latent constructs, as well as from the indicators to the constructs can be evaluated using standardized scores. All six models were initially specified using maximum likelihood estimation from covariance matrices, with all relevant parameters freed for estimation. In certain cases, modifications were necessary in order for the models to converge and then demonstrate optimal fit (see Table 16, below, for a complete list of all modifications required for the six models). Five fit indices were chosen *a-priori* to evaluate the adequacy of the models specified, according to Hu and Bentler's (1999) cut-off recommendations: the Chi-square test (Chi-square, p > .05), the Root Mean Square Error of Approximation (RMSEA $\leq .06$), Comparative Fit Index (CFI $\geq .95$), the Goodness-of-Fit Index (GFI $\geq .95$), and the Standardized Root Mean-squared Residual (SRMR $\leq .08$). Following model

specification, the estimated parameters for each model were examined as a final plausibility check (e.g., ensuring variances and residuals were > 0).

Table 16

	EF Source	Behavior Problem Reporter	Matrix	Estimation Method	Modifications Required
Model #1:	Maternal Report	Mother	Covariance	ML	1. None
Model #2:	Teacher Report	Teacher	Covariance	ML	1. Residuals for Hyp. and Dissoc. set equal (residual for Dissoc. < 0)
					2. Did not estimate variance for Beh. Probs. factor (variance was < 0)
Model #3:	Maternal Report	Teacher	Covariance	ML	1. Residuals for Hyp. and Dissoc. set equal (residual for Dissoc. < 0)
Model #4:	Teacher Report	Mother	Covariance	ML	1. Did not estimate variance for TR EF factor (variance was < 0)
Model #5:	Lab Assessed	Mother	Correlation	ULS	 Did not estimate variance for Beh. Probs. factor (variance was < 0)
Model #6:	Lab Assessed	Teacher	Correlation	ML	1. Residuals for Hyp. and Dissoc. set equal (residual for Dissoc. < 0)
					2. Did not estimate variance for LA EF factor (variance was < 0)

SEM Specifications and Modifications

Note. ML = Maximum Likelihood; ULS = Unwieghted Least Squares; Hyp. = Hypervigilance; Dissoc. = Dissociation; TR EF = Teacher Reported EF; LA EF = Lab Assessed EF; Beh. Probs. = Behavior Problems.

Models #1 and #2 (see Figures 5 and 6, below, for path diagrams of standardized parameter estimates) tested whether EF mediated the relationship between IPV exposure, traumatic stress symptoms, and behavior problems within a single environmental context (i.e., maternal and teacher reports, respectively). Both models demonstrated excellent fit, meeting or exceeding the cut-offs suggested by Hu and Bentler (1999) for at least four out of the five fit indices chosen *a priori*. Consistent with the modified hypotheses, an examination of the standardized estimates indicated that in both contexts, the children's EF fully mediated the relationship between IPV exposure, traumatic stress symptoms, and behavior problems. Specifically, IPV exposure predicted greater traumatic stress symptoms, which predicted worse EF, which then predicted greater behavior problems. Within both contexts (i.e., at home and at school), dissociation loaded most strongly onto the traumatic stress latent factor. The model explained 83% of maternal reported behavior problems. The percent of teacher reported behavior problems explained by the mediational model could not be estimated, as the variance for behavior problems in Model #2 had to be fixed in order for the model to converge. Additional information for both models is presented in Appendix J, including t-scores for estimated parameters (see Figures 13 - 14) and a complete list of fit indices (Tables 19 - 20).

Importantly, two initial models without EF were specified in an attempted replication of Milot et al.'s (2010) findings, which stated that traumatic stress symptoms alone mediated the relationship between IPV exposure and behavior problems. Milot and colleagues only assessed teacher reported traumatic stress symptoms and behavior problems, whereas the present study assessed traumatic stress symptoms by a maternal semi-structured interview. The first replication model examined teacher reported behavior problems, consistent with Milot et al.'s model; however, the model's chi-square was significant, indicating the model did not provide an

acceptable fit to the observed data (see Figures 15 - 18 and Tables 21 - 22 in Appendix J, for parameter estimates and fit indices information for the two replication models). Likewise, the replication model with maternal reported behavior problems also had a significant chi-square, indicating that the model did not provide an acceptable fit to the observed data. These two replication failures, in contrast with the excellent fitting full mediation models proposed by the present study, offer strong evidence in support of the present study's assertion that EF is an important inter-mediating variable.





*p < .05; [†]significance test is not conducted.





for Behavior Problems = 1.00 (variance for Behavior Problems was not estimated).

*p < .05; [†]significance test is not conducted.

Models #3 and #4 tested whether the children's reported EF in one context (e.g., at home or school) mediated the relationship between IPV exposure, traumatic stress symptoms, and behavior problems reported in a separate context. Both of these models (see Figures 7 and 8, below) demonstrated excellent fit to the data, satisfying all five of the fit indices' cut-offs suggested by Hu and Bentler (1999); however, the two models suggest contradictory conclusions. Model #2 indicated that maternal reported EF fully mediated the relationship between IPV exposure, traumatic stress symptoms, and teacher reported behavior problems, suggesting that EF observed at home predicts behavior problems at school. This model explained 12% of teacher reported behavior problems. In contrast, mediation was not supported for teacher reported EF and maternal reported behavior problems, consistent with the modified hypothesis that predicted EF in one context would not mediate behavior problems in another. Additional information for both models is presented in Appendix J, including t-scores for estimated parameters (see Figures 19 – 20) and a complete list of fit indices (Tables 23 – 24).





*p < .05; [†]significance test is not conducted.





Note. Chi-Square = 14.73 (df = 10), p = 0.142; RMSEA = 0.058 (90% C.I. = 0.00 - 0.12); CF1 = 0.99; GF1 = 0.97; SRMR = 0.026; R for Behavior Problems = 0.51.

*p < .05; [†]significance test is not conducted.

Models #5 and #6 (see Figures 9 and 10, below) tested whether lab-assessed EF mediated the relationship between IPV exposure, traumatic stress symptoms, and behavior problems at home and at school. Both models required more substantial changes in model specification and estimation in order to converge and demonstrate acceptable fit values. For instance, both models required estimation from correlation matrices, rather than covariance matrices. Traditional SEM estimation methods use covariance matrices, rather than standardized variables, in order to provide more stable estimates (Kline, 2011). Models #5 and #6, however, only converged when correlation matrices were used, suggesting the models might not be scale invariant (Kline, 2011). Additionally, model #5 required estimation using unweighted least squares, rather than maximum likelihood in order to converge. Therefore, there is evidence to suggest that the parameter estimates for the proposed mediational models using lab-assessed EF may not be as reliable compared to the previous four models and should be replicated in another sample before strong conclusions can be drawn. Both models either met or exceeded Hu and Bentler's (1999) suggested cut-offs for at least four out of the five fit indices, indicating that the models provided an acceptable fit to the observed data. Neither model, however, supported the mediation pathways proposed in the study. Model #5 (Figure 9) indicated IPV had a direct effect on the three y-side variables, such that IPV exposure predicted greater traumatic stress symptoms, worse lab-assessed EF, and maternal reported behavior problems. Interestingly, model #5 also suggested that increased traumatic stress symptoms predicted better lab-assessed EF performance in contrast to the findings of each of the previous models, which indicated that traumatic stress symptoms were associated with worse EF. Possible reasons for this unexpected finding are explored in the discussion. Additional information for both models is presented in

Appendix J, including t-scores for estimated parameters (see Figures 21 - 22) and a complete list of fit indices (Tables 25 - 26).

Lastly, alternative models were examined, addressing whether EF and behavior problems simply measure different aspects of the same underlying construct. This alternative hypothesis suggests that EF and behavior problems covary, but EF does not independently predict behavior problems. Alternative models were therefore estimated to test whether behavior problems mediated the relationship between IPV exposure, traumatic stress symptoms, and EF. If there was support for the alternative hypothesis (i.e., that EF and behavior problems covary, but do not have a directional relationship), these models should have demonstrated equally good fit as those presented in this manuscript; however, the alternative models either failed to converge or demonstrated poor fit.





for Behavior Problems = 1.00 (variance for Behavior Problems was not estimated).

*p < .05; [†]significance test is not conducted.

SEM #6: Lab Assessed EF and Teacher Reported Behavior Problems



*p < .05; [†]significance test is not conducted.

CHAPTER 10

Discussion

The present study recruited a sample of at-risk mothers and their preschool-age children through a local Head Start organization to empirically address three primary research questions: (1) whether dissociative and/or hypervigilant responses to IPV exposure are differentially related to behavior outcomes, (2) whether dissociative and/or hypervigilant responses are differentially related to levels of AC, WM, and IC, and (3) if AC, WM, and/or IC functioning mediates the relationship between IPV exposure, dissociative and/or hypervigilant traumatic stress responses, and observed behavior problems. Contrary to expectations, however, exploratory and confirmatory analyses offered strong evidence that the three EF sub-components loaded onto a single, global EF factor within each environment assessed (i.e., at home, school, and in the lab). Additionally, maternal and teacher reported behavior problems were minimally correlated, suggesting that the children's behavior problems were also context dependent. Therefore, the last two research questions were modified as follows: (2) are dissociative and/or hypervigilant responses differentially related to the children's EF in the three environments, and (3) does EF mediate the relationship between IPV exposure, traumatic stress responses, and behavior problems at home and at school? The evidence for each of these research questions is examined next, along with other relevant topics.

Relationship between Dissociation and Hypervigilance

In the present sample, dissociative and hypervigilant symptoms were moderately-highly correlated, consistent with one of the few previously published findings (i.e., Mertin & Mohr, 2002). The current research represents the first substantive investigation into the co-morbidity between dissociative and hypervigilant symptoms in preschool-age children exposed to chronic,

interpersonal violence. Based on published clinical norms (i.e., Putnam et al., 1993; Scheeringa et al., 1995) more than one third (37.1%) of the sample had clinically significant hypervigilance, whereas less than five percent (4.9%) had clinically significant dissociative symptoms. Importantly, however, each of the children with clinically significant dissociation also exhibited clinically significant hypervigilance. In contrast, for the children with clinically significant hypervigilance, 13.2% had no reported dissociative symptoms and only 13.2% had clinically significant co-morbid dissociative symptoms. The remaining 73.6% of the children with clinically significant hypervigilance exhibited varying levels of sub-clinical dissociative symptoms, indicating that for most of the children in the sample, there was a high degree of comorbidity between the two traumatic stress reactions.

The present study also evaluated the possibility of collinearity due to the high degree of co-morbidity between dissociative and hypervigilant symptoms; however, variance inflation factor metrics were non-significant, suggesting that although the two constructs are correlated, they each contribute unique variance to predicted outcomes and are not linear dependent. The implication is that dissociative and hypervigilant symptoms represent two different, but related, traumatic stress reactions and should be assessed separately, rather than by a single indicator.

Based on animal studies and clinical reports of young children exposed to chronic forms of interpersonal violence, Perry and colleagues (1995) argued that traumatic stress reactions occur on a continuum anchored by dissociative experiences on one end and hypervigilance on the other. Perry et al. speculated that some children experience alternating dissociative and hypervigilant episodes; however, no previous empirical studies had investigated Perry et al.'s theory. In part, this lack of empirical research was likely related to the course of history of psychiatric nosology. The four most recent editions of the DSM (APA, 1983/1987/1994/2000)

only included symptoms of hypervigilance in the PTSD criteria and not dissociation. The current research argued that dissociative responses might be especially salient for young children exposed to IPV due to the threat and betrayal of trust occurring within the caregiving system (e.g., Freyd, 1996; Perry et al., 1995). In support of this argument, the few previous studies that had examined dissociative symptoms following exposure to family violence, such as IPV, indicated that young children are at an increased risk for developing dissociative symptoms (e.g., Macfie et al., 2001a; Ogawa et al., 1997) in addition to the more widely studied hypervigilant symptoms (e.g., Levendosky et al., 2002; Zerk et al., 2009).

Contrary to expectations, however, in the present sample fewer than five percent of the children (i.e., 4.9%) exhibited clinically significant dissociative symptoms. This surprising finding suggests two possible interpretations. First, the limited number of preschool-age children with clinically significant dissociative symptoms might indicate the need to update Perry et al.'s (1995) theory. Perry et al. suggested that young children might be equally likely to dissociate in response to a threat, as experience hypervigilance. If the current study's results are replicated, the findings would clearly indicate that preschool-age children exposed to IPV are considerably more likely to become hypervigilant than to dissociate. Furthermore, the relatively few preschool-age children who experience clinically significant dissociation might be particularly likely to experience episodes of clinically significant hypervigilance, whereas the opposite may not hold true (i.e., a child with clinically significant hypervigilance might not experience clinically significant percent.

An alternative, compelling interpretation of the low rates of clinically significant dissociative symptoms is that the mothers were not able to report on their children's dissociative symptoms as accurately as their hypervigilant symptoms. This would plausibly be due to

dissociation reflecting a fragmented internal experience (e.g., DePrince & Freyd, 2007) rather than externally manifested symptoms. A preschool-age child with significant dissociative experiences might appear to be reserved and under-responsive to an observed, when if fact the child might be experiencing significant internal distress in response to the repeated exposure to the violence. Over 75% of the children in the current study had reported sub-clinically levels of dissociative symptoms. These figures suggest that dissociative symptoms might be a common response to chronic IPV, as Perry et al. (1995) argued, but that the rates found in the present study might be an *underestimate* of the true number of children with clinically significant dissociation.

Macfie et al. (2001a) anticipated the problem with maternal reported dissociative symptoms and collected teacher reports of dissociation using the same measure administered in the present study. The teachers frequently participated in research and were trained to carefully observe the children. Using teacher reports, Macfie and colleagues found that 17% of maltreated preschool-age children exhibited clinically significant dissociation. The present study recruited a similar SES sample as Macfie et al.; however, the children in Macfie et al.'s study were referred by social services, thus the children arguably might have had more severe forms of psychopathology and higher rates of dissociation than would be expected in a community sample. In summary, it is plausible that the current study's findings underestimate the rates of dissociation for preschool-age children exposed to chronic IPV. Future research should examine these two alternative interpretations (i.e., that dissociation is not as common as hypervigilance versus that the current study's findings underestimated the true prevalence rates of dissociation) by including multiple reporters of dissociative symptoms and/or careful observations by trained clinicians.

Differential Relationships between Two Traumatic Stress Reactions and Behavior Problems

Consistent with expectations, the present study's findings indicated that dissociative symptoms were predictive of maternal reported internalizing problems above and beyond the effects of hypervigilance; however, neither traumatic stress symptoms predicted teacher reported internalizing problems. Also consistent with the study's hypotheses, hypervigilance predicted both maternal and teacher reported externalizing problems; however, when dissociation and hypervigilance were considered together, dissociation unexpectedly predicted maternal reported externalizing behavior problems, as well.

The present study's findings suggest that dissociation might be associated with global affective and physiological dysregulation, rather than only processes related to internalizing behavior problems (e.g., anxiety and depression). In support of this explanation, as previously detailed, every child with clinically significant dissociative symptoms also exhibited clinically significant hypervigilance. If these children experienced vacillating traumatic stress reactions, it is reasonable to assume that they also experienced more global affective dysregulation. Very limited empirical data is available to evaluate this claim. Shields and Cicchetti (1998) found that maltreated children's sub-clinical dissociation predicted worse emotion regulation, above and beyond controlling for maltreatment status and other cognitive variables (e.g., attention and verbal abilities). Only one previous study has examined the relationship between dissociative symptoms and broadband behavior problems. In a sample of maltreated preschool-age children, dissociation was moderately-highly associated with both internalizing and externalizing problems (Macfie et al., 2001a).

Alternatively, the results also suggest a possible "halo effect" for maternal reported symptoms. In other words, mothers who perceived their child as "bad" may have been more

likely to endorse several items on measures of traumatic stress symptoms, as well as on other measures of problematic behaviors with high face validity (e.g., behavior problem questionnaire and the EF maternal report measure). If true, the halo effect might have masked a more nuanced differential relationship between the traumatic stress symptoms and internalizing and externalizing behavior problems. Importantly, a relationship between these two constructs emerged across reporters (e.g., maternal reported traumatic stress symptoms and teacher reported behavior problems), suggesting that the possible halo effect was not the sole driver behind the relationship.

Overall, these findings also highlight the importance of assessing for both dissociation and hypervigilance. Had the current study only assessed PTSD-related symptoms, consistent with previous studies (e.g., Jouriles et al., 2008), hypervigilance would have emerged as the sole predictor of maternal reported behavior problems and teacher reported externalizing problems. Yet, with the addition of dissociative symptoms, a more nuanced picture was obtained. Underlying Structure of Preschool-age Children's Executive Functioning

The current study conducted the first empirical examination of the structure underlying preschool-age children's EF after assessing multiple sub-components of EF, including AC, WM, and IC. Contrary to expectations, however, the exploratory and confirmatory analyses revealed that preschool-age children's EF is not comprised by dissociable subcomponents, but are best represented by a single, global EF within each context (i.e., at home, school, and in the lab). Exploratory analyses elucidated the natural latent structure inherent in the data, whereas two alternative models of EF structure were subsequently tested through confirmatory methods. Importantly, even exploratory models with EF variables obtained within a single context (e.g.,

maternal report, teacher report, or lab-based scores) did not result in the predicted three component structure and offered additional evidence for a single, global EF component.

The current findings of a single, global EF factor within individual contexts offers the strongest evidence to-date of the underlying structure for preschool-age children's EF. Although previous factor analytic studies (e.g., Hughes & Ensor, 2008; Shing et al., 2010; Wiebe et al., 2008/2011) with preschool-age children suggested a single EF factor, each of these studies only examined two sub-components of EF (i.e., WM and IC) using fairly complex EF tasks, which increased the likelihood of obtaining a single factor (e.g., Garon et al., 2008). In contrast to these previous studies, the current research used simple EF tasks that minimized recruitment of more than one EF domain at a time. Even with these more targeted EF tasks, a single EF factor emerged suggesting that the previous studies' (e.g., Shing et al., 2010) results were not solely attributable to the authors' choice of measures. The single EF factor found in the current study contrasted sharply with the three latent factors reported in samples with older children (Lehto et al., 2003) and adolescents (Miyake et al., 2000). The divergent findings across these factor analytic studies suggests a developmental trajectory of EF structure with increasingly differentiated abilities with age.

The second novel contribution of the present study's factor analytic results was the finding that the children's EF was context dependent, with relatively independent EF abilities reported at home, school, and in the lab. Specifically, the children's EF was only minimally correlated across maternal and teacher reports, with no association found between either of these reports and lab-assessed abilities. These results suggest that preschool-age children's EF may be dependent on contextual cues. From a developmental perspective, this novel finding makes theoretical sense. EF is an important cognitive regulatory system (e.g., Eisenberg et al., 2009;

Rueda et al., 2010) with strong structural and functional associations with other regulatory systems (e.g., the limbic system) (e.g., Lezak, 1995). During their early years, children are unable to fully regulate their own affect or behaviors, relying on caregivers and contextual cues (e.g., social demands) to play an important role as external regulators (e.g., Bernier, Carlson, & Whipple, 2010). Within typical development, as children age, they increasingly strengthen their internal capacity for self-regulation and rely less on external regulators (Kochanska, Coy, & Murray, 2001; Morris et al., 2011). For instance, in a sample of preschool-age through early elementary school children, Morris and colleagues (2011) reported that mothers were successfully able to help the preschool-age children regulate their negative affect after negative affect was induced using a lab paradigm. In contrast, elementary age children did not rely on maternal regulatory attempts.

Preschool-age children may therefore be sensitive to regulatory differences in external regulators. This could explain the unexpected pattern of findings that both EF and behavior problems were contextually dependent in the present study. For instance, for most of the children included in the study it is plausible that their home environment is less restrictive than the classroom, which is arguably a more structured, restrictive environment. The lab arguably presented the children with the most structured and restrictive environment with relatively austere furnishings, one-on-one attention with a research assistant, and highly structured tasks. Given that EF is a regulatory system (e.g., Eisenberg et al., 2009; Rueda et al., 2010), the children might have demonstrated different EF in each of these three environments in response to the different contextual cues (e.g., levels of restrictiveness, caregiver attention, and task demands). Before these findings are generalized, however, they need to be replicated in additional samples. If replicated, one obvious implication of the findings is that researchers
should be cautious in presuming that associations between EF and outcome variables of interest measured in one environment (e.g., in the lab) generalize to other contexts (e.g., at home or school).

Relationship between Traumatic Stress and Executive Functioning

Neither dissociative or hypervigilant symptoms predicted either teacher reported EF or lab-assessed EF, regardless of whether the symptoms were considered individually or together. Thus, traumatic stress and EF within these two contexts did not reveal a direct relationship, in contrast to the findings from the structural equation models reviewed in the next section. Hypervigilance initially predicted greater maternal reported executive dysfunction, until dissociative symptoms were considered simultaneously, at which point only dissociation emerged as a significant predictor. Together, hypervigilance and dissociation accounted for a considerable portion of variance in the children's EF (44%).

This pattern of findings suggests two possible explanations. The simplest explanation is that in light of the highly context dependent nature of EF and behavior problems in the current sample, traumatic stress symptoms assessed in one context (e.g., by maternal report) may not be directly related to EF assessed in other contexts (e.g., at school or in the lab). This possibility necessitates that traumatic stress symptoms were also highly context dependent, which the current study did not assess, but seems plausible given the underlying role physiological dysregulation may play in both traumatic stress symptoms and behavior problems (e.g., Cook et al., 2005; De Bellis et al., 1999a/1999b; Milot et al., 2010). If preschool-age children partially rely on external sources of regulation (e.g., caregivers), which are contextually dependent (i.e., mother at home, teacher at school), then traumatic stress symptoms may differentially manifest in separate environments.

Although previous empirical studies have not rigorously examined whether traumatic stress symptoms differentially manifest in various environments, evidence from Graham-Bermann et al.'s (2008) study of preschool-age children's traumatic stress following exposure to IPV appears to support this possibility. Graham-Bermann and colleagues collected maternal and teacher reports of the children's PTSD symptoms using developmentally appropriate, modified criteria. They did not report formal statistics on the interrater agreement between maternal and teacher reports; however, the authors provided a table of how many children in their sample exhibited each symptom according to both reports. According to Graham-Bermann et al.'s figures, mothers and teachers only shared three out of the five most commonly endorsed symptoms. Furthermore, for these three symptoms, mothers appeared considerably more likely to endorse the PTSD symptoms (ranging from 29 - 54.1% greater endorsement for each symptom) (Graham-Bermann et al., 2008). Assuming the mothers and teachers in the study were reliably reporting on the children's observable behavior in each context, these figures indicate that preschool-age children's traumatic stress symptoms may be highly context dependent, similarly to EF and behavior problems.

An alternative, related interpretation is that a direct relationship between traumatic stress symptoms and EF only occurs within single contexts (i.e., at home or school) and not when functioning is assessed across contexts. In the current study, the regression models that examined direct effects of dissociative and hypervigilant symptoms on EF found support for this direct relationship within single contexts; however, across contexts the relationship between traumatic stress symptoms and EF may be indirect and undetectable without another mediating variable (such as EF, as proposed in the current study) or additional related variables (e.g., IPV). If this explanation has empirical support, then a structural model including the related variables of

interest and EF should demonstrate acceptable fit to the data. The evidence from the structural models do, in fact, offer support for this alternative explanation and are reviewed next. Executive Functioning as a Mediating Mechanism between IPV Exposure, Traumatic Stress, and Preschool-age Children's Behavior Problems

The current study's findings strongly indicated that EF is a mediating variable between IPV exposure, traumatic stress symptoms, and behavior problems, with a couple of important exceptions. Within single environments (i.e., at home or school), EF fully mediated the relationship between IPV exposure, traumatic stress symptoms, and reported behavior problems in the expected directions. For instance, IPV exposure predicted greater traumatic stress symptoms, which in turn predicted worse EF. Worse EF then predicted greater behavior problems. These effects were robust and the mediational models demonstrated excellent fit to the observed data.

Models examining the mediational pathways across environments (e.g., maternal reported EF and teacher reported behavior problems) suggested somewhat conflicting results. Maternal reported EF fully mediated the relationship between IPV exposure, traumatic stress, and teacher reported behavior problems; however, no such mediation occurred for teacher reported EF and maternal reported behavior problems. No specific hypotheses were specified regarding the relationships between lab-assessed EF and maternal/teacher reported behavior problems due to the lack of previous empirical work to guide hypothesis generation. Notably, the models which included lab-assessed EF required greater modifications in order for the models to converge and demonstrate acceptable fit. Therefore, the findings should be interpreted with caution, as the results are likely less reliable than the models assessing maternal and teacher reported EF. Lab-assessed EF did not mediate the relationships between IPV exposure, traumatic stress symptoms,

and either maternal or teacher reported behavior problems. Furthermore, the model which included maternal reported behavior problems suggested that greater levels of traumatic stress were associated with *better* lab-assessed EF, presumably due to increased levels of arousal associated with being in a novel environment.

Only one previous study has examined preschool-age children's cognitive functioning following IPV exposure and thus the present study's results must be replicated before strong conclusions can be drawn. As reviewed in the introduction, Jouriles et al. (2008) tested whether hypervigilance mediated the relationship between IPV exposure and explicit memory performance assessed with lab-based tasks and did not find any support for the mediating pathway. The findings from the present study are somewhat consistent with Jouriles et al., in that the structural models with lab-assessed EF and teacher reported behavior problems did not indicate traumatic stress symptoms mediate the relationship between IPV exposure and EF. In contrast, the model with maternal reported behavior problems and lab-assessed EF suggested that traumatic stress symptoms mediated the relationship between IPV exposure and EF.

Comparisons with Jouriles et al.'s (2008) findings should be approached cautiously, however, as SEM parameter estimates are very sensitive to changes in the model and the present analyses included a latent factor for behavior problems, which Jouriles et al. did not assess. Additionally, the authors assessed explicit memory, which is a different form of memory than WM. The present study also examined EF as a global construct, in response to the exploratory and confirmatory analyses, which further differentiates the two studies and makes cross-study comparisons difficult.

Notably, the current study also failed to replicate two modified versions of Milot et al.'s (2010) mediational model that posited traumatic stress symptoms alone (i.e., not in conjunction

with EF) mediate the relationship between exposure to chronic, family violence (maltreatment in their sample) and preschool-age children's behavior problems. It is possible that methodological differences between the two studies may have contributed to the replication failures. Milot et al. relied on a single reporter (teacher) for their assessments, whereas the present study assessed both maternal and teacher reported behavior problems. The authors also used a global measure of PTSD-related symptoms and did not breakdown the results according to PTSD symptom clusters. As others have extensively documented (e.g., Scheeringa et al., 1995; Scheeringa et al., 2003; van der Kolk et al., 2009), PTSD demonstrates poor construct validity for preschool-age children exposed to chronic, interpersonal forms of violence, such as maltreatment or IPV. The current research used Perry et al.'s (1995) traumatic stress theory, which posits that psychological traumatic stress symptoms fall on a continuum anchored by dissociative symptoms on one end and hypervigilance on the other. Unfortunately, Milot et al. neither assessed dissociated symptoms nor reported specific fit information for the three PTSD symptom clusters; thus, no information is available regarding the unique role of hypervigilance relative to reexperiencing or avoidance/numbing symptom clusters.

More important than the methodological differences between the present research and Milot et al.'s (2010) study, the current research refined the theoretical argument advanced by the authors to explain why children exposed to chronic, interpersonal violence develop such pernicious behavior problems. As Milot et al. noted, physiological dysregulation associated with chronic psychological stress and subsequent chronic activation of the HPA axis (e.g., Cicchetti & Rogosh, 2001; Heim et al., 2000; Heim et al., 2003) is thought to result in broad dysregulation. However, Milot and colleagues only assessed traumatic stress symptoms as a mediated variable between exposure to chronic, interpersonal violence and behavior problems; yet, traumatic stress symptoms alone do not inherently indicate behavior problems. In other words, even if the present study had successfully replicated Milot et al.'s findings, an additional mediating mechanism is theoretically necessary. The current research integrated Perry et al.'s (1995) traumatic stress theory, De Bellis et al.'s (1999a/1999b) developmental trauma theory, and Blair's (2010) contextual stress and EF theory to argue that exposure to IPV alters structural and functional neural networks associated with EF. The current study's models that included EF as a mediating variable demonstrated excellent fit to the observed data and explained a large portion of the variance in the children's behavior problems for both maternal and teacher reports. The study's results offered strong empirical evidence that executive dysfunction plays an important role in the development of preschool-age children's behavior problems following exposure to IPV.

The present study's findings also revealed important information regarding preschool-age children's behavior problems. In contrast to the original hypotheses, structural models that examined broadband maternal and teacher reported internalizing and externalizing symptoms separately either failed to converge or demonstrated poor fit, suggesting the need to examine total behavior problems within contexts (i.e., at home or school) rather than by separate broadband behaviors. Although contrary to the theoretical pathways posited in the introduction, the context dependent behavior problems were unsurprising in light of the minimal correlations between maternal and teacher reports of behavior problems. Furthermore, this pattern of findings is consistent with the exploratory and confirmatory EF analyses that also demonstrated context dependent behavior problems (i.e., preschool-age children may be responding to differential contextual cues to regulate their behavior). Additionally, previous studies indicate that EF concurrently and longitudinally predicts children's behavior problems (e.g., Eisenberg et

al., 2010; Hughes & Ensor, 2008; Rueda et al., 2010) and therefore context dependent EF should also theoretically be related to context specific behavior problems.

Although the present study was cross-sectional and directional effects could not be established, alternative models that examined whether behavior problems mediated the relationship between traumatic stress symptoms and EF either failed to converge or demonstrated poor fit. This pattern of findings is important and suggests that the relationship between EF impairment and behavior problems is not equivocally bidirectional, but unidirectional in nature (i.e., executive dysfunction predicts behavior problems).

Strengths of the Present Study

The study benefited from several methodological strengths. The mother-child dyads were carefully recruited from a local Head Start organization to closely match the broader, low-SES population in the area. The present study was able to naturally control for the effects, stressors, such as poverty, might have had on traumatic stress symptoms, EF, and behavior problems, by recruiting a relatively homogenous SES sample. Although the present study was not experimental, the natural controls associated with recruiting families with similar SES increase the reliability of the findings associated with the effects due to IPV exposure and minimizes potential confounding effects associated with environmental factors.

In contrast to a previous, particularly noteworthy study (i.e., DePrince et al., 2009) of EF and exposure to family violence, the present study assessed children during a critical developmental period for emerging EF (Carlson, 2005; Diamond, 2002) and when children are also most likely to have IPV exposure (e.g., Fantuzzo et al., 1997). Other methodological strengths include the assessment of unidirectional and bidirectional IPV, which better captures the total violence preschool-age children are exposed to within the caregiving environment. The present study also assessed EF across three environments (at home by maternal report, at school by teacher report, and in the lab). EF studies with preschool-age children typically assess EF with lab-based tasks (e.g., DePrince et al., 2009; Jouriles et al., 2008; Wiebe et al., 2008/2011); however, the present study demonstrated the importance of assessing preschool-age children's EF within single contexts due to their cognitive and behavioral sensitivity to contextual cues. Likewise, behavior problems were assessed by maternal and teacher reports, which showed a similar context dependent pattern as EF.

Limitations of the Present Study

Even though the present study makes several theoretical and empirical contributions to several distinct fields of study (e.g., effects of early childhood IPV exposure; preschool-age children's EF), the study is also limited by four important constraints. First, the cross-sectional nature of the study prevents strong conclusions from being drawn regarding the relationship between the timing of the IPV exposure, subsequent traumatic stress reactions, EF impairment, and the behavior problems reported at home and in school. This is not a trivial limitation. For example, it is possible that young children with greater executive dysfunction are more prone to experiencing either dissociative or hypervigilant responses following IPV exposure in contrast to the direction of effect posited by the current research. This empirical question can only be answered with a longitudinal study that carefully assesses exposure to traumatic events, traumatic stress, and EF with serial measurement.

Second, although the children's EF and behavior problems were assessed with maternal and teacher reports (and EF was also assessed with lab tasks), traumatic stress symptoms were only assessed by maternal report using a well-validated, semi-structured clinical interview and a questionnaire. The study presumed that maternal reported traumatic stress symptoms would

represent the children's global symptoms; however, the present study found strong evidence that the children's EF and behavior problems were highly context dependent. Additionally, regression and structural models that evaluated the relationship between traumatic stress symptoms, EF, and behavior problems across reporters offered mixed evidence. In light of these findings, future studies evaluating children's functioning across multiple environments, should assess traumatic stress symptoms within each environment of interest (e.g., maternal reported symptoms at home and teacher reported symptoms at school).

Third, due to logistical constraints, all research interviews were conducted in either the late afternoon or evening so the dyads could attend the visits after the school day. Some of the children were tired during the visits (especially the younger preschool-age children), which may have resulted in less than optimal performances on the EF tasks than if the visits had been conducted at an earlier time of the day. The research assistants were provided extensive training regarding strategies for helping the children remain engaged in the activities and to give their best performances on the tasks; despite the research assistants exceptional attempts, however, some of the children were naturally less motivated on the tasks than others. Statistically, some of the variance associated with the younger children being tired during the visits was likely partialled out in the regression models that controlled for the effects of the children's age on their EF performance for lab-based EF tasks. Not all of the variance was presumably removed, though, and the lab-assessed EF tasks demonstrated lower internal consistency than the maternal or teacher reported EF scores and should therefore be interpreted with greater caution.

Lastly, the current sample was purposefully recruited from the local Head Start schools in order to provide a relatively homogenous, at-risk population; however, this also naturally limits the generalizability of the findings beyond low-income, at-risk families, such as those eligible for

Head Start services. The reported findings are expected to remain significant in other samples (e.g., with middle-class families) due to the proposed psychological and physiological mechanisms thought to be invariant across samples; however, this remains an empirical question contingent on future replications.

Clinical Implications of the Present Study's Findings

The current study's findings suggest two primary clinical implications, both involving the need for more careful assessment when children are exposed to IPV. First, the present study demonstrated the importance of assessing for dissociative symptoms in addition to PTSD-related symptoms, such as hypervigilance. Although the study's results did not fully support the proposed differential pathways for dissociative and hypervigilant symptoms and broadband internalizing and externalizing problems, dissociation emerged as a significant predictor for maternal reported behavior problems and worse EF. Additionally, in the structural models, dissociative symptoms had a higher factor loading on the traumatic stress latent factor than hypervigilance, offering converging evidence that dissociative symptoms play an important role in the pathways predicting greater executive dysfunction and behavior problems both at home and in the classroom.

Mental health professionals who solely rely on the DSM-IV-TR (APA, 2000) to guide their clinical conceptualization of a child's traumatic stress reactions following exposed to family violence are likely to miss important clinical information, as dissociative symptoms are not included in the PTSD criteria. The pattern of findings from the current study offers strong empirical support for Perry et al.'s (1995) traumatic stress theory, which posits that traumatic stress reactions occur on a spectrum of dissociative and hypervigilant experiences. For clinicians with limited material resources or requiring a quick dissociation screening measure, the Child

Dissociative Checklist (Putnam et al., 1993) used in the current study is an excellent option. The measure has good psychometric properties (Putnam et al. 1993), is free, and requires little time to complete (3 - 4 minutes).

The second important clinical implication of the current study's findings concerns the need for mental health professionals to carefully assess a child's EF following IPV exposure. Within single contexts (i.e., at home or at school), EF fully mediated the relationship between IPV exposure, traumatic stress symptoms, and preschool-age children's behavior problems. Furthermore, the failed attempts to replicate Milot et al.'s (2010) mediation model, suggest that considering traumatic stress symptoms alone is not sufficient for explaining the relationship between IPV exposure and behavior problems. If replicated in other samples, this pattern of findings has significant implications for establishing best clinical practices. For instance, if a contemporary clinician is following best clinical practices and he/she suspects a child has been exposed to IPV, he or she will likely assess for traumatic stress symptoms, most notably PTSD. In addition to supporting the need for assessing dissociative symptoms, the current study's results also indicate that the clinician should conduct an assessment for potential EF problems, in order to more fully understand the nature of the child's behavior problems. As with dissociative symptoms, there are well-validated parent and teacher report measures of preschool-age children's EF, including the Behavior Rating Inventory of Executive Functioning (Gioia et al., 2003) used in the current study.

Future Directions

The findings from the present study suggest several important future directions for research. For instance, which children are most likely to develop primarily hypervigilant versus dissociative responses to chronic forms of interpersonal violence, such as IPV? Additionally,

initial reports (e.g., Macfie et al., 2001a; Putnam et al., 1997) indicate that levels of dissociation decline with age; however, no research to-date examines whether this decline is simultaneously accompanied by an increase in hypervigilant symptoms for traumatized children. The consequence of this paucity of research is that there is little empirical evidence to evaluate whether Perry et al.'s (1995) traumatic stress theory is invariant across developmental periods. Future longitudinal studies, complete with serial assessment, should investigate the relationship between dissociative and hypervigilant responses to interpersonal violence across time.

An unresolved research question is whether dissociation and hypervigilance have a differential relationship with broadband behavior problems. The present study attempted to empirically resolve this question; however, the evidence was mixed and contingent on which reporter (i.e., mother or teacher) reported the behavior problems. The study's findings suggested highly context dependent EF and behavior problems. Based upon initial evidence from previous studies (e.g., Graham-Bermann et al., 2008), it is also likely that preschool-age children's traumatic stress symptoms are context dependent; however, the present study did not anticipate this possibility and only assessed maternal reported traumatic stress symptoms. Future studies would benefit from assessing both parent and teacher reported traumatic stress symptoms. With multi-informant reports of dissociation and hypervigilance, it is possible the theorized differential relationships between these two traumatic stress responses and internalizing and externalizing behavior problems within single contexts (i.e., at home or school) will emerge.

The present study used careful analytic methods to determine the natural structure of preschool-age children's EF. The present study determined that a single, global EF factor represented the underlying structure of preschool-age children's EF. Previous studies (e.g., Shing et al., 2010; Wiebe et al., 2008; Wiebe et al., 2011) have also reported a single EF factor for

preschool-age children; however, these studies only examined two highly related sub-domains of EF, WM and IC, (Garon et al., 2008) and did not include AC. Thus, there is converging evidence for a single, global EF factor during the preschool period, but additional evidence from studies that assess multiple domains of EF is required before this question is fully resolved.

Based on the divergent findings of EF factor structure from samples with preschool-age children (e.g., the present study's findings, as well as Hughes & Ensor, 2008; Shing et al., 2010; Wiebe et al., 2008/2011) compared to older children and adolescents (e.g., Lehto et al., 2003; Miyake et al., 200) future longitudinal research should explicitly examine whether EF factor structure changes with development. For instance, a single EF factor might best describe preschool-age children's functioning; however, as the children develop and their cognitive abilities mature and differentiate, a more complex EF structure might emerge, presumably due to increasingly differentiated and complex neural networks.

Another line of future research concerns the unexpected findings that the preschool-age children's behavior problems and EF were strongly context dependent. As argued in this discussion, this pattern of findings might be related to preschool-age children's reliance on external regulators, such as their mothers and teachers (e.g., Bernier et al., 2010; Kochanska, Coy, & Murray, 2001; Morris et al., 2011), who naturally vary in their regulatory abilities. Further longitudinal investigations should examine whether children's behavior problems and EF become less context dependent with age, as children internalize regulatory abilities (Kochanska et al., 2001) that are presumably less variant across environments than when children rely on external regulators.

Lastly, the present study's main series of findings indicated that EF fully mediates the relationship between IPV exposure, traumatic stress symptoms, and behavior problems within

single contexts (i.e., at home or school) requires. If this mediating relationship is successfully replicated in future samples, then future studies should also empirically test whether EF mediates these relationships for children only exposed to a single-incident, non-interpersonal traumatic event in contrast to chronic, interpersonal violence. If the mediation pathways are specific to chronic, interpersonal violence, this contrast would suggest possible greater resilience in the face of a single-incident traumatic event. Additionally, if the mediation pathways are only supported for chronic, interpersonal violence, this would be further evidence for altered neurodevelopmental trajectories in areas associated with EF (e.g., PFC) (e.g., Blair, 2010) due to chronic exposure to traumatic stress (e.g., De Bellis et al., 1999; Perry et al., 1995). Future longitudinal, imaging studies should examine this possibility by exploring the precise timing and course of the developmental pathology.

APPENDICES

APPENDIX A

COPY OF RECRUITMENT FLYER

The Healthy Moms - Healthy Kids Study!



<u>Do you have a child</u> who is 3 - 5 years old and attends Head <u>Start?</u>

PARTICIPATE IN A STUDY

We need women to take part in a research interview about stress, parenting, the mother-child relationship, and child development.

- Interview takes place at Michigan State University and will last approximately 90 minutes.
- You must be the biological mother of your child, be between 18 – 40 years old, and you and your child must be in good health.
- You will be paid \$75 in cash.
- All information is kept <u>completely</u> <u>confidential.</u>

If you are interested or would like more information, please call **(517) 432 – 1447**

Faculty Supervisor: Dr. Alytia Levendosky Rm. 46 Psychology Bldg. East Lansing, MI 48824

APPENDIX B

TELEPHONE SCREENING INTERVIEW

Healthy Moms – Healthy Kids Telephone Screening Protocol

"Thank you for your interest in the Healthy Moms – Healthy Kids Study! Before we begin, we need to tell you about the study and your rights as a potential research participant.

This research study is about stress, parenting, the mother-child relationship, and child development. If you are eligible, the information you provide will be used as part of this study. The information you provide during this brief screening, regardless of your eligibility, will be stored in a locked file cabinet in the Healthy Moms - Healthy Kids Study office. If you decide at any point now or in the future that you would like us to destroy and not use your information, we will do so. The possible risks of participating in this study are small and include possible discomfort from discussing sensitive topics. Do you have any questions or concerns about this?"

"Okay, I'd like to find out a little information from you to see if you are eligible to participate in the study. Are you able to answer a few questions right now? (Wait for participant to say yes or no. If no, thank the participant for calling and ask her to call back at a more convenient time.) The questions are about your age, education, and racial background. We also ask about your experiences with your romantic partner, including types of conflict that you may have experienced. It should only take about 15 minutes. You can choose not to answer any of the questions or you can choose to end the telephone conversation whenever you want. Even after you answer all the questions, you can still choose to participate or not in the study. Any of these decisions will not affect your relationship with any agencies or Michigan State University. Do you have any questions?"

"If you have any questions as we go along, please ask me. If at any time you have concerns or questions about this study please contact Dr. Alytia Levendosky at (517) 432-1447. If you have questions or concerns about your role and rights as a research participant, would like to obtain information or offer input, or would like to register a complaint about this study you may anonymously contact the Michigan State University's Human Research Protection Program at 517-355-2180."

"Finally, there are no right or wrong answers to these questions. We want women in our study who have lots of different life experiences."

Demographics & Identifying Information

"Please spell your first and last name for me"

Name :

Phonetic spelling/pronunciation key:

	"What is your birth date?" (mm/dd/yyyy)			
	"How old are you right now?" Age: \rightarrow If younger than 18 or older to years discontinue interview	han 40		
	Interviewer completes (circle one): 18-21 22-25 26-29 30-34 35	5-40		
	 "What is your racial or ethnic group?" (Read options and circle one) 1 = Native American 2 = Asian American/Pacific Islander 3 = Black, African American 4 = Latino, Hispanic, Chicano 5 = Multiracial (multiracial means having parents of different races) 6 = Caucasian, White 			
	Interviewer completes (circle one): White Non-white			
"Pleas	ase spell your child's name who attends Head Start"			
	Name:			
	Phonetic spelling/pronunciation:			
	"What is your child's gender"? Male Female			
"What is your child's birth date?" (mm/dd/yyyy)				
	"How old is your child right now?"			
	Age: \rightarrow If younger than 3 years OR older than 5 years, discontinue			
	"What is your child's racial or ethnic group?" (Read options and circle one) 1 = Native American 2 = Asian American/Pacific Islander 3 = Black, African American 4 = Latino, Hispanic, Chicano 5 = Multiracial (multiracial means having parents of different races) 6 = Caucasian, White			
"Let r with y	t me go ahead and get some contact information from you, in case we need to get in you or get disconnected from you during the intake screening process."	n touch		

Contact information

Address:

Street number and name and apartment #

City, State, ZIP

Telephone #: h/c/w, h/c/w (Always get a second telephone number. If the mother does not have a second personal number, ask her for the number of a friend or family member that she would feel comfortable with us contacting to get in touch with her.)

1. Is it OK to contact you on the phone numbers you have provided? YES NO

If **NO**, is this because you think it may be hard to reach you directly?_____ OR because you would rather not to have people in your household know about your participation in our study? _____ (check only one option)

2. When we call, do you have any preferences for any of the following? (read a through d and check all that apply)

_____a) block caller ID when calling

b) do not leave a message on answering machine

c) only call during the day; indicate specific preferred times:

d) only call during the evening; indicate specific preferred times:

___e) no preference

Do you have an email address?

If YES, Is it OK to contact you at the e-mail address you have provided? YES NO

INTERVIEWER, please transfer ID number here from previous pages → ID #: _____

Date: _____

Sensitive Information – TO BE STORED SEPARATELY!

1.	"What Head Start location does your child attend?"
Head 2	Head Start School: \rightarrow if child does not attend a Start
	school, discontinue the intake ¹
2.	"Is English your first language?" YES NO
	If NO, "Can you read and understand English?" YES NO \rightarrow If NO, discontinue
3.	"Are you the biological mother of this child?" YES NO \rightarrow if NO, discontinue
4.	"In the past year, have you always lived with your child?" YES $NO \rightarrow if NO$, discontinue
5.	"Was your child born premature?" YES NO If YES, how many weeks premature? \rightarrow If below 37 weeks, discontinue
6.	"Does your child have any of the following:" \rightarrow If child has any of these, discontinue
	Birth defects? Describe:
	Serious medical conditions? Describe:
	Significant developmental delays? Describe:

7. "Do you have legal custody of your child?" YES NO \rightarrow If NO, discontinue

¹ Anytime the interviewer discontinues the interview, s/he says "Thank you for calling us today. Unfortunately you are not eligible for our study. We have specific requirements in terms of (age/health status/relationship status) because we are looking at stress hormones and the effects of experiencing life stress on those hormones. We really appreciate the time you took calling our project and answering our questions! Thank you so much!"

8. "Are you currently breastfeeding any infants or young children?" YES NO

If **YES**, "if you are eligible to participate, would you be willing to not breastfeed for 2 hours prior to the in person interview?" **YES** NO \rightarrow *If NO*, *discontinue*

9. "Are you currently pregnant?" YES NO \rightarrow If YES, complete item below

9a. When is your due date?:

10. "Do you currently have any of the following health problems?" (read list) \rightarrow *If YES, discontinue*

Cushings	YES	NO
Addisons Disease	YES	NO
Cancer	YES	NO

11. "Are you currently receiving cancer treatment?" YES NO \rightarrow If YES discontinue

"Now I'd like to ask you some yes/no questions about your relationships with any romantic partners you may have had during your child's entire lifetime. Note that this also includes partners who may not be your child's biological father. Are you by yourself or, if not, are you able to answer these questions at this time?" (Wait for participant to say yes or no. If no, ask the participant to call back at a more convenient time.)

Domestic Violence Screening

CTS Postnatal

"No matter how well a couple gets along, there are times when they disagree on major decisions, get annoyed about something the other person does, or just have spats or fights because they're in a bad mood, they are tired, or for some other reason. They also use many different ways of trying to settle their differences. I'm going to read a list of things that you and any of your partners might have done when you had a dispute. Think about each one of the items on the list as I read them to you. At the end, I will ask you if any of these things have happened to you with **ANY** of your romantic partners <u>since your child's birth</u>."

- 5. Threatened to hit or throw something at you
- 6. Threw or smashed or hit or kicked something
- 7. Threw something at you
- 8. Pushed, grabbed, or shoved you
- 9. Slapped you
- 10. Kicked, bit, or hit you with a fist
- 11. Hit or tried to hit you with something
- 12. Beat you up
- 13. Threatened you with a knife or gun
- 14. Used a knife or gun on you

Did any of these things happened to you *since your child's birth?* YES NO

If **NO**, did anything else happen that I did not list here *since your child's birth?*

Describe:

"Thank you for sharing this information with us. The study manager will go over your information and a scheduler will call you back within the next week or so to let you know if you are eligible for our study."

"Let me tell you something about the bigger research study. This research study is about stress, parenting, the mother-child relationship, and child cognitive, social and emotional development. One of the stressors we will ask you about is domestic violence. We hope to learn about the strengths that you bring to your situation, your feelings and perceptions of your child, and your child's behaviors both at home and at school. We hope to use this information to help plan better programs for families experiencing domestic violence.

If you decide to take part in the study, you and your child will come to the campus of Michigan State University to participate. We will ask you questions about how you have been feeling recently, events that have happened to you including during your pregnancy, your feelings about your child, and the health and behavior of your child. We will also be asking you for 3 saliva samples (drool) from you and your child during the interview. This just involves spitting in a tube. Spitting in the tubes is easy to do, and it is not painful or dangerous. We use the saliva to measure the levels of a stress hormone (cortisol). After we measure the cortisol, we will destroy the samples immediately. We will not run any other biological tests on these samples. One of these saliva samples will be taken after your child engages in a challenging task. For this we will have your child to engage in a series of fun, interactive assessments to learn how children think. Your child can take a break and visit with you at any time.

The entire interview will take about 2 hours to complete. You will be paid \$75 at the end of this interview to thank you for your participation.

"Do you have any questions?" "Would you like to participate?" YES NO

If **YES** \rightarrow "Let me go ahead and schedule you for an interview. All of our interviews start at either 4 or 6:30 pm. Which day would work best for you?"

"We offer care for one additional child on some interviews, will you need to bring another child to your interview?" YES NO

If **YES**: How many children and how old are them?

"We provide parking during the interview, will you be driving to our project office?" YES NO If **YES:** What is the model and color of the car you will be driving? A research assistant will be waiting for you by the parking lot, and this information will help her recognize you.

There are a few things we need you to avoid before your interview (Read list of things to avoid).

We'll provide a snack and water for your child, but he/she will not be able to eat during about the first hour to the interview. Feel free to bring other food/drinks or sippy cup if s/he needs one.

AFTER COMPLETION OF THE INTAKE SCREENING INTERVIEW GIVE THE INTAKE TO A PROJECT INVESTIGATOR (AUDIE OR LIA) TO BE REVIEWED BEFORE THE SENSITIVE INFORMATION IS DETACHED AND FILED SEPARATELY FROM THE REST OF THE INTAKE INTERVIEW!

APPENDIX C

VERBAL INTRODUCTION TO STUDY AND CONSENT PROCESS

Introduce the interview protocol to the participant:

"Thank you for coming in for our interview. This afternoon we will be completing a number of activities, including an interview, filling out questionnaires and collecting saliva samples from you and your child. Your child will also be working with another interviewer (state the child interviewer's name) to complete a balance beam task, as well as some interactive assessments. We are interested in learning more about you and your child's physical and psychological health, your parenting style, as well as domestic violence and other stressful life events you may have experienced.

During the balance beam task, your child will be asked to walk forward, backward sideways and over some cones on a balance beam that is approximately 2 and half feet (30 inches) off the ground. Your child will perform these tasks for a total of five minutes while you watch from another room. However, if your child becomes very upset at any point or cries we will stop the procedure. You can also ask us to stop this procedure at any time if you feel uncomfortable. We will be videotaping this so that later we can code your child's emotional and behavioral responses to this situation. We will also be collecting 3 saliva samples from you and 3 saliva samples from your child, which will be used only to study the activity of a stress hormone called cortisol that is present in the saliva.

All the information gathered today is strictly confidential and will not be linked to any identifying information after the end of our interview. However, if you indicate that child abuse is occurring or has occurred in your household, we are required to make a report to Child Protective Services.

When the interview is complete, you will be paid \$75. If for any reason we are not able to complete the interview today, we can schedule another time to finish and will pay you at the completion of that follow-up interview. If you decide to withdraw from participating in the study at any point or your child does not want to participate, we will stop the interview immediately and not use any of your data. In this case, we will pay you \$30 for coming to the interview. This decision would not impact your relationship with MSU, Head Start, or the study.

I would like for you to read over this consent form, which includes more detailed information. I will be back in a few minutes to answer any questions you may have."

APPENDIX D

MOTHER'S CONSENT FORM

Thank you for your participation in The Healthy Moms – Healthy Kids Study! We appreciate your time and the effort you made to come in today. This research study is about stress, parenting, the mother-child relationship, and child development. One of the stressors we will ask you about is domestic violence. We hope to learn about the strengths that you bring to your situation, your feelings and views of your child, and your child's behaviors both at home and at school. We hope to use this information to help plan better programs for families experiencing domestic violence. Participation in all or part of this study is *completely* voluntary. You can choose not to answer any questions/questionnaires, or discontinue your participation at any time. If you or your child choose to stop the interview at any time you will be paid \$75 as a way for us to say 'thank you' for your time. Either way, your child will receive a prize and a snack, with your permission.

What will I do as part of the research study today?

If you decide to take part in the study, you will be asked questions about romantic relationships and conflict you may have had in those relationships, events that have happened to you recently, your feelings about your child, your parenting style, and your child's behaviors at home. We will also be asking your permission to have your child's Head Start teacher fill out 2 brief questionnaires about your child's behavior at school (see the separate form "Mother's Permission for Teacher"). Additionally, we will ask you for 4 saliva samples (drool) from you and 4 from your child during the interview. This involves spitting in a tube—it is very easy to do and it is not painful or dangerous in any way. We will show you how to do this. Three of these saliva samples will be taken after your child does a mild stress task. For this your child will be asked to walk across a balance beam, with soft padding underneath it. You will be able to watch your child during this task but will not be able to help them walk across the beam. A research assistant will be there in case your child needs help with the task. The task is safe as the research assistant will nearby in case your child begins to fall and because there is ample padding underneath the beam. Additionally, the beam is wide enough for most children to walk across without trouble. However, you or your child can stop the task at any time if either of you feel uncomfortable.

How long will this interview last today?

The interview lasts approximately 90 minutes. You and your child may take breaks at any time. If you child finishes their portion of the interview early, we have lots of fun games and puzzles for them to play while you complete your interview.

How will you protect my confidentiality?

Question: Will my information/answers be shared with anyone at Head Start?

Answer: While Head Start is helping the Healthy Moms – Healthy Kids Study find

families to participate in our research, **<u>none</u>** of the information you share during the research interview will be given to any person at Head Start. This includes information you share with us about yourself, your family and your child.

> Question: Who will get to see the results of my child's questionnaires?

➤ <u>Answer</u>: To protect your child's confidentiality, we will not be sharing their answers from the interview with you, or anyone at Head Start, with 3 exceptions: 1) If your child tells us

they are being hurt, 2) If your child tells us they are going to hurt someone else, or 3) If your child tells us they are hurting or plan to hurt themselves. In any of these instances we would let you know.

Also, while we will be asking you for permission to have your child's teacher fill out behavior rating forms, personally identifiable information will not be shared with you, your child's teacher or anyone else at Head Start. Your child's teacher will <u>not</u> be interviewed for the study – they will only be answering questions on a paper-and-pencil questionnaire about your child's behavior at school. When the study is done, we will summarize information from all study participants and will not report information about individuals. This *anonymous summarized* information will be presented to Head Start so that they can provide better services to families.

Question: How else will you keep my information/answers confidential?

➤ <u>Answer</u>: All information will be kept strictly confidential to the fullest level according to law. When you signed up for the study during the intake interview, we put your name, child's name, basic demographic information and contact information on a piece of paper along with a unique identification number. This paper is stored under lock and key and is kept separate from all other sensitive information you provided us during the intake screening interview. It will also be kept separate from the information you will provide today. Following the intake interview, this information can only be accessed by the project investigators and research assistants responsible for scheduling interviews. Your name, unique identification number, and contact information is also stored in a digital file that is password protected and stored in a locked office on a computer that is not connected to the internet. Only the project investigators and the research assistants who schedule visits have access to this digital file.

➤ All of the questionnaires you fill out today will have your identification number on them, so the information you provide today cannot be easily linked with your identity. Your full name will not be on any questionnaires or pieces of paper with your answers to our interview questions. All of the information you provide us today will be kept in locked file cabinets in a locked office at Michigan State University. All saliva samples will have the same identification number and they will be stored in a locked freezer and destroyed after analysis. Your identity will not be revealed in any reports written about this study. We will summarize information from all study participants and will not report information about individuals. The only exception is in the case of child abuse. If you indicate that child abuse is occurring or has occurred in your household, we must make a report to Protective Services. If a report to Protective Services is required, Head Start will *not* be told about this.

Why do you need saliva samples?

We use the saliva to measure levels of a stress hormone in the body called cortisol. After we test the levels of cortisol, we will destroy the samples right away. *We will not run any other tests on these samples*.

Are there any risks or direct benefits of participating for me and my child?

While you may not directly benefit from your participation in this study, your participation will help us to better understanding of the effects of domestic violence on women and young children. You may experience some benefits in telling your history and having someone who can help you find resources.

The possible risks of participating in this study are small and include possible upset or discomfort from discussing topics such as domestic violence. We will provide a list of resources for counseling and other services at the end of the interview.

Can I or my child stop participating if we want?

Yes, absolutely. You can participate in all parts of the study or just some parts. For example, you may want to answer the questions but you may not want your child to do the mild stress task. You have the right to withdraw from this study at any point during the interview and receive \$30 for your participation. Your decision about whether to participate or not will not affect your relationship with Head Start, Michigan State University, or any other agencies.

Will you videotape any parts of this interview?

We would like to videotape mild stress task that the research assistant will conduct with you and your child. This videotape will be used to make sure that the interviewer is conducting the task properly. The videotape may be coded by trained research assistants for your child's response to the task at the end of the study. The videotape will not have your or your child's name on it; an identification number will be put on it. We will keep this videotape in a locked file cabinet in a locked office at Michigan State University. When we are finished with all interviews and analysis using these data, we will destroy the videotapes (after approximately 24 months).

Videotaping of the mild stress task is *completely* voluntary. If you do not want to be videotaped, you can still do all of the parts of the interview and will not be penalized in any way. You and your child will receive the full payment for this interview, regardless of your decision about videotaping.

Who will have access to the videotape?

Only two groups of people will see the videotapes: the Healthy Moms – Healthy Kids study staff and, in the case of a research audit, the Michigan State University Institutional Review Board staff.

What if I have questions now or later?

If you have any questions now, please feel free to ask us at any time. If at any time you have concerns or questions about this study, such as scientific issues, how to do any part of it, or to report an injury, please contact Dr. Alytia Levendosky at (517) 432-1447.

If you:

- ▶ have questions or concerns about your role and rights as a research participant
- > would like to obtain information or offer input
- ➤ would like to register a complaint about this study

you may anonymously contact the Michigan State University's Human Research Protection Program at 517-355-2180, Fax 517-432-4503, or e-mail <u>irb@msu.edu</u> or regular mail at 202 Olds Hall, MSU, East Lansing, MI 48824. I have read this consent form and voluntarily agree that my child and I will participate in this research study.

Signature of Participant

Print Name

Date

I have read this consent form and voluntarily agree to have the mild stress task videotaped for training and reliability purposes.

Signature of Participant

Print Name

Date

Signature of Witness

Print Name

Date

Alytia Levendosky, Ph.D. 107C Psychology Building Michigan State University Department of Psychology East Lansing, MI 48824

APPENDIX E

TEACHER RELEASE FORM SIGNED BY MOTHER

We would like your permission to have your child's teacher answer some questions about his /her observations of your child's behavior, feelings, and academic performance. Your child's teacher will be told that you are participating in a study of child development by Michigan State University, but nothing else about the study. No information that you give us will be shared with the child's teacher. If you agree to let us contact your child's teacher, please complete the release form below.

As a parent of,, I give my permission for my child's teacher, Name of Child				
, to answer questions about my child's behavior, feelings, Name of Teacher				
and academic performance for a study of child development that I am participating in at				
Michigan State University.				
Parent Name (Print)				
Parent Signature				
Date				

APPENDIX F

TEACHER CONSENT FORM

Dear Teacher:

The parent or guardian of your student _______has provided consented for us to contact you as part of their participation in the Healthy Moms – Healthy Kids Study. This research study is about the child cognitive, social and emotional development. We hope to use the information you share to help plan better strategies and interventions for parents and for teachers who work with young children. We are asking that you complete 2 questionnaires regarding this student's emotions, behavior, and academic performance. The questionnaires should take approximately 20-30 minutes to complete, and you will be paid \$10 to thank you for your time. We would like to thank you in advance for your willingness to participate, and for the time and effort you are taking to help us. Your participation in this study is *completely* voluntary. We will provide you with a copy of the release of information from the student's mother.

How will you protect my confidentiality?

All information that you give us will be kept strictly confidential among the project staff. None of the information you provide will be shared with the student, his/her parent, or anyone else at Head Start. Neither your name nor the student's name will appear on any questionnaires. An identification number will be put on them instead. Everything you give us today will be kept in locked file cabinets in a locked office on the campus of Michigan State University. Your identity will not be revealed in any reports written about this study. When the study is completed, we will summarize information from all study participants and will not report information about individuals. This *anonymous summarized* information will be presented to Head Start so that they can provide better services to families.

Your privacy will be protected to the maximum extent allowable by law. The only exception to full confidentiality is in the case of ongoing child abuse or neglect. If you indicate that child abuse or neglect may be occurring in the child's household, we are required to make a report to Child Protective Services.

How will you protect the confidentiality of the student for whom I completing these questionnaires?

As part of their participation in this study, families are ensured confidentiality of all information shared regarding their child. This means that you will not have access to any of the information shared by parents regarding their child during their interview. This also means that the results of the questionnaires that you complete about the child will not be shared with you, the child's family, or anyone else at Head Start.

What if I do not want to answer all or part of the questionnaires?

You have the right to refuse to answer any questions at any point during the interview without penalty or negative consequences. Your decision about whether to participate or not will *not* affect your relationship with Head Start, Michigan State University, or any other agencies or Michigan State University.

What if I have questions now or later?

If at any time you have concerns or questions about this study, such as scientific issues, how to do any part of it, or to report an injury, please contact Dr. Alytia Levendosky at (517) 432-1447.
If you:

Department of Psychology East Lansing, MI 48824

- ➤ have questions or concerns about your role and rights as a research participant
- ➢ would like to obtain information or offer input
- > would like to register a complaint about this study

you may anonymously contact the Michigan State University's Human Research Protection Program at 517-355-2180, Fax 517-432-4503, or e-mail <u>irb@msu.edu</u> or regular mail at 202 Olds Hall, MSU, East Lansing, MI 48824.

I have read this form and voluntarily agree to participate in this research study.

Signature of Teacher	Print Name	Date
Signature of Research Staff	Print Name	Date
Alytia Levendosky, Ph.D. 107C Psychology Building Michigan State University		

APPENDIX G

CHILD ASSENT FORM

"If it's okay with you today, we will ask you to do some fun activities, like playing games, solving puzzles, and gym activities. We want to learn about kids like you! For some of these things we are going to use a camera to videotape you. Most kids think this stuff is really fun! If you don't want to do any of the activities it is okay. No one will be mad or upset. Just tell me. We will take lots of breaks and if you want to see your mom at any time, you can. When we are finished I have a gift for you so say "thank you" for helping us to learn about kids."

Does this sound okay to you – do you want to do the activities today? Yes or no?

(Interviewer circle one based on child's verbal response): YES NO

APPENDIX H

COPIES OF MEASURES

Demographics Questionnaire

					Subject #
				Date of I	Interview
			Name of Int	terviewer	
Subject #	IT NOW:"				
1 Not at all ne	2 rvous	3	4	5	6 Extremely nervous
1.	First name of assignment sl	child: heet prior to	interview)	(Interview	wer: fill in from
2.	Confirm Child	l's birthdate:	//		
3.	Are you curre → If y Intervi 2011 a Nov. 1 (and cl comple	ntly pregnant res, due date ewer discont sk the mom i or mom doe hild prize) an ete remainder	? YES NO :/ (mu inue interview. If c f we can reschedul s not want to resched d inform mom that c of study.	m/yy) lue date is b le for Dec. 1 hedule, prov t she is not b	before Nov. 1, If due date is after vide full payment eligible to
4.	How many bio	ological child	ren do you current	tly have?	
5.	How many pe (If participan composition l	ople, includin it is living in before movir	ng yourself, live in a shelter, questio ng into shelter.)	your house n refers to	ehold? household
6.	Choose the on (choose only on (1)	e that best de one): single, neve	escribes your curre	nt marital/r	elationship status
	(2)	married	(a) For how lon	ıg?	(in months)
	(3)	separated	(b) For how lon	ng?	(in months)
	(4)	divorced	(c) For how lon	g?	(in months)
	(5)	widowed	(d) For how lon	ng?	(in months)

- 7. How would you describe your relationship status with the biological father of your child? (Read all choices and circle one)
 - (1) I am still in a relationship with him.
 - (2) We have been together off and on and are currently together.
 - (3) We have been together off and on and are currently <u>not</u> together.
 - (4) I have not had a relationship with him since the child was born.
 - (5) Is deceased.
- 8. What is your current relationship with the father of your child? (circle one)

		1 = spouse 2 = ex-spouse 3 = partner/fiancé 4 = ex-partner 5 = friend 6 = acquaintance 7 = stranger 8 = other Please specify:		
9.	Is the	child's father involved with the child?	YES	NO
10.	Does	the child's father live with the child?	YES	NO
11.	Do yo → IF resch	ou currently have custody of your child? NO, discontinue interview, provide full paym edule (mom cannot provide legal consent).	YES ent but do not	NO
	11a.	IF YES , is it full or joint? (Joint custody is ONLY selected if custody arr decided in a court of law, otherwise code as fu	FULL angement was ll custody)	JOINT
	11b.	IF JOINT, who do you share custody with? (Give name and relationship to child)		_
	11 c .	IF JOINT , how many days per month does yo you?	ur child live with	

- 12. What is your occupation status? Chose one of the following:
 - 1. Unemployed
 - 2. SSI Disability
 - 3. Full-time employee
 - 4. Part-time employee
 - 5. Contract worker / per diem
- 13. What is the highest level of education you have completed? (Circle one)
 - 1. Some High School
 - 2. High School Diploma
 - 3. GED
 - 4. Some college, trade school (e.g., Cosmetology, Nursing, Technical/Vocational), or AA degree
 - 5. BA/BS
 - 6. Some grad school or graduate degree
- 14. Do you currently receive services from . . . ?

a.	WIC	YES	NO
b.	TANF (formerly AFDC)	YES	NO
c.	Protective Services	YES	NO
d.	Food Stamps	YES	NO
e.	Medicaid	YES	NO
f.	SSI (Disability)	YES	NO
g.	FIA cash assistance/grant	YES	NO

15. What is your total family income per month (estimate)?

 \rightarrow Note: <u>Must</u> be a value over \$0 – include <u>all</u> forms of income, including, but not limited to, unemployment, disability, child support, food stamps, Medicaid, etc. PROBE EXTENSIVELY.

- 16. Are you currently residing in a shelter for battered women?
 - (a) **YES NO**/888
 - (b) If **YES**, # days? _____
- 17. Have you ever stayed in a shelter for battered women?
 - (a) **YES NO**/888
 - (b) If **YES**, # days? _____

Revised Conflicts Tactics Scales (Straus et al., 1996)

No matter how well a couple gets along, there are times when they disagree, get annoyed with the other person, want different things from each other, or just have spats or fights because they are in a bad mood, are tired, or for some other reason. Couples also have many different ways of trying to settle their differences. This is a list of things that might happen when you have differences. Please circle how many times you did each of these things <u>since your child was born</u>, and how many times your partner(s) did them <u>since your child was born</u>. If you or your partner(s) did not do one of these things since your child was born, circle "N/A".

HOW OFTEN DID THE FOLLOWING HAPPEN SINCE YOUR CHILD WAS BORN:

A = ONCE B = TWICE C = 3 - 5 TIMES D = 6 - 10 TIMES E = 11 - 20 TIMES F = MORE THAN 20 TIMESN/A = THIS NEVER HAPPENED

1.	I showed my partner(s) I cared even though we disagreed.	А	В	С	D	Е	F	N/A
2.	My partner(s) showed care for me even though we disagreed.	А	В	С	D	Е	F	N/A
3.	I explained my side of a disagreement to my partner(s).	A	В	С	D	Е	F	N/A
4.	My partner(s) explained his/her side of a disagreement to me.	A	В	С	D	Е	F	N/A
5.	I insulted or swore at my partner(s).	A	В	С	D	E	F	N/A
6.	My partner(s) did this to me.	A	В	С	D	E	F	N/A
7.	I threw something at my partner(s) that could hurt.	A	В	С	D	E	F	N/A
8.	My partner(s) did this to me.	A	В	С	D	E	F	N/A
9.	I twisted my partner(s) arm or hair.	A	В	С	D	Е	F	N/A
10.	My partner(s) did this to me.	A	В	С	D	Е	F	N/A
11.	I had a sprain, bruise, or small cut because of a fight with my partner(s).	A	В	C	D	E	F	N/A
12.	My partner(s) had a sprain, bruise, or small cut because of a fight with me.	Α	В	С	D	Е	F	N/A

13. I showed respect for my partners' feelings about an issue.	А	В	С	D	Е	F	N/A
14. My partner(s) showed respect for my feelings about an issue.	A	В	С	D	Е	F	N/A
15. I made my partner(s) have sex without a condom.	A	В	С	D	Е	F	N/A
16. My partner(s) did this to me.	A	В	С	D	E	F	N/A
17. I pushed or shoved my partner(s).	A	В	С	D	Е	F	N/A
18. My partner(s) did this to me.	A	В	С	D	Е	F	N/A
19. I used force (like hitting, holding down, or using a weapon) to make my partner(s) have oral or anal sex.	A	В	С	D	Е	F	N/A
20. My partner(s) did this to me.	A	В	С	D	Е	F	N/A
21. I used a knife or gun on my partner(s).	A	В	С	D	Е	F	N/A
22. My partner(s) did this to me.	A	В	С	D	Е	F	N/A
23. I passed out from being hit on the head by my partner(s) in a fight with me.	A	В	C	D	Е	F	N/A
24. My partner(s) passed out from being hit on the head in a fight with me.	A	В	C	D	Е	F	N/A
25. I called my partner(s) fat or ugly.	A	В	С	D	E	F	N/A
26. My partner(s) called me fat or ugly.	A	В	С	D	E	F	N/A
27. I punched or hit my partner(s) with something that could hurt.	A	В	С	D	Е	F	N/A
28. My partner(s) did this to me.	A	В	С	D	Е	F	N/A
29. I destroyed something belonging to my partner(s).	A	В	С	D	Е	F	N/A
30. My partner(s) did this to me.	A	В	С	D	Е	F	N/A
31. I went to a doctor because of a fight with my partner(s).	A	В	С	D	Е	F	N/A
32. My partner(s) went to a doctor because of a fight with me.	A	В	С	D	Е	F	N/A
33. I choked my partner(s).	А	В	С	D	E	F	N/A

34. My partner(s) did this to me.	А	В	С	D	Е	F	N/A
35. I shouted or yelled at my partner(s).	A	В	С	D	E	F	N/A
36. My partner(s) did this to me.	A	В	С	D	E	F	N/A
37. I slammed my partner(s) against a wall.	A	В	С	D	E	F	N/A
38. My partner(s) did this to me.	Α	В	С	D	Е	F	N/A
39. I said I was sure we could work out a problem.	Α	В	С	D	Е	F	N/A
40. My partner(s) were sure we could work it out.	Α	В	С	D	Е	F	N/A
41. I needed to see a doctor because of a fight with my partner(s), but I didn't.	A	В	С	D	E	F	N/A
42. My partner(s) needed to see a doctor because of a fight with me, but I didn't.	Α	В	С	D	Е	F	N/A
43. I beat up my partner(s).	A	В	С	D	E	F	N/A
44. My partner(s) did this to me.	A	В	С	D	E	F	N/A
45. I grabbed my partner(s).	A	В	С	D	E	F	N/A
46. My partner(s) did this to me.	A	В	С	D	E	F	N/A
47. I used force (like hitting, holding down, or using a weapon) to make my partner have sex.	A	В	C	D	Е	F	N/A
48. My partner(s) did this to me.	Α	В	С	D	Е	F	N/A
49. I stomped out of the room or house or yard during a disagreement.	A	В	С	D	Е	F	N/A
50. My partner(s) did this to me.	A	В	С	D	E	F	N/A
51. I insisted on sex when my partner(s) did not want to (but did not use physical force).	Α	В	C	D	E	F	N/A
52. My partner(s) did this to me.	A	В	С	D	Е	F	N/A
53. I slapped my partner(s).	A	В	С	D	E	F	N/A
54. My partner(s) did this to me.	A	В	С	D	E	F	N/A

55. I had a broken bone from a fight with my partner(s).	А	В	С	D	E	F	N/A
56. My partner(s) had a broken bone from a fight with me.	А	В	С	D	E	F	N/A
57. I used threats to make my partner(s) have oral or anal sex.	А	В	С	D	Е	F	N/A
58. My partner(s) did this to me.	А	В	С	D	E	F	N/A
59. I suggested a compromise to a disagreement.	А	В	С	D	Е	F	N/A
60. My partner(s) did this to me.	А	В	С	D	Е	F	N/A
61. I burned or scalded my partner(s) on purpose.	А	В	С	D	Е	F	N/A
62. My partner(s) did this to me.	А	В	С	D	Е	F	N/A
63. I insisted my partner(s) have oral or anal sex (but did not use force).	Α	В	С	D	E	F	N/A
64. My partner(s) did this to me.	А	В	С	D	Е	F	N/A
65. I accused my partner(s) of being a lousy lover.	А	В	С	D	Е	F	N/A
66. My partner(s) did this to me.	А	В	С	D	Е	F	N/A
67. I did something to spite my partner(s).	А	В	С	D	Е	F	N/A
68. My partner(s) did this to me.	А	В	С	D	Е	F	N/A
69. I threatened to hit or throw something at my partner(s).	А	В	С	D	E	F	N/A
70. My partner(s) did this to me.	А	В	С	D	Е	F	N/A
71. I felt physical pain that still hurt the next day, because of a fight with partner(s).	А	В	C	D	E	F	N/A
72. My partner(s) felt physical pain the next day, because of a fight we had.	A	В	С	D	Е	F	N/A
73. I kicked my partner(s).	А	В	С	D	E	F	N/A
74. My partner(s) did this to me.	А	В	С	D	E	F	N/A
75. I used threats to make my partner(s) have sex.	А	В	С	D	E	F	N/A

76. My partner(s) did this to me.	А	В	С	D	Е	F	N/A
77. I agreed to try a solution to a disagreement my partner(s) suggested.	A	В	С	D	E	F	N/A
78. My partner(s) tried a solution I suggested.	А	В	С	D	E	F	N/A

Psychological Maltreatment of Women Inventory – Short Version (Tolman, 1995)

The questionnaire asks about actions you and your partner(s) may have experienced in any of your relationships <u>since your child was born</u>. Answer each item as carefully as you can by circling a number next to each statement according to the following scale:

1 = NEVER 2 = RARELY 3 = OCCASIONALLY 4 = FREQUENTLY 5 = VERY FREQUENTLY

SINCE YOUR CHILD WAS BORN:

10a.	My partner(s) called me names.	1	2	3	4	5
10b.	I called my partner(s) names.	1	2	3	4	5
11a.	My partner(s) swore at me.	1	2	3	4	5
11b.	I swore at my partner(s).	1	2	3	4	5
12a.	My partner(s) yelled and screamed at me.	1	2	3	4	5
12b.	I screamed and yelled at my partner(s).	1	2	3	4	5
13a.	My partner(s) treated me like an inferior.	1	2	3	4	5
13b.	I treated my partner(s) like an inferior.	1	2	3	4	5
26a.	My partner(s) monitored my time and made me account for my whereabouts	1	2	3	4	5
26b.	I monitored my partner(s) time and made him account for his whereabouts	1	2	3	4	5
30a.	My partner(s) used our money or made important financial decisions without talking to me about it.	1	2	3	4	5
30b.	I used our money or made important financial decisions without talking to my partner(s) about it.	1	2	3	4	5
32a.	My partner(s) was jealous or suspicious of my friends.	1	2	3	4	5

32b.	I was jealous or suspicious of my partner(s) friends.	1	2	3	4	5
36a.	My partner(s) accused me of having an affair with another man.	1	2	3	4	5
36b.	I accused my partner(s) of having an affair with another woman.	1	2	3	4	5
39a.	My partner(s) interfered in my relationship with other family members.	1	2	3	4	5
39b.	I interfered in my partner(s)' relationship with other family members.	1	2	3	4	5
40a.	My partner(s) tried to keep me from doing things to help myself.	1	2	3	4	5
40b.	I tried to keep my partner(s) from doing things to help himself.	1	2	3	4	5
42a.	My partner(s) restricted my use of the telephone.	1	2	3	4	5
42b.	I restricted my partner(s) use of the telephone.	1	2	3	4	5
45a.	My partner(s) told me my feelings were irrational or crazy.	1	2	3	4	5
45a.	I told my partner(s) his feelings were irrational or crazy.	1	2	3	4	5
46a.	My partner(s) blamed me for his problems.	1	2	3	4	5
46b.	I blamed my partner(s) for my problems.	1	2	3	4	5
49a.	My partner(s) tried to make me feel crazy.	1	2	3	4	5
49b.	I tried to make my partner(s) feel crazy.	1	2	3	4	5

Behavior Rating Inventory of Executive Functioning – Preschool (Gioia et al., 2003) *Note: for both Parent and Teacher Report

During the past 6 months, please rate how often the following behaviors have been a problem for your child (if you are the teacher, 'your student').

N = NEVER S = SOMETIMES O = OFTEN

1.	Overreacts to small problems.	Ν	S	0
2.	When given two things to do, remembers only the first or last.	N	S	0
3.	Is unaware of how his/her behavior affects or bothers others.	N	S	0
4.	When instructed to clean up, puts things away in a disorganized, random way.	Ν	S	0
5.	Becomes upset with new situations.	Ν	S	0
6.	Has explosive, angry outbursts.	Ν	S	0
7.	Has trouble carrying out the actions needed to complete tasks (such as trying one puzzle piece at a time, cleaning up to earn a reward).	N	S	0
8.	Does not stop laughing at funny things or events when others stop.	N	S	0
9.	Needs to be told to begin a task even when willing to do it.	N	S	0
10.	Has trouble adjusting to new people (such as babysitter, teacher, friend, or day care worker).	Ν	S	0
11.	Becomes upset too easily.	N	S	0
12.	Has trouble concentrating on games, puzzles, or play activities.	N	S	0
13.	Has to be more closely supervised than similar playmates.	N	S	0
14.	When sent to get something, forgets what he/she is supposed to get.	N	S	0
15.	Is upset by a change in plans or routine (for example, order of daily activities, adding last minute errands to schedule, change in driving to the store).	Ν	S	0

16.	Has outbursts for little reason.	Ν	S	0
17.	Repeats the same mistakes over and over even after help is given.	N	S	0
18.	Acts wilder or sillier than other in groups (such as birthday parties, play group).	Ν	S	0
19.	Cannot find clothes, shoes, toys, or books even when he/she has been given specific instructions.	Ν	S	0
20.	Takes a long time to feel comfortable in new places or situations (such as visiting distant relatives or new friends).	Ν	S	0
21.	Mood changes frequently.	N	S	0
22.	Makes silly mistakes on things he/she can do.	N	S	0
23.	Is fidgety, restless, or squirmy.	N	S	0
24.	Has trouble following established routines for sleeping, eating, or play activities.	Ν	S	0
25.	Is bothered by loud noises, bright lights, or certain smells.	N	S	0
26.	Small events trigger big reactions.	N	S	0
27.	Has trouble with activities or tasks that have more than one step.	N	S	0
28.	Is impulsive.	N	S	0
29.	Has trouble thinking of a different way to solve a problem or complete an activity when stuck.	N	S	0
30.	Is disturbed by changes in the environment (such as new furniture, things in room moved around, or new clothes).	N	S	0
31.	Angry or tearful outbursts are intense but end suddenly.	N	S	0
32.	Needs help from adult to stay on task.	N	S	0
33.	Does not notice when his/her behavior causes negative reactions.	N	S	0
34.	Leaves messes that others have to clean up even after instruction.	N	S	0
35.	Has trouble changing activities.	Ν	S	0

36.	Reacts more strongly to situations than other children.	Ν	S	0
37.	Forgets what he/she is doing in the middle of an activity.	N	S	0
38.	Does not realize that certain actions bothers others.	N	S	0
39.	Gets caught up in the small details of a task or situation and misses the main idea.	N	S	0
40.	Has trouble "joining in" at unfamiliar social events (such as birthday parties, picnics, holiday gatherings).	Ν	S	0
41.	Is easily overwhelmed or overstimulated by typical daily activities.	N	S	0
42.	Has trouble finishing tasks (such as games, puzzles, pretend play activities).	Ν	S	0
43.	Gets out of control more than playmates.	N	S	0
44.	Cannot find things in room or play area even when given specific instructions.	Ν	S	0
45.	Resists change of routine, foods, places, etc.	N	S	0
46.	After having a problem, will stay disappointed for a long time.	Ν	S	0
47.	Cannot stay on the same topic when talking.	Ν	S	0
48.	Talks or plays too loudly.	Ν	S	0
49.	Does not complete tasks even after given directions.	Ν	S	0
50.	Acts overwhelmed or overstimulated in crowded, busy situations (such as lots of noise, activity, or people).	Ν	S	0
51.	Has trouble getting started on activities or tasks even after instructed.	Ν	S	0
52.	Acts too wild or out of control.	N	S	0
53.	Does not try as hard as his/her abilities on activities.	N	S	0
54.	Has trouble putting the brakes on his/her actions even after being asked.	Ν	S	0
55.	Unable to finish describing an event, person, or story.	Ν	S	0

56.	Completes tasks or activities too quickly.	Ν	S	0
57.	Is unaware when he/she does well and not well.	Ν	S	0
58.	Gets easily sidetracked during activities.	Ν	S	0
59.	Has trouble remembering something, even after a brief period of time.	Ν	S	0
60.	Becomes too silly.	Ν	S	0
61.	Has a short attention span.	Ν	S	0
62.	Plays carelessly or recklessly in situations where he/she could be hurt (such as playground, swimming pool).	Ν	S	0
63.	Is unaware when he/she performs a task right or wrong.	Ν	S	0

Child Behavior Checklist – 1 ½ - 5 (Achenbach & Rescorla, 2000)

Below is a list of items that describe children. For each item that describes the *now or within the past 2 months*, please circle the *2* if the item is *very true* or *often true* of the child. Circle the *1* if the item is *somewhat or sometimes true* of the child. If the item is *not true* of the child, circle the *0*. Please answer all items as well as you can, even if some do not seem to apply to the child.

- 0 = Not True (as far as you know)
- **1** = Somewhat or Sometimes True
- 2 = Very True or Often True

1.	Aches or pains (without medical cause; do not include stomach or headaches)	0	1	2
2.	Acts too young for age	0	1	2
3.	Afraid to try new things	0	1	2
4.	Avoids looking others in the eye	0	1	2
5.	Can't concentrate, can't pay attention for long	0	1	2
6.	Can't sit still, restless or hyperactive	0	1	2
7.	Can't stand having things out of place	0	1	2
8.	Can't stand waiting; wants everything now	0	1	2
9.	Chews on things that aren't edible	0	1	2
10.	Clings to adults or too dependent	0	1	2
11.	Constantly seeks help	0	1	2
12.	Constipated, doesn't move bowels (when not sick)	0	1	2
13.	Cries a lot	0	1	2
14.	Cruel to animals	0	1	2
15.	Defiant	0	1	2
16.	Demands must be met immediately	0	1	2
17.	Destroys his/her own things	0	1	2
18.	Destroys things belonging to his/her family or other children	0	1	2
19.	Diarrhea or loose bowels (when not sick)	0	1	2
20.	Disobedient	0	1	2
21.	Disturbed by any change in routine	0	1	2
22.	Doesn't want to sleep alone	0	1	2

23. Doesn't answer when people talk to him/her	0	1	2
24. Doesn't eat well	0	1	2
25. Doesn't get along with other children	0	1	2
26. Doesn't know how to have fun; acts like a little adult	0	1	2
27. Doesn't seem to feel guilty after misbehaving	0	1	2
28. Doesn't want to go out of home	0	1	2
29. Easily frustrated	0	1	2
30. Easily jealous	0	1	2
31. Eats or drinks things that are not food $- don't$ include sweets	0	1	2
32. Fears certain animals, situations, or places	0	1	2
33. Feelings are easily hurt	0	1	2
34. Gets hurt a lot, accident-prone	0	1	2
35. Gets in many fights	0	1	2
36. Gets into everything	0	1	2
37. Gets too upset when separated from parents	0	1	2
38. Has trouble getting to sleep	0	1	2
39. Headaches (without medical cause)	0	1	2
40. Hits others	0	1	2
41. Holds his/her breath	0	1	2
42. Hurts animals or people without meaning to	0	1	2
43. Looks unhappy without good reason	0	1	2
44. Angry moods	0	1	2
45. Nausea, feels sick (without medical cause)	0	1	2
46. Nervous movements or twitching	0	1	2
47. Nervous, highstrung, or tense	0	1	2
48. Nightmares	0	1	2
49. Overeating	0	1	2
50. Overtired	0	1	2
51. Shows panic for no good reason	0	1	2
52. Painful bowel movements (without medical cause)	0	1	2
53. Physically attacks people	0	1	2

54. Picks nose, skin, or other parts of body	0	1	2
55. Plays with own sex parts too much	0	1	2
56. Poorly coordinated or clumsy	0	1	2
57. Problems with eyes (without medical cause)	0	1	2
58. Punishment doesn't change his/her behavior	0	1	2
59. Quickly shifts from one activity to another	0	1	2
60. Rashes or other skin problems (without medical cause)	0	1	2
61. Refuses to eat	0	1	2
62. Refuses to play active games	0	1	2
63. Repeatedly rocks head or body	0	1	2
64. Resists going to bed at night	0	1	2
65. Resists toilet training	0	1	2
66. Screams a lot	0	1	2
67. Seems unresponsive to affection	0	1	2
68. Self-conscious or easily embarrassed	0	1	2
69. Selfish or won't share	0	1	2
70. Shows little affection toward people	0	1	2
71. Shows little interest in things around him/her	0	1	2
72. Shows too little fear of getting hurt	0	1	2
73. Too shy or timid	0	1	2
74. Sleeps less than most children during the day and/or night	0	1	2
75. Smears or plays with bowel movements	0	1	2
76. Speech problem	0	1	2
77. Stares into space or seems preoccupied	0	1	2
78. Stomachaches or cramps (without medical cause)	0	1	2
79. Rapid shifts between sadness and excitement	0	1	2
80. Strange behavior	0	1	2
81. Stubborn, sullen, or irritable	0	1	2
82. Sudden changes in mood or feelings	0	1	2
83. Sulks a lot	0	1	2
84. Talks or cries out in sleep	0	1	2

85. Temper tantrums or hot temper	0	1	2
86. Too concerned with neatness or cleanliness	0	1	2
87. Too fearful or anxious	0	1	2
88. Uncooperative	0	1	2
89. Underactive, slow moving, or lacks energy	0	1	2
90. Unhappy, sad, or depressed	0	1	2
91. Unusually loud	0	1	2
92. Upset by new people or situations	0	1	2
93. Vomiting, throwing up (without medical cause)	0	1	2
94. Wakes up often at night	0	1	2
95. Wanders away	0	1	2
96. Wants a lot of attention	0	1	2
97. Whining	0	1	2
98. Withdrawn, doesn't get involved with others	0	1	2
99. Worries	0	1	2
100. Please write in any problems the child has that were not listed above:	0	1	2
		-	

Child Behavior Checklist – Teacher Report Form (Achenbach & Rescorla, 2000)

- I. For how many months have you known this child? _____ months.
- II. How well do you know him/her? (circle one):
 - a. Not well
 - b. Moderately well
 - c. Very well
- III. Has he/she ever been referred for a special education program or special services? (circle

one):

- a. No
- b. Yes
- c. Don't know

Below is a list of items that describe children. For each item that describes the *child now or within the past 2 months*, please circle the *2* if the is *very true* or *often true* of the child. Circle the *1* if the item *is somewhat or sometimes true* of the child. If the item is *not true* of the child, circle the θ . Please answer all the items as well as you can, even if some do not seem to apply to the child.

- 0 = Not True (as far as you know)
- **1** = Somewhat or Sometimes True
- 2 = Very True or Often True

1.	Aches or pains (without medical cause; <i>do not</i> include stomach or headaches)	0	1	2
2.	Acts too young for age	0	1	2
3.	Afraid to try new things	0	1	2
4.	Avoids looking others in the eye	0	1	2
5.	Can't concentrate, can't pay attention for long	0	1	2
6.	Can't sit still, restless or hyperactive	0	1	2
7.	Can't stand having things out of place	0	1	2
8.	Can't stand waiting; wants everything now	0	1	2
9.	Chews on things that aren't edible	0	1	2
10.	Clings to adults or too dependent	0	1	2

11. Constantly seeks help	0	1	2
12. Apathetic or unmotivated	0	1	2
13. Cries a lot	0	1	2
14. Cruel to animals	0	1	2
15. Defiant	0	1	2
16. Demands must be met immediately	0	1	2
17. Destroys his/her own things	0	1	2
18. Destroys things belonging to others	0	1	2
19. Daydreams or gets lost in his/her thoughts	0	1	2
20. Disobedient	0	1	2
21. Disturbed by any change in routine	0	1	2
22. Cruelty, bullying, or meanness to others	0	1	2
23. Doesn't answer when people talk to him/her	0	1	2
24. Difficulty following directions	0	1	2
25. Doesn't get along with other children	0	1	2
26. Doesn't know how to have fun; acts like a little adult	0	1	2
27. Doesn't seem to feel guilty after misbehaving	0	1	2
28. Disturbs other children	0	1	2
29. Easily frustrated	0	1	2
30. Easily jealous	0	1	2
31. Eats or drinks things that are not food $-$ <i>don't</i> include sweets	0	1	2
32. Fears certain animals, situations, or places other than daycare or school	0	1	2
33. Feelings are easily hurt	0	1	2
34. Gets hurt a lot, accident-prone	0	1	2
35. Gets in many fights	0	1	2
36. Gets into everything	0	1	2
37. Gets too upset when separated from parents	0	1	2
38. Explosive and unpredictable behavior	0	1	2
39. Headaches (without medical cause)	0	1	2
40. Hits others	0	1	2
41. Holds his/her breath	0	1	2

42.	Hurts animals or people without meaning to	0	1	2
43.	Looks unhappy without good reason	0	1	2
44.	Angry moods	0	1	2
45.	Nausea, feels sick (without medical cause)	0	1	2
46.	Nervous movements or twitching	0	1	2
47.	Nervous, highstrung, or tense	0	1	2
48.	Fails to carry out assigned tasks	0	1	2
49.	Fears daycare or school	0	1	2
50.	Overtired	0	1	2
51.	Fidgets	0	1	2
52.	Gets teased by other children	0	1	2
53.	Physically attacks people	0	1	2
54.	Picks nose, skin, or other parts of body	0	1	2
55.	Plays with own sex parts too much	0	1	2
56.	Poorly coordinated or clumsy	0	1	2
57.	Problems with eyes (without medical cause)	0	1	2
58.	Punishment doesn't change his/her behavior	0	1	2
59.	Quickly shifts from one activity to another	0	1	2
60.	Rashes or other skin problems (without medical cause)	0	1	2
61.	Refuses to eat	0	1	2
62.	Refuses to play active games	0	1	2
63.	Repeatedly rocks head or body	0	1	2
64.	Inattentive, easily distracted	0	1	2
65.	Lying or cheating	0	1	2
66.	Screams a lot	0	1	2
67.	Seems unresponsive to affection	0	1	2
68.	Self-conscious or easily embarrassed	0	1	2
69.	Selfish or won't share	0	1	2
70.	Shows little affection toward people	0	1	2
71.	Shows little interest in things around him/her	0	1	2
72.	Shows too little fear of getting hurt	0	1	2

73. Too shy or timid	0	1	2
74. Not liked by other children	0	1	2
75. Overactive	0	1	2
76. Speech problem	0	1	2
77. Stares into space or seems preoccupied	0	1	2
78. Stomachaches or cramps (without medical cause)	0	1	2
79. Overconforms to rules	0	1	2
80. Strange behavior	0	1	2
81. Stubborn, sullen, or irritable	0	1	2
82. Sudden changes in mood or feelings	0	1	2
83. Sulks a lot	0	1	2
84. Teases a lot	0	1	2
85. Temper tantrums or hot temper	0	1	2
86. Too concerned with neatness or cleanliness	0	1	2
87. Too fearful or anxious	0	1	2
88. Uncooperative	0	1	2
89. Underactive, slow moving, or lacks energy	0	1	2
90. Unhappy, sad, or depressed	0	1	2
91. Unusually loud	0	1	2
92. Upset by new people or situations	0	1	2
93. Vomiting, throwing up (without medical cause)	0	1	2
94. Unclean personal appearance	0	1	2
95. Wanders away	0	1	2
96. Wants a lot of attention	0	1	2
97. Whining	0	1	2
98. Withdrawn, doesn't get involved with others	0	1	2
99. Worries	0	1	2
100. Please write in any problems the child has that were not listed above:	0	1	2

Posttraumatic Stress Disorder Semi-Structured Interview and Observational Record (Scheeringa et al., 2005)

"Now I am going to ask about upsetting events that may have occurred at any time in your child's life."

"Has your child ever experienced, witnessed, or learned about a loved one experiencing..."

1. An accident or crash with automobile, plane, or boat.	Date of event:
2. Attacked by an animal.	Date of event:
3. Man-made disasters (crashes, fires, war)	Date of event:
4. Natural disasters (hurricane, tornado, flood)	Date of event:
5. Has your child ever witnessed another person being beaten, raped, threatened with serious harm, shot at, seriously wounded, or killed (not including IPV)	Date of event:
6. Has your child ever experienced physical abuse	Date of event:
7. Has your child ever experienced sexual abuse, been sexually assault, or raped	Date of event:
<i>"Has your child experienced, witnessed, or heard about</i> 8. Accidental burn	" Date of event:
9. Near drowning	Date of event:
10. Hospitalization, emergency room visit, and/or invasive medical procedures	Date of event:
11. Kidnapped	Date of event:
12. <u>Any</u> item endorsed on the post -natal violence question (interviewer show the post-natal CTS2 and PMWI	naires <u>or</u> items 10, 11, or 12 on PMWI Y N
\rightarrow If YES, worst violent event the child was <u>in the</u>	house during (qualitative description):
Date of worst CTS2 or PMWI event:	

13. Other (Specify):

Date of event: _____

NOTE: IF NO EVENTS ARE ENDORSED, CHECK HERE _____ AND <u>skip to item</u> #P45 → Ask items P45 – P50 and then end PTSDSSI interview.

IF MORE THAN ONE EVENT, ASK:

"Which of these do you think caused the most emotional or behavior problems for your child?"

WRITE THE EVENT NUMBER 1-13

IF CHILD EXPERIENCED MORE THAN ONE EVENT, ASK THE QUESTIONS ON <u>THIS</u> <u>PAGE ONLY</u> ABOUT THE WORST EVENT.

"For <u>(worst event</u>), I'm going to ask you a list of reactions that s/he might have had in the seconds or minutes right after the event occurred"

P14. "Was s/he afraid or scared?"	"For how long?"	MIN.
P15. "Worried?"	"For how long?"	MIN.
P16. "Helpless?"	"For how long?"	MIN.
P17. "Angry?"	"For how long?"	MIN.
P18. "Sad?"	"For how long?"	MIN.
P19. "Surprised?"	"For how long?"	MIN.
P20. "Numb?"	"For how long?"	MIN.
P21. "Did s/he cry?"	"For how long?"	MIN.
P22. "Scream?"	"For how long?"	MIN.
P23. "Become agitated?"	"For how long?"	MIN.
P24. "Act aggressive?"	"For how long?"	MIN.
P25. "Look confused?"	"For how long?"	MIN.
P26. "Look out of touch like s/he was in a	daze?"	
	"For how long?"	MIN.
P27. "Seem physically sick, like sick to her	r stomach?"	
	"For how long?"	MIN.

"Now I'm going to ask you a bunch of questions about any symptoms your child might have developed since the event(s) you mentioned, such as *(list all endorsed on previous page)*. For

something to be a symptom it must be abnormal. I'll be repeating that a behavior needs to be "more than the average child his/her age." We know that sometimes this is obvious and sometimes it's hard to figure out." "Most symptoms that people show after traumas start right away. Some of them go away and some of them stick around. I only need to mark it if it is still around in the last 4 weeks."

IF A CHILD HAS EXPERIENCED MORE THAN ONE TRAUMATIC EVENT, ASK THE REMAINDER OF THE PTSD QUESTIONS FOR THE TOTALITY OF ALL EVENTS. THAT IS, SYMPTOMS CAN BE ENDORSED FOR ANY OF THE EVENTS. FREQUENCY = NUMBER OF TIMES IT OCCURRED DURING THE LAST 4 WEEKS.

P28. INTRUSIVE RECOLLECTIONS

"Does s/he have intrusive memories of the event(s)?"	Y	Ν
"Does s/he bring it up on his/her own?"	Y	Ν
IF YES, EXAMPLE:		

IF YES, "And this was present in the last 4 weeks?" Y N \rightarrow *IF NO*, *SKIP TO P29* Frequency?_____ Onset?___/___

Note: Only ask if P28 is YES → P28a. AFFECT WHEN TALKING ABOUT IT

"Does s/he look distressed or not distressed when s/he brings it up?" Y N

P29. PLAY REENACTMENT OF THE TRAUMA

"Does X reenact the event in her play with dolls or toys? This would be scenes that look just like the trauma?" "Does s/he act it out by him/herself or with other kids?" Y NIF YES, EXAMPLE:

IF YES, "And this was present in the last 4 weeks?" Y	N → <i>IF</i> NO , <i>SKIP TO P30</i>
Frequency?	
Onset?/	

P30. NON-PLAY REENACTMENT OF LIFE EVENT

"What about other times? Does s/he act it out at the grocery or mealtime?" Y N

IF YES, EXAMPLE:

IF YES, "And this was present in the last 4 weeks?" Frequency? Onset?/	$\mathbf{Y} \mathbf{N} \rightarrow IF \mathbf{NO}, SKIP TO P31$
P31. NIGHTMARES: ABOUT TRAUMA "Has s/he had any nightmares or bad dreams about the Y N IF YES, EXAMPLE:	e trauma that wake him/her up?"
IF YES, "And this was present in the last 4 weeks?" Frequency? Onset?/ P32. NIGHTMARES: INCREASED/ NOT ABOU "Is X having more nightmares than s/he used to have b trauma or not?"	Y N \rightarrow <i>IF NO</i> , <i>SKIP TO P32</i> F TRAUMA but you don't know if they are about the Y N
IF YES, EXAMPLE: IF YES, "And this was present in the last 4 weeks?" Y Frequency? Onset? /	Y N → <i>IF</i> NO , <i>SKIP TO P</i> 33
P33. FLASHBACKS "Since the event, has s/he felt as though the "life even when it wasn't? This is where a child is acting like the aren't in touch with reality. This is a pretty obvious th	t" was happening to him/her again, even by are back in the traumatic event and hing when it happens."

Ν

IF YES, EXAMPLE:

IT DID NOT HAVE TO HAPPEN IN THE PAST 4 WEEKS ONLY. THIS ITEM IS AN EXCEPTION TO THE 4 WEEK RULE. Frequency? _____ FREQUENCY = TOTAL OCCURRENCES SINCE LIFE EVENT. Duration? _____MIN Onset? ___/___

P34. DISSOCIATION

"Since (the event) has s/he had episodes when s/he seems to freeze? We call this dissociation where you try to snap him/her out of it but s/he was unresponsive." Y N IF YES, EXAMPLE:

IF YES, ask: "One of the best ways to tell if this was dissociation is if you wave your hand in front of their face and they don't even blink. Did you try that?

If further clarification needed, ask: "Did you try touching him/her on the shoulder to snap him/her out of it?

IT DID NOT HAVE TO HAPPEN IN THE PAST 4 WEEKS ONLY. THIS ITEM IS AN EXCEPTION TO THE 4 WEEK RULE.

Frequency? _____ FREQUENCY = TOTAL OCCURRENCES SINCE LIFE EVENT. Duration? _____MIN Onset? ___/___

P35. PSYCHOLOGICAL DISTRESS AT REMINDERS

"Does s/he get upset when exposed to reminders of the event(s)?" Y N PROBE WITH EXAMPLES THAT ARE SPECIFIC TO THIS CHILD'S EVENT(S). ASK ABOUT AS MANY SPECIFIC EXAMPLES AS YOU CAN THINK OF UNTIL YOU GET AN ENDORSEMENT OR RUN OUT OF EXAMPLES. IF YES, EXAMPLE:

IF YES, "And this was present in the last 4 weeks?" $\mathbf{Y} \quad \mathbf{N} \rightarrow IF NO, SKIP TO P36$ RECORD AVOIDANCE AND DISTRESS ITEMS EVEN IF THERE HAVE NOT BEEN ANY REMINDERS IN THE LAST 4 WEEKS BUT THE MOTHER BELIEVES THE SYMPTOM WOULD HAVE OCCURRED IF THERE HAD BEEN REMINDERS. Frequency? ______MIN

Onset? ___/____

P36. PHYSIOLOGICAL DISTRESS AT REMINDERS

"Does s/he get physically distressed when confronted by reminders? Like heart racing, shaking hands, sweaty, short of breath, or sick to his/her stomach?" Y N PROBE WITH EXAMPLES THAT ARE SPECIFIC TO THIS CHILD'S EVENT(S). ASK ABOUT AS MANY SPECIFIC EXAMPLES AS YOU CAN THINK OF UNTIL YOU GET AN ENDORSEMENT OR RUN OUT OF EXAMPLES. IF YES, EXAMPLE:

IF YES, "And this was present in the last 4 weeks?" $\mathbf{Y} \rightarrow IF NO$, SKIP TO P37 RECORD AVOIDANCE AND DISTRESS ITEMS EVEN IF THERE HAVE NOT BEEN ANY REMINDERS IN THE LAST 4 WEEKS BUT THE MOTHER BELIEVES THE SYMPTOM WOULD HAVE OCCURRED IF THERE HAD BEEN REMINDERS.

Frequency? _____ Duration? _____MIN Onset? ___/___

P37. AVOIDANCE OF THOUGHTS, FEELINGS, OR CONVERSATIONS

"Does s/he try to avoid conversations that might remind him/her of the trauma?" "Does s/he try to avoid private thoughts or feelings that might remind him/her of the trauma?" $\mathbf{Y} = \mathbf{N}$

PROBE WITH EXAMPLES THAT ARE SPECIFIC TO THIS CHILD'S EVENT(S). IF YES, EXAMPLE:

IF YES, "And this was present in the last 4 weeks?" Y N \rightarrow *IF NO*, *SKIP TO P38* RECORD AVOIDANCE AND DISTRESS ITEMS EVEN IF THERE HAVE NOT BEEN ANY REMINDERS IN THE LAST 4 WEEKS BUT THE MOTHER BELIEVES THE SYMPTOM WOULD HAVE OCCURRED IF THERE HAD BEEN REMINDERS.

Frequency? _____MIN Duration? _____MIN Onset? /

P38. AVOIDANCE OF PEOPLE, PLACES OR THINGS

"Does s/he try to avoid any things or places that might remind him/her of the trauma? I mean, can you tell that s/he is trying to avoid a reminder before s/he becomes upset?" Y

PROBE WITH EXAMPLES THAT ARE SPECIFIC TO THIS CHILD'S EVENT(S). ASK ABOUT AS MANY SPECIFIC EXAMPLES AS YOU CAN THINK OF UNTIL YOU GET AN ENDORSEMENT OR RUN OUT OF EXAMPLES.

IF YES, EXAMPLE:

IF YES, "And this was present in the last 4 weeks?" $\mathbf{Y} \quad \mathbf{N} \rightarrow IF NO, SKIP TO P40$ RECORD AVOIDANCE AND DISTRESS ITEMS EVEN IF THERE HAVE NOT BEEN ANY REMINDERS IN THE LAST 4 WEEKS BUT THE MOTHER BELIEVES THE SYMPTOM WOULD HAVE OCCURRED IF THERE HAD BEEN REMINDERS. Frequency? _____ Duration? _____MIN Onset? _____

P39. INABILITY TO RECALL AN IMPORTANT ASPECT OF THE EVENT

"Does s/he have difficulty remembering the incident?" "Has s/he seemed to have forgotten the entire event?" Y N

IF YES, EXAMPLE:

IF YES \rightarrow "And this was present in the last 4 weeks?" Y N

P40. LOSS OF INTEREST IN USUAL ACTIVITIES

"Has s/he lost interest in doing things that s/he used to like to do since the trauma?" IF NO, ASK: "Would you say s/he was not interested in much before the trauma but it's become substantially worse since then?" Y N IF YES, EXAMPLE:

IF YES, "And this was present in the last 4 weeks?" 0	1 IF NO, SKIP TO P41
Frequency?	
Onset? /	

P41. RESTRICTED RANGE OF AFFECT: LOSS OF POSITIVE AFFECT

"Since the trauma, s/he doesn't show as many happy emotions - lik	te smiles or laughs - on
his/her face, or doesn't show them as strongly as s/he used to?"	Y N

IF YES, EXAMPLE:

IF YES, "And this was present in the last 4 weeks?" Y N \rightarrow <i>IF NO</i> , <i>SKIP TO P42</i> Onset?
P42. RESTRICTED RANGE OF AFFECT: LOSS OF NEGATIVE AFFECT "And how about as many negative emotions – like sad, mad, or upset?" Y N IF YES, EXAMPLE:
IF YES, "And this was present in the last 4 weeks?" Y N \rightarrow <i>IF NO</i> , <i>SKIP TO P43</i> Onset?
P43. SENSE OF FORESHORTENED FUTURE "This may seem like an odd question, but has seemed to lose hope for the future. I mean, she/he said that she/he won't live long enough to be a big kid or she'll/he'll never be able to get married or get a job." Y N IF YES, EXAMPLE:
IF YES, "And this was present in the last 4 weeks?" Y N \rightarrow <i>IF NO</i> , <i>SKIP TO P44</i> Onset?
P44. DETACHMENT/ SOCIAL WITHDRAWAL "Since the trauma has s/he become more distant from family members and friends? I mean, s/he doesn't want to show affection or maybe even be around people?" Y N IF NO, ASK: "Would you say s/he was distant before the trauma but it's become substantially worse since then?" IF YES, EXAMPLE:
IF YES, "And this was present in the last 4 weeks?" $\mathbf{Y} \mathbf{N} \rightarrow IF NO$, SKIP TO P45 Onset?

P45. DIFFICULTY INITIATING SLEEP

"Has s/he had a hard time falling asleep since the trauma?" Y N IF NO, ASK: "Did s/he have trouble falling asleep before the trauma but it's become more difficult since then?"

IF NO TRAUMATIC EVENT(S) ENDORSED, USE FOLLOWING PROBE:

"Has there ever been a time for a period of 4 weeks or longer, that s/he had difficulty falling asleep? Did this happen more nights than not during this period of time? Did anything significant happen in his/her life around the same time that could have affected his/her sleep?"

IF YES to any of the above questions, EXAMPLE:

IF YES, "And this was present in the last 4 weeks?"	Y	$N \rightarrow IF NO$, SKIP TO P46	
Frequency?			
Duration? MIN			
Onset? /			

P46. NIGHT WAKING

"Has your child had trouble staying asleep during the night since the trauma?" Y N IF CHILD WAKES UP BECAUSE OF NIGHTMARES, CODE NIGHTMARES, NOT NIGHT WAKING. NIGHT TERRORS DO NOT COUNT AS NIGHT WAKING. IF NO, ASK: "Did s/he have trouble staying asleep before the trauma but it's become more difficult since then?

IF NO TRAUMATIC EVENT(S) ENDORSED, USE FOLLOWING PROBE:

"Has there ever been a time for a period of 4 weeks or longer, that s/he had trouble staying asleep? Did this happen more nights than not during this period of time? Did anything significant happen in his/her life around the same time that could have affected his/her sleep?" IF CHILD WAKES UP BECAUSE OF NIGHTMARES, DO NOT CODE. NIGHT TERRORS ALSO DO NOT COUNT AS NIGHT WAKING.

IF YES, EXAMPLE:

IF YES, "And this was present in the last 4 weeks?" $\mathbf{Y} \rightarrow IF NO$, SKIP TO P46 Frequency? _____ Duration? _____MIN Onset? _____

P47. IRRITABILITY/ ANGER/ TANTRUMS

"Has s/he been more irritable, or had outbursts of anger, or developed extreme temper tantrums since the trauma?" Y N

IF NO, ASK: "Would you say s/he was unusually irritable before the trauma but it's become substantially worse since then?"

IF NO TRAUMATIC EVENT(S) ENDORSED, USE FOLLOWING PROBE:

"Has there ever been a time for a period of 4 weeks or longer, that s/he has been very irritable, or had outbursts of anger, or developed extreme temper tantrums? Was this different than how your child normally feels or acts?"

IF YES, EXAMPLE:

IF YES, "And this was present in the last 4 weeks?" Y	$\mathbf{N} \rightarrow IF \mathbf{NO}$, SKIP TO P48
Duration?MIN Onset?/	

P48. DECREASED CONCENTRATION

"Has X had more trouble concentrating since (the event)?" Y N IF NO, ASK: "Did s/he have trouble concentrating before the trauma but it's become more difficult since then?"

IF NO TRAUMATIC EVENT(S) ENDORSED, USE FOLLOWING PROBE:

"Has there ever been a time for a period of 4 weeks or longer, that s/he has had trouble concentrating? Was this different than how your child normally is able to concentrate? Has your child been diagnosed with ADD or ADHD?"

IF YES, EXAMPLE:

IF YES, "And this was present in the last 4 weeks?" $\mathbf{Y} \rightarrow IF NO$, SKIP TO P49 Frequency? _____ Onset? /

P49. HYPERVIGILANCE

"Has s/he been more "on the alert" for bad things happening than before the trauma? I mean, does s/he look over her shoulder, looking out for danger?" Y N
IF NO, ASK: "Would you say s/he was hypervigilant before the trauma but it's become substantially worse since then?"

IF NO TRAUMATIC EVENT(S) ENDORSED, USE FOLLOWING PROBE:

"Has there ever been a time for a period of 4 weeks or longer, that s/he has been "on the alert" for bad things happenings, like looking over his/her shoulder for danger? Was this different than how your child normally acts?"

IF YES, EXAMPLE:

IF YES, "And this was present in the last 4 weeks?" Y N \rightarrow *IF NO*, *SKIP TO P50* Onset? _____

P50. EXAGGERATED STARTLE RESPONSE

"Has ______ startled more easily than before the trauma? I mean, if there's a loud noise or someone sneaks up behind him/her, does s/he jump and seem startled more than the average child that age?" Y N

INTERVIEWER OUGHT TO DEMONSTRATE STARTLE RESPONSE IF NO, ASK: "Would you say s/he was easily startled before the trauma but it's become substantially worse since then?"

IF NO TRAUMATIC EVENT(S) ENDORSED, USE FOLLOWING PROBE:

"Has there ever been a time for a period of 4 weeks or longer, that s/he has startled easily? I mean, if there's a loud noise or someone sneaks up behind him/her, does s/he jump and seem startled more than the average child that age? Was this different than how your child normally acts?"

IF YES, EXAMPLE:

IF YES, "And this was present in the last 4 weeks?" Y	Y	$N \rightarrow$	IF NO,	SKIP	TO P5
Frequency?					
Onset?/					

P51. AGGRESSION

"Has your child been more physically aggressive since the trauma? Like hitting, kicking, biting, or breaking things." Y = N

IF NO, ASK: "Would you say s/he was aggressive before the trauma but it's become substantially worse since then?"

IF YES, EXAMPLE:

IF YES, "And this was present in the last 4 weeks?" Y N \rightarrow <i>IF NO</i> , <i>SKIP TO P52</i> Frequency? Onset?
P52. SEPARATION ANXIETY "Has s/he developed separation anxiety, that is, become more clingy to you since the trauma?"
IF NO, ASK: "Would you say s/he was too clingy before the trauma but it's become substantially worse since then?" IF YES, EXAMPLE:
IF YES, "And this was present in the last 4 weeks?" Y N \rightarrow <i>IF NO</i> , <i>SKIP TO P53</i> Frequency? Duration?MIN Onset?
P53. NIGHT TERRORS 'Does s/he ever have what we call night terrors? This is where a person screams out like they': having a bad dream, but they don't wake up, and they don't remember it the next day." \mathbf{Y} N
USUALLY OCCUR IN FIRST 60 MINUTES OF SLEEP. NIGHTMARES USUALLY OCCUR AFTER THE FIRST 90 MINUTES OF SLEEP. IF YES, EXAMPLE:
IF YES, "And this was present in the last 4 weeks?" Y N \rightarrow <i>IF NO</i> , <i>SKIP TO P54</i> Frequency? Duration?MIN Onset?
P54. REGRESSION IN DEVELOPMENTAL SKILLS "Since the life event, has X gone backward in his/her development?" Y N

ONLY IF CHILD HAD SKILL BEFORE AND LOST IT AFTER LIFE EVENT. E.G., TOILETING, LANGUAGE, MOTOR SKILLS. IF YES, EXAMPLE:

IF YES, "And this was present in the last 4 weeks?" Y N \rightarrow *IF NO*, *SKIP TO P55* Onset? ____/____

P55. NEW FEARS NOT OBVIOUSLY TRAUMA-RELATED

"Since the trauma, has X developed any new fears about things that $\frac{\text{don't seem related}}{\text{Y}}$ to the trauma?" $\frac{\text{V}}{\text{N}}$

"What about going to the bathroom alone?" "Afraid of the dark now?" "Other?" If NO, ask: "Would you say s/he had any of these fears before the trauma but it's become substantially worse since then?"

IF YES, EXAMPLE:

IF YES, "And this was present in the last 4 weeks?" Y N \rightarrow *IF NO*, *SKIP TO P55* Onset? _____

Child Dissociative Checklist (Putnam, 1997)

Below is a list of behaviors that describe children. For each item that describes your child NOW or WITHIN THE PAST 12 MONTHS, please circle one of the following:

NT = NOT TRUE ST = SOMEWHAT OR SOMETIMES TRUE VT = VERY TRUE

1.	Child does not remember or denies traumatic or painful experiences that are known to have occurred.	NT	ST	VT
2.	Child goes into a daze or trance-like state at times or often appears "spaced-out." Teachers may report that he or she "daydreams" frequently in school.	NT	ST	VT
3.	Child shows rapid changes in personality. He or she may go from being shy to being outgoing, from feminine to masculine, from timid to aggressive.	NT	ST	VT
4.	Child is unusually forgetful or confused about things that he or she should know, e.g. may forget the names of friends, teachers, or other important people, loses possessions or gets easily lost.	NT	ST	VT
5.	Child has a very poor sense of time. He or she loses track of time may think that it is morning when it is actually afternoon, gets confused about what day it is, or becomes confused about when something has happened.	NT	ST	VT
6.	Child shows marked day-to-day or even hour-to-hour variations in his or her skills, knowledge, food preferences, athletic abilities, e.g. changes in handwriting, memory for previously learned information such as multiplication tables, spelling, use of tools or artistic ability.	NT	ST	VT
7.	Child shows rapid regressions in age-level behavior, e.g. a 12 year-old starts to use baby-talk, sucks thumb, or draws like a 4 year-old.	NT	ST	VT
8.	Child has a difficult time learning from experience, e.g., explanations, normal discipline or punishment do not change his or her behavior.	NT	ST	VT
9.	Child continues to lie or deny misbehavior even when the evidence is obvious.	NT	ST	VT

10.	Child refers to himself or herself in third person (e.g., as she or her) when talking about self, or at times insists on being called by a different name. He or she may also claim that things that he or she did actually happened to another person.	NT	ST	VT
11.	Child has rapidly changing physical complaints such as a headache or upset stomach. For example, he or she may complain of a headache one minute and seem to forget about it the next.	NT	ST	VT
12.	Child is unusually sexually precocious and may attempt age-inappropriate sexual behavior with older children or adults.	NT	ST	VT
13.	Child suffers from unexplained injuries or may even deliberately injure self at times.	NT	ST	VT
14.	Child reports hearing voices that talk to him or her. The voices may be friendly or angry and may come from "imaginary friends" or sound like the voices of parents, friends, or teachers.	NT	ST	VT
15.	Child has a vivid imaginary companion(s). Child may insist that the imaginary companion(s) is responsible for things that he or she has done.	NT	ST	VT
16.	Child has intense outbursts of anger, often without apparent cause and may display unusual physical strength during these episodes.	NT	ST	VT
17.	Child sleepwalks frequently.	NT	ST	VT
18.	Child has unusual nighttime experiences, e.g. may report seeing "ghosts" or that things happen at night that he or she can't account for (e.g., broken toys, unexplained injuries).	NT	ST	VT
19.	Child frequently talks to him or herself, may use a difference voice or argue with self at times.	NT	ST	VT
20.	Child has two or more distinct and separate personalities that take control over the child's behavior.	NT	ST	VT

Stanford-Binet Intelligence Scales for Early Childhood* (Roid, 2003)

Materials: Early SB5 testing kit, including answer response sheets and stimulus presentation books.

Both non-verbal and verbal working memory will be assessed using the tasks from the Working Memory Index on the Early SB5 (Roid, 2003). Two sub-tests will assess non-verbal working memory, including a delayed response task, where the child must watch the examiner hide an object and then wait before indicating where the hidden object is located, and a block span task that measures children's ability to observe and mimic a motor-spatial sequence (the examiner touching a series of blocks in a predetermined order, which gets progressively more difficult as the number of blocks included in each trial is increased). Likewise, two sub-tests will assess the preschoolers' verbal working memory. The first is a task that requires the children to remember progressively longer sentences they hear the examiner read and then are required to repeat the sentences back to the examiner verbatim. A second sub-test of verbal working memory requires the participants to listen to a sentence posed as a question and repeat only the last word of the sentence back to the examiner. The Working Memory Index from the Early SB5 has excellent reported validity and reliability (Strauss et al., 2006).

**Note*. The Stanford-Binet is an assessment battery that cannot be fully reproduced here, as each of the subtests require stimulus materials. Thus, a brief description of this well-validated measure follows.

Dimensional Change Card Sort* (Frye et al., 1995) (Protocol based on Zelazo, 2006)

Materials: Two sorting trays approximately 11.5 cm long, 9.5 cm wide, and 2 cm deep. Two vertical pieces of foamcore board with velcro attached (to display affixed target cards behind sorting trays).
Two laminated target cards: each card is 10.5 cm x 7 cm with velcro attached to back. One card depicts of blue rabbit and the other depicts a red row boat.
Twelve test cards (same dimensions as target cards). Half (n = 6) depict a red rabit, while the other half depict a blue row boat.

INTERVIEWER: Place two trays on table, in front of child, and within the child's reach. Affix the two target cards to the vertical foam core boards (one per board) and place one board behind each tray.

"Here's a blue rabbit and here's a red boat. Now we are going to play a card game. This is the color game. In the color game, all the blue ones go here [pointing to the tray with the blue rabbit], and all of the red ones go here [pointing to the tray with the red boat]."

DEMONSTRATION:

"See, here's a blue one. So it goes here [place the card face down in the appropriate tray]. If it's blue, it goes here [point to tray], but if it's red it goes there [point to tray]."

"Now here's a red one. Where does this one go?"

Demonstration Correct? Y N
If PRE-TRIAL IS CORRECT, say "Very good! You know how to play the color game."
If child POINTS, say "Can you help me put this red one down?"
If NO, say "No, this one's red, so it has to go over here in the color game. Can you help me put this red one down?"

NOTE: The cards must be placed <u>face down</u> in the trays. If the child places the card face up, turn the card over before handing the child another card to sort.

PRE-SWITCH TRIALS:

"Now it's your turn. So remember, if it's blue it goes here, but if it's red it goes there."
-Select first test card and label it by the relevent dimension only (e.g., say "Here's a blue one. Where does it go?")
-If the child point to a tray, sort the cards for him or her. Ensure that whomever sorts the cards, that the cards are placed <u>face down</u> in the sorting trays.
-For each new randomly presented card, use <u>one</u> of the following prompts: "Here's a blue one, where does this one go?"

"Let's do another one." "Let's do it again." "How about another one?"

-Do not say "Okay" or let the child know if they sorted the cards correctly.

Trial #	Relevant Dimension	Correct Sort?
1 - Boat	Blue	Y N
2 – Rabbit	Red	Y N
3 – Boat	Blue	Y N
4 – Rabbit	Red	Y N
5 – Rabbit	Red	Y N
6 - Boat	Blue	Y N

POST-SWITCH TRIALS:

"Now we're going to play a new game. We're not going to play the color game anymore. We're going to play the shape game. In the shape game, all the rabbits go here [pointing to the correct tray], and all the boats go there [point to the correct tray]. Remember, if it's a rabbit, put it here [point], but if it's a boat put it there [point]. Okay?"

Hand the child the seventh card.

"Where does this one go?" Regardless of the child's performance, say "Let's do another one."

Proceed to administer all six trials in the same manner as the pre-switch trials. Do <u>not</u> indicate whether the sorts are correct.

Trial #	Relevant Dimension	Correct Sort?
7 – Rabbit	Rabbit	Y N
8 – Boat	Boat	Y N
9 – Rabbit	Rabbit	Y N
10 – Boat	Boat	Y N
11 – Boat	Boat	Y N
12 - Rabbit	Rabbit	Y N

Peg Tapping Task (Diamond & Taylor, 1996)

"When I tap one time like this (Experimenter taps once), I want you to tap two times like this (Experimenter taps twice). Let's try that."

Rule #1: "When I tap one time (Experimenter taps once), you tap...(Experimenter holds the dowel for the child to tap)."

Demonstration Trial #1 Correct? Y N If CORRECT, provide significant praise. If NO, re-explain and demonstrate the rule again.

"Now, when I tap two times like this (Experimenter taps twice), I want you to tap one time like this (Experimenter taps once). Let's try that."

Rule #2: "When I tap two times (Experimenter taps twice), you tap... (Experimenter holds the dowel for the child to tap)."

Demonstration Trial #2 Correct? Y N If CORRECT, provide significant praise \rightarrow see note below. If NO, re-explain and demonstrate the rule again.

REGARDLESS OF PERFORMANCE, DO <u>NOT</u> GIVE ANY FEEDBACK ON THE FOLLOWING TRIALS:

Trial #	# of Experimenter Taps	# of Child Taps	Trial Correct?
1	1		Y N
2	2		Y N
3	2		Y N
4	1		Y N
5	2		Y N
6	2		Y N
7	1		Y N
8	1		Y N
9	1		Y N
10	2		Y N
11	1		Y N
12	2		Y N
13	2		Y N
14	1		Y N
15	1		Y N
16	2		Y N

Day-Night Task (Gerstadt et al., 1994)

Materials: Two stimulus cards – one painted with brightly with a blue sky and a yellow sun and another painted black with stars and a white moon.

Rule #1: SHOW CHILD 'NIGHT' CARD: "When you see this card, I want you to say 'day'." → IF NECESSESARY, PROMPT WITH "What do you say for this one?"

Demonstration Trial #1 Correct? Y N If CORRECT, provide significant praise. If NO, re-explain and demonstrate the rule again.

Rule #2: SHOW CHILD 'DAY' CARD: "When you see this card, I want you to say 'night'." → IF NECESSESARY, PROMPT WITH "What do you say for this one?"

Demonstration Trial #2 Correct? Y N If CORRECT, provide significant praise. If NO, re-explain and demonstrate the rule again.

REGARDLESS OF PERFORMANCE, DO <u>NOT</u> GIVE ANY FEEDBACK ON THE FOLLOWING TRIALS:

Trial #	Card	CORRECT	Child's	Trial Correct?
		Response	Response	
			(D or N)	
1	Moon	"Day"		Y N
2	Sun	"Night"		Y N
3	Sun	"Night"		Y N
4	Moon	"Day"		Y N
5	Sun	"Night"		Y N
6	Moon	"Day"		Y N
7	Moon	"Day"		Y N
8	Sun	"Night"		Y N
9	Sun	"Night"		Y N
10	Moon	"Day"		Y N
11	Sun	"Night"		Y N
12	Moon	"Day"		Y N
13	Moon	"Day"		Y N
14	Sun	"Night"		Y N
15	Moon	"Day"		Y N
16	Sun	"Night"		Y N

APPENDIX I

ADDITIONAL CFA FIGURES AND TABLES NOT INCLUDED IN TEXT





Note. Chi-Square = 216.26 (*df* = 34), *p* = 0.000; RMSEA = 0.194 (90% C.I. = 0.17 – 0.22); CFI = 0.38; GFI = 0.77; SRMR = 0.16.

Fit Indices for CFA Model #1: AC, WM, and IC Latent Factors

Degrees of Freedom = 34Minimum Fit Function Chi-Square = 240.63 (P = 0.0) Normal Theory Weighted Least Squares Chi-Square = 216.24 (P = 0.0) Estimated Non-centrality Parameter (NCP) = 182.2490 Percent Confidence Interval for NCP = (139.50; 232.48)Minimum Fit Function Value = 1.69 Population Discrepancy Function Value (F0) = 1.2890 Percent Confidence Interval for F0 = (0.98; 1.64)Root Mean Square Error of Approximation (RMSEA) = 0.1990 Percent Confidence Interval for RMSEA = (0.17; 0.22)P-Value for Test of Close Fit (RMSEA < 0.05) = 0.00 Expected Cross-Validation Index (ECVI) = 1.8290 Percent Confidence Interval for ECVI = (1.52; 2.17)ECVI for Saturated Model = 0.77ECVI for Independence Model = 2.81Chi-Square for Independence Model with 45 Degrees of Freedom = 379.48Independence AIC = 399.48Model AIC = 258.24Saturated AIC = 110.00Independence CAIC = 439.10Model CAIC = 341.46Saturated CAIC = 327.96Normed Fit Index (NFI) = 0.37Non-Normed Fit Index (NNFI) = 0.18Parsimony Normed Fit Index (PNFI) = 0.28Comparative Fit Index (CFI) = 0.38Incremental Fit Index (IFI) = 0.40Relative Fit Index (RFI) = 0.16Critical N (CN) = 34.08Root Mean Square Residual (RMR) = 16.00Standardized RMR = 0.16Goodness of Fit Index (GFI) = 0.77Adjusted Goodness of Fit Index (AGFI) = 0.62Parsimony Goodness of Fit Index (PGFI) = 0.47

T-scores of Parameter Estimates for CFA Model #2: MR, TR, and LA Latent Factors



Note. Chi-Square = 36.84 (*df* = 32), *p* = 0.255; RMSEA = 0.033 (90% C.I. = 0.00 – 0.07); CFI = 0.98; GFI = 0.95; SRMR = 0.05.

Fit Indices for CFA Model #2: MR, TR, and LA Latent Factors

Degrees of Freedom = 32Minimum Fit Function Chi-Square = 37.74 (P = 0.22) Normal Theory Weighted Least Squares Chi-Square = 36.84 (P = 0.25) Estimated Non-centrality Parameter (NCP) = 4.8490 Percent Confidence Interval for NCP = (0.0; 24.08)Minimum Fit Function Value = 0.27Population Discrepancy Function Value (F0) = 0.03490 Percent Confidence Interval for F0 = (0.0; 0.17)Root Mean Square Error of Approximation (RMSEA) = 0.03390 Percent Confidence Interval for RMSEA = (0.0; 0.073)P-Value for Test of Close Fit (RMSEA < 0.05) = 0.72 Expected Cross-Validation Index (ECVI) = 0.5890 Percent Confidence Interval for ECVI = (0.55; 0.72)ECVI for Saturated Model = 0.77ECVI for Independence Model = 2.81Chi-Square for Independence Model with 45 Degrees of Freedom = 379.48Independence AIC = 399.48Model AIC = 82.84Saturated AIC = 110.00Independence CAIC = 439.10Model CAIC = 173.98Saturated CAIC = 327.96Normed Fit Index (NFI) = 0.90Non-Normed Fit Index (NNFI) = 0.98Parsimony Normed Fit Index (PNFI) = 0.64Comparative Fit Index (CFI) = 0.98Incremental Fit Index (IFI) = 0.98Relative Fit Index (RFI) = 0.86Critical N (CN) = 202.25Root Mean Square Residual (RMR) = 3.06Standardized RMR = 0.050Goodness of Fit Index (GFI) = 0.95Adjusted Goodness of Fit Index (AGFI) = 0.92Parsimony Goodness of Fit Index (PGFI) = 0.55

APPENDIX J

ADDITIONAL SEM FIGURES AND TABLES NOT INCLUDED IN TEXT

T-scores for SEM #1: Maternal Reported EF and Behavior Problems



Note. Chi-Square = 14.81 (df = 9), p = 0.096; RMSEA = 0.067 (90% C.I. = 0.00 - 0.13); CFI = 0.99; GFI = 0.97; SRMR = 0.024; R² for Behavior Problems = 0.83.

Fit Indices for SEM #1: Maternal Reported EF and Behavior Problems

Degrees of Freedom = 9Minimum Fit Function Chi-Square = 14.96 (P = 0.092) Normal Theory Weighted Least Squares Chi-Square = 14.81 (P = 0.096) Estimated Non-centrality Parameter (NCP) = 5.8190 Percent Confidence Interval for NCP = (0.0; 20.49)Minimum Fit Function Value = 0.11Population Discrepancy Function Value (F0) = 0.04190 Percent Confidence Interval for F0 = (0.0; 0.14)Root Mean Square Error of Approximation (RMSEA) = 0.06790 Percent Confidence Interval for RMSEA = (0.0; 0.13)P-Value for Test of Close Fit (RMSEA < 0.05) = 0.28 Expected Cross-Validation Index (ECVI) = 0.3790 Percent Confidence Interval for ECVI = (0.33; 0.48)ECVI for Saturated Model = 0.39ECVI for Independence Model = 4.65Chi-Square for Independence Model with 21 Degrees of Freedom = 646.13Independence AIC = 660.13Model AIC = 52.81Saturated AIC = 56.00Independence CAIC = 687.87Model CAIC = 128.10Saturated CAIC = 166.96Normed Fit Index (NFI) = 0.98Non-Normed Fit Index (NNFI) = 0.98Parsimony Normed Fit Index (PNFI) = 0.42Comparative Fit Index (CFI) = 0.99Incremental Fit Index (IFI) = 0.99Relative Fit Index (RFI) = 0.95Critical N (CN) = 206.68Root Mean Square Residual (RMR) = 1.66Standardized RMR = 0.024Goodness of Fit Index (GFI) = 0.97Adjusted Goodness of Fit Index (AGFI) = 0.91Parsimony Goodness of Fit Index (PGFI) = 0.31

T-scores for SEM #2: Teacher Reported EF and Behavior Problems



Note. Chi-Square = 17.10 (df = 11), p = 0.105; RMSEA = 0.063 (90% C.I. = 0.00 – 0.12); CFI = 0.98; GFI = 0.97; SRMR = 0.033; R² for Behavior Problems = 1.00 (variance for Behavior Problems was not estimated).

Fit Indices for SEM #2: Teacher Reported EF and Behavior Problems

Degrees of Freedom = 11Minimum Fit Function Chi-Square = 18.32 (P = 0.074) Normal Theory Weighted Least Squares Chi-Square = 17.10 (P = 0.10) Estimated Non-centrality Parameter (NCP) = 6.1090 Percent Confidence Interval for NCP = (0.0; 21.44)Minimum Fit Function Value = 0.13Population Discrepancy Function Value (F0) = 0.04390 Percent Confidence Interval for F0 = (0.0; 0.15)Root Mean Square Error of Approximation (RMSEA) = 0.06390 Percent Confidence Interval for RMSEA = (0.0; 0.12)P-Value for Test of Close Fit (RMSEA < 0.05) = 0.32 Expected Cross-Validation Index (ECVI) = 0.3690 Percent Confidence Interval for ECVI = (0.32; 0.47)ECVI for Saturated Model = 0.39ECVI for Independence Model = 2.61Chi-Square for Independence Model with 21 Degrees of Freedom = 356.76 Independence AIC = 370.76Model AIC = 51.10Saturated AIC = 56.00Independence CAIC = 398.50Model CAIC = 118.47Saturated CAIC = 166.96Normed Fit Index (NFI) = 0.95Non-Normed Fit Index (NNFI) = 0.96Parsimony Normed Fit Index (PNFI) = 0.50Comparative Fit Index (CFI) = 0.98Incremental Fit Index (IFI) = 0.98Relative Fit Index (RFI) = 0.90Critical N (CN) = 192.64Root Mean Square Residual (RMR) = 3.28Standardized RMR = 0.033Goodness of Fit Index (GFI) = 0.97Adjusted Goodness of Fit Index (AGFI) = 0.92Parsimony Goodness of Fit Index (PGFI) = 0.38

Standardized Estimates for Attempted SEM Replication of Milot et al.'s (2010) Findings: Teacher Reported Behavior Problems



Note. Chi-Square = 14.26 (df = 7), p = 0.047; RMSEA = 0.085 (90% C.I. = 0.01 – 0.15); CFI = 0.96; GFI = 0.97; SRMR = 0.031. * p < .05; [†]significance test is not conducted.

T-scores for Attempted SEM Replication of Milot et al.'s (2010) Findings: Teacher Reported Behavior Problems



Note: Chi-Square = 14.26 (*df* = 7), *p* = 0.047; RMSEA = 0.085 (90% C.I. = 0.01 – 0.15); CFI = 0.96; GFI = 0.97; SRMR = 0.031.

Table 21

Fit Indices for Attempted SEM Replication of Milot et al.'s (2010) Findings: Teacher Reported Behavior Problems

Degrees of Freedom = 7Minimum Fit Function Chi-Square = 15.19 (P = 0.034) Normal Theory Weighted Least Squares Chi-Square = 14.26 (P = 0.047) Estimated Non-centrality Parameter (NCP) = 7.2690 Percent Confidence Interval for NCP = (0.094 ; 22.12)Minimum Fit Function Value = 0.11Population Discrepancy Function Value (F0) = 0.05190 Percent Confidence Interval for F0 = (0.00066; 0.16)Root Mean Square Error of Approximation (RMSEA) = 0.08590 Percent Confidence Interval for RMSEA = (0.0097; 0.15)P-Value for Test of Close Fit (RMSEA < 0.05) = 0.16 Expected Cross-Validation Index (ECVI) = 0.3090 Percent Confidence Interval for ECVI = (0.25; 0.40)ECVI for Saturated Model = 0.30ECVI for Independence Model = 1.62Chi-Square for Independence Model with 15 Degrees of Freedom = 217.90Independence AIC = 229.90Model AIC = 42.26Saturated AIC = 42.00Independence CAIC = 253.68Model CAIC = 97.73Saturated CAIC = 125.22Normed Fit Index (NFI) = 0.93Non-Normed Fit Index (NNFI) = 0.91Parsimony Normed Fit Index (PNFI) = 0.43Comparative Fit Index (CFI) = 0.96Incremental Fit Index (IFI) = 0.96Relative Fit Index (RFI) = 0.85Critical N (CN) = 173.69Root Mean Square Residual (RMR) = 3.10Standardized RMR = 0.031Goodness of Fit Index (GFI) = 0.97Adjusted Goodness of Fit Index (AGFI) = 0.90Parsimony Goodness of Fit Index (PGFI) = 0.32

Standardized Estimates for Attempted SEM Replication of Milot et al.'s (2010) Findings: Maternal Reported Behavior Problems



Note. Chi-Square = 14.32 (df = 7), p = 0.046; RMSEA = 0.086 (90% C.I. = 0.01 – 0.15); CFI = 0.98; GFI = 0.97; SRMR = 0.025. * p < .05; [†]significance test is not conducted.

T-scores for Attempted SEM Replication of Milot et al.'s (2010) Findings: Maternal Reported Behavior Problems



Note. Chi-Square = 14.32 (*df* = 7), *p* = 0.046; RMSEA = 0.086 (90% C.I. = 0.01 – 0.15); CFI = 0.98; GFI = 0.97; SRMR = 0.025.

Table 22

Fit Indices for Attempted SEM Replication of Milot et al.'s (2010) Findings: Maternal Reported Behavior Problems

Degrees of Freedom = 7Minimum Fit Function Chi-Square = 14.59 (P = 0.042)Normal Theory Weighted Least Squares Chi-Square = 14.32 (P = 0.046) Estimated Non-centrality Parameter (NCP) = 7.3290 Percent Confidence Interval for NCP = (0.13; 22.22)Minimum Fit Function Value = 0.10Population Discrepancy Function Value (F0) = 0.05290 Percent Confidence Interval for F0 = (0.00091; 0.16)Root Mean Square Error of Approximation (RMSEA) = 0.08690 Percent Confidence Interval for RMSEA = (0.011 ; 0.15)P-Value for Test of Close Fit (RMSEA < 0.05) = 0.15 Expected Cross-Validation Index (ECVI) = 0.3090 Percent Confidence Interval for ECVI = (0.25; 0.40)ECVI for Saturated Model = 0.30ECVI for Independence Model = 2.83Chi-Square for Independence Model with 15 Degrees of Freedom = 389.98 Independence AIC = 401.98Model AIC = 42.32Saturated AIC = 42.00Independence CAIC = 425.76Model CAIC = 97.80Saturated CAIC = 125.22Normed Fit Index (NFI) = 0.96Non-Normed Fit Index (NNFI) = 0.96Parsimony Normed Fit Index (PNFI) = 0.45Comparative Fit Index (CFI) = 0.98Incremental Fit Index (IFI) = 0.98Relative Fit Index (RFI) = 0.92Critical N (CN) = 180.83Root Mean Square Residual (RMR) = 1.60 Standardized RMR = 0.025Goodness of Fit Index (GFI) = 0.97Adjusted Goodness of Fit Index (AGFI) = 0.90Parsimony Goodness of Fit Index (PGFI) = 0.32

T-scores for SEM #3: Maternal Reported EF and Teacher Reported Behavior Problems



Note. Chi-Square = 14.44 (df = 10), p = 0.154; RMSEA = 0.056 (90% C.I. = 0.00 - 0.11); CFI = 0.98; GFI = 0.97; SRMR = 0.028; R² for Behavior Problems = 0.12.

Fit Indices for SEM #3: Maternal Reported EF and Teacher Reported Behavior Problems

Degrees of Freedom = 10Minimum Fit Function Chi-Square = 15.86 (P = 0.10) Normal Theory Weighted Least Squares Chi-Square = 14.44 (P = 0.15) Estimated Non-centrality Parameter (NCP) = 4.4490 Percent Confidence Interval for NCP = (0.0; 18.72)Minimum Fit Function Value = 0.11Population Discrepancy Function Value (F0) = 0.03190 Percent Confidence Interval for F0 = (0.0; 0.13)Root Mean Square Error of Approximation (RMSEA) = 0.05690 Percent Confidence Interval for RMSEA = (0.0; 0.11)P-Value for Test of Close Fit (RMSEA < 0.05) = 0.39 Expected Cross-Validation Index (ECVI) = 0.3690 Percent Confidence Interval for ECVI = (0.32; 0.46)ECVI for Saturated Model = 0.39ECVI for Independence Model = 2.52Chi-Square for Independence Model with 21 Degrees of Freedom = 343.73Independence AIC = 357.73Model AIC = 50.44Saturated AIC = 56.00Independence CAIC = 385.47Model CAIC = 121.78Saturated CAIC = 166.96Normed Fit Index (NFI) = 0.95Non-Normed Fit Index (NNFI) = 0.96Parsimony Normed Fit Index (PNFI) = 0.45Comparative Fit Index (CFI) = 0.98Incremental Fit Index (IFI) = 0.98Relative Fit Index (RFI) = 0.90Critical N (CN) = 208.82Root Mean Square Residual (RMR) = 2.65Standardized RMR = 0.028Goodness of Fit Index (GFI) = 0.97Adjusted Goodness of Fit Index (AGFI) = 0.92Parsimony Goodness of Fit Index (PGFI) = 0.35

T-scores for SEM #4: Teacher Reported EF and Maternal Reported Behavior Problems



Note. Chi-Square = 14.73 (df = 10), p = 0.142; RMSEA = 0.058 (90% C.I. = 0.00 - 0.12); CFI = 0.99; GFI = 0.97; SRMR = 0.026; R² for Behavior Problems = 0.51.

Fit Indices for SEM #4: Teacher Reported EF and Maternal Reported Behavior Problems

Degrees of Freedom = 10Minimum Fit Function Chi-Square = 14.78 (P = 0.14) Normal Theory Weighted Least Squares Chi-Square = 14.73 (P = 0.14) Estimated Non-centrality Parameter (NCP) = 4.7390 Percent Confidence Interval for NCP = (0.0; 19.15)Minimum Fit Function Value = 0.10Population Discrepancy Function Value (F0) = 0.03390 Percent Confidence Interval for F0 = (0.0; 0.13)Root Mean Square Error of Approximation (RMSEA) = 0.05890 Percent Confidence Interval for RMSEA = (0.0; 0.12)P-Value for Test of Close Fit (RMSEA < 0.05) = 0.37 Expected Cross-Validation Index (ECVI) = 0.3690 Percent Confidence Interval for ECVI = (0.32; 0.46)ECVI for Saturated Model = 0.39ECVI for Independence Model = 2.88Chi-Square for Independence Model with 21 Degrees of Freedom = 394.84 Independence AIC = 408.84Model AIC = 50.73Saturated AIC = 56.00Independence CAIC = 436.58Model CAIC = 122.06Saturated CAIC = 166.96Normed Fit Index (NFI) = 0.96Non-Normed Fit Index (NNFI) = 0.97Parsimony Normed Fit Index (PNFI) = 0.46Comparative Fit Index (CFI) = 0.99Incremental Fit Index (IFI) = 0.99Relative Fit Index (RFI) = 0.92Critical N (CN) = 224.05Root Mean Square Residual (RMR) = 1.81Standardized RMR = 0.026Goodness of Fit Index (GFI) = 0.97Adjusted Goodness of Fit Index (AGFI) = 0.92Parsimony Goodness of Fit Index (PGFI) = 0.35





Note. Chi-Square = 13.67 (df = 10), p = 0.189; RMSEA = 0.051 (90% C.I. = 0.00 – 0.11); CFI = 1.00; GFI = 1.00; SRMR = 0.023; R² for Behavior Problems = 1.00 (variance for Behavior Problems was not estimated).

Fit Indices for SEM #5: Lab Assessed EF and Maternal Reported Behavior Problems

Degrees of Freedom = 10Normal Theory Weighted Least Squares Chi-Square = 13.67 (P = 0.19) Estimated Non-centrality Parameter (NCP) = 3.6790 Percent Confidence Interval for NCP = (0.0; 17.55)Minimum Fit Function Value = 0.014Population Discrepancy Function Value (F0) = 0.02690 Percent Confidence Interval for F0 = (0.0; 0.12)Root Mean Square Error of Approximation (RMSEA) = 0.05190 Percent Confidence Interval for RMSEA = (0.0; 0.11)P-Value for Test of Close Fit (RMSEA < 0.05) = 0.44 Expected Cross-Validation Index (ECVI) = 0.3590 Percent Confidence Interval for ECVI = (0.32; 0.45)ECVI for Saturated Model = 0.39ECVI for Independence Model = 2.91Chi-Square for Independence Model with 21 Degrees of Freedom = 398.65 Independence AIC = 412.65Model AIC = 49.67Saturated AIC = 56.00Independence CAIC = 440.39Model CAIC = 121.00Saturated CAIC = 166.96Normed Fit Index (NFI) = 1.00Non-Normed Fit Index (NNFI) = 1.06Parsimony Normed Fit Index (PNFI) = 0.48Comparative Fit Index (CFI) = 1.00Incremental Fit Index (IFI) = 1.03Relative Fit Index (RFI) = 1.00Root Mean Square Residual (RMR) = 0.023Standardized RMR = 0.023Goodness of Fit Index (GFI) = 1.00Adjusted Goodness of Fit Index (AGFI) = 0.99Parsimony Goodness of Fit Index (PGFI) = 0.36





Note. Chi-Square = 19.32 (df = 11), p = 0.056; RMSEA = 0.073 (90% C.I. = 0.00 - 0.13); CFI = 0.95; GFI = 0.96; SRMR = 0.044; R² for Behavior Problems = 0.10.

Fit Indices for SEM #6: Lab Assessed EF and Teacher Reported Behavior Problems

Degrees of Freedom = 11Minimum Fit Function Chi-Square = 21.05 (P = 0.033) Normal Theory Weighted Least Squares Chi-Square = 19.32 (P = 0.056) Estimated Non-centrality Parameter (NCP) = 8.3290 Percent Confidence Interval for NCP = (0.0; 24.63)Minimum Fit Function Value = 0.15Population Discrepancy Function Value (F0) = 0.05990 Percent Confidence Interval for F0 = (0.0; 0.17)Root Mean Square Error of Approximation (RMSEA) = 0.07390 Percent Confidence Interval for RMSEA = (0.0; 0.13)P-Value for Test of Close Fit (RMSEA < 0.05) = 0.22 Expected Cross-Validation Index (ECVI) = 0.3890 Percent Confidence Interval for ECVI = (0.32; 0.49)ECVI for Saturated Model = 0.39ECVI for Independence Model = 1.66Chi-Square for Independence Model with 21 Degrees of Freedom = 221.34Independence AIC = 235.34Model AIC = 53.32Saturated AIC = 56.00Independence CAIC = 263.08Model CAIC = 120.69Saturated CAIC = 166.96Normed Fit Index (NFI) = 0.90Non-Normed Fit Index (NNFI) = 0.90Parsimony Normed Fit Index (PNFI) = 0.47Comparative Fit Index (CFI) = 0.95Incremental Fit Index (IFI) = 0.95Relative Fit Index (RFI) = 0.82Critical N (CN) = 167.83Root Mean Square Residual (RMR) = 0.044Standardized RMR = 0.044Goodness of Fit Index (GFI) = 0.96Adjusted Goodness of Fit Index (AGFI) = 0.90Parsimony Goodness of Fit Index (PGFI) = 0.38

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