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MINDING THE BABY®: MATERNAL ADVERSE CHILDHOOD EXPERIENCES AND
TREATMENT OUTCOMES IN A MOTHER-INFANT HOME VISITING PROGRAM

by

JESSICA GORKIN ALBERTSON

A dissertation submitted to the Graduate Faculty in Psychology in partial fulfillment of the
requirements for the degree of Doctor of Philosophy, The City University of New York

2017

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Minding the Baby®: Maternal adverse childhood experiences and treatment outcomes
in a mother-infant home visiting program

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This manuscript has been read and accepted for the Graduate Faculty in
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Abstract

Minding the Baby®: Maternal adverse childhood experiences and treatment outcomes in a mother-infant home visiting program

by Jessica Gorkin Albertson

Advisor: Professor Steve Tuber

This study examined Adverse Childhood Experiences (ACEs) in a sample of women participating in Minding the Baby® (MTB), a mother-infant home-visiting intervention known to have positive effects on mother-infant attachment. In addition to documenting maternal childhood trauma exposure within the sample, this study explored whether such exposure affected the intervention outcome or service delivery. We looked specifically at whether maternal childhood trauma exposure affected mother-child attachment or frequency of contact with home-visitors. We also examined the relationship between maternal early childhood trauma exposure and reflective functioning capacity (RF), a potential resiliency-promoting factor.

Methods: The study's participants were 29 first-time mothers between the ages of 16 and 26 who were enrolled in the MTB intervention between 2007 and 2015. They were administered the Pregnancy Interview (Slade, 2003) at baseline and the Strange Situation Procedure (Ainsworth, Blehar, Waters, & Wall, 1978) when their infants were 12 months of age. Dose of intervention was calculated as the number of home-visits during the first 15 months of the intervention.

This study made use of a unique and novel approach for collecting trauma-related data on intervention participants. Specifically, we asked clinicians who worked with participant mothers over the course of the 27-month intervention to work as a team to fill out an Adverse Childhood

Experiences Scale-mini (ACES-mini; Anda et al., 2006) for each client based on their knowledge of mothers' childhood trauma history.

Results: Results indicated that MTB serves a highly traumatized population, as the mean trauma score of 5.52 is considered “high” by CDC standards. However, the level of maternal adverse childhood experiences was not found to be related to attachment outcome, indicating that MTB is serving the needs of even the most traumatized mothers. Mothers with the highest ACE scores also received the highest dose of intervention, but that dose did not moderate the relationship between maternal trauma exposure and child attachment. Finally, although RF was not related to maternal ACE score, there was a trend suggesting that mothers with higher RF who had also been exposed to higher levels of childhood trauma were more likely to obtain secure attachment with their infants than mothers with high childhood trauma exposure but lower RF capacity.

Discussion: The findings suggest that the MTB intervention shows promise as a tool to address attachment outcomes in highly traumatized populations, but that despite positive attachment outcomes, the impact of maternal trauma exposure reverberates in the relationship. The findings are further discussed in relation to implications for collecting data on trauma exposure, conducting research within a clinical intervention, and the importance of considering attachment and trauma theories in tandem.

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Chapter 1: Introduction

In her seminal paper on infant-parent psychotherapy, Selma Fraiberg (Fraiberg, Adelson & Shapiro, 1975) outlined the idea that parents' unresolved relational patterns set down in their own childhoods reemerge as "ghosts in the nursery" such that trauma, violence and their sequelae may be unconsciously passed from one generation to the next. Fraiberg's paper, and the considerable literature that evolved from her pioneering work, underscores the way in which maternal trauma can profoundly affect the security of the parent-child relationship.

Decades of research and clinical experience have affirmed the validity of Fraiberg's observations as well as the effectiveness of the dyadic approaches she pioneered (Lieberman & Van Horn, 2008). The relationship between caregiver and child is not only extremely important, but also extremely complex and influenced by many factors related to the caregiver, the child and the environment. Those who work with parents and infants have long recognized that the caregiver's own history powerfully shapes and impacts this most important foundational relationship, and that parents who have been traumatized often transmit their traumatic experiences to their children in a variety of ways. It is for this reason that the parent-child relationship has been targeted for intervention, particularly with first-time young mothers and in families that have faced community and household dysfunction, such as substance abuse and mental health issues. With an understanding of the way the parent's history shapes their relationship with their baby, researchers and clinicians can work to strengthen parent-infant relationships, securing the foundation upon which development unfolds.

Home visiting interventions have proven especially useful in reaching the neediest families who may otherwise have difficulty accessing resources (Olds, Sadler, Kitzman, 2007). While a prolific body of research in early interventions has shown positive outcomes associated

with home visiting, it remains unclear how the degree of parental trauma exposure (i.e., the “ghosts” to which Fraiberg et al. refer) influences success in these interventions. The present study will draw on data from an interdisciplinary home-visiting intervention [Minding The Baby® (MTB)] to explore whether the degree of maternal trauma exposure impacts the mother’s ability to make use of an attachment-based intervention.

The present study aims to evaluate the impact of maternal trauma exposure on Minding The Baby® outcome. While all mothers enrolled in this home visiting intervention are considered “at risk,” they vary somewhat in the degree of trauma exposure that they have experienced before the age of 18. Research on the effects of complex and relational trauma suggests that those mothers who have experienced the most trauma in their own childhoods may present special challenges and/or opportunities for intervention. The current study explores how the maternal experience of trauma in the mother’s own childhood affects MTB intervention outcome. Specifically, the current study evaluates the relationship between maternal trauma exposure and infant attachment classification at one year in the MTB intervention group. We also tested whether level of trauma exposure affects engagement in treatment, and thus contributes to poorer outcome. Finally, in view of the fact that individuals who are able to think about and reflect upon their experiences of trauma are less likely to be impacted by those experiences in a negative way or to allow those experiences to negatively impact their relationship with their infants (Fonagy et al., 1995; Bateman & Fonagy, 2012), we also examined the relationship between maternal trauma exposure and reflective functioning in MTB participants.

It is hoped that the current study contributes to our understanding of how maternal trauma exposure impacts mothers in this attachment-based intervention. Given the clinical and anecdotal

evidence that many Minding The Baby® participants carry complicated trauma histories, research is sorely needed to illuminate how such histories impact the current intervention. Thus, the present study is poised both to fill a gap in the literature and to clarify and focus the positive MTB findings that have been published heretofore. With such knowledge, attachment-based interventions could ultimately be tailored and improved upon to best serve the needs of the most traumatized participants.

Chapter 2: Literature Review

The history of the study of trauma

Since the earliest study of mental illness, clinicians and researchers have endeavored to understand how life events (and especially early life events) impact later psychological functioning. Decades of research have invariably confirmed that aspects of the environment powerfully shape the psyche. That is, humans are grossly impacted by the environment; both by the surroundings and conditions within which they develop, and also by the events and or disruptions that occur along the way. Traumatic experience is particularly relevant to the understanding of psychological functioning. While trauma does not unequivocally lead to psychopathology, it is associated with a number of negative outcomes and undoubtedly has the potential to impact multiple domains of human functioning.

Despite the numerous psychological sequelae known to be associated with traumatic experience, the fields of psychology and psychiatry largely neglected the study of trauma for many years. Historically, long periods of relative neglect of the subject were interrupted when conditions of war perpetuated such widespread trauma that the field was forced to address it. During World War I, psychiatrists coined the term “shell shock” to describe the symptoms of traumatized soldiers (Crocq & Crocq, 2000). However, eventually such a vast number of soldiers presented for treatment of shell shock that the diagnosis was discouraged in an attempt to limit the number of cases relieved from active duty (Lasiuk & Hegadoren, 2006). Although the very field of clinical psychology was born from the trauma experiences of soldiers in World War II, “traumatic stress” was still not formally recognized as a mental health disorder. It was not until later on, that another war (Vietnam) once again forced trauma into the psychological discourse. In the 1970s, clinicians began to recognize common patterns between soldiers

returning from Vietnam and women who had been raped or sexually assaulted (Lasiuk & Hegadoren, 2006). These commonalities led theorists to expand the concept of shell shock to include the types of reactions related to experiencing traumatic stress more generally. However, until 1980, clinicians lacked a way to classify the disturbances seen in soldiers and other survivors of life-threatening events. At that time, the American Psychiatric Association included the first trauma-related diagnosis in the Diagnostic and Statistical Manual (DSM), which finally marked psychological trauma as a condition officially worthy of study.

Despite the inclusion of Post Traumatic Stress Disorder (PTSD) in the DSM, the field has struggled to come to a consensus regarding a clear and singular definition of what constitutes “trauma.” Originally, in DSM III, trauma was defined as that which is “outside the range of normal human experience” (American Psychiatric Association, 1980). However, this definition was altered when epidemiological evidence made clear that traumatic events were *not* necessarily uncommon (see Kessler, Sonuga, Bromet, Hughes & Nelson, 1995). In contrast, the current iteration of the DSM (DSM-5), defines trauma as “exposure to actual or threatened death, serious injury, or sexual violence” either by directly experiencing the event, learning of it having occurred to someone close, or witnessing it having occurred to others (American Psychiatric Association, 2013, p. 271). Although defined narrowly this way in the DSM, some modern trauma theorists also think of trauma more broadly as referring to that which overwhelms an individual’s capacity to cope, whether life-threatening or otherwise (Glaser, 2000; Herman, 1992; van der Kolk, 2014).

PTSD and its limitations

The Diagnostic and Statistical Manual (DSM) diagnosis of Post Traumatic Stress Disorder (PTSD) is specific and based on the presence of particular symptoms. As with the

definition of trauma (described above), the symptom criteria for PTSD have also changed slightly since 1980 with each new edition of the DSM. In the current DSM (DSM-5), PTSD entails exposure to narrowly-defined traumatic experience (i.e., “actual or threatened death, serious injury or sexual violence”), followed by the presence of “intrusion symptoms” (i.e., nightmares, flashbacks, distressing memories), “avoidance symptoms” (i.e., efforts to avoid traumatic memories or cues), “negative alterations in cognitions of mood” (i.e., amnesia, feelings of detachment, self-blame) and “marked alterations in arousal and reactivity” (i.e., irritable behavior, problems with concentration, hypervigilance) [American Psychiatric Association (APA), 2013, p. 271]. With these specific criteria, researchers have been able to isolate, follow and study PTSD. Thus, inclusion of PTSD in the DSM has led to decades of productive research on the disorder (van der Kolk, 2014). Following the results of such research, the DSM-5 also notes that diagnosis of PTSD is related to impaired functioning and suicidality (APA, 2013).

Although the inclusion of PTSD in the DSM reflected a positive shift towards conceptualizing and treating traumatic experiences, the diagnosis of PTSD is limited in its ability to capture the experiences of all trauma survivors. Specifically, as was first noted by Herman (1992), and later elaborated by van der Kolk (2014) along with a number of other trauma theorists and researchers, the diagnosis of PTSD treats all traumas in the same way, and does not differentiate between individuals who experience a single and/or isolated catastrophic event and those who experience trauma repeatedly over a long span of time. Van der Kolk (2014) writes that the description of symptoms in the DSM “suggests a clear story line: A person is suddenly and unexpectedly devastated by an atrocious event and is never the same again” (p. 157). However, this story line neglects the reality of millions of individuals who come of age in homes and community environments characterized by the presence of repeated and ongoing traumata.

Not only does the DSM definition of PTSD fail to differentiate between single-incident and chronic trauma exposure, but it also does not account well for differences between children and adults who suffer traumatic exposure (van der Kolk, et al., 2009). Specifically, the PTSD diagnosis does not take into consideration how developmental stage may affect the presence of certain symptoms nor does it consider the varying effect of exposure when it occurs during one developmental period versus another (Lieberman & Van Horn, 2008). Moreover, the PTSD diagnosis fails to capture the adverse reactions more typical of chronic trauma survivors. In fact, posttraumatic impairments of chronic trauma survivors (many of whom experienced trauma during childhood) extend far beyond PTSD symptoms. Unlike the symptoms described in the DSM, symptoms of chronic trauma exposure are known to include emotion dysregulation, information processing bias, and existential/spiritual adjustment (Herman, 1992, Janoff-Bulman, 2010, Coutois & Ford, 2009). Thus, while the diagnosis of PTSD has led to important research on the impact of trauma, the field now struggles to understand the adverse consequences of growing up in an environment characterized by the presence of multiple, recurring and/or ongoing traumatic events and relationships.

Complex Trauma and its impact on child and adult development

Judith Herman (1992) was the first to coin the term “complex PTSD” to describe the sequelae of repeated chronic trauma that begins in childhood. In her pioneering work, *Trauma and Recovery*, Herman (1992) expanded upon the ways in which trauma’s detrimental effects may reach far wider than the definition of PTSD entails. Herman defined traumatic events as those that “overwhelm the ordinary human adaptations to life” (Herman, 1992, p. 33). She further described psychological trauma as “an affliction of powerlessness” because the victim of trauma is rendered helpless in some way (p. 33). Herman writes, “traumatic events overwhelm

ordinary systems of care that give people a sense of control, connection and meaning” (p. 34). In this description, Herman captures trauma’s profound and detrimental effects on relationships, including parenting and therapeutic relationships.

Herman’s description of “complex PTSD” set the stage for continuing work on the concept of complex trauma. Like “complex PTSD,” the more contemporary term, “complex trauma” refers to “a type of trauma that occurs repeatedly and cumulatively, usually over a period of time and within specific relationships and contexts” (Courtois, 2008, p 86). Complex trauma encompasses domestic violence, abuse, and upheaval in the home. It also captures the idea of “attachment trauma”; trauma that occurs within the closest attachment relationships and as a result, has wide-reaching effects (Courtois, 2008, p. 86).

Although “complex trauma” is not yet included as a diagnosis in the current iteration of the DSM (DSM-5), Courtois and colleagues have identified seven problem areas associated with the experience of early, repeated interpersonal trauma. These include 1) alterations in the regulation of affect, 2) alterations in attention and consciousness (including dissociation), 3) alterations in self-perception, 4) alterations in perception of the perpetrator, 5) alterations in relationship to others (including difficulty with trust and intimacy), 6) somatization and medical problems and 7) alterations in systems of meaning (including pervasive feelings of hopelessness) (Courtois, 2008). Clearly, the alterations associated with complex trauma extend much further than those characterized by single-incident PTSD. While PTSD leads to distressing symptoms, the experience of complex or interpersonal trauma is so far-reaching precisely because it puts the individual at risk for breakdown of their basic healthy psychological development (Ford & Courtois, 2009). Complex trauma is distinguished from PTSD in that victims of complex trauma have developed within the very context of ongoing trauma. While PTSD symptoms reflect a

characteristic response to external danger, Ford and Courtois (2009) contrast PTSD with the characteristics of complex trauma, which follow from the “*internal* threat of being unable to self-regulate, self-organize or draw upon relationships to regain self-integrity” (p.17). Indeed, complex trauma has been shown to impact development in multiple domains, from childhood on (Lieberman & Van Horn, 2008, van der Kolk et al., 2009).

Research on complex trauma in children and adolescents reflects several areas in which chronically traumatized young people evidence dysfunction and underperform compared to non-traumatized peers (Cook et al., 2005). Much of this literature is based on exposure to abuse, rather than symptoms of trauma per se. This is related to the fact that the presence of childhood exposures to trauma is more reliably observable than childhood trauma symptoms, which, as noted above, are not easily detected with the current diagnostic tools. Moreover, a literature on childhood exposure to trauma predates the inclusion of PTSD in the DSM. Well before posttraumatic reactions were discussed in relation to Vietnam veterans, Dr. Henry C. Kempe and colleagues authored *The Battered Child* (first published in 1962), which is recognized for its role in first raising awareness of the prevalence and detrimental effects child abuse (Helfer, Kempe, Krugman, 1999). On the foundation of Kempe’s legacy, a body of work detailing the consequences of various forms of childhood abuse and maltreatment emerged. This literature paved the way for more contemporary work on child trauma with the understanding that maltreatment at the hands of a caregiver is potentially traumatic. More recently, van der Kolk et al. (2009) developed the term “developmental trauma” to refer to abuse, neglect and other trauma exposures that occur across the span of a child’s development.

Both the maltreatment literature and the more recent literature on developmental trauma enforce the notion that exposure to trauma in childhood is related to various negative outcomes.

In particular, research has shown that maltreated children struggle to discriminate between and accurately label emotional states (Beeghly & Cicchetti, 1994) and maltreated toddlers are more likely to respond to self-recognition with neutral or negative affect than non-traumatized toddlers (Culp et al., 1991). Furthermore, the experience of childhood physical or sexual abuse increases risk for major depression and also predisposes individuals to earlier onset of depression, and less success with treatment for depression (Fergusson, Horwood, Lynskey, 1996; Putnam, 2003; Zlotnik, Ryan, Miller, Keitner, 1995). Additionally, children of abusive parents have been shown in prospective studies to have impaired cognitive functioning in late infancy (Egeland, Sroufe & Erikson, 1983) and chronic trauma of abuse and neglect is further associated with delays in language development and overall IQ (Culp et al., 1991). Taken together, a vast body of research links early childhood maltreatment to disruption of developmental achievements in motor, emotional, behavioral, language, social, academic and cognitive domains (van der kolk et al., 2009; Cook et al., 2005). Early maltreatment is also empirically linked to outcomes far beyond early childhood. These long-term effects of maltreatment include school failure, absenteeism, less anticipation of attending college, social and thought problems, violence perpetration, substance abuse, personality disorder, and anxiety disorders in adulthood (Kearney, Wechsler, Kaur & Lemos-Miller, 2010; Tuber, Boesch, Gorkin & Terry, 2014).

Furthermore, neurobiological research has also demonstrated the effect of early childhood trauma on the developing brain. Teicher et al. (2003) described physical changes in the brain that occur at multiple levels, including the neurochemical, structural and functional. In particular, childhood maltreatment has been associated with the finding of smaller corpus callosum and intracranial volume in maltreated children (De Bellis, et al., 1999; Jackowski, Araujo, Tavares de Lacerda, De Jesus Mari & Kaufman, 2009), as well as attenuated

development of the hippocampus and amygdala (Teicher et al., 2003). Teicher et al. (2003) put forth the hypothesis that due to early sensitive periods in brain development, the early childhood brain is particularly vulnerable to maltreatment and excessive stress. According to Teicher et al., excess stress in early childhood puts the traumatized child's brain on a path of alternative development, privileging survival over other functions with cascading consequences well into adulthood.

Following Teicher et al.'s (2003) hypothesis, many of the issues raised by the maltreatment literature in relation to complex trauma in childhood have also been demonstrated in studies with adults. On a basic level, adults with trauma histories are more likely to be diagnosed with other psychiatric problems, including depression, suicidality, personality disorders and anxiety (Briere & Elliot, 2003; Neumann, Houskamp, Pollack & Briere, 1996; Trickett, Noll, Reiffman & Putnam, 2001). Adults who experienced trauma early in life are also more likely to suffer from PTSD (Boney-McCoy & Finkelhor, 1995; Noll, Horowitz, Bonanno, Trickett, & Putnam, 2003), to experience dissociation (Putnam, 1997) and to abuse alcohol and other substances (Kilpatrick et al., 2000; Marcenko, Kemp, Larson, 2000). Thus, trauma experienced during childhood has the potential to bring about profound psychological and psychobiological disturbances well into adulthood.

Perhaps most concerning, research also suggests that chronically traumatized and abused individuals commonly form relationships that repeat past abuses or victimizations, unconsciously repeating the trauma in a perpetual cycle (Pearlman & Courtois, 2005). In particular, developmental difficulties that impede the sense of self and ability to adequately regulate emotion interrupt the process of creating and maintaining healthy, mutual relationships, which leaves individuals vulnerable to further trauma. Additionally, the longer that a child is exposed to

trauma (over the course of childhood) and the more traumatic experiences he or she is exposed to, the more severe the traumatic reactions (Briere, Kaltman & Green, 2008; Briere & Scott, 2014). In a field trial to examine the effects of cumulative trauma over and above PTSD diagnosis, van der Kolk, Roth, Pelcovitz, Sunday and Spinazzola (2005) and Briere, Kaltman and Green (2008) demonstrated the idea of “symptom complexity” in relation to trauma. Specifically, with increasing exposure to ongoing trauma and different types of traumas, debilitating symptoms also become more complex, both in terms of number of presenting symptoms as well as number of comorbid disorders for which criteria are met (Putnam, Harris, Putnam, 2013; Briere, Kaltman & Green, 2008). This research lends credibility to the idea of complex trauma as a potentially debilitating condition with the power to affect multiple negative outcomes across the span of a lifetime.

Adverse Child Experiences (ACE) Study

Recently, interest in the effects of repeated cumulative trauma experienced during childhood has spread beyond the field of mental health. In particular, researchers in the medical and public health fields have begun to recognize the cascading effects of early childhood trauma and have therefore begun to stress the importance of proactively assessing individual trauma history. Although not specifically borne out of the mental health field, the Adverse Child Experiences (ACE) study has drawn attention to the wide-reaching impact of various forms of childhood abuse and household dysfunction as well as the need for primary prevention.

The ACE study began in the late 1990s as a collaboration between Kaiser Permanente’s Health Appraisal Center (HAC) in San Diego, California, and the U.S. Centers for Disease Control and Prevention. A large-scale epidemiological study, the ACE study has employed a cumulative stressor model to assess the relationship between the total number of Adverse

Childhood Experiences and various health and social problems in adulthood. With data collected between 1995 and 1997 on over 18,000 participants, the project has generated a number of publications, drawing attention *empirically* to a fact understood theoretically by the mental health community; that is, the powerful nature of ACEs.

The study population for the ACE study was drawn from the San Diego Health Appraisal Center (HAC), which provides health evaluations to adult members of the Kaiser Health Plan in San Diego County. Over 50,000 members are evaluated yearly and visits to the HAC are primarily for the purpose of health assessment, rather than illness-centered care [Centers for Disease Control and Prevention (CDC), 2015].

Each person who was evaluated at the HAC between August 1995 and March 1996 (wave I) and June and October 1997 (wave II) completed a standardized questionnaire including health history, health-related behavior and psychosocial evaluations. Two weeks after the visit, he or she was then mailed an instrument -- the "ACE questionnaire" -- inquiring about his or her history of adverse childhood experiences. ACEs (as defined by the questionnaire) occur specifically before age 18 and include several categories of adverse childhood experience; psychological, physical or sexual abuse, neglect, violence against the mother, and living with substance abusers, mentally ill, suicidal or incarcerated household members. Eight categories of adverse childhood experiences were studied in the first wave; the two categories of neglect were added in the second wave. The ACE questionnaire was constructed by culling questions from published surveys. Specifically, the Conflict Tactics Scale (Straus & Gelles, 1990) was used to define violence against the respondent's mother while questions about sexual abuse during childhood were adapted from Wyatt (1985), and questions about substance abuse were adapted from the 1988 National Health Interview Survey (CDC, 2015).

As defined by the ACE questionnaire, Adverse Childhood Experience is emotional, physical or sexual abuse, emotional or physical neglect, or growing up in a household where there was domestic violence, substance abuse, mental illness, parental discord or crime. The ACE-mini questionnaire was adapted from the original ACE questionnaire by the principal investigator for the ACE study. While the target categories of abuse, neglect and dysfunction remained the same between the original ACE questionnaire and ACE-mini, each category was condensed into one question on the ACE-mini. Thus, for each of these experiences that took place before age 18 (i.e., childhood), participants receive a score of 1, with a total of 10 possible ACEs (one for each category of abuse, neglect or dysfunction). The response rate for the survey was 70% and responses yielded a database with the health information (via medical records) and ACE information (via mailed questionnaire) of 18,175 participants.

Following collection between 1995 and 1997, the large ACE dataset has been mined to examine many outcomes, both retrospectively and prospectively. Publications have repeatedly shown a strong, graded relationship between ACE score and various health and social problems, including smoking (Anda et al., 1999), unintended pregnancies (Dietz et al., 1999), sexually transmitted diseases (Hillis et al., 2004), adult alcohol problems (Dube, Anda, Felitti, Edwards, Croft, 2002; Dube et al., 2006), attempted suicide (Dube et al., 2001a), illicit drug use (Dube et al., 2001b), and leading causes of death in the United States (Felitti et al., 1998). Using logistic regression and relative risk ratios, researchers have found a 4 to 12-fold risk of alcoholism, depression, and drug abuse for those adults who experienced 4 or more ACEs. Notably, the ACE categories turned out to be approximately equal to each other in impact, such that an ACE score of 4 could consist of any four of the ACE categories (Felitti & Anda, 2010). A significant dose-response relationship has also been found between the number of ACEs and various disease

conditions including cancer, ischemic heart disease and skeletal fractures (Felitti et al., 1998). Moreover, the relationships between ACE score and a variety of health behaviors and outcomes has been shown to be robust across four different birth cohorts dating back to 1900 (Dube, Felitti, Dong, Giles & Anda, 2003).

In addition to several other public policy and health domains, the ACE study has been particularly relevant to those interested in teenage pregnancy and the negative consequences associated with it. Hillis et al. (2004) used the ACE study to evaluate whether exposure to ACEs increased risk of adolescent pregnancy and whether ACEs or adolescent pregnancy itself was the principal source of long-term psychosocial consequences of adolescent pregnancy, including financial problems and high stress in adulthood. Using logistic regression, Hillis et al. (2004) found a strong dose-response relationship between number of ACEs and teenage pregnancy, such that as the ACE score increased, so did the risk of adolescent pregnancy increase incrementally. These researchers also found that adverse psychosocial sequelae often attributed to adolescent pregnancy in fact seemed to be due to being reared in environments characterized by significant ACEs, rather than the fact of becoming pregnant as an adolescent. This study suggested that programs that address family dysfunction and therefore potentially decrease ACEs must be a critical part of addressing teenage pregnancy and its consequences.

In many ways, the ACE study provided empirical proof for observations that have long been part of the discourse in psychological communities. In particular, the ACE study findings suggest that the impact of adverse childhood experience on many adult health outcomes is strong and cumulative, despite the number of years that have elapsed since the ACE itself. This finding underscores the fact that childhood experiences are impactful long after they have occurred. Notably, the ACE data is closely related to the maltreatment data described above. In many

ways, the large ACE database validates the maltreatment literature by examining overlapping constructs with different terms. In ACE terminology, what was referred to by Kempe and colleagues as maltreatment is known as adverse childhood experience. As both literatures suggest, the presence of ACEs (including child maltreatment) is associated with serious mental and physical illness as well as other detrimental outcomes affecting prognosis and treatability.

Notably, the ACE study has helped to elevate knowledge of the existence of ACEs (which often go unrecognized and unacknowledged) and has thus illuminated the need for primary prevention of adverse childhood experiences, even within a community of practitioners focused primarily on adults. Crucially, the study has also served to alert many outside of the mental health field to the serious and debilitating consequences of ongoing childhood trauma. The ACE study, like the maltreatment literature, focuses on traumatic exposure, rather than traumatic symptoms. However, the ACE study and other research (Briere & Elliot, 2003; Neumann, Houskamp, Pollack & Briere, 1996; Trickett, Noll, Reiffman & Putnam, 2001) make clear that with more exposure, come more numerous and more complicated symptoms (Putnam, Harris & Putnam, 2013; Briere, Kaltman & Green, 2008). Furthermore, the fact that a clear majority of patients who were exposed to one category of childhood abuse or household dysfunction were also exposed to at least one other puts the concept of “risk” into focus and validates the reality of trauma that is truly complex (Felitti et al. 1998).

Resilience Factors

While research on the effects of ACEs has proliferated in the last decade, some of the original ACE study researchers have also begun to examine the “salutogenic” (i.e., health-promoting) factors associated with resilience in the face of trauma (Dube, Felitti & Rishi, 2013, p. 139). Resilience research has identified individual, context and community-level factors that

contribute to resiliency. In particular, family strengths (such as “family closeness,” “family loyalty” and “family support”) (Hillis et. al 2010), perception of personal competence (when realistic) (Wright, Masten & Narayan, 2013), and specific healing, spiritual or faith-based processes that help individuals deal with trauma or loss (Werner, 2013) have been associated with resiliency in the face of adversity. Moreover, longitudinal studies [Kauai Longitudinal Study (Werner & Smith, 2001) and the Minnesota Parent-Child Project (Yates, Egeland & Sroufe, 2003)] strongly support the notion that a history of supportive and consistent care, particularly in early childhood, is an important resilience-promoting factor. In particular, Yates et al. (2003) found that children with histories of secure attachment in infancy demonstrated a greater capacity to rebound from a difficult school transition than those without histories of secure attachment. In the face of vast research on the detrimental effects of trauma, understanding such resilience-promoting factors (like secure attachment) is crucial to creating and implementing appropriate interventions.

Maternal Trauma and Parenting

Courtois (2008) suggests that establishing and nurturing intimate relationships is most challenging for individuals with complex trauma. It is thus unsurprising that the parenting relationship, perhaps the *most* intimate of relationships, is known to be profoundly impacted by the mother’s experience of trauma. Thus, in order to understand and/or treat complex trauma, it is important to consider its impact on parenting and the related construct of intergenerational transmission of trauma, by which poor outcomes associated with trauma are bestowed upon the children of those who have been traumatized.

Research supports the notion that the experience of trauma often leads to inconsistent or inadequate parenting. Kiser and Black (2005) undertook a review of the clinical and research

literatures to clarify the connection between chronic trauma exposure and family processes. Their review of fifty studies found that trauma-related distress was associated with decreased parental functioning including insensitivity, withdrawal, negativity, and low warmth (Kiser & Black, 2005). Furthermore, across several studies, maternal trauma history (beyond the experience of trauma-related distress) was also associated with detrimental effects on parenting, including negative views of self as parent (Banyard, 1997) and increased physical discipline/violence (Lyons-Ruth, 2003; Newcomb & Locke, 2001). Moreover, in a study of 152 adult female survivors of complex trauma, Banyard, Williams and Siegel (2001) found that higher rates of trauma exposure were related to decreased parenting satisfaction, reports of child neglect, use of physical punishment and a history of protective service reports. Importantly, these links were only partially mediated by increased maternal depression, meaning that maternal trauma exposure impacted parenting above and beyond the impact of maternal depression. Similarly, Cohen, Hien and Batchelder (2008) found in a sample of 176 urban mothers that cumulative trauma was a significant predictor of parenting outcomes (including punitiveness and aggression), even after controlling for demographic and diagnostic variables. These studies reinforce the growing body of literature demonstrating persistent findings that parental cumulative trauma exposure effects parental functioning in detrimental ways.

One particular concern regarding the parental functioning of traumatized parents relates to the issue of intergenerational transmission of trauma. This concept refers to the phenomenon that the sequelae of trauma (including dissociation, depression, anxiety, etc.) are known to affect the children of adults who have been traumatized, placing the next generation at risk for a host of negative outcomes. Without intervention, trauma of abuse, neglect and other dysfunction may be perpetuated in a cycle from one generation to the next.

Noll, Trickett, Harris and Putnam (2008) compiled data over the course of a longitudinal prospective multigenerational study on the effects of childhood sexual abuse in attempt to provide a descriptive analysis of the intergenerational effects of childhood abuse. In comparing mothers with substantiated childhood sexual abuse to demographically matched controls, Noll et al. (2008) found that mothers who had themselves been abused as children were more likely than comparison (non-abused) mothers to have experienced physical victimization, to have reached clinical cut-off for adult depression, to be diagnosed with at least one psychiatric disorder, to report substance abuse or alcohol dependence, to have dropped-out of school, to be the victim of domestic violence, and to be obese in adulthood. In turn, the children of the mothers who had experienced childhood abuse were more likely to have been born to a teenage mother, have been born prematurely and to have been involved with Child Protective Services at the time of the study. The study authors presented this data as evidence for the extent to which “offspring burden is attributable, at least in part, to maternal childhood abuse” (Noll et al., 2008, p. 442). In other words, not only does early childhood abuse lead to psychiatric and health-related issues themselves correlated to parenting outcomes, but research consistently suggests that (at least in the absence of intervention), the effects of maternal trauma are often experienced by (or passed on to) the next generation.

Attachment

It is impossible to fully consider the concept of intergenerational transmission of trauma without considering the concept of attachment. Secure attachment has been known to buffer infants from overwhelming stress, while disrupted attachment can, in and of itself be traumatic, as the child is left on his own to cope with early experiences of distress (Allen, 2001; Schore 2003; Pearlman & Courtois, 2005). Moreover, Toth and Cicchetti (1996) suggest that the

negative developmental cascade known to follow childhood maltreatment in fact begins with insecure attachment. It is thus impossible to understand the impact of maternal trauma and the mechanisms of intergenerational transmission of trauma without exploring the attachment literature. Conversely, attachment research provides clues for ways in which the cycle of abuse and neglect can be broken.

John Bowlby is credited with first showing the critical importance of attachment in humans as well as primates. Drawing on the ethological theories of Darwin and Harlow, Bowlby (1969) postulated that infant behavior is driven by the attachment behavioral system, a motivational system that when activated, propels the infant to seek the comfort of and proximity to the primary caregiver. Specifically, Bowlby (1969) suggested that when the attachment system is activated, infants exhibit behaviors such as crying, clinging and following that function to bring the caregiver back to the infant. Because infants cannot survive without the protection and care of parents, Bowlby understood attachment as an evolutionary system that ultimately promoted infant safety and survival. Bowlby also understood the importance of the mother's behavior in patterning attachment and theorized that infants develop internal working models of attachment reflected in their behaviors and based on their lived experience.

Although Bowlby first articulated attachment theory, Mary Ainsworth empirically tested the idea and created a classification system to describe and categorize infant attachment patterns. Drawing on Bowlby's theory that infants exhibit attachment behaviors upon separation in order to be rejoined and soothed by their caregivers, Ainsworth understood that attachment style could be observed by introducing the infant to brief separations from its caregiver in a paradigm called The Strange Situation Procedure (SSP; Ainsworth, Blehar, Waters and Wall, 1978). In the SSP, infants were originally classified into three main patterns of attachment that are each

characterized by a specific internal working model: the secure, avoidant and resistant/ambivalent patterns in regards to attachment. Later, Mary Main and colleagues noticed that some infants in the Strange Situation Procedure seemed to display contradictory strategies upon separation from caregivers, which made them difficult to classify in one of these three attachment categories. Thus, Main and Solomon (1990) added a fourth “disorganized/disoriented” category characterized by odd atypical behaviors in the strange situation that are thought to reflect the child’s lack of any coherent strategy to manage distress.

According to Main and Solomon (1990), the label of “disorganized” in relation to attachment reflects the lack of an internal working model to generate coherent strategies with which to manage overwhelming distress. Indeed, disorganized attachment has been linked to the development of several problematic outcomes later in life, including aggression (Lyons-Ruth, 1996), personality disorders (Lyons-Ruth, 2003), and dissociation (Ogawa, Sroufe, Weinfeld, Carlson & Egeland, 1997; Carlson, 1998). Children labeled “disorganized/disoriented” in the Strange Situation Procedure tend to exhibit contradictory and inconsistent behavior or odd, unusual behavior (such as freezing, stilling and dazed expression) (Hesse & Main, 1999). Main and colleagues theorized that the conflicted disorganized/disoriented behaviors reflected the infant’s fear of his/her caregiver. They suggested that infants who fear their own caregivers are left in a situation without resolution since the caregiver (source of safety to whom the infant turns when frightened) is also the source of fear. They theorized that in such a situation, fear could lead to simultaneous conflicting desires to approach and flee the caregiver, which, Main and colleagues understood might result in the types of odd, conflicting behaviors exhibited by disorganized infants in the Strange Situation.

Following the study of infant attachment patterns, complementary styles of attachment in adult caregivers have also been identified, offering research substantiation for the intergenerational transmission of attachment (Main, Kaplan & Cassidy, 1985). To examine attachment representations in adults, George, Kaplan and Main (1996) developed the Adult Attachment Interview (AAI). Like the Strange Situation Procedure, the AAI is intended to “evoke” the attachment system by asking adults to respond to open-ended questions about childhood attachment relationships and the influence of those relationships on the adult’s own development. Indeed, Steele, Steele and Fonagy (1996) discovered a significant relationship between the attachment styles of mothers (as measured by the AAI) and their infants (as measured in the SSP) at one year of age. The discovery of the concordance between maternal state of mind in regards to attachment and child attachment classification at one year was groundbreaking in that it empirically linked the mother’s mental state with the child’s attachment behavior. This link constitutes clear evidence that the parent’s lived experience and more specifically, her mental representation of that lived experience, is powerfully transmitted to the child.

Due to the negative outcomes associated with disorganized attachment, researchers have been particularly interested in this attachment category and its adult corollary, the “unresolved” classification on the AAI. Adults who, like their disorganized infant counterparts, showed signs of disorientation and disorganization during the AAI were subsequently labeled “unresolved.” The unresolved classification is indexed by a lapse in monitoring wherein the interviewee seems to have lost awareness of the discourse context (Main, Goldwyn & Hesse, 1998). Such markers of unresolved status on the AAI tend to surround discussions of potentially traumatic events (such as abuse) or deaths. These adults are thus considered to suffer from “unresolved” loss or

trauma that causes lapses in monitoring or reasoning on the AAI and reflects incoherence in the adult's internal working model of attachment. Moreover, Main and colleagues (Main & Hesse, 1990, 1992; Main & Morgan, 1996) have posited that dissociative processes (such as the segregation of memories) hinder the integration of trauma-related material, resulting in the types of discourse lapses that yield an "unresolved" score on the AAI. Indeed, the most traumatized mothers (those with the highest ACE scores) have been found more likely to be "unresolved" on the AAI (Murphy et al. 2013). Moreover, Bailey, Moran and Pederson (2007) found an association between unresolved attachment and a number of symptoms frequently associated with complex trauma including dissociation, inconsistent sense of self, and relationship problems. Thus, empirical data supports the theory connecting maternal trauma to "unresolved" status on the AAI. This represents an important contribution to the understanding of intergenerational transmission of trauma in that it clarifies one aspect of how maternal trauma may manifest in the relationship between mother and child (i.e., via the mother's unresolved attachment status).

In addition to its link with maternal trauma history, maternal unresolved status on the AAI is also linked to child attachment status. Specifically, mothers who are unresolved in relation to their own trauma experience may perpetuate disorganized attachment in their children. Main and Hesse (1990) were first to theorize a mechanism between adult unresolved classification and infant disorganization. They suggested that a parent still overwhelmed by past traumatic experiences may respond to his or her infant in ways that are frightened or frightening to the infant. Specifically, Main and Hesse (1990) described overtly frightening behavior (such as creeping up behind an infant) as well as inadvertently frightening behavior that is frightening to the infant by nature of the fact that the parent himself appears scared (behaviors including

withdrawing from the infant or responding with alarm to the infant's overtures). Like overtly frightening behavior, inexplicably frightened parent behavior may be alarming to the infant because infants take cues from caregivers as to whether or not a situation is threatening (i.e., worthy of fear). A caregiver's fear communicates to the infant that there is something he or she should fear as well. Main and Hesse suggested that while many parents may not be consciously aware of reacting in fearful ways toward their infants, frightened parental behavior may be triggered internally and unconsciously by the associations to parents' own traumatic or frightening past experiences. In other words, Main and Hesse put forth the idea that the parent's history in relation to his/her own caregivers plays a crucial role in shaping the parenting behavior (vis-à-vis fear) that then informs the infant's attachment.

Hesse and Main's hypotheses have since been supported by empirical research. In a sample of 113 dyads, Jacobvitz, Leon and Hazen (2006) found a strong association between maternal unresolved loss as scored on the AAI and the mother's frightened or frightening behavior when the infant was 8 months of age. Similarly, Schuengel (1997) found an association between maternal unresolved loss on the AAI and maternal display of frightened or frightening behaviors towards the infant at 10 or 11 months. Furthermore, a meta-analysis by Schuengel, Bakermans-Kranenburg and Van IJzendoorn (1999) provided support for the hypothesis that frightening maternal behavior mediates the relationship between unresolved maternal loss and infant disorganization. These studies highlight the fact that traumatized parents who have not been able to resolve their own trauma behave in unique and characteristically frightening ways towards their infants. Given this premise, parental trauma history (and the parents' ability to process and metabolize that trauma history) has profound implications for parental behavior and child attachment status.

More recently, Lyons-Ruth and Jacobovitz (1999) have expanded on Main and Hesse's (1990, 1992) theories about caregiver fear. According to Lyons-Ruth and colleagues, when an "unresolved" parent is triggered by the infant's fear or pain and unconsciously reminded of "her own helplessness as a child in obtaining comfort" (Lyons-Ruth & Jacobovitz, 1999, p. 548), he or she will restrict attention and responsiveness to the infant's attachment cues in order to prevent re-experiencing his or her own unresolved fearful affects. Such a response then leads to a "less balanced and less mutually regulated interaction between the partners," resulting in the infant's disorganized attachment (p. 548). Indeed, Lyons-Ruth, Bronfman and Parsons (1999) and Lyons-Ruth, Bronfman and Atwood (1999) demonstrated that parental withdrawal from the aroused infant is associated with infant disorganization of attachment. Thus, empirical evidence supports the idea that both frightened and frightening caregiver behaviors are implicated in disorganized attachment.

In an attempt to further articulate the link between parental unresolved trauma and child disorganization, Lyons-Ruth (2003) places frightened and frightening behaviors within the broader context of affective communication between parent and infant. Along with her colleagues, Lyons-Ruth has hypothesized that frightened and frightening parental behavior represent manifestations of a single hostile/helpless internal working model of attachment. Either manifestation of this internal working model (whether hostile or helpless) may be frightening to the infant. In this sense, the adult's internal working model of attachment (as it relates to the adult's metabolization of his or her own attachment experiences) profoundly impacts the infant's attachment. The connection between the adult's state of mind and the child's lived experience must be underscored. Lyons-Ruth, Dutra, Schuder and Bianchi (2006) write, "the relevant traumas of infancy most often result from the 'hidden traumas' of caregiver unavailability and

interactive dysregulation” (p. 6). The caregiver’s ability to respond to his or her infant, influenced by his or her own mental state, is the crucial factor in determining the infant’s experience of safety (or lack thereof) in the attachment relationship. It is in this way that the attachment relationship can buffer the effects of maternal trauma or can perpetuate the maternal trauma to the next generation.

Attachment and trauma, taken together

The attachment literature provides the context to understand how complex trauma perpetuated within the closest attachment relationships holds the potential for the cascade of negative outcomes seen empirically in the ACEs research. The trauma literature argues that security and safety (as experienced in the ideal attachment relationship) become much harder to attain after the repeated experience of trauma in the context of a close relationship. In other words, chronic exposure to maladaptive relationships disturbs later relational functioning because it operates upon internal working models of attachment first described by Bowlby. Indeed, children chronically exposed to maladaptive relationships develop representations of others as untrustworthy and tend to experience relational ineffectiveness and difficulty maintaining relationships (Cole & Putnam, 1992; Courtois, 2008). Years before dissociation was described as a typical outcome of complex trauma (Courtois, 2008), Main and colleagues observed that traumatized mothers seemed to rely on dissociative cognitive processes that resulted in the types of reasoning and discourse lapses observed on the AAI. Moreover, Courtois’ (2008) description of the relational difficulties associated with complex trauma is consistent with Lyons-Ruth’s portrayal of a hostile-helpless representation of relationships. According to both Lyons-Ruth and Courtois’ theories, following the experience of relational trauma, the perception

of relationships often hinges on the imbalanced interaction between a hostile aggressor and helpless victim.

In sum, the attachment and trauma literature dovetail to inform our understanding of the relationship between caregiver trauma history and its effect on child rearing. To date, a solid body of evidence has linked parental trauma and child attachment disorganization. The definition of parental trauma in these studies includes *both* the experience of physical/sexual abuse as well as witnessing violence in the home. Lyons-Ruth and Block (1996) found that infants of mothers who were not abused but had witnessed violence between others in childhood were as likely to display a disorganized attachment strategy as were infants whose mothers had directly experienced physical or sexual abuse. Lyons-Ruth and Block's (1996) finding points to the fact that the parental history factors affecting parental attachment representations expand beyond the experience of actual abuse to include other instances of fear, threat and concern for safety. Critically however, the effect of the parental trauma hinges on how the adult has made meaning of the traumatizing experience. In other words, it was not just that the mothers in Lyons-Ruth and Block's (1996) sample had witnessed violence but that they had been unable to metabolize and integrate this experience. Given the established links between maternal unresolved loss, maternal fear and infant disorganization, it is clear that a caregiver's experiences predating the child's life play a crucial role in shaping the trajectory of the parent-infant relationship. Thus, maternal trauma cannot be overlooked in the context of the attachment relationship nor can attachment be overlooked in considering the sequelae of maternal trauma.

Mediating factors in the parenting relationship- Reflective Functioning

Although theory and a growing body of research support the notion that maternal trauma can be perpetuated from one generation to the next via disorganized attachment, maternal trauma

does not necessarily result in disorganized attachment. In a study exploring the relations between severity of maternal experiences of childhood trauma, maternal psychiatric symptoms, caregiving behavior and attachment, Lyons-Ruth and Block (1996) found that even though women exposed to childhood trauma were at elevated risk for establishing disorganized attachment relationships with their infants, 42% of mothers who had experienced physical or sexual abuse went on to develop *secure* attachment relationships with their children. Clearly, it is not the case that maternal trauma predetermines disorganized attachment, although it does increase risk of developing it. Given this risk, it is important to consider the factors that make it possible for traumatized mothers to remain available to their infants.

Attachment-based research carried out over the last 25 years suggests that a parent's capacity to mentalize plays a critical role in protecting the next generation from maternal trauma. Fonagy, Steele, Moran, Steele and Higgitt (1991) first developed the construct of reflective functioning (RF) as a way to understand how attachment representations were passed from one generation to the next. RF refers to the ability to mentalize; that is, to make sense of one's own and others' behavior in terms of underlying mental states and intentions (for an overview, see Slade, 2005). High capacity for RF implies an understanding that a person's behavior is linked to underlying mental states and also that certain beliefs and emotions may be contextualized within relationships or developmental phases. RF is thus measured by an individual's awareness that behavior is a reflection of predictable, dynamic and likely unobservable intentions and emotions.

While Fonagy and colleagues first described reflective functioning, Slade, Grienenberger, Bernbach, Levy and Locker (2005) applied the notion specifically to parents with the term "parental reflective functioning." Parental RF refers to the capacity of the parent to envision and reflect upon the child's mental states (Slade et al., 2005). Slade et al. (2005) suggest that parents

lacking in RF may have more difficulty reflecting on their child's experience, and therefore may be more prone to enactments and projections in response to the child's distress. Conversely, parents who can make sense of their child's internal experience-- that is, envision their child's separate mind-- are able to help their children experience security in the face of distress, leading to the development of secure attachment (Greinenberger, Kelly & Slade, 2005). In other words, Slade (2005 et al., 2005) suggests that the relationship between adult and infant attachment is mediated by maternal reflective functioning. Indeed, in one of the original studies of reflective functioning, Fonagy, Steele and Steele (1991) found that parents whose AAIs were rated as high in reflective functioning were themselves more likely both to be classified as secure/ autonomous on the AAI, and to have children who were securely attached at 1 year of age. Furthermore, using regression analyses to examine maternal disrupted communication, maternal RF and infant attachment, Grienenberger, Kelly and Slade (2005) found that RF appeared to "serve as a buffer to breakdowns in affect regulation during times of infant distress" (p. 306). This research suggests that high reflective functioning capacity may enhance the attachment relationship by helping parents to manage infant distress in ways that ultimately lead to the child's felt security in the relationship.

While high reflective functioning capacity may contribute to attachment security, it may unfortunately be harder to maintain in the face of traumatic experience. Fonagy (1999) refers to dissociation (a common symptom of trauma) as "the converse of reflective function" (p. 103). Given Fonagy's premise, the capacity to maintain RF even in the face of trauma likely represents a core type of resiliency. For example, Fonagy et al. (1995) documented that adults who experienced early deprivation and trauma but were nevertheless able to process such experiences in a reflective way were far less likely to develop borderline personality disorder than were

traumatized adults with low reflective functioning. Furthermore, in a study of mothers with PTSD, Schechter et al. (2005) found that maternal reflective functioning supported the formation of mothers' balanced, integrated mental representations of their young children, while PTSD symptoms inhibited the formation of such balanced representations. Schechter and colleagues suggested that "reflective functioning may exert an inhibitory effect on trauma-associated dysregulation" because when parents are able to mentalize, they can see their child as separate and able to have his own developmentally-determined intentions, beliefs and feelings (Schechter et al, 2005, p. 324). In turn, the parent is better able to help the child regulate distress and develop secure attachment.

Thus, the construct of reflective functioning may contribute to the understanding of why maternal trauma exposure does *not* automatically predispose an infant to attachment disorganization. Unlike trauma exposure (the fact of which cannot be changed), reflective functioning skills have the potential to be taught and to be practiced within each new relationship. Interventions therefore can make use of the concepts such as reflective functioning in promoting resiliency in the face of maternal trauma exposure.

Disrupting the cycle: The role of intervention

From their inception, infant mental health programs have taken up the task of disrupting the cycle in which the legacy of trauma is expressed through parenting. Using the rich history of theory and research, interventions endeavor to make it possible for a mother to provide a secure base for her child without dissociating, becoming triggered, or otherwise enacting and projecting her own experience onto the infant. Approaching this issue from different angles and using different tactics, various iterations of home-visiting interventions have pursued this same goal.

In a review of the home-visiting literature, Stern (2006), citing Lyons-Ruth and Easterbrook (2006), points out that pregnancy and early parenting (while the child is still in infancy) appears to be a uniquely ripe time for intervention. That is, parents in general appear to be particularly available to intervention during the developmental shift into parenthood. For this reason, parenting interventions and specifically home-visiting interventions offer a special opportunity to ameliorate the effects of the parent's past and positively impact the parent-infant relationship.

First interventions: Selma Fraiberg and Ghosts in the Nursery

While Main, Hesse, Goldwyn, Lyons-Ruth and others have described some of the ways that a traumatic past can disrupt the caregiving relationship, it was Selma Fraiberg who best illustrated the ways in which a mother's past can affect her ability to provide care to her infant. In their groundbreaking work, *Ghosts in the Nursery*, Fraiberg, Adelson and Shapiro (1975) suggested that specific vulnerabilities (such as the experience of past interpersonal trauma) may limit a mother's ability to respond sensitively to her infant, resulting in a repetition of painful aspects of the mother's past. In many ways, Fraiberg and colleagues were observing the very phenomena that Main and Hesse and Lyons-Ruth went on to study, namely, that the mother's own early trauma has the power to derail the mother's capacity to "see" and "hear" her infant. In their paper, Fraiberg, Adelson and Shapiro (1975) described the development of an infant mental health program. Young mothers -- typically with significant abuse histories, and referred by child protective services -- were visited in their homes. The authors describe their work as a drawing together of psychoanalysis, developmental psychology and social work, highlighting concepts such as "repression" and "identification with the aggressor" to describe what they observed. Fraiberg and colleagues understood their therapeutic work as helping previously

traumatized mothers to revive the repressed affects experienced at the time of earlier abuse (such as helplessness, rejection, fear, etc.) in the context of a safe, therapeutic relationship.

Experienced and re-lived this way, affects needed no longer come to life (i.e., be blindly repeated) in the present relationship between mother and baby.

In *Ghosts in the Nursery* (1978), Fraiberg, Adelson and Shapiro plainly state that, “the presence of pathological figures in the parental past will not, in itself, predict identification with those figures and the passing on of morbid experience to one’s own children” (p 419).

Recognizing the fact that many parents are resilient in the face of earlier trauma, Fraiberg and colleagues worked to develop resilience in the mothers they were seeing. Their pioneering work and observations set the stage for a range of diverse and continuously evolving forms of infant-parent interventions.

Trauma-focused infant mental health interventions

Although Fraiberg and her colleagues were inherently addressing parent-infant attachment in their work, the concept of attachment was only just developing in the literature at the time when *Ghosts in the Nursery* (1975) was published. As attachment became a bigger part of the discourse surrounding mental health of young children, interventions emerged with the explicit goal of enhancing secure attachments between infants and parents. In particular, researchers and clinicians came to understand that attachment-based interventions were particularly relevant in the treatment of trauma. Work by Main (1995), Lyons-Ruth and Block (1996), Cicchetti (1989) and others illuminated the fact that young children’s ability to recover from trauma is largely impacted by the quality of their attachments. With this knowledge, trauma interventions focusing specifically on attachment emerged (Berlin, Ziv, Amaya-Jackson, Greenberg, 2005).

Drawing on Fraiberg's *Ghosts in the Nursery*, Alicia Lieberman and colleagues developed and tested an Infant-Parent Psychotherapy program at the University of California, San Francisco. As described by Lieberman (1991), Infant Parent Psychotherapy (IPP) involves both the parent and child being seen together (with rare exceptions), and pulls on theories from individual therapy treatment, developmental guidance and concrete assistance for parents. Working with the parent and child together, the IPP therapist is able to observe spontaneous reactions between parent and child and view the baby as the focus of the parent's transferential reactions. According to Lieberman, Silverman and Pawl (2000), IPP "aims at protecting infant-toddler mental health by aligning the parents' perceptions and resulting caregiving behaviors more closely with the baby's developmental and individual needs within the cultural, socioeconomic, and interpersonal context of the family" (p. 472).

Infant-Parent Psychotherapy is explicitly relationship-focused. Lieberman and colleagues point out that although clarifying the links between the parent's past and present behavior was originally considered the central goal of the treatment, developments in psychoanalytic theory have shifted that goal somewhat to focus on the corrective attachment experiences in the therapeutic relationship (Lieberman, Silverman and Pawl, 2005). The understanding of parent's past as central in shaping the present remains; however, IPP recognizes that the therapeutic relationship "becomes a vehicle for change in rigidly constricted or disorganized internal representations of the self in relation to attachment" (Lieberman, Silverman & Pawl, 2005, p. 474). Studies by Lieberman and colleagues (Lieberman & Zeanah, 1999; Lieberman, Weston, & Pawl, 1991) and by Heinicke and colleagues (Heinicke et al., 1999; Heinicke et al., 2000) have demonstrated a relationship between IPP and higher rates of attachment security between mothers and their infants. Specifically, Lieberman (1991) found that a group of 100 intervention

dyads visited weekly from 12-24 months (either at their home or at an office, depending on the mother's preference) performed significantly better than controls on measures of goal-corrected partnership, child avoidance, resistance and anger at mother, as well as maternal empathic responsiveness to the child. After one year, anxiously-attached dyads who had undergone IPP looked the same as securely-attached dyads on these measures. The same was not true for pairs in the control group. Thus, IPP has been proven to enhance security in the attachment between mothers and infants.

Other interventions, including Circle of Security (COS; Cooper, Hoffman, Powell & Marvin, 2005; Powell, Cooper, Hoffman & Marvin, 2009) have also focused on the attachment relationship as the primary target for intervention. The COS intervention was developed specifically for “high-risk” children and is unique in that each child’s attachment classification (and mother’s attachment behaviors) form the basis of an individualized approach to the intervention (Hoffman, Marvin, Cooper, Powell, 2006). As described by Marvin et al. (2002), the general “goal” of the intervention is to present Ainsworth’s ideas of “secure base” and “haven of safety” to the parent in a ‘common sense’ and accessible way (Marvin et al, 2002, p. 109). To do this, Marvin and colleagues developed a graphic (a circle) representing both sides of the exploration and attachment needs of the child, which is used to explain the need for “rupture and repair” (Tronick, 1989), as well as the existence of defensive strategies that are part of the normal response to child behavior. The general goal of COS is broken down into five overarching therapeutic goals: 1) to create a holding environment (Winnicott, 1978) or secure base from which parents can explore parenting, 2) to provide a map (graphic) of attachment theory, 3) to help parents develop observational skills, 4) to improve parent reflective functioning ability through reflective dialogue and 5) to develop parent empathic ability while

lessening automatic defensive processes. The intervention employs both a group and individual component over the course of 20 weeks during which video-feedback is utilized (Marvin, Cooper, Hoffman, Powell, 2002).

Like Lieberman's Infant Parent Psychotherapy, Circle of Security has also shown promising results in improving parent-child attachment. Using a pretest-posttest longitudinal design, Hoffman, Marvin, Cooper and Powell (2006) recruited 75 dyads from Head Start and Early Head Start programs to participate in the COS intervention. Hoffman et al. (2006) found a significant decrease in attachment disorganization as well as in insecure attachment classification following the intervention.

Programs such as Infant-Parent Psychotherapy and Circle of Security demonstrate that in highly traumatized communities, it is possible to intervene with parents and children in order to strengthen the parent-child attachment. Given the vital and protective function of secure attachment, addressing attachment insecurity or disorganization through intervention proves a promising way to disrupt the cycle of intergeneration transmission of trauma.

Home-visiting interventions

Given that they are both intensive and long term, home-visiting interventions in particular hold great promise for interrupting the intergenerational transmission of trauma. Interventions that utilize home visitors to bring treatment directly to clients are important because the very issues that put young families at highest risk (poverty, trauma, domestic and community violence or mental health issues, etc.) often serve as barriers for those families to access treatment. Home-visiting programs have for the past 40 years been seen as an efficient and effective way to bring direct and sustained services into the homes of those who may be most disenfranchised and who

may otherwise lack resources to obtain care. It is these types of interventions that potentially hold the most promise for traumatized families.

In recent years, federal legislation has influenced the proliferation of home-visiting programs. In 1988, Congress passed the Comprehensive Child Development Act (Public Law 100-297), which authorized the Administration on Children, Youth and Families in the Department of Health and Human Services to conduct a 5-year initiative for low-income families. The outcome of this law was the Comprehensive Child Development Program (CCDP), which employed case management and parent education services delivered by paraprofessionals. Eventually, this program was found to be ineffective (Goodson, Layzer, St. Pierre, Bernstein & Lopez, 2000) but it led to the development of Early Head Start (EHS), a federally-funded program for low-income families with young children in birth-to-three year range (Love et al., 2005). EHS employs various models across the country, but it includes both center-based learning and home-visiting in some locations. Unlike the CCDP, findings of the EHS intervention have indicated better cognitive and language development for children involved in the program, but these findings are not limited to home-visiting services (Love et al., 2005).

Political movements (even in absences of changed laws) have also affected the development of home-visiting programs in the United States. In 1989, the National Commission to Prevent Infant Mortality advocated for the expansion of home-visiting programs and in 1991, the U.S. Advisory Board on Child Abuse and Neglect also advocated for the expansion of these programs. Furthermore, in 1998, the Council on Child and Adolescent Health of the American Academy of Pediatrics recommended that primary pediatric care be augmented by home-visiting [see Olds, Sadler & Kitzman, (2007)]. When the advisory board made this recommendation, it

promoted a program of paraprofessional home visiting (Hawaii Healthy Start Program; HSP) which was later implemented and tested in several states including Alaska and New York.

Olds, Sadler and Kitzman (2007) undertook a review of the home-visiting literature, focusing on interventions that have been tested using randomized trials conducted within the past 10 years in developed countries. Olds et al. (2007) review perinatal interventions, as well as interventions focused post-birth on child health and development. The authors point out that home visiting programs differ in regard to specific goals (although they also share many common goals), the educational/vocational backgrounds of the visitors, the segments of the population targeted, the specific content/curriculum of the programs, and the structure or supervision provided to those delivering the services. These variables can be arranged in numerous constellations of programs, leading to a variety of different outcomes (see Olds, Sadler, Kitzman, 2007 for a more detailed review). However, Olds et al. (2007) point out that even when promising gains are made, improvements are often attenuated when measured in follow-up studies several years after the visitation occurs. Other programs have shown to improve some outcomes, while actually perpetuating negative effects on other outcomes [see Duggan et al. (1999) for an example of this phenomenon with the Hawaii Healthy Start Program].

Olds, Sadler and Kitzman (2007) point out that nurses may make ideal home-visitors because they are often “acknowledged as having legitimate agendas and skills to address the concerns of pregnant women and parents of young children” (p. 376). While nurse home-visiting programs have been tested since the early 1970s (Olds et al., 2007), one particularly prolific home-visiting program, Nurse-Family Partnership (NFP) has been tested in three separate randomized control trials (RCTs) since 1977. Participants in NFP are visited regularly by nurse

home-visitors during pregnancy and the first two years of the child's life. The NFP program promotes "sensitive, responsive and engaged caregiving," helps parents set goals for themselves, and encourages family involvement (Olds, 2002, p. 157). The nurses specifically aim to help women improve their prenatal health-related behaviors, improve children's post-natal health by helping parents provide more competent care, and improve parents' economic self-sufficiency by helping develop a vision for their futures or helping parents complete education or find work (Olds, Sadler & Kitzman, 2007).

The first RCT of Nurse-Family Partnership was conducted in Elmira, New York with a sample of 400 low-income families. The program was found to improve women's prenatal health-related behaviors, pregnancy outcomes (i.e., length of gestation), and the rate of reported child abuse and neglect within the first 2 years of the child's life (Olds, Henderson, Chamberlin & Tatelbaum, 1986). A 15-year follow-up found that effects on rates of reported child abuse were sustained, and that nurse-visited women were less likely than control counterparts to have been arrested, convicted or have spent time in jail (Olds et al., 1997). However, there were no differences found in terms of fertility, employment or receipt of welfare in the full sample (differences were detected when women who were classified unmarried or low-SES at registration were examined separately) (Olds et al., 1997).

A second RCT of Nurse Family Partnership was conducted in Memphis, Tennessee, with a sample of 1138 low-income families. The Memphis trial of Nurse-Family Partnership was found to have improved some outcomes (fewer incidences of pregnancy-induced hypertension, more use of community services, more attempted breast-feeding) in the nurse-visited group (Kitzman et al., 1997). However, other outcomes (including effects on birth weight and infant Apgar scores) were not affected (Kitzman et al., 1997).

The most recent RCT of Nurse Family Partnership was conducted in Denver, Colorado on a sample of 735 mostly Hispanic families. In this RCT, the use of both nurses and paraprofessionals as home-visitors was evaluated. Findings indicated that paraprofessionals were less effective than nurses as home-visitors, as the nurses produced a larger number of maternal and child effects (such as more positive parent-child interaction, fewer child language delays and fewer instances of maternal rapid subsequent pregnancy) (Olds et al. 2002). Positive effects for nurse-visited women as compared to those visited by paraprofessionals also showed bigger effect sizes for positive outcomes and those seen by nurses were also more engaged in the program (Olds et al., 2002). Overall, years of testing NFP (both RCTs and follow-up studies) have demonstrated a range of positive public health, parenting and life-course outcomes for families visited by nurses in their homes [including continued education, healthy reproductive behavior, less welfare use and lower rates of criminal behavior (Eckenrode et al., 2010; Kitzman et al., 2010; Olds et al., 2010; Olds, Sadler & Kitzman, 2007)].

As extended reviews of the home-visiting literature suggest, there are a variety of ways to examine whether early intervention can ameliorate the impact of trauma. For example, disruption of the intergenerational transmission of trauma and abuse could be measured in number child abuse reports or child visits to the emergency room. However, a more textured approach would be to look at attachment outcomes, and particularly, the presence or absence of disorganized attachment, which is itself known as a typical outcome of child maltreatment (Carlson, Cicchetti, Barnett & Braunwald, 1989; Cicchetti & Toth, 1995; Carlson, 1998; Van Ijzendoorn, Schuengel & Bakermans-Kranenberg, 1999) and predictor of later psychopathology (Lyons-Ruth, 1996; Carlson, 1998; Sroufe, Carlson, Levy & Egeland, 1999; Van Ijzendoorn, Schuengel & Bakermans-Kranenberg, 1999; Lieberman & Van Horn, 2008).

The intervention under investigation: Minding The Baby®

Minding The Baby® (MTB) is a home-visiting intervention that was developed in 2002, and is an amalgam of two evidence-based home-visiting models described above; The Nurse-Family Partnership (NFP) (Olds, 2007) and infant-parent psychotherapy (IPP) (Lieberman, Silverman & Pawl, 1999) models. MTB pioneered an interdisciplinary intervention, drawing health, mental-health and life course aims under the umbrella of one interdisciplinary intervention. To this end, MTB employs a treatment team comprised of a master's-level social worker and master's-level nurse practitioner to deliver the intervention collaboratively. The team promotes secure and reciprocal mother-child attachment relationships in the service of both health and mental-health related outcomes.

Minding The Baby® (MTB) is run in collaboration by the Yale School of Nursing and the Yale Child Study Center in partnership with two community health centers; The Fair Haven Community Health Center (FHCHC) and The Cornell Scott Hill Community Health Center (CSHCHC). Beginning in 2002, MTB has enrolled more than 200 intervention and control families into the program and officially began a randomized control trial (RCT) in 2009. In 2014, following the first wave of analyses on the RCT, MTB was designated by the Department of Health and Human Services as an “evidence based early childhood home visiting service model.” With this designation, MTB began transition from a research to a service program, focusing on the aim of promoting strong relationships between first-time mothers and their children as a foundation for optimal developmental outcomes in a variety of domains (including health and mental health).

In addition to being unique in its approach as an interdisciplinary home-visiting program, MTB is also unique in its focus on reflective parenting. Given research on the importance of

maternal reflective functioning for a range of outcomes (RF) (Slade, Grienenberger, Bernbach, Levy & Locker, 2005; Grienenberger; Kelly & Slade, 2005; Slade, 2005; Patterson, Slade & Sadler, 2005; Fonagy, Steele & Steele, 1991), MTB clinicians work with the central aim of improving the mother's capacity to reflect upon her own and her child's mental and physical states. This aim is tied to the understanding that trauma, poverty and chronic stress create barriers to listening, thinking and wondering about the thoughts and feelings underlying behavior. Such a lack of reflective functioning leads to disrupted communication and ultimately, insecure attachment (Grienenberger, Kelly & Slade, 2005; Slade et al., 2005). By modeling and encouraging reflective functioning, clinicians aim to strengthen communication and the relationship between the mother and her child. Thus, the relationship is at the core of the MTB intervention.

MTB is a voluntary program targeting families in need. The Community Health Centers from which participants are recruited serve a medically underserved population of families, many of whom are at or below the poverty line in New Haven, Connecticut. All participants are first-time mothers between the ages of 14 and 25. These young mothers have diverse ethnic and cultural backgrounds, including African American, Caribbean American, Puerto Rican, Mexican and Honduran (Sadler et al., 2013). Although the families are diverse, many of these young mothers have experienced multiple traumas in their lifetimes, including domestic violence, substance abuse, homelessness, etc.

The MTB intervention itself involves roughly 27 months of home visitation, where first-time mothers receive weekly home visits from the time of enrollment until infants turn one year. After the one year mark, participants are typically visited bi-monthly until graduation at two years. The visits are conducted by a team of clinicians comprised of one social worker and one

nurse practitioner who generally alternate visiting the family. However, the MTB intervention is applied flexibly, meaning that when appropriate (for example, when a health concern dominates), the family might be visited more often by one or the other of clinicians or might be visited by both at the same time. Furthermore, clinicians are flexible about time and place of visit, allowing mothers to schedule the visits to maximize convenience. Occasionally, the home visitors meet with the mother and child alone, but not infrequently, members of the primary or extended family are also involved in visits (Slade et al., 2014). The end result is that despite fixed goals and underlying theories, the intervention itself differs somewhat in frequency and content from family to family, as dictated by the family's unique characteristics.

Common to all families, both the social worker and pediatric nurse-practitioner are intimately involved in the treatment. This pair makes up the treatment team and each member of the team embodies both distinct and overlapping roles, with shared training and supervision to support their collaboration, in addition to domain-specific supervision (Slade et al., 2014). The relationship between these clinicians and the mother is conceptualized as the primary agent of change. Both clinicians focus on health, development, parenting and mental health concerns and work to support the mother and child – psychically and concretely – in a variety of ways as necessary. Along with the entire MTB team, the social worker-nurse practitioner pair also support each other, working collaboratively toward common goals for each family.

While each treatment demands flexibility to the family's needs, there are also distinct phases of treatment shared by all families. The first phase, "assessment," includes collecting the background and history, demographic and life course variables, and baseline capacity for reflective functioning (RF) of each participant mother. The second phase, "engagement and forming a relationship," entails the clinicians' establishment of safety, persistence, consistency

and concrete support. In the third and final phase of treatment, the “wondering why” phase, clinicians work to imagine the thoughts and feelings of the mother and baby, to raise various possibilities about the baby’s mind, and to establish links between feelings and behaviors and between minds (i.e., to heighten reflective capacity) (Slade et al., 2014). At graduation, the hope is that mothers have begun to be able to do some of this work themselves.

Initial findings have documented encouraging outcomes associated with participation in the MTB intervention. As opposed to participants in the control group, intervention families were found to have higher rates of on-time pediatric immunization, lower rates of rapid subsequent child rearing, and lower rates of referrals to protective services (Sadler et al., 2013). Intervention mothers who began the intervention with the lowest level of reflective functioning (RF) or fewest years of formal education also showed an increase in level of RF over the course of the intervention (Sadler et al., 2013). Furthermore, teen mothers in the intervention group were found to be less likely to have disrupted affective communication with their infants at 4 months than mothers in control group. Perhaps most importantly, intervention group infants were found to have higher rates of secure attachment and lower rates of disorganized attachment at one year. Specifically, the intervention group was 3.4 times as likely as was the control group to have infants who had secure attachments, and control group children were 3.1 times more likely to have a disorganized attachment classification as were the intervention group children (Sadler et al., 2013). Moreover, in a follow-up study, children of intervention group mothers were also found to have lower levels of maternally reported behavioral problems in elementary school (Ordway, Sadler, Dixon, Close, Mayes & Slade, 2014).

The Proposed Study

The findings described above suggest a range of positive outcomes for the bulk of families in MTB. And yet, despite the fact that many of the mothers in the study reported multiple experiences of trauma across childhood and adolescence, and some showed signs of complex trauma disorder, the research on MTB to date has not addressed the ways that maternal trauma has affected outcomes and service delivery. The proposed study examines the impact of maternal trauma on the intervention, specifically whether the mother's level of exposure to adverse childhood experiences might have impacted attachment outcome, or the frequency of visits during the first 15 months of the intervention.

As has been described above, it has been well documented that traumatized mothers are more likely to have disorganized infants than are their non-traumatized peers. Clearly the MTB intervention altered that trajectory, with MTB mothers having fewer disorganized infants than mothers in the control group. But was this trajectory the same for all mothers? Are highly traumatized mothers (that is, mothers with high levels of trauma exposure) as likely to have the same attachment outcomes as less traumatized mothers? How does the level of trauma exposure affect attachment outcomes in MTB families?

Secondly, do more traumatized MTB mothers evidence different patterns of engagement in the intervention, as reflected by different dose of the intervention? Given what is known about trauma survivors and their engagement in treatment, research is needed to examine the role of dose of intervention in the success of the intervention with highly traumatized mothers. Although home-visiting models tend to have guidelines in terms of intended dose (or number of visits), ultimately participants control this variable either by making themselves unavailable for visits (missing sessions) or by frequently reaching out to home-visitors for extra sessions. Dose

is a pertinent issue because the known sequelae of complex trauma have profound implications for projected engagement in therapeutic interventions. Specifically, the trauma literature highlights the fact that the experience of trauma within close interpersonal relationships damages the basic sense of safety, trust and security with others (Pearlman & Courtois, 2005; Courtois, 2008; Deprince & Freyd, 2007), which suggests that even when successfully enrolled in an intervention, the most traumatized individuals may still engage with the intervention less. On the other hand, one might also reasonably suspect that with the myriad of other symptoms frequently accompanying early trauma exposure (e.g., substance abuse, depression, etc.), traumatized mothers might turn to home-visitors in the intervention even more so than their less traumatized counterparts because they may face more “crisis” situations. Indeed, while low dose can indicate a lack of engagement in the intervention and/or lack of solidified relationship between participants and home-visitors, high dose has also been shown to be associated with high stress, substance abuse and mental health problems (Olds et al., 2002; Hien et al., 2012). Given the theoretical understanding of complex trauma, research can illuminate how the most traumatized families behave in the intervention and whether the dose of intervention impacts outcome with these families.

Perhaps unsurprisingly, research examining the dose of intervention in Nurse-Family Partnership program has yielded a complicated picture of the relationship between dose and success because engagement is a complicated issue in regards to trauma. Holland et al. (2014) examined attendance patterns in the Nurse Family Partnership Program. Their results were interesting in that they indicated that “low attenders” (attended fewer than 50% of visits throughout the entire program) had the best outcomes, while “high attenders” (attended at least 50% throughout the program) had the most visits and good outcomes, but “increasing attenders”

(increased attendance from 43% just after birth to 96% in the second year) had the least completed visits and the poorest outcomes. While these results affirm the fact that the relationship between dose (attendance) and outcomes in home-visiting interventions are far from straightforward, they do not address the question of participant trauma exposure and its role in the dose-success equation. Clearly, the relationship between attendance and outcome is not a simple dose-response relationship and is complicated by other factors that may reflect *why* the mother is engaging more or less in the treatment. In addition to continuing to explore the relationship between dose and outcome, research is clearly needed to clarify how parents who have experienced early childhood trauma make use of the intervention.

Finally, do certain capacities contribute to resiliency in the face of early trauma exposure? Specifically, does reflective functioning capacity help mothers with high trauma exposure to ultimately go on to achieve secure attachments with their children? The RF literature indicates that it may be particularly difficult to mentalize against the backdrop of trauma. However, Fonagy et al. advocate for the bolstering of mentalizing as an optimal focus for treating trauma suffered in early attachment relationships (Allen, Fonagy & Bateman, 2010). Exploring the relationship between RF and trauma in the MTB intervention may ultimately help us to know whether (and if so, how) we are tailoring the intervention to the most traumatized participants.

In sum, the current study will document maternal trauma exposure and then explore the ways in which such exposure affects intervention outcome. Specifically, our research will examine the following questions: What is the impact of trauma exposure on the effectiveness of MTB, as measured by attachment outcomes and does maternal childhood trauma history moderate the impact of MTB on attachment outcome? What role does dose play in assessing the

effectiveness of MTB in the more traumatized mothers and is there an interaction between dose and maternal trauma history in predicting attachment outcome? Finally, is maternal Reflective Functioning correlated with maternal trauma exposure in MTB mothers and is there an interaction between maternal RF and maternal trauma history in predicting attachment outcome? Ultimately, such understandings can help further strengthen the intervention and eventually render it optimally effective for the most traumatized mothers.

Chapter 3: Methods

The present study is a secondary analysis, drawing on data collected from an ongoing longitudinal research study of Minding the Baby® (MTB). The ongoing study, “Minding the Baby: A Home Intervention Study,” began in 2002 and is a joint project between the Yale Child Study Center, the Yale School of Nursing, and two community health centers in New Haven, Connecticut. MTB has been conducting a federally and privately funded randomized controlled trial since 2009, although the program has made use of both an intervention and control group since it began in 2002. The present study will examine outcomes in a subset of women recruited into the intervention group. The ongoing study has been approved by the Human Investigation Committee at Yale University (HIC Protocol #0206017098) and the current study has been approved by the IRB of the City University of New York (IRB File #2015-0180). In order to clarify the way in which the original data was collected, the methods of the original study will be reviewed briefly here, followed by a more detailed account of the current study’s methods below.

Subjects

Participants in the original MTB study were primiparous women attending a nurse-midwifery group prenatal session at the Fair Haven Community Health Center (FHCHC) or Cornell Scott Hill Community Health Center (CSHHC), both located in New Haven, Connecticut. The Community Health Centers from which participants are recruited serve a medically underserved population of families, most of whom live at or below the poverty line and have diverse ethnic and cultural heritages, including African American, Caribbean American, Puerto Rican, Mexican and Honduran (Sadler et al., 2013). All participants are first-time mothers.

Primiparous women selected for the MTB intervention were recruited by MTB staff members who regularly visited the prenatal groups at both FHCHC and CSHHC. A nested randomization approach was used such that prenatal groups (rather than individuals) were randomly assigned (by sealed envelope method) to be recruited as either control or intervention group participants. Group status was thus randomly assigned to each prenatal care group before women were invited to join the study. All women in these groups who met inclusion criteria were invited to join the study. Inclusion criteria were 1) the ability to speak and understand English, 2) 14-25 years of age, 3) having a first child, 4) no active heroin or cocaine usage, 5) no DSM-IV psychotic disorder, 6) no major or terminal chronic medical condition in the mother. After recruitment, participating women signed a participation consent form before enrollment.

As part of the MTB study, mothers in both the intervention and control groups received standard prenatal and postnatal care at their Community Health Center and completed research measures. Those in the intervention group only took part in the MTB home visiting intervention described above. Of the 60 intervention group mothers enrolled in the Wave 1 pilot study (2002-2009), the average maternal age was 19.5, average years of education was 11.4, 64% were not working, 66% were Latino, 24% Black and 10% white or mixed background, while 12% were married (Sadler & Slade, 2016). Of the 60 intervention group mothers in the RCT (2009-2015), the average maternal age was 19.5, average years of education was 11.2, 67% were Latina, 22% were Black, 11.7% were White or mixed background, while 8.2% were married (Sadler et al., 2013). The present study drew eligible women from both the pilot and RCT samples. The two samples were very similar and there were no significant differences in demographic variables between the control and intervention groups in either sample.

Setting

The original study was carried out in four locations:

1. The Fair Haven Community Health Center (FHCHC) in New Haven, CT where a subset mothers received prenatal and primary care.
2. The Cornell Scott Hill Community Health Center (CSHCHC) in New Haven, CT where another subset of mothers received prenatal and primary care.
3. Family homes. Research collection visits were carried out in the mothers' homes or in a pre-determined location accessible to the mother (such as a library, a Dunkin' Donuts).
4. The Yale School of Nursing/Yale Child Study Center in New Haven, CT. Most research instruments were completed in the mothers' homes. Research visits that required a laboratory space took place on the Yale campus.

Procedures

Women attending prenatal groups at FHCHC and CSHHC were approached by members of the MTB team and offered the opportunity to join the MTB project, either as control or intervention group participants (based on nested group randomization). Those women who showed interest in the program and met criteria were then visited at home by MTB staff who described the program in detail and answered questions. From there, women who gave informed consent to join the study (typically during their second trimester) were enrolled as part of either the control or intervention group.

If women were enrolled in the intervention group, they began MTB's 27 month home visiting program (described above). If enrolled in the control group, participants received standard care from their CHC and received monthly fliers and updates from MTB. Mothers in

both the control and intervention groups took part in research and data collection visits, for which they were reimbursed \$25.00 per visit.

As part of the larger MTB study, both clinicians as well as research assistants collected a number of measures at 4 months, 14 months, and 24 months. Some of these measures were focused on health, some on life course, and some were demographics measures. Many were collected at home but some measures were also collected in the lab at Yale. For further information, see Sadler et al. (2013). As will be detailed below, only a small subset of these measures were included in the present analysis. In particular, we included measures of mothers' Reflective Functioning during pregnancy, the child's attachment organization at 12 months, and the dosage level of the treatment. The measures used in the current study and the procedures for collecting them will be described below.

The Current Study

The current study assessed the impact of maternal trauma exposure on outcomes in 29 families who graduated from the program during the years 2007-2016. In order to assess trauma exposure in a group of women who have now graduated from the MTB program, the current study invited clinicians to complete an adaptation of an existing and widely used trauma exposure questionnaire, the Adverse Childhood Experiences Questionnaire (mini version). Rather than ask the mothers themselves to rate their own childhood trauma exposure – as has been typical in research to date – clinicians who worked closely with the families over the 27 month period of the intervention used their clinical knowledge and notes to retrospectively rate maternal trauma exposure. As will be elaborated below, trauma exposure scores for each mother were then studied in relation to attachment, dose of the intervention and maternal reflective functioning (RF). Specifically, we examined how maternal trauma exposure affects a main

intervention outcome (infant-mother attachment), as well as how trauma exposure is related to the dose of intervention and to maternal RF at baseline.

Subjects:

All women who began the intervention between 2007 and 2014 were identified. They were considered eligible for inclusion in the current study if, in addition to having completed the study with a pair of clinicians currently employed by MTB; attachment and dosage data were available. Note that this study did not include the original study's control group. This is because a) we did not have trauma exposure data for the control group and b) we were interested in the impact of trauma exposure on the intervention outcome and control group women did not complete the intervention.

Procedures:

The majority of data intended for the current study was collected as part of the larger study described above and was accessed through the project database before being analyzed in relation to maternal trauma exposure. Note that the current study makes use of two kinds of data: data already collected as part of the larger study and other data (from clinicians) that was collected currently for the present study. Data collected as part of the larger study include: the level of maternal RF, which was assessed with The Pregnancy Interview (PI; Slade, 2003) at baseline (within the first few weeks of enrollment); demographics, which were assessed with a questionnaire (at baseline); attachment classification, which was assessed via the Strange Situation Paradigm (Ainsworth et al., 1978) at 12 months; and dose of intervention, which was assessed by counting the number of visits at 12 months.

To gather baseline data on RF, clinicians met with mothers at their homes or another convenient location (such as the library) to administer the PI, a clinical interview regarding the

young women's experiences of pregnancy and expectations about the baby. Baseline data collection also included a demographic questionnaire.

When the baby was 12 months old (roughly 15 months into the intervention), mothers and babies were invited into the lab for a research data collection visit during which they participated in the Strange Situation Procedure (SSP; Ainsworth et al., 1978) as a measure of infant attachment classification. This is a taped laboratory observation procedure administered by research assistants.

Finally, dose of intervention was calculated by measuring the total number of visits a mother received during the course of the intervention. The current study assessed the 12-month outcome; therefore, dosage data was only accessed with regard to the first 15 months of intervention (or up until the time that attachment data was collected). Because some participants are more available to the intervention than others, not all mothers received the same dose of intervention. Procedurally, participants are not involved in the dose calculation. Clinicians record when they make a visit and this data is stored on the secure database, which was accessed for the present analysis.

As opposed to data on maternal RF, demographics, attachment, and dose of intervention, data on maternal trauma exposure was collected retrospectively as part of the current study. Specifically, MTB clinicians were asked to complete a measure of trauma exposure (the ACES-mini, described below) for each eligible mother with whom they worked (eligible meaning that other necessary data on the mother was available for analysis, and that both of the treating clinicians were currently employed by MTB). This measure is typically administered directly to subjects. However, our clinical decision was not to administer it directly to mothers because of the team's concern that trauma exposure questionnaires are often stressful for participants to

complete. Also, because many of the mothers in this sample had already graduated the program, they were not necessarily reachable. Therefore, we decided to invite clinicians to evaluate maternal trauma exposure retrospectively based on their experience with the participants.

Although data on trauma exposure was not collected as part of the original study (neither during the pilot nor the RCT phase), the MTB team had long suspected that many participants had experienced forms of trauma throughout their lifetimes. Originally, the MTB team attempted to capture participant trauma by measuring post-traumatic symptomatology using the Mississippi Scale for Civilian PTSD (Keane, Cadell and Taylor, 1988). However, analyses of PTSD symptoms revealed no significant results. Specifically, there were no differences between control and intervention groups in PTSD symptoms and neither group had average scores in the clinically significant range on the Mississippi Scale, although roughly a quarter of mothers in each group did have scores above the clinical cut-offs at each time point. The failure to find clinically significant levels of PTSD in the groups did not conform with our clinical impressions, suggesting a measurement issue, rather than a reflection of the lack of traumatic experiences. With the understanding that survivors of lifelong developmental traumas may not report or experience trauma symptoms in the same way as those who experience single-incident trauma, we decided that a more sensitive way to measure trauma in this population would be to examine exposures, rather than symptoms. This decision ultimately led us to choose the ACEs-mini measure, asking clinicians to report on participant trauma exposure.

When we embarked on this project, we were not sure whether to have clinicians rate participant trauma exposure separately, or as pairs who worked together with the mother. Ultimately, we decided that clinician pairs (who treated participant mothers together for a period of 27 months) would report on the trauma exposure of each participant *together*, using their joint

experience and their clinical notes. That is, for each study participant, we collected one trauma questionnaire (mini-ACES) filled out by the team of clinicians who treated the mother together and who subsequently discussed and reviewed the cases together. Given that most mothers had graduated from the program at the time of the present study, clinicians discussed each case, and reviewed their case notes and other experiences with the mothers before rating how many traumatic events they collectively remembered to be a part of the mother's history. While we are not aware of any research project that has used the mini-ACES this way, we do know via consultation with the Nurse Family Partnership home-visiting intervention in Connecticut, that this practice is used clinically and has proven both feasible and useful. NFP in Connecticut asks clinicians to fill out mini-ACES with research personnel after meeting with participant mothers in order to track maternal trauma exposure (Personal Communication, JoAnn Robinson, April, 2015). Moreover, we know from our own experience that over time, as clinicians build relationships with the participants, mothers often "open-up" and divulge intimate details of their past experiences, which clinicians then discuss in staff meetings and team supervisions to best understand and treat the mothers with whom they work. Thus, the present study aims to make empirical use of clinical data.

Once mini-ACES scores generated by clinicians were entered into the database, we accessed the remaining data (attachment, RF and dosage of treatment) from the larger study project database. Before enrollment in MTB, study participants gave informed consent to participate in the larger study. However, once entered into the database, participant data was de-identified and clinicians were asked for trauma exposure information about participants by their identifiers, not by the participant names. Thus, we remained blind to identifying data, including

subject names and addresses. Furthermore, before asking clinicians to complete the mini-ACES, we obtained informed consent from them to participate in the current study.

Measures

A. Adverse Childhood Experiences Scale- mini version (ACES-mini; Anda et al., 2006)

The ACE study is an ongoing collaboration between Kaiser Permanente's Health Appraisal Center (HAC) in San Diego, California and the U.S. Centers for Disease Control and Prevention. Each person who was evaluated at the HAC between August 1995 and March 1996 (Wave I) and June and October 1997 (Wave II) completed a standardized questionnaire including health history and health-related behavior and psychosocial evaluations. He or she was then mailed an ACE questionnaire two weeks after his or her visit inquiring about the history of adverse childhood experiences. ACEs (as defined by the questionnaire) occur specifically before age 18 and include 10 categories of adverse childhood experience: emotional, physical or sexual abuse, emotional or physical neglect, violence against the mother, separation of the parents, and living with substance abusers, mentally ill, suicidal or incarcerated household members. The ACE questionnaire (mini) is comprised of 10 questions used to define Adverse Childhood Experiences before the age of 18. Questions from published surveys were used to construct the ACE questionnaire. Specifically, questions from the Conflict Tactics Scale (Strauss & Gelles, 1990) were used to define violence against the respondent's mother while questions about sexual abuse during childhood were adapted from Wyatt (1985), and questions about substance abuse were adapted from the 1988 National Health Interview Survey (Centers for Disease Control and Prevention, 2015). The response rate for the survey was 70% and yielded a database with the health and ACE information of 18,175 participants.

The ACE questionnaire-mini contains questions reflecting separate categories of trauma that may have been experienced in childhood (before age 18). Specifically, the mini ACE defines trauma exposure as the experience of: 1) emotional abuse, 2) physical abuse, 3) sexual abuse, 4) emotional neglect, 5) physical neglect, 6) parental separation, 7) witnessing of domestic violence, 8) exposure to substance abuse in the home, 9) exposure to a depressed, mentally ill or suicidal household member, and 10) incarceration of a household member. Respondents receive a score of "1" for each category of trauma represented by the ten ACE prompts. The number of ACEs is summed to create ACE scores (0-10). This cumulative ACE score creates the basis for rating the extent of trauma a person experienced during childhood (0 being the lowest rating possible and 10 the highest). Test-retest reliability of the measure has been shown to be in the excellent range (range of Cohen's Kappa 0.46-.0.86) (Dube et al., 2004). Validity has been widely established in that high ACE scores have been linked to poor adulthood outcomes in the areas of both health and mental health (Felitti, et al., 1998; Anda et al., 1999; Dietz, et al., 1999; Hills, Anda, Felitti, Nordenberg, Marchbanks & March, 2004; Dube, Anda, felitti, Edwards & Croft, 2002; Dube et al., 2001a; Dube et al., 2001b).

For the present analysis, clinicians were asked to complete the 10-question ACES-mini about each of the participants with whom they have worked. To our knowledge, this way of measuring ACEs has not been used in research. However, of all trauma exposure measures we could give, this one was most amenable to completion by clinicians because it is a blunt measure. That is, to accurately complete the measure, one needs only to know whether or not an event has occurred (i.e., if yes, the score is "1," if no, the score is "0"). Crucially, respondents need *not* know exactly when the event occurred or how specifically it was remembered or experienced by the participant. That is, the measure does not capture severity or frequency of the event, and is

rated in binary “yes/no” fashion. Clinicians, who worked with mothers closely for 27 months and in many cases developed intimate knowledge of the mother’s family and background, were in a unique position to be able to provide this data about the mothers. With this methodology, we used this widely-implemented and validated measure in a novel way (i.e., with clinicians) in order to collect data that would otherwise be unavailable.

Despite their intimate knowledge of participants, clinicians were also given the option to respond with “P” for ACE categories of abuse or dysfunction that they believed *probably* occurred but could not say with certainty. The study author then reviewed each “P” with clinicians, eliciting reasons why a “P” was assigned. The “P”s and corresponding rationales for assigning them were reviewed by the study author and a clinical supervisor. In cases where “P”s could not be resolved with further discussion between clinicians, study author and clinical supervisor, items that received a “P” from one clinician and not from the other were rated as “1.” In this way, we erred on the side of clinical judgment that the specific type of abuse, neglect or dysfunction had likely occurred.

B. The Strange Situation Paradigm (Ainsworth, Blehar, Waters & Wall, 1978)

The Strange Situation Procedure (SSP) is a 30-minute standardized laboratory procedure used to assess the quality of the child’s attachment to his caregiver. The SSP consists of eight 3-minute episodes involving the infant, the primary caregiver and a female stranger. Each SSP was videotaped by a trained team at the Yale Child Study Center and then coded by an expert coder. The coding yields one of four primary attachment classifications: secure, avoidant, ambivalent or disorganized (Ainsworth et al., 1978; Main & Solomon, 1990).

In addition to primary attachment classification, each infant is also assigned a continuous score for level of disorganization (termed “d score”) as specified by Main and Solomon (1990) from 1 (low) to 9 (high). The overall level of disorganization score is assigned by expert coder according to the following scale, as set forth in Main and Solomon (1990): (1) no signs of disorganized/disoriented behavior; (3) slight signs of disorganized/disoriented behavior, yet no inclination to assign D classification; (5) moderate indices of disorganized/disoriented behavior, though not clearly sufficient for D classification (e.g., no very strong indicators of disorganized/disoriented behavior are present, and those that are present are not necessarily frequent or intense enough to warrant a D classification); (7) definite qualification for *D* attachment status, but the behavior is not extreme (e.g, there may be one very strong indicator of disorganized/disoriented behavior or several lesser indicators); (9) definite qualification for *D* attachment status including strong, persistent, and/or extreme indicators. According to the classification system, overall level of disorganization (i.e, “d”) scores of more than 5 prompt a reclassification to the Disorganized category (*D*) as the primary classification (Main & Solomon, 1990).

The SSP is a well-validated and reliable procedure that has been used in studies of attachment for over 30 years. It has been used successfully with low-income mothers and mothers from various cultural backgrounds (Carlson & Sroufe, 1995). Coding was performed by an expert coder naive to the group status of the participants.

C. Pregnancy Interview (PI): Pregnancy Interview - Short Form (Slade, 2003).

This is a 22 item semi-structured clinical interview designed to assess a woman’s emotional experience of pregnancy as well as the nature of her developing relationship with her

baby. This interview has been used successfully with different samples (Patterson, Slade & Sadler 2005). The interview is audiotaped and then transcribed to be scored by trained and certified coders blind to group status.

The PI is scored using a system developed by Slade, Patterson and Miller (2007) and based on a modified version of Fonagy and colleagues' Reflective Functioning Scoring Manual (1998) to assess RF specifically during pregnancy. RF scores for maternal reflective functioning range from negative reflective capacity (-1) to high (9). The average scores in non-stressed samples of mothers is 6, while the average scores in poverty samples is 4 (Grienenberger et al., 2005; Levy, Truman & Mayes, 2001). To score at 5 or above, the mother must demonstrate an ability to link behavior to its underlying mental state or to link one person's mental state with another (Slade, Grienenberger, Bernbach, Levy & Locker, 2005).

The RF scale has been validated using samples of ordinary pregnant women (Fonagy, Steele & Steele, 1991). Studies involving both the PI and Parent Development Interview (PDI; Slade, Aber, Berger, Bresgi & Kaplan, 2004) have found prenatal and postnatal RF scores on these measures are correlated (Pajullo et al., 2011). In all studies, scoring reliabilities above .80 have been regularly achieved.

D. Dose Calculation

Dose of intervention refers to how many visits mothers participated in over the course of the intervention. While MTB is based on a treatment model in which mothers are visited every week during the first 12 months and then every other week during the second year of the intervention, different mothers engage in treatment in different ways and consequently, wind up being seen by the clinicians more or less than expected. The MTB study calculates dose by

summing the number of visits a mother receives. For the purposes of the present study, number of visits was counted from enrollment in the study to completion of the SSP when the infant was one year of age. The number of visits the mother has received during this time frame constituted the “dose” of intervention.

Aims and Hypotheses of the current study

1. To examine the relationship between mothers’ early trauma exposure (as assessed by clinician ratings on the ACE Questionnaire) and her child’s attachment status (as measured using the SSP), within a sample of families being seen in a reflective home visiting program.
 - a. We hypothesized that mothers with the highest ACE scores (most trauma exposure) would be more likely to have children classified as insecure/disorganized in the SSP at 12 months than mothers with lower ACE scores.
 - b. We hypothesized a significant relationship between maternal trauma exposure (measured via ACE score) and overall level disorganization score (“d” score) at 12 months. That is, the more early childhood trauma exposure a mother had, the higher her child’s overall level of disorganization score would be.
2. To examine the relationship between mothers’ early trauma exposure (as assessed by clinician ratings on the ACE Questionnaire) and engagement in Minding the Baby®, as measured by total number of visits across the course of the intervention.
 - a. We hypothesized a positive relationship between maternal trauma exposure (ACE score) and dose (as measured by number of sessions). That is, the more

childhood trauma exposure a mother reported, the higher dose of intervention she will have received.

- b. We hypothesized an interaction effect between trauma and dose in predicting attachment outcome. In other words, we hypothesized that mothers with high trauma and secure children will have received a higher dosage of the MTB intervention than mothers with high trauma and insecure/disorganized attachment when their children are one year of age.
3. To examine the relationship between mothers' early trauma exposure (as assessed by clinician ratings on the ACE Questionnaire) and baseline Parental RF (as measured using the Pregnancy Interview).
 - a. We hypothesized a negative relationship between maternal trauma exposure and maternal RF score. That is, mothers who had the most childhood trauma exposure (highest ACE score) will have the lowest reflective functioning scores (low RF).
 - b. We hypothesized an interaction effect between trauma and baseline reflective functioning in predicting attachment outcome. In other words, we hypothesized that mothers with high trauma and securely attached children will have had higher RF at baseline than mothers with high trauma and insecure or disorganized attachment when their children were one year of age.

Chapter 4: Results

Demographics

Twenty-nine subjects were included in the present investigation. Most women (69%, $n=20$) in the study identified as Latina, 13.8% ($n=4$) identified as Black/African-American, while 17.2% ($n=5$) of subjects identified as “other” (which included “biracial” and “Italian”). Participant ages ranged from 16 to 26 years, with an average age of 20.2 years. Seventeen percent of mothers in the study achieved a ninth grade education or lower ($n=5$), while 24.1% of mothers received some college education ($n=7$). Note that the demographics presented here are consistent with the larger sample of Minding the Baby® participants and suggest that demographically, the subsample analyzed herein is representative of the larger pilot study and RCT samples (Sadler & Slade, 2016; Sadler et al., 2013).

Main Variables

In the present study, attachment status served as the main outcome variable measured. Table 1 depicts the attachment classifications of infants in the sample at one year of age. Sixty-two percent ($n=18$) of infants were securely attached at one year, while 17.2% ($n=5$) were classified as disorganized. Because only one infant was insecure-resistant, the two insecure-organized attachment classifications (insecure-resistant and insecure-avoidant) were collapsed into one insecure-organized category for the analyses described below. In the present sample, 20.7% ($n=6$) infants were insecure-organized when the child was one year of age.

Table 1. Demographic characteristics of participants (n=29)

	Frequency	%
Race		
Latina	20	69
Black/African-American	4	13.8
“Other”	5	17.2
Age		
16	3	10.3
17	2	6.9
18	5	17.2
19	3	10.3
20	4	13.8
21	4	13.8
22	2	6.9
23	0	0
24	1	3.4
25	4	13.8
26	1	3.4
Education		
8 th grade	3	10.3
9 th grade	2	6.9
10 th grade	5	17.2
11 th grade	3	10.3
12 th grade	4	13.8
Post-hs voc*	5	17.2
Some college	7	24.1

*Post-hs voc= post high school vocational training

Table 2 depicts base-rate information relevant to the clinical variables examined in relation to the attachment outcome (trauma level, dose and RF). Each clinical variable will be discussed separately below.

Table 2. Descriptive characteristics of clinical variables

Clinical variable	Mean	Median	SD	Minimum	Maximum
Trauma (ACES-mini) (n=29)	5.52	6	2.86	1	10
Dose (n=29)	54	49	20.03	21	104
Reflective Functioning (n=27)	2.96	3.0	.876	1.5	5.5

Note. ACES-mini= Adverse Childhood Experiences Scale-mini

Maternal childhood trauma in the present sample was measured using a clinician report of the Adverse Child Experiences Scale-mini (ACE-mini). The ACE-mini score reflects the number of types of adverse experiences that occurred before the participant was 18 years of age. As presented in Table 2, trauma scores ranged from 1 adverse childhood experience (low level of trauma) to 10 adverse childhood experiences (highest possible level of trauma). The mean trauma score was 5.52 with a standard deviation of 2.86. Table 3 breaks down the trauma exposure in the present sample by category of exposure and by amount of trauma exposure. The Centers for Disease Control and Prevention (CDC) demarcates scores of 4 or more on the ACE-mini as “high trauma exposure,” due to the fact that an ACE score of 4 or more is associated with exponentially higher probability of negative outcomes (Centers for Disease Control and Prevention [CDC], 2014). Four participants in the sample (13.8%) received a trauma score of 1, 13.8% (n=4) received a trauma score of 2, while most participants, 72.4% (n=21) received a trauma score of 4 or more (high trauma).

Table 3. Prevalence (%) of childhood exposure to abuse, neglect and household dysfunction in current sample (n=29) and published ACE findings (n=9,367)

Category of childhood exposure	Present Sample (n=29)	National sample of women (n=9,367)
Abuse by Category		
Emotional	75.9	13.1
Physical	55.2	27.0
Sexual	6.9	24.7
Neglect by Category		
Emotional	72.4	16.7
Physical	37.9	9.2
Household dysfunction by category		
Mother treated violently	58.6	13.7
Parental separation or divorce	86.2	24.5
Mental illness in the household	65.5	23.3
Household substance abuse	55.2	29.5
Incarcerated household member	37.9	5.2
ACE-mini score		
0	0	34.5
1	13.8	24.5
2	13.8	15.5
3	0	10.3
4 or more	72.4	15.2

As depicted in Table 3, adverse childhood experiences occurred in the present sample at a much higher rate than they occur in the national population of women. While 15.2% of women in a nationally representative sample received an ACE score of 4 or more (high trauma), 34.5% of women received an ACE score of 0. By way of comparison, none of the participants in the current sample received a score of 0 (no childhood trauma), while 72% of women in the present sample received a score of 4 or more (high trauma). Furthermore, only a quarter of the present sample reports a low level of trauma (ACE-mini score of less than 4).

With respect to specific types of trauma, the categories of trauma most endorsed in the current population include separation or divorce of the parents (before the participant was 18 years of age) (86.2%, n=25), emotional abuse (75.9%, n=22), emotional neglect (72.4%, n=21), and depression or mental illness in the immediate family (65.5%, n=19). In comparison to national averages for women, all types of trauma were more prevalent in the present sample than

in women nationally, with the exception of sexual abuse. Although most categories of trauma were reported to be at least twice the rate of the national average, sexual abuse was reported in the present sample at roughly 1/3 the rate it is reported nationally in women. Specifically, 6.9% (n=2) of the present sample received a score representing the experience of sexual abuse during childhood, while 24.7% of women nationally report childhood sexual abuse. The discrepancy between sexual abuse reported nationally and in the current sample will be discussed further below.

Table 2 also depicts the base-rate characteristics related to the “dose” of intervention (number of visits) that mothers received up until the baby’s first year of age. The number of visits (i.e., dose) ranged from 21 to 104. The median number of visits was 49, with a mean of 54 visits and a standard deviation of 20 visits. Clearly, despite the fact that MTB has guidelines for intervention dose, the actual dose received differs widely from participant to participant.

With regard to level of RF (measured at baseline), subjects ranged in score from 1.5 (absent but not repudiated RF) to 5.5 (definite or ordinary RF) (see Table 2). The mean reflective functioning score was 2.96 with a standard deviation of .88. In a validity and reliability study of RF on the Parent Development Interview (PDI), a normative sample of women was found to have a mean RF score of 4.6 (Sleed, 2014). Thus, the average score of participants in this sample is lower than the average RF score of women in a non-traumatized, nonclinical sample. The average score of the present sample may be more consistent with the average RF scores in clinical samples (i.e., in Sleed, 2014, a prison sample was found to have a mean RF score of 3.4).

Relationships between variables

We used a one-way multivariate analysis of variance (MANOVA) to examine whether maternal childhood trauma or dose of intervention differed as a function of maternal race. The

univariate F tests are presented in Table 4. Results from this analysis indicated that there were no statistically significant mean differences among the three categories of maternal race on either trauma [$F=0.20$, $df=(1, 26)$, $p=.82$] or dose [$F=0.84$, $df=(1, 26)$, $p=.44$]. We also examined effect size using partial eta-squared. Consistent with the findings of the significance tests, the effects can be described as “small” for trauma (partial eta squared =.015) and “small to medium” for dose (partial eta squared = .061). In other words, the amount of maternal childhood trauma did not differ in this sample as a function of race. Similarly, the dose of intervention received by each participant also did not differ as a function of race.

Table 4. Univariate Analyses of Variance – Trauma and Dose (Visits) by Race

Dependent Variable	Hispanic (n=20)	African-American (n=4)	Other (n=5)	df	F	p
	m(sd)	m(sd)	m(sd)			
Trauma	5.30 (2.90)	6.25 (3.86)	5.80 (2.28)	(2,26)	0.20	.82
Dose (visits)	52.55(20.51)	48.50(19.36)	64.20(18.94)	(2,26)	0.84	.44

We also examined whether maternal trauma or dose of intervention were related to maternal age or maternal education level using Pearson correlations (see Table 5). None of these correlations were statistically significant. Despite the lack of statistically significant findings, we did observe an inverse relationship between maternal age and dose of intervention, indicating that older mothers tended to have fewer home visits ($r=-.22$). However, using effect size standards, this relationship was fairly modest. In other words, older mothers had a tendency to receive lower doses of the intervention, but this tendency was not statistically significant and was not particularly strong.

Table 5. Pearson correlations of the demographic and clinical variables (n=29)

Demographic variables	Trauma
Maternal Age	-.040 ¹
Maternal Level of Education	-.103 ³

¹ $p = .836$ ² $p = .248$ ³ $p = .597$ ⁴ $p = .443$

Aim 1: The relationship between maternal trauma and attachment classification

The relationship between maternal childhood trauma exposure and infant attachment status was examined when the child was one year of age. The analyses were split into Aim 1a (examining maternal trauma and child attachment status using attachment category) and Aim 1b [examining maternal trauma and attachment status using overall level of disorganization (i.e., “d”) score].

Aim 1a predicted that mothers with the highest ACE-mini scores (most trauma exposure) would be more likely to have children classified as insecure or disorganized in the Strange Situation Procedure (SSP) at 12 months than mothers with lower ACE-mini scores. A one-way analysis of variance (ANOVA) was used to investigate the relationship between attachment classification and trauma. As presented in Table 6, results revealed that there was no statistically significant relationship between attachment status at one year and maternal childhood trauma ($F = .106$, $df = (2, 26)$, $p = .36$). Partial eta squared was used to determine effect size and at .075, the effect size would be considered “small to moderate.”

Table 6. Univariate Analysis of Variance Summary Table for the Relationship Between Trauma and Attachment

Source	SS	df	MS	F	p	η^2
Attachment Status	17.21	2	8.60	1.06	.36	.75
Error	212.03	26	8.16			
Total	229.24	28				

Thus, overall, the relationship proposed between trauma score and child attachment category for Aim 1a was not statistically significant. However (see Table 7), the mean trauma score of mothers of disorganized children was higher than for any other group. Furthermore, the biggest difference in mean trauma score was between the disorganized group and the insecure-organized group (most of whom were rated as having “avoidant attachment”). Thus, as a group, mothers whose infants were disorganized at one year reported the most trauma exposure in their own childhoods. Conversely, as a group, mothers whose infants were secure reported less trauma exposure in their childhoods. Mothers whose children were insecure-organized (largely avoidant) reported the lowest levels of childhood trauma exposure. Thus, the biggest difference between mean childhood trauma scores in this case was between the mothers in the disorganized attachment group and the mothers in the insecure-organized attachment group. The significance of this finding will be discussed in further detail below.

Table 7. Descriptive Statistics: Trauma score by attachment group

Attachment Status	Mean	SD	n
Disorganized	6.60	2.70	5
Insecure-organized	4.17	2.56	6
Secure	5.67	2.97	18

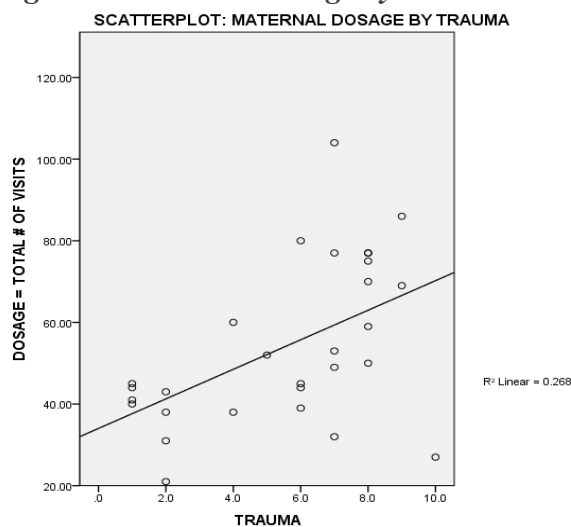
Aim 1b predicted that maternal trauma (ACE score) would be positively correlated with overall level of disorganization (i.e., “d score”) when the child was one year of age. The bivariate relationship between maternal trauma and the overall level of child disorganization was examined using a Pearson correlation. The relationship between maternal trauma and overall level of disorganization (“d”) score, $r=.24$, was not statistically significant ($p=.21$). However, the relationship was positive and using effect size measures can be characterized as “small-to-moderate.” Thus, mothers with the highest amount of trauma in their own childhoods had infants with more indices of disorganization in the Strange Situation. The relationship is modest and positive, although it did not reach the level of statistical significance.

Aim 2: The relationship between trauma and dose and its effect on program outcome

Aim 2a predicted that mothers who reported having been exposed to more trauma in their own childhoods would have received a higher dose of the intervention (i.e., more visits) at one year than mothers who reported having been exposed to less trauma in their childhoods. In order to rule out the possibility that the relationship between dose and trauma was a curvilinear one, a regression model was used to test the presence of curvilinearity in the relationship. The linear component of trauma was significantly and moderately strongly related to dose (Beta=.52, $p=.004$). When the curvilinear component was introduced into the model as a second step, it was

found to be statistically insignificant, supporting the claim that the relationship between dose and trauma is not curvilinear ($p=.524$). Figure 1 depicts the linear relationship between dose and trauma by way of a scatterplot. As the scatterplot demonstrates, mothers who reported having experienced more trauma in their own childhoods also received a higher dose of intervention (i.e., were visited more frequently by home visitors) than mothers who were exposed to less trauma in their childhoods.

Figure 1: Maternal Dosage by Trauma



Aim 2b predicted an interaction between maternal childhood trauma exposure and dose of intervention on child attachment at 12 months, such that mothers with more childhood trauma and a higher dose of the intervention would be more likely to have securely attached children at one year than mothers who had been exposed to high trauma but who received a lower dose of the intervention. A multinomial logistic regression found no evidence of a relationship between infant attachment classification and maternal trauma that is moderated by dose ($\chi^2=.016$, $df=2$, $p=.92$). More specifically, there was no evidence that the relationship between infant disorganization at one year (as opposed to secure attachment) and maternal trauma was moderated by dose of the intervention ($\chi^2=.09$, $df=1$, $p=.77$). Similarly, there was no evidence

that the relationship between insecure infant attachment (as opposed to secure attachment) and maternal trauma was moderated by dose ($\chi^2=.11$, $df=1$, $p=.75$). Thus, mothers whose children were disorganized or insecure in their attachment at one year and who also had high levels of trauma were no more or less likely to have received a different dose of the intervention than mothers whose infants were rated securely attached at one year and also had high childhood trauma exposure.

In sum, the more trauma a mother reports in her own childhood, the higher dose of intervention she received. For example, the mother who received 104 visits by the end of year 1 (the highest dose received) also had an ACE-mini score of 7 (high trauma). The positive relationship between trauma exposure and dose suggests that highly traumatized participants may be needier. However, despite the positive relationship between trauma and dose, there was no evidence that dose moderated the relationship between maternal trauma exposure and infant attachment classification at one year.

Aim 3: The relationship between trauma and Reflective Functioning and its effect on program outcome

Aim 3a predicted that mothers with lower baseline levels of maternal RF would have had the highest level of trauma exposure in their childhoods. Aim 3a was tested using a Pearson correlation. There was no evidence of a relationship between maternal childhood trauma and baseline RF ($r=-.07$, $p=.72$). In other words, mothers who reported high levels of trauma in their childhoods were no more or less likely to have had higher reflective functioning at baseline than mothers who reported a lower level of trauma in their childhoods.

Aim 3b predicted an interaction effect between maternal trauma and maternal RF, such that mothers with high trauma and securely attached children would have had higher RF at baseline than mothers with high trauma and whose infants were insecure or disorganized.

Because of the relatively small size of the current sample, moderation effects were tested using two different methods. First we pooled the non-secure attachment groups (all insecure-organized and disorganized children) and compared the non-securely attached group to securely attached children. This created a 2-group comparison and allowed us to use binary logistic regression to examine the interaction effect. However, because we expected that insecure-organized children might be different from disorganized children, we also used a 3-way comparison to compare secure infants to insecure infants to disorganized infants using multinomial logistic regression. Results of both types of comparisons are presented below.

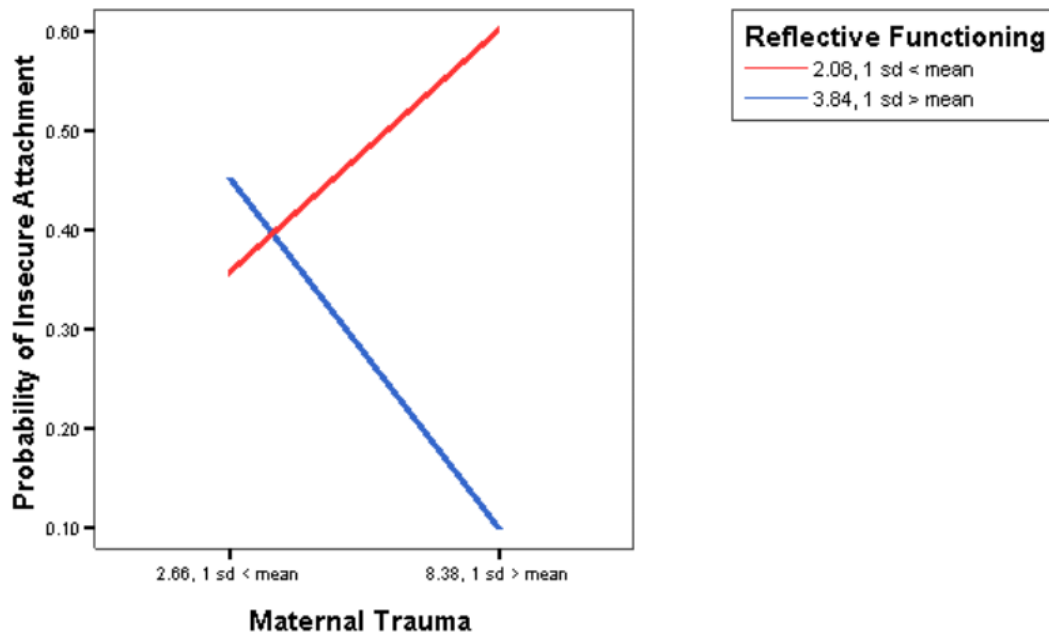
Results of the binary logistic regression model are presented in Table 8 and suggest that there is an interaction between maternal trauma and maternal RF as they jointly affect infant attachment classification at one year. Note that although the relationship is not statistically significant at the $p=.05$ level ($\chi^2=2.94$, $df=1$, $p=.09$), the p value of .09 suggests a trend in the data. Because of this trend, the effect was further plotted in Figure 2. As represented in the plot, women who were “high” in trauma (i.e., 1 standard deviation above the mean) but who were also “high” in RF (again, 1 standard deviation above the mean) evidenced the lowest probability of having an insecurely attached child at one year. Conversely, women who were “high” in trauma but who were “low” (1 standard deviation below the mean) in RF were more likely to have an insecurely attached child at one year. Women who were “low” in maternal trauma (1sd < mean) fell between the two aforementioned groups of “high” trauma women in terms of the probability of having an insecurely attached child, regardless of their level of RF.

Table 8. Binary Logistic Regression Predicting Attachment Status

Predictor	B	SE	Chi-Square	df	p	Odds ratio
Trauma (T)	0.78	0.55	2.38	1	.12	2.24
Reflective Function (RF)	1.02	.082	1.90	1	.17	2.78
Interaction (T*RF)	-.030	0.19	2.94	1	.09	0.74

Fig. 2: Predicted Probability Of Insecure v. Secure Attachment

Maternal Trauma X Reflective Functioning Interaction Effect



A three-group comparison (securely attached versus insecurely attached versus disorganized attachment) was also estimated using multinomial logistic regression. These results are presented in Table 9. There is no evidence of a relationship between the 3-group attachment classification and maternal trauma that is mediated by reflective functioning at the conventional $p = .05$ level ($\chi^2 = 3.73$, $df = 2$, $p = .16$). More specifically, there is no evidence that the relationship between having a disorganized child (as opposed a securely attached child) and maternal trauma is mediated by RF ($\chi^2 = 0.03$, $df = 1$, $p = .86$). However, there is some

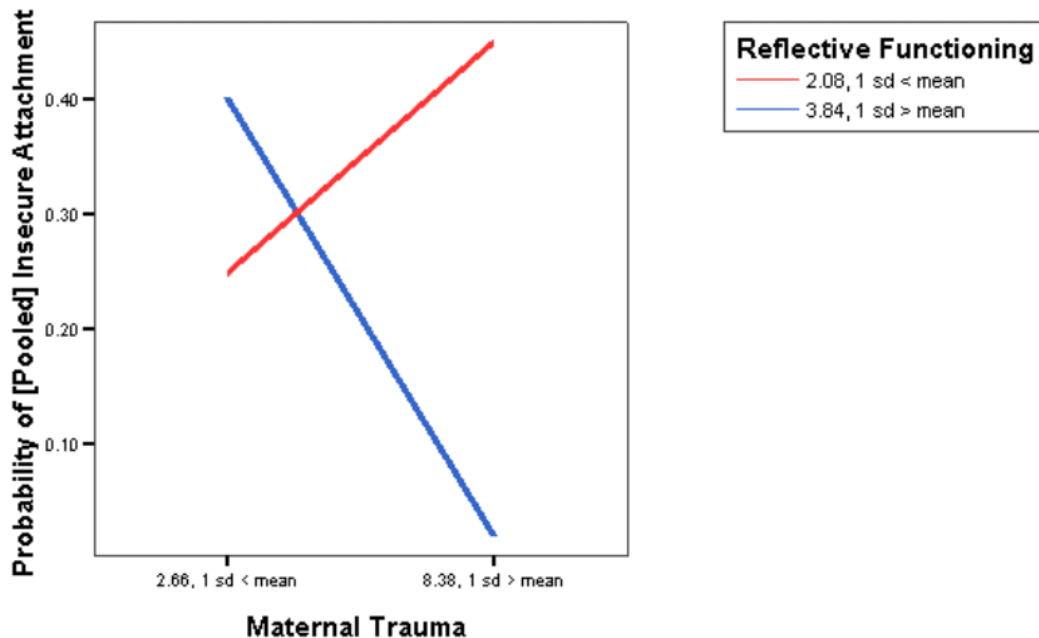
suggestion (as seen in the 2-group comparison) that maternal trauma and RF interact to jointly affect the likelihood of having an insecure as opposed to the securely attached child ($\chi^2 = 2.84$, $df = 1$, $p = .09$). The visual depiction of the suggested interaction plotted above (see Fig. 2) also characterizes this suggested interaction (see Fig. 3). That is to say, women reporting higher levels of trauma, but who also have higher levels of RF, evidenced the lowest probability of having an insecurely attached child. Similarly, women reporting higher levels of trauma but who also had lower levels of RF evidenced the highest probability of having an insecurely attached child. The probability of having an insecurely attached child among women who report low levels of maternal trauma, irrespective of their scores on reflective functioning, fell midway between the two aforementioned types of high trauma women. Thus, in the face of high trauma, high RF seems to be a protective factor promoting security in the attachment relationship.

Table 9. Multinomial Logistic Regression Predicting Attachment Status

Disorganized v. Secure						
Predictor	B	SE	Chi-Square	df	p	Odds ratio
Trauma (T)	0.07	0.83	0.01	1	.93	1.07
Reflective Function (RF)	-1.32	2.25	0.34	1	.56	0.27
Interaction (T*RF)	0.06	0.34	0.03	1	.86	1.06

Insecure v. Secure						
Predictor	B	SE	Chi-Square	df	p	Odds ratio
Trauma (T)	1.07	0.71	2.24	1	.14	2.91
Reflective Function (RF)	1.56	1.06	2.19	1	.14	4.77
Interaction (T*RF)	-0.44	0.26	2.84	1	.09	0.65

Fig. 3: Predicted Probability Of [Pooled] Insecure v. Secure Attachment
Maternal Trauma X Reflective Functioning Interaction Effect



In sum, baseline RF is not related to amount of trauma a mother experienced in her own childhood, which may suggest that it operates separately as a resilience-promoting factor. Along these lines, there is evidence of a trend ($p=.09$) toward an interaction between trauma and RF impacting the attachment relationship between mother and child. That is, mothers who had the highest levels of trauma but were also protected by higher baseline levels of RF were more likely to have securely attached children at one year than those women with high trauma exposure but lower levels of baseline RF. The significance of the above findings will be further discussed below.

Chapter 5: Discussion

The present study evaluated maternal trauma exposure in a group of participants engaged in the Minding the Baby® (MTB) home intervention. Three aims and six hypotheses were evaluated examining 1) the impact of maternal childhood trauma on attachment outcomes; 2) the impact of dose of the intervention on outcomes; 3) and the impact of maternal RF as a resilience-promoting factor in the face of maternal childhood trauma. These analyses have contributed both to our understanding of participants in the current MTB intervention and to our understanding of the role of maternal childhood trauma exposure in attachment-based interventions more generally.

MTB participants were targeted for inclusion in the intervention based on their relative “risk” due to poverty and youth. Although the MTB team had long suspected that a majority of intervention participants have faced significant lifetime trauma, the present study is the first to empirically evaluate trauma exposure in MTB participants. Results of the present analyses revealed that the majority of participants had high levels of trauma exposure. While maternal childhood trauma exposure varied somewhat from participant to participant, the average trauma exposure score of 5.5 on the ACEs is considered “high” by CDC standards. Consistent with this mean trauma exposure score, 72.4% of the present sample of participants reported high trauma exposure (i.e., having been exposed to 4 or more ACEs). This percentage is significantly higher than the percentage of women nationally who report having experienced 4 or more adverse childhood experiences before the age of 18 (only 15.2% of women nationally report this level of early childhood trauma exposure). In fact, all categories of early exposures were reported in the MTB sample with at least twice the frequency they are in a nationally representative sample of women, with the exception of sexual abuse. Thus, the data presented here address a new way to

conceptualize “risk” and “need” in this population by documenting the high level of upheaval, disruption and early trauma exposure participant mothers have faced.

Results relating to the 6 hypotheses tested will be reviewed immediately below. Note that no demographic variable (participant age, level of education, or race/ethnicity) was found to be a significant predictor for distinguishing between level of trauma exposure or attachment classification of the participants.

Trauma exposure and attachment outcome (Aim 1)

The MTB intervention aims to help young first-time mothers develop the sorts of relationships with their children that will lead to secure attachment. Given that the majority of women in the MTB sample studied were survivors of early childhood trauma/family dysfunction, the first set of analyses examined whether early trauma exposure was related to successful outcome (i.e., secure attachment) in the intervention. To that end, we examined whether highly traumatized mothers undergoing the intervention were as likely to have securely attached children as their less traumatized peers. Our results supported the null hypothesis, namely that highly traumatized MTB participants were no less likely to have secure attachment than their less traumatized peers. Thus, our results indicate that reported maternal trauma exposure did not play a direct moderating role on intervention outcome.

The lack of detected difference in the attachment relationship between the highly traumatized and less traumatized mothers in the MTB intervention is significant in that it suggests that the MTB intervention is effective with mothers, regardless of the severity of their trauma histories. That is, despite the fact that decades of research suggest that mothers exposed to early childhood trauma and dysfunction are at risk for a host of negative outcomes, including insecure attachment (Lyons-Ruth, 2003; Kisler & Black, 2005; Murphy et al., 2014), the current

study finds that mothers who report higher levels of trauma exposure but who take part in the MTB intervention are *not* more likely to have insecure or disorganized children than mothers with relatively lower levels of trauma. These results expand upon and clarify the Sadler et al. 2013 MTB findings because they indicate that the published positive effects of participation in the MTB intervention apply to severely traumatized mothers. In effect, participation in the MTB intervention may break the link between maternal trauma exposure and child insecure or disorganized attachment, interrupting the intergenerational transmission of trauma.

The second set of results related to maternal trauma and attachment also suggest that the MTB intervention may break the cycle of intergenerational transmission of trauma by strengthening mother-child attachments. Specifically, in addition to the hypothesis described above relating to child attachment classification, we also hypothesized that maternal childhood trauma exposure would be correlated with overall level of disorganization (i.e., “d score”) at one year. This hypothesis was also not supported. That is, no statistically significant effects were detected in the relationship between maternal childhood trauma exposure and overall level of child disorganization (“d score”).

Although our results suggest that the MTB intervention appears to be interrupting the intergenerational transmission of trauma by protecting children from insecure/disorganized attachment, a nuanced look at the data reveals that the intervention does not erase the impact of maternal trauma exposure. Rather, although its larger impacts seem to be ameliorated, its subtle effects continue to reverberate in the relationship. For one, although it did not rise to the level of statistical significance, maternal childhood trauma exposure was positively correlated with the child’s overall level of disorganization (i.e., “d” score) characterized by a small-to-moderate effect size ($r=.24$). In other words, even when the child was ultimately classified as secure or

insecure-organized, the level of maternal trauma exposure was found to be positively related to the level of disorganized/disoriented behaviors that the child exhibited in the Strange Situation Procedure. Moreover, our data also revealed that mothers of disorganized children in the current sample had the highest mean trauma exposures scores (though this difference did not rise to the level of statistical significance). Thus, we do see some indication that mothers of children who are disorganized in relation to attachment may have been exposed to an especially high level of early trauma. Taken together, these data underscore the reality that the consequences of early trauma exposure are often deeply entrenched and that while this 27-month intervention may ameliorate them, they are not eradicated.

In sum, results of the Aim 1 analysis suggest that the MTB intervention shows promise as a tool to address attachment outcomes in highly traumatized populations. Yet, even when the intervention yields positive effects (i.e., higher rates of secure attachments), the impact of maternal trauma exposure reverberates in the relationship.

Dose and Trauma Exposure (Aim 2)

The second aim of the analyses examined whether maternal childhood trauma exposure affected engagement in the MTB intervention (by way of dose) and further, whether the dose of intervention moderated the success of the intervention. Our hypothesis that early trauma exposure would be positively correlated with dose of the intervention was statistically supported. That is, the mothers who reported the most exposure to trauma in their own childhoods also received the most visits by MTB home-visitors in the child's first year of life.

Our dose analysis reveals important data about the way that highly traumatized participants may engage in interventions. While we found that mothers who reported the most trauma exposure received the highest dose of intervention, we also observed wide variation in

the dose of MTB intervention received during the first year (range of dose went from 21-104 visits). This range indicates that despite flexible guidelines, MTB participants are determining contact with their home visitors based on some matrix of individual needs and characteristics. Many intervention programs (i.e., Circle of Security (COS); Cooper, Hoffman, Powell & Marvin, 2005) have a fixed number of program sessions for each participant with the idea that number of sessions should not differ based on individual participant variables, such as trauma exposure. However, the current study suggests that treating all participants as having the same dosing needs may be ill conceived. In fact, it makes sense clinically that mothers with the most childhood trauma exposure may have more frequent contact with their home-visitors. That is, given that mothers who experienced early disruption in their own lives are likely to suffer from a cascade of psychological difficulties, it is not surprising that highly traumatized mothers were also the most needy participants. Having been deprived of stability and safety in their early lives, traumatized mothers present with many needs when a supportive clinician becomes available and proves reliable. Moreover, following the theory that individuals who experienced disruption in their earliest relationships also tend to have more difficulty establishing trust and rapport in new relationships, MTB mothers who experienced the most early trauma may have needed more time and connection with home visitors to establish the necessary therapeutic alliance with them. However, because MTB clinicians continued to show up and to contact mothers, even when they may have been hard to reach, participants may ultimately have been able to break transference expectations of lack of care and to allow their needs (however great) to be known.

While the mothers reporting the most early trauma exposure also received the most visits, there was no statistical evidence of an interaction between dose of intervention and maternal trauma exposure in predicting child attachment classification at one year (intervention outcome).

That is, there was no difference between the attachment classification of children whose mothers had high trauma exposure and high dose and children whose mothers had high trauma exposure and low dose. Thus, while mothers with the highest trauma scores did receive the highest dose of intervention, dose of intervention did not moderate success (i.e., attachment outcome).

Results of our dose-trauma moderation analysis contribute to the complicated picture of the relationship between dose, trauma and success. Specifically, the fact that dose did not emerge as a moderator between maternal trauma exposure and success in the intervention suggests that rather than *needing* a higher dose of intervention, the most traumatized mothers may need to exercise control over the amount of intervention they receive, with the possibility of receiving a higher dose if the mothers so choose. That is, our results support the notion that the most traumatized mothers need to exercise agency in determining the dose that is appropriate for them individually, even if that dose may be higher than the general program guidelines suggest. While all participants (traumatized or otherwise) likely need to experience agency in therapeutic relationships, the trauma literature suggests that re-establishing lost agency may be particularly important for those who have experienced trauma. Specifically, Herman (1992) asserts that the first step in healing from trauma requires the victim to be empowered and to regain a sense of control, including control over how relationships and interventions unfold. In effect, the participants with the most trauma exposure may need to titrate the level of intervention to suit their personal needs and comfort level in order to optimize intervention success.

Taken together, the present results suggest that trauma exposure is an important variable to consider in conceptualizing appropriate dose of attachment-based interventions. Our study indicates that mothers with the most early trauma exposure may have different needs in the MTB intervention, and perhaps in interventions more generally. In fact, dose of intervention is likely

not a “one-size-fits-all” variable and factors related to participant history, trauma exposure and participant ability to assert control over contact may be used to clarify the question of appropriate dose.

Reflective Functioning and Trauma Exposure (Aim 3)

The present analyses also examined the relationship between RF and maternal childhood trauma exposure and explored whether baseline level of RF impacted a traumatized mother’s success in the intervention. The hypothesis that maternal childhood trauma exposure would be negatively correlated with maternal RF was not supported. That is, results indicated no statistically significant relationship between maternal trauma exposure and baseline level of maternal RF. The relationship detected was negatively correlated, but the effect size was small ($r=-.07$). Thus, in the present sample, RF was not found to be associated with trauma exposure, but rather, RF may act independently as a resiliency-promoting factor.

The idea that RF promotes resilience in the face of trauma was also partially supported by a trend in the data suggesting that mothers with the highest levels of trauma exposure but who also had higher levels of baseline RF were more likely to have securely attached children than mothers who had high levels of trauma exposure but lower levels of RF. The trend observed here supports the work of Fonagy et al. (1991) and Slade (2005), confirming that RF can act as a protective factor in the face of trauma. That is, the trend suggests that when mothers who have experienced high levels of dysfunction in their own childhoods are able to reflect on their own and others’ experiences, they are able to promote stability and security in their relationships with their own children, thereby protecting those children from the negative effects associated with intergenerational transmission of trauma and insecure attachment.

It is important to note that the interaction detected between maternal RF and trauma exposure in predicting secure attachment reflected a difference ($p=.09$) between the secure and non-secure groups (two group comparison). However, when a three-group comparison was examined, the important difference emerged between the secure and insecure-organized groups ($p=.09$), but not between the secure and disorganized groups ($p=.86$). This was a perplexing finding and it is unclear why it occurred. It is possible that baseline RF was too consistently low across mothers of disorganized infants such that a lack of variation in RF scores contributed to this non-significant finding. Potential areas of weakness in the present study will be discussed further below, but there is a need for more research to clarify this perplexing result.

On the whole, the findings related to RF underscore the validity of conceptualizing RF as a mechanism of change in the MTB intervention. Theoretically, as reviewed above, it can be difficult to mentalize against the backdrop of overwhelming early trauma. However, unlike trauma exposure, the fact of which cannot be changed, RF capacities can increase with intervention. Indeed, mother-child interventions dating all the way back to Selma Fraiberg and colleagues (1975) have rested upon the theoretical understanding that reflective capacities are key to helping mothers become reliable, secure bases from which their children can develop¹. In line with Fraiberg's seminal ideas, we observed in the current study a trend suggesting that mothers with better reflective capacities were more readily able to overcome the negative effects of their own childhood trauma. Thus, our results affirm not only MTB's theoretical approach (increasing RF to promote resiliency), but they point to a substantial literature affirming ideas about the importance of maternal reflection in disrupting the intergenerational transmission of

¹ Note that the terms "reflection" and "attachment" were not yet developed when *Ghosts in the Nursery* (Fraiberg, Adelson & Shapiro, 1975) was published but that we read these concepts into the work.

trauma and insecure attachment. As this was a trend ($p=.09$) finding, a bigger sample needs to be tested to confirm our hypotheses and strengthen our interpretations.

Drawing concepts together: Trauma and Attachment

The present analysis draws from and pulls together two distinct sets of theories: trauma theory and attachment theory. These literatures have evolved largely separately from one another and yet they are deeply intertwined. In fact, the widely supported tenet that chronic developmental trauma disturbs relational functioning hinges on the idea that such trauma disrupts internal working models of self, other and self-in-relation-to-other that were first described by Bowlby. Moreover, the concepts of safety and security are central to both sets of theories. Further, the relational positions of victim, perpetrator and bystander cannot be divorced from the hostile, helpless and fearful stances in relation to attachment. Drawing on these theoretically overlapping ideas, we now understand that maternal trauma exposure may be passed to the next generation *via* the attachment relationship and that intervening in the attachment relationship may be the key to breaking the cycle of ongoing developmental trauma. Given this understanding, it is crucial to consider the concepts of trauma and attachment together in order to adequately explore and intervene with survivors of complex trauma.

Despite the theoretical overlap between the fields of trauma and attachment, an individual's response on a trauma inventory is rarely considered within the framework of her attachment style or relational history. Trauma measurement guidelines seem to imply that individual characteristics (such as attachment) will not affect collection of trauma-related material. Our study suggests otherwise. Specifically, a close look at the mean maternal trauma scores by attachment group led us to think about whether all mothers are equally likely to report trauma exposure. In the present sample, mothers of insecurely-attached children reported the

lowest mean trauma score in comparison to other groups. This finding was initially surprising when we would have expected mothers of secure children to have had the lowest trauma exposure scores. Yet, when we consider that most babies in the insecurely attached group (4 out of 5) were in fact classified as insecure-avoidant, the data begin to make sense clinically. In the SSP, insecure-avoidant children tend to appear as though they are not distressed, while physiological markers of distress suggest otherwise (Waters, Matas & Sroufe, 1975). Their outward appearances (language, emotion, behavior) belie their inner experience. In turn, avoidant children tend to have mothers who deal in the same way with emotional experiences and who react to the expression of attachment needs by withdrawing or turning away from their infants (Main, Kaplan & Cassidy 1985; Slade & Aber, 1992). That is, these women may be unlikely to report painful inner experiences; rather, they avoid emotional pain and present as tremendously detached and without strong feelings (Egeland & Sroufe, 1981; Isabella, 1993). The attachment literature suggests that what lies deep within their psyches may be very different from what is presented or reported.

Taking the attachment literature into account, we suspect that mothers of insecure-avoidant children may be less likely to report early childhood trauma and more likely to avoid thinking about these experiences. The implication is that the lowest mean trauma score of the insecurely attached group may be the result of mothers in this group underreporting trauma exposures, rather than the result of this group having *experienced* less early trauma than the mothers of securely attached infants. Accordingly, attachment histories of participants influenced how trauma exposures were reported. For the mothers of insecurely attached children in present sample (and likely for all of the mothers), attachment style was inextricably linked to their report

of traumatic experience. Thus, the present study affirms the utility of considering early trauma within the framework of attachment in order to ascertain more thorough trauma exposure data.

The idea that attachment classification may impact trauma exposure data has important implications for research in this area, and for the Adverse Childhood Experiences study in particular. The CDC has widely disseminated the ACE questionnaire and has determined that a cut-off of 4 ACEs constitutes “high trauma” in the same way that it suggests 5 alcoholic drinks constitutes a binge (Centers for Disease Control and Prevention, 2016). Yet, our data suggest that the ACEs score is complicated by the fact that all individuals may not be equally likely to report ACEs. Specifically, we observed that attachment organization may critically impact the overall ACE score. Thus, the idea of locating trauma exposure within an attachment framework offers an important corrective on the sanctity of the meaning of the ACEs, which were originally collected by questionnaire. In the absence of other clinical data, the ACE score represents only one part of an accurate picture. Including clinicians in a discussion on participant trauma exposures may be one way to improve the accuracy of the score. The strengths and weaknesses of this particular approach will be discussed further below.

Overlap of measurement issues and clinical issues: Understanding measurement from a clinical perspective

This study made use of a unique and novel approach in order to collect data on childhood trauma exposure; that is, we employed clinicians in the collection of participant trauma exposure data. Using this particular approach also led us to think about how the clinical and research aims of an intervention overlap with and inform one another. As we developed this project, we asked ourselves: What is the impact of asking particular research questions within an intervention project? How can we use research measures in a way that makes sense clinically? How can the research and clinical arms of an intervention team work together to enhance clinical practice?

These questions are particularly relevant in the context of collecting data on trauma exposure, precisely because such data are notoriously difficult to collect and because disclosure or nondisclosure (whether for research or otherwise) occurs within a clinical context. Our results affirm the idea that gathering accurate data on trauma exposure is difficult, and that measuring trauma exposure, just as treating traumatic reactions, requires clinically-informed thinking and clinical skill.

In the present study, we observed a large discrepancy between the rate of sexual abuse reported in the current sample and the rate at which it is reported in a nationally representative sample of women. Specifically, the ACE-mini item measuring exposure to childhood sexual abuse was endorsed in the present sample at one-third the rate (6.9 vs. 24.7%) endorsed by women nationally. This discrepancy suggests severe underreporting of sexual abuse in the present sample.

Given decades of research suggesting that childhood sexual abuse is frequently not disclosed, or disclosed only after significant delay (Paine & Hansen, 2002; Gomes-Schwartz, Horowitz & Cardarelli, 1990; Kelley, Brant & Waterman, 1993; Sorenson & Snow, 1991), the underreporting of childhood sexual abuse in the present sample was not particularly surprising. In fact, the phenomenon of underreporting of childhood sexual abuse has been affirmed by several prospective and retrospective studies. Specifically, Williams (1994) conducted a prospective study in which children with documented histories of sexual abuse were followed and when interviewed 17 years later, 38% did not recall the abuse. In a similar but retrospective study, Widom and Morris (1997) also found substantial underreporting of child sexual abuse in cases where court-substantiated cases of abuse had occurred.

Part of the difficulty surrounding retrospective reports of trauma involves the nature of memory itself. Traumatic memories tend to be dissociated and stored differently in the brain, which impacts the readiness with which they are accessed (Van der Kolk, 2014). Of course, denial and repression of traumatic memories can also hinder their remembrance. Yet above and beyond the nature of the memories themselves, relationships and contextual factors influence whether memories readily accessed will be shared. Kogan (2004) examined the factors that influence the disclosures made by female survivors of unwanted sexual experiences in childhood and adolescence and found that a closer relationship to the perpetrator made disclosure less likely. Both clinicians (Liang & Kamsler, 1990) and empirical researchers (Arata, 1998; Berliner & Conte, 1990; DiPietro et al., 1997; Sauzier, 1989; Sorenson & Snow, 1991) have suggested that children who are sexually abused by a close family member are particularly hesitant to disclose their abuse. Interestingly, family structure -- and specifically, never having lived with both parents -- is also associated with not disclosing (Kogan, 2004). This is important in that 86.2% of the present sample reported that parents were divorced or separated, and presumably, some proportion of that large percentage did not live with both parents, which could have impacted their likeliness to report abuse.

While we know that sexual abuse is frequently underreported across different studies and in various contexts, we also wondered whether something specific to the present intervention impacted the suspected underreporting of childhood sexual abuse. Specifically, we wondered what it was about these participant-clinician pairs that caused sexual abuse to be reported at a dramatically lower rate than any other category of abuse, neglect or family dysfunction. One possibility is that the clinicians were hesitant to ask about past experiences of sexual abuse. Emphasizing the role of stigma and taboo in relation to nondisclosure of childhood sexual abuse,

Courtois (2016) asserts that although our society has become increasingly open to acknowledging trauma and PTSD, we still (clinicians and others alike) cannot talk about incest. In fact, clinicians regularly commented that participant disclosures of past *physical* abuse emerged from discussion of participants' discipline theories and practices, which were observed and discussed in-vivo. Certainly, clinicians would be much less able (and likely also less willing) to observe, wonder about and comment upon in-vivo sexual interactions.

Moreover, we suspect that there may be something about the context of a mother-infant intervention in particular that makes it especially difficult to discuss past experiences of sexual abuse. Pregnancy and early motherhood are times of great transition and psychological reorganization (Slade, Cohen, Sadler & Miller, 2009). Given the unique challenges of this time, we imagine that in this context, women may be even more unlikely to report early sexual abuse than they might be during another time of life. For one, pregnancy is inherently tied to sexuality and birth itself may be extremely triggering of earlier sexual trauma (Slade et al., 2009; Seng, 2002). Both birth and the earliest stages of mothering involve a loss of control over the mother's own body. When loss of control is so real, past victimizations or more pernicious forms of losing control over the body may be too "close to the surface" and too threatening to be discussed. Moreover, as women talk about breastfeeding, birth control, and physical health with their home visitors, their bodies inherently become part of the intervention. Perhaps, within this context, it does not feel possible for mothers to think about their bodies in other ways.

We also suspect that the aim of this particular intervention (securing healthy relationships between mothers and children) may further complicate the decision to disclose childhood sexual abuse. The MTB intervention is voluntary and women choose to participate because they are ultimately striving for something more than what they had -- something better for their children.

These earliest stages of parenting are both a time of hope and a time of fear (Slade, Cohen, Sadler & Miller, 2009). In the context of trying to push forward -- to reach toward hope -- mothers may be particularly hesitant to reflect back on past sexual trauma. What would it mean for a mother to simultaneously hold in mind both her hope for her baby and the acknowledgement of her own childhood sexual abuse? Ultimately we do not know whether other women in this stage of life (first time pregnancy and early motherhood) readily disclose sexual abuse in any context. While we have norms for women nationally, we do not have norms specifically for groups of pregnant women or new mothers. Given the unique vulnerability and difficulty associated with this phase of life, it is possible that women simply do not disclose during these phases in a way that can be compared to a nationally representative sample of women.

While we may speculate, we do not know why women in the present sample so infrequently reported childhood sexual abuse. However, we are stuck by the fact that measurement within the context of an intervention can never be divorced from the clinical aspects of the intervention. In the present study, disclosing or nondisclosing was a decision that occurred within the context of the treatment relationship. Thus, in the context of this study, our research collection directly depended on the clinical situation. Yet, we assert that in any research paradigm, the decision to report trauma (or not) always hinges on clinically relevant factors, such as relational history, attachment representations, cultural norms, ability to trust, etc. Thus, for a truly nuanced measurement of a construct such as trauma, one must seriously consider the complex clinical context.

While research aims and clinical aims are not always considered simultaneously, as we saw in our study, they are always deeply intertwined. To measure a particular construct within an

intervention (such as trauma exposure) necessarily highlights the importance of that construct, which reverberates clinically. In this case, clinicians needed a push to think about participant trauma exposure – a push they received because we chose to research trauma. Given the underreporting of childhood sexual abuse suspected here, it follows that clinicians in all attachment-based interventions could benefit from being made aware of the possibility of maternal childhood trauma and the potential for lack of disclosure of abuse. The present study provides an opportunity to help home-visiting clinicians become aware of the possibility of childhood sexual abuse history (and childhood trauma history more broadly) that is not readily disclosed. For this reason alone, measuring trauma exposure may be a very important clinical objective, even though we know that past trauma is not always accurately reported.

Collecting data for the present study: Further clinical implications for research

Enlisting clinicians to complete the ACEs-mini measure was in fact the culmination of 4 years of discussion about complex trauma in the MTB intervention population. The groundwork for the current investigation began in 2012, before some participants in the present sample were even enrolled in the intervention. At the time, we presented clinicians with an overview of complex trauma and the seven alterations associated with it (c.f., Courtois, 2008) and then asked clinicians to discuss the concept in reference to specific (randomly chosen) cases. One thing we discovered during our 2012 conversations is that most of the clinicians had never heard of complex trauma before and though they were hesitant to consider asking participants about trauma directly, all were intrigued to learn more about this literature. As clinicians considered their clients through the lens of complex trauma, they also noted that many mothers had never disclosed trauma to home-visitors during the intervention, but they did disclose to the research

assistant at the final research visit. This was perplexing to clinicians who had worked over two years to build relationships with mothers and their families.

After asking clinicians to review the concept of complex trauma and think about some specific cases, we asked simply if clinicians believed this concept “fit” with this population. The responses were varied by individual and by discipline. One social worker reported that, “when reading [about complex trauma] there’s a lot that really spoke to me...it speaks to the heaviness of situations.” Another social worker commented that she believed 80% of MTB participants would probably fit the complex trauma diagnosis, while a third commented, “the more we’re thinking about...I feel like it can be addressed more specifically...there are ways to explore with moms...there is so much focus on the present that we’re not exploring the past.” On the other hand, one of the nurse home-visitors had a hard time thinking about specific cases through the lens of complex trauma because, she stated, “the social workers talk much more about this kind of thing than the nurses.” In sum, we saw that some clinicians “took” to the idea more readily than others and some were more comfortable than others when it came to considering participant trauma exposure. At least one clinician wondered, “If we had this information, what would we do with it?” Thus, one question seemed to be: would it be too overwhelming to contemplate all that these women have faced? Would the task of moving toward secure attachment -- of helping these women -- feel too insurmountable if the past was exposed?

Despite some initial reluctance (and we suspect, fear) to explore trauma exposure, clinicians grappled with these new ideas and questions, which once introduced were not easily forgotten. As a team, clinicians, researchers and supervisors began to discuss and speculate about participant trauma histories in team meetings and to consider the various factors that affect disclosure. Along with a shift in the field toward considering the consequences of “toxic stress,”

our decision to measure trauma promoted a thoughtful engagement on the part of the team. In effect, wondering about trauma made it possible to *think* and learn about trauma and eventually made it possible to collect information about participant trauma exposure.

The four year discussion of complex trauma as it relates to MTB participants eventually evolved into the study presented here, using clinician report of ACEs to measure maternal trauma exposure. Bringing the concept of complex trauma to the clinical team, over time, made this measurement possible because we acknowledged and worked with clinicians' hesitancy to ask these questions. Despite the above-mentioned nurse's 2012 assertion that nurses talk less about "this kind of thing" than social workers, when we collected data for the present study, we asked both nurse and social worker home-visitors to rate participant trauma exposure together. The nurse who (three years earlier) had made that claim had no difficulty reporting ACEs for mothers with whom she had worked.

Given the varying initial responses to measuring trauma, we did wonder whether certain clinician teams were more receptive to reporting trauma than others and to that extent, we looked at the mean ACE scores assigned by each clinician team. We did not find significant differences between the mean score of one clinician team versus the other. We believe that after informing clinicians about trauma, their perceptions about participant trauma began to change. In fact, MTB clinicians reported that the exercise of completing ACE-mini forms for each client -- as a team -- enhanced their thinking about their clients. In effect, the decision to measure trauma underscored the importance of this construct and brought it closer to the forefront of clinicians' minds. At the conclusion of data collection, one clinician spontaneously commented, "I'm glad you're asking these pointed questions [i.e., ACES]. It helps me to think about it this way...it's so

important.” This clinician’s statement (along with our data) illustrates the ways that measurement and clinical process are inextricably linked.

Study Limitations and Future Directions

The most significant limitation of the present study is likely related to the relatively small sample size analyzed. Because sample size dictates statistical power, we cannot rule out the possibility that null results would become significant with bigger sample sizes. Our small sample size also meant that we had a relatively small number of disorganized infants to include in the present analysis. To combat the limitation of our small sample size, we included effect size measures wherever possible. We also pooled insecure and disorganized infants for analysis of aim 3 in order to have a larger group with which to compare the securely attached infants. Nevertheless, a larger sample would have provided greater power and thus more confidence in our statistical results. Moreover, our intervention sample was also found to be highly traumatized (i.e., high mean ACE score). While clinically this was not surprising, lack of variability in the sample (i.e., a relative dearth of non-traumatized participants) leaves our analysis vulnerable to ceiling and floor effects.

Methodologically, this study was also limited by the lack of control group information available. Because trauma exposure data could not be collected from control group participants, we were unable to measure whether highly traumatized mothers without the benefit of the MTB intervention were equally likely to form secure attachments with their children as the mothers included in the present intervention sample. In lieu of control group information, we relied on decades of clinical and research findings to infer that, in the absence of intervention, maternal trauma exposure impacts the likelihood of secure attachment. While the body of research backing the relationship between maternal trauma and attachment is extensive, use of control

data would have strengthened our interpretation that the MTB intervention disrupts the intergenerational transmission of trauma.

As discussed above, the methodology of the current study was unique in that we asked clinicians to complete the ACEs-mini on behalf of their clients. Asking clinicians to report levels of trauma exposure in MTB mothers was our only way to assess adverse childhood experiences, given that we had not assessed trauma exposure over the course of the study. As discussed above, we also found that -- contrary to our clinical observations -- more typical measures of PTSD (The Mississippi, etc.) indicated no post traumatic symptomatology whatsoever. Both of these facts inspired us to develop the methodology used here. And yet, there are inherent limitations to this method. First, asking clinicians to report ACEs potentially introduces other variables into the data. For example, our results indicated that women with the highest trauma exposure scores were also seen more often by home-visitors. While there are clinical explanations for this result (i.e., that more traumatized moms are also more needy), it is also possible that clinicians reported the highest trauma for these participants because they were seen more and thus known by clinicians more intimately. We cannot rule out the possibility that variables related to the clinician-participant relationship could have influenced the ACE-mini scores. Second, it may well be that the nature of the therapeutic relationship and the mothers' reluctance to explore shaming experiences within the context of a mothering intervention limited the disclosure of key traumatic experiences. We believe that that was certainly the case in some instances.

Not surprisingly, the present study affirms that data related to trauma exposure are extremely difficult to collect. While participant self-report of trauma might have eliminated some of the potential confounding variables introduced by asking clinicians to report on trauma

exposure, it would not have addressed the fact that participants often do not disclose trauma. In truth, there is no ideal way to collect information related to trauma exposure. Self-report measures are always fraught due to the many variables (cultural, attachment, intelligence, etc.) that affect how individuals fill out the measure. For this reason, we view clinician-report of the ACEs as a potential strength of the current study. In fact, it is possible that clinician-report of ACE-mini may actually have offered a *less*-biased account of trauma exposure than would otherwise have been the case. In many cases, the year-plus history of a clinical relationship has created a much stronger foundation for eliciting accurate reporting of trauma exposure than an isolated self-report form could have. Further, we know that practically, intervention programs use the ACE-mini measure in a variety of ways (having nurses fill them out, having clinician and participant do it together, etc.). Thus, while we recognize the limitations of using clinician report of trauma exposure, we also believe that this method of data collection is useful. Future research may examine the areas of overlap or difference between a mother's self-report of trauma exposure and the clinician's report of the mother's trauma exposure. Such research might also provide a foundation from which mothers and clinicians can begin a conversation about trauma exposure.

Given that the current study suggests that the MTB intervention is successful with highly traumatized mothers, future studies may also continue to explore how and when MTB impacts the relationship between traumatized mothers and their babies. Specifically, a next step might be to look at the Atypical Maternal Behavior Instrument for Assessment and Classification (AMBIANCE; Bronfman, Parsons & Lyons-Ruth, 1999), which is already implemented as part of the MTB research protocol. Because the AMBIANCE measures affective communication between mother and baby when the baby is fourth months of age, examining this measure could

shed light on how traumatized mothers are able to form secure attachments despite their trauma histories. In particular, the AMBIANCE score reflects the mother's ability to regulate infant fear, distress and arousal by tallying the frequencies of atypical maternal behaviors (behaviors likely to bring about disorganized attachment) observed in videotaped interactions. Examining these scores would potentially illuminate whether the most traumatized mothers communicate differently with their four-month-olds than less traumatized mothers. Specifically, the AMBIANCE score could speak to whether the most traumatized mothers use communications to regulate infant fear and arousal in the same way as their less traumatized peers. Such information would potentially further our understanding of how and when MTB intervenes to impact the negative sequelae of maternal childhood trauma exposure.

Furthermore, future research should also continue to investigate the relationship (observed in the current study) between attachment representation and trauma exposure report. As discussed above, no known studies have considered report of trauma exposure and attachment experiences in tandem, despite the fact that attachment history undoubtedly impacts memory and the decision to disclose traumatic experiences. Our observations suggest that a more thorough picture of trauma exposure would follow from exposure research that takes attachment history into account. To that end, future research is needed to explore how participants with different attachment classifications complete trauma exposure questionnaires. We believe such research would lead to new and innovative ways to measure trauma data and to more thoroughly understand effective ways to intervene.

Conclusion

Following the ACE studies, the need for primary prevention programs has been heavily stressed (Barnett, Liu, DeVoe, Alperovitz-Bichelle & Duggan, 2007; Dube, Felitti, Dong, Giles

& Anda, 2003; Putnam, Harris & Putnam, 2013). The present study suggests that MTB is indeed addressing the negative sequelae of ACEs, and particularly, the threat of insecure attachment that follows from maternal trauma. MTB thus emerges as a primary prevention program poised to meet the needs of the most traumatized parents and poised to answer the call for prevention programs so widely heralded by the ACE research.

As a contribution to the intervention and trauma literatures, our study not only highlights the potential for attachment-based interventions to address the intergenerational transmission of trauma; but also addresses the issues of intervention dosing and resiliency-promoting factors that contribute to success. This contribution both expands upon the published findings regarding the MTB intervention, and also provides valuable information to consider with regards to all trauma-related interventions.

Finally, our study pulls together theories and ideas that have historically developed separately from one another. Namely, our study has made use of a tool from the public health community (i.e., the ACE assessment) in order to evaluate and validate a reflective attachment-based intervention. In so doing, we drew together not only the fields of epidemiology and psychology, but also the theoretical literatures regarding trauma and attachment. We assert that report of traumatic experience --likely even memory of traumatic experience itself-- hinges on attachment-related experience. We also assert that measurement of clinical data cannot be divorced from clinical process. By including clinicians in this research project, we affirmed the utility of grounding research within the clinical context. We hope that this study serves to encourage clinically-informed collection of trauma-related data and highlights the utility of educating clinicians regarding the far-reaching effects of early, chronic and complex developmental trauma.

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