PRENATAL MALTREATMENT RISK, EARLY PARENTING BEHAVIORS, AND CHILDREN’S EMERGENT REGULATION

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PRENATAL MALTREATMENT RISK, EARLY PARENTING BEHAVIORS, AND CHILDREN’S EMERGENT REGULATION

Abstract

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This project examined relationships among early maltreatment risks, maternal parenting behaviors, and children's self-regulation in a sample of 304 primiparous mothers and their children. Structural equation modeling (SEM) was used to examine the relationships among prenatal maternal maltreatment risk; 4, 8 and 18 month parenting; and children’s regulation at 24 months. A more detailed investigation of specific parenting behaviors and how they change over time, including risk antecedents and children's regulatory consequences was provided by Hierarchical Linear Modeling (HLM) and a series of regression analyses. Results provided support for the role of maltreatment risk in determining both early and later parenting. Moreover, children’s regulatory difficulties, assessed by physiological, emotional, and behavioral scales of regulation, were influenced by parenting at 18 months; changes in specific parenting behaviors, especially the quality of the home environment; and prenatal maltreatment risk. Findings are discussed in terms of their implications for understanding the effects of
prenatal maltreatment risk on parenting and children’s self-regulation and how prevention efforts can best target these domains in high risk families.
DEDICATION

To my Lord, helping me to fulfill my God-given dreams (1 Peter 5: 6-7)
To my amazing angels, Gabriella Atira and Isaiah Matthew, thank you for being my children
To my family who supported me
To my friends and neighbors who were always ready to lend a hand
To all the ladies at the Center for Children and Families, your encouragement has lifted me up!
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INTRODUCTION

Nearly one million children were reported to have experienced neglect or abuse in 2004 (U.S. Department of Health and Human Services, 2006). Research has shown that maltreated children are at risk for a variety of developmental difficulties including behavioral problems, cognitive delays, and emotional maladjustment (Aber, Allen, Carlson, & Cicchetti, 1989; Eckenrode, Laird, & Doris, 1993; Eigsti & Cicchetti, 2004). A growing body of work has highlighted the process nature of children’s self-regulation between maltreatment and developmental dysfunction such that maltreatment is related to children’s compromised self-regulation skills which in turn impede development in the aforementioned domains (Maughan & Cicchetti, 2002; Shields & Cicchetti, 1998; Trickett, 1998).

Numerous suggestions have been put forth to explain how maltreatment influences children's self-regulation with consistent evidence supporting the role of parenting behaviors, particularly punitive, harsh punishment, as the mechanisms responsible for compromising children's subsequent regulation (Brown, Cohen, Johnson, & Salzinger, 1998). Less is known how other important parenting behaviors are affected by maltreatment risk and the impact that these behaviors may have on children’s developing regulation. Furthermore, with the effects of maltreatment on children's regulation being well-documented in school-aged children (Maughan & Cicchetti, 2002) and additional evidence suggesting earlier dysfunction (Crittenden, 1992), elucidating the
relationships among maltreatment risk, parenting practices, and toddlers' developing regulation becomes especially important for the prevention of later childhood psychopathology. The present study explores the relationship between early maltreatment risk and parenting behaviors over the course of the first 18 months of life. Importantly, this study also examines predictors of changes in the parenting behaviors over time and the implications for these changes on children's developing self-regulation.

*Maltreatment and Developmental Consequences*

The role of early caregiving in children's development is paramount (Parke & Buriel, 1998). At the most basic and necessary level, parents provide life-sustaining nourishment, safety, and warmth. From a socialization perspective, parents are the first major teachers of their children, fostering social, emotional, adaptive, and cognitive growth (Parke & Buriel, 1998). According to this perspective, the parenting that is received supports a child's ability to grow into an individual that will eventually function independently in society (Parke & Buriel, 1998). For children raised in a maltreating environment, however, development may become markedly compromised in multiple domains.

Maltreated children often experience delays in cognitive functioning including intelligence and academic problems, as well as adaptive skills deficits. Multiple studies have shown that school-aged maltreated children perform lower on measures of receptive vocabulary skills and standardized tests, and also are more likely to repeat a grade than their nonmaltreated peers (Eckenrode, et al., 1993; Kendall-Tackett & Eckenrode, 1996). Pre-academic and language delays have also been documented in younger children. For
instance, Eigsti and Cicchetti (2004) investigated the impact of early maltreatment on children's expressive syntax measured at age 5. Early maltreatment was associated with significant delays in both vocabulary and production of syntactic structures (Eigsti & Cicchetti, 2004). Adaptive behaviors are also impacted; maltreated children score significantly lower on indices of home and social adjustment than non-maltreated peers (Wodarski, Kurtz, Gaudin, & Howing, 1990).

Socioemotional difficulties and behavioral problems are the most consistently reported outcomes linked to maltreatment with a large body of evidence highlighting elevated rates of depression and externalizing behaviors among maltreated children (Aber, et al., 1989; Kim & Cicchetti, 2003; Kopp & Wyer, 1994; Wodarski, et al., 1990). For instance, Kim and Cicchetti (2003) reported a higher incidence of internalizing behaviors in a group of young maltreated children than in a non-maltreated comparison group. Similarly, Aber and colleagues (1989) found that maltreated children had more behavioral problems and depression than children in a comparison group. Studies controlling for possible confounding influences have also shown a strong relationship between maltreatment and socioemotional development. Wodarski and colleagues (1990) investigated the effects of maltreatment on several socioemotional outcomes and controlled for the families’ socioeconomic status. Comparative analyses between the abused children and their non-maltreated counterparts yielded significant differences in several socioemotional domains including abused children exhibiting more behavior problems as rated by both parents and teachers, as well as showing more aggression and delinquency (Wodarski et al., 1990). Additionally, the developmental repercussions of
maltreatment do not attenuate over time; behavioral and adjustment problems are often apparent into adolescence (Erickson & Egeland, 1996; Leiter, 2007).

A growing body of literature has shown that self-regulation may play a role in maltreatment's multi-faceted long-term influence on emotional, social, cognitive, and behavioral functioning. More specifically, it has been suggested that maltreatment is associated with dysfunctional regulation which then impedes development in multiple domains. Investigations in samples of school-aged children have documented the mediational role of deficient self-regulatory skills among maltreatment and peer difficulties (Shields & Cicchetti, 2001), internalizing problems (Maughan & Cicchetti, 2002), and aggression (Shields & Cicchetti, 1998). Although self-regulation appears to play an important process role in determining the influence maltreatment has on the functioning in older children, less is known how maltreatment impacts children's growing regulation, particularly during the critical years of early development.

The Development of Self-regulation

Self-regulation is considered to be an essential task of early childhood that provides a foundation for concurrent and future development in multiple domains (Kopp, 2002; Trickett, 1998). Multiple regulatory abilities (e.g. compliance, effortful control, inhibition, emotion regulation, biological regulation) have been documented in separate investigations with these abilities falling into four general types of regulation: cognitive, emotional, behavioral, and physiological. Cognitive regulation, including attentional deployment (Kopp, 2002), strategy utilization and goal-setting (Pintrich, 2000) is generally considered to play an 'executive functioning' role. Cognitive regulation allows
children to problem-solve and focus attention on tasks in addition to fostering self-initiating learning (Kopp, 2002; Pintrich, 2000). Emotion regulation, including suppression and maintenance, is accomplished through modification and expression of emotions (Thompson, 1994). Emotion regulation is intricately interwoven into social interaction - by recognizing that emotions and subsequent expressions of these emotions elicit different responses from those around them, children learn to modify such emotions in order to adapt to the current environment (Shipman & Zeman, 2001). Discussed at times as part of cognitive and/or emotional regulation (such as walking away from a frustrating task), behavioral regulation refers to a child’s ability to utilize, maintain, or inhibit behaviors. Behavioral regulation plays an important role in supporting social development through controlling aggressive impulses and inhibiting dominant responses (Kopp, 2002). Interlaced with each of the aforementioned components of regulation is physiological regulation. New tools have allowed researchers to examine children’s vagal tone and cardiac rhythms; other studies have used biological markers such as sleep or eating disturbances as indicators of physiological dysregulation (El-Sheikh, Buckhalt, Cummings, & Keller, 2007). Although many studies have investigated these components separately, researchers have begun calling for the consideration of a comprehensive conceptualization of self-regulation to advance understanding of children's full regulatory potential (National Research Council, 2000).

Children make significant advances in self-regulation throughout the first few years of life with regulation changing from primarily external (e.g. mother guided) to internal (self) control (Kopp, 2002; Thompson, 1994). Regulatory capabilities expand from rudimentary self-soothing capabilities at birth to more complex voluntary abilities.
in the first few months of life. By 6 months, infants can shift their attention (Rothbart, Posner, & Boylan, 1990) and near the end of the first year of life children are able to utilize attention shifting abilities for their own personal goals (Kopp, 2002). Along with attentional maturation, the ability to inhibit a dominant response or behavior also emerges between 6 and 12 months (Rothbart, Derryberry, & Posner, 1994). One year old infants are able to decrease competing distractions, observe their own problem-solving behaviors and subsequently alter non-successful strategies, in addition to maintaining focus on an interesting task. At this age, children can also manage their emotions by disengaging from stressful stimuli or engaging in a pleasurable activity. Early language skills, although very basic, provide an important advancement for the expression of needs. Although 12 month olds are capable of multiple self-regulatory skills, caregivers still play a large role in maintaining and supporting optimal regulation.

During the second year of life, regulatory skills continue to improve. Language abilities become more advanced and children can use words as a vehicle for emotional expression as well as to support the control of emotions (Kopp, 1989). A greater understanding of language also allows children to better comprehend caregivers' requests and rules and, in turn, fosters the development of compliance (Kochanska, Coy, & Murray, 2001). In addition, children's cognitive regulatory skills make significant advancements that allow for increased planning abilities and learning (Kopp, 1989).

Twenty-four month olds are increasingly involved in independent goal-directed activities and self-initiated exploration. Toddlers begin to desire more autonomy and by 24 months of age children are self-regulators (Kopp, 1982). Continued refinement of skills occurs throughout early childhood, however, between 2 and 3 years of age, self-regulation
abilities become coherent and stable (Kochanska, Murray, & Harlan, 2000; Vaughn, Kopp, & Krakow, 1984).

Although the temperament perspective on self-regulatory abilities often refers to self-regulation as a characteristic of the child that has a strong biological basis (Rothbart, et al., 1994), increasing support has been found for the influence of the quality of the parent-child relationship on children’s growing regulatory skills – even those that are physiological (Propper & Moore, 2006; Thompson, 1994). During these early years, biological maturation supports regulatory skills (e.g. brain growth, increased motor control), but the development of self-regulation is largely contingent on the young child's caregiving experience with parents serving as ‘teachers' and ‘supporters’ for their children (National Research Council, 2000; Thompson, 1994; van den Boom, 1994).

Specific parenting behaviors have been delineated as important predictors of children's emerging regulation with particular emphasis on sensitivity and responsiveness, warmth, encouragement and mentoring/modeling of new skills, and the use of positive guidance and teaching strategies (Houck & LeCuyer-Maus, 2004; Schunk, 2001; Spinrad & Stifter, 2002). These parenting behaviors promote regulation acquisition in several ways. First, responding to the child's needs quickly and effectively can reduce the duration and intensity of negative affect and subsequently make such emotions easier for the child to regulate (Thompson, 1994). Second, caregiving that encourages children's exploration while providing protection and comfort when needed, afford the opportunity for newly found skills to be tested in a safe environment. A child can be introduced to frustrating tasks without feeling emotionally overwhelmed fostering self-competency and a sense of pride at their own regulation skills (Ramey & Ramey,
Third, language plays an important role in emerging regulation; the emphasis placed on communication and guidance of the child promotes the use of language versus crying as a vehicle for achieving goals (Kopp, 2002; Ramey & Ramey, 1999). Fourth, parental scaffolding, that is to say developmentally appropriate aid, extends children’s growing self-competence in their already present abilities and extends capabilities (Calkins, Smith, Gill, & Johnson, 1998).

Parenting and Children's Self-Regulation

A large body of evidence lends support to the link between parenting and children's developing regulation (Calkins, et al., 1998; Eisenberg, Zhou, Spinrad, Valiente, Fabes, & Liew, 2005; van den Boom, 1994). For instance, van den Boom (1994) found that early maternal sensitivity and contingent responsiveness were important determinants of the level of children’s crying over the first 12 months of life such that mothers showing more of these parenting behaviors had children that cried less. In a similar vein, Calkins and colleagues (1998) examined the relationship between maternal positive guidance and children’s behavioral regulation in a group of 2 year old toddlers from middle class families. Positive guidance, described as the frequency of behaviors such as praising, showing affection, demonstrating for the child, and using positive encouragement, was significantly related to children’s regulation such that mothers who engaged in high amounts of positive guidance had toddlers who were more compliant during observational assessments including cleanup and stop playing tasks.

Findings from the longitudinal National Institute of Child Health and Development (NICHID) Early Child Care Study have also consistently supported the
importance of early caregiving on children's regulation. This ongoing study was designed to examine the effects of two important environments in a young child's life: the childcare setting and the family, and included multiple assessments of parenting and children’s development throughout the first three years of life. Data was gathered from over 1,364 families with a wide variety of background characteristics: socioeconomic differences, racial diversity, and two-parent and single-parent families. Results from this intensive study have suggested that parenting is an important determinant in children's regulation despite the number of hours spent in childcare (NICHD Early Child Care Research Network, 1998, 2001, 2003, 2004). In one set of analyses, childcare and mothering were examined as predictors of children's compliance, negativity, and self-control at 24 and 36 months. Mothering emerged as a stronger and more consistent predictor than childcare for children's outcomes (NICHD Early Child Care Research Network, 1998). In another investigation, children's affect dysregulation was assessed at 24 and 36 months and cognitive, social, and behavioral outcomes were measured at 54 months and when children were in kindergarten and first grade. Children's affect dysregulation was associated with less maternal sensitivity and fewer stimulating behaviors (NICHD Early Child Care Research Network, 2004). Follow-up analyses were conducted to examine the effects of dysregulation on children's development. Controlling for family characteristics including maternal education, depressive symptoms, and income, dysregulated children had more problematic development in cognitive, social, and behavioral domains at 54 months and in kindergarten and first grade (NICHD Early Child Care Research Network, 2004). It is clear that the early caregiving environment provides a supportive framework
for developing regulatory abilities and has important implications for impacting its later stability as well as concurrent and future development.

*Changes in Parenting and Regulation*

Although early parenting behaviors have been associated with children's regulation, less is known how parenting at different times in the first 18 months and changes in parenting behaviors during this time impact children's emergent regulation. Because of children’s varying needs and developmental capabilities at different ages, it has been postulated that certain parenting behaviors may be more important at one time than another with a particular emphasis on the importance of early infancy (Bowlby, 1969; National Research Council, 2000). For instance, physical contact (e.g. cuddling and holding) is essential in infancy for regulating emotions, but becomes less important through the toddler years as language communication comes more into place. With the central role that caregiving plays in the acquisition of self-regulation, it seems likely that particular parenting behaviors may be important at specific times for the novice self-regulator, and emerging research is highlighting the consequences of parenting at different times on children’s regulation. In fact, growing research suggests possible differential effects of parenting on children's regulation at varying ages (Landry, Miller-Loncar, Smith, & Swank, 2002; Landry, Smith, Swank, Assel, & Vellet, 2001).

Additional findings from the NICHD Early Child Care Study have shown that parenting influences may change over time. More specifically, using a subsample of toddlers from the NICHD study, maternal behaviors, including feedback and control style were investigated as predictors of children’s behaviors at 24 and 36 months of age (Kelly,
Maternal evaluative feedback and control style at 24 months predicted children's shame, persistence, and avoidance of mastery activities at 36 months. In addition, negative maternal evaluations at 24 months were related to children's later shame, while positive maternal feedback at 24 months was related to children's later persistence. Furthermore, children with mothers who utilized more autonomy-supporting control at 24 months were less likely to avoid challenging activities at 36 months (Kelly, et al., 2000). Extending these findings to older preschoolers, Landry and colleagues (2002) examined the relationship between maternal verbal scaffolding when children were 3 and 4 years of age and children's 6-year cognitive regulation. Findings suggested that early verbal scaffolding at 3 years indirectly influenced executive processing skills by influencing children's language and problem-solving skills at 4 years of age. However, scaffolding when children were 4 years old did not show a significant relationship to cognitive regulatory skills, highlighting the importance of specific parenting behaviors at different developmental ages. Using a younger sample of children Landry and colleagues (2001) examined responsive parenting clustered around two developmental stages (6 months to 2 years) and (3 and 4 years). Findings refuted the tenet that early parenting was most crucial in children's development; rather they found that consistent responsiveness over time was associated with optimal outcomes.

Taken together, these findings suggest that certain parenting behaviors play a more instrumental role at different times in development while other behaviors are important throughout. With many past studies employing an abbreviated assessment of parenting and utilization of simple analytical techniques, less elucidated is how early
parenting behaviors change over the course of the first 18 months of life and their
differential impact on regulation development.

*Maternal Maltreatment Risk, Parenting, and Regulation*

Strong support has been provided for the relationship between early caregiving
and the development of regulatory abilities; it is not surprising then, that abusive and
neglectful parenting has detrimental effects on children's regulation. Because
socioemotional functioning is largely supported by sensitive caregiving, the antithesis of
this environment creates dramatic problems for a child's regulation and subsequent
development in multiple domains (Maughan & Cicchetti, 2002; Pollak, Cicchetti,
Hornung, & Reed, 2000; Shields & Cicchetti, 2001). Research has highlighted the
regulatory difficulties displayed by maltreated children in early and middle childhood
(Maughan & Cicchetti, 2002; Pollak, et al., 2000). In a sample of maltreated
preschoolers, 80% exhibited dysregulated emotion patterns (Maughan & Cicchetti, 2002).
The dysregulated emotion patterns fell into two categories: undercontrolled/ambivalent
(displaying underregulated emotional behavioral reactivity without being goal-oriented)
and overcontrolled/unresponsive (displaying low levels of overt emotional behavioral
reactivity). For older children, empirical research has shown that maltreated children
have difficulty in understanding others' emotional expressions, expressing appropriate
emotions, and attentional problems (Maughan & Cicchetti, 2002; Pollak, et al., 2000).
Little research, however, has investigated regulatory processes in at-risk toddlers.

It has been suggested that children's regulation strategies are affected by
maltreatment in two ways. First, abusive and neglectful caregivers provide inappropriate
models for their victimized children by using aggressive or apathetic means for handling their own emotions. In this manner, children's resources for handling negative emotions are limited (Calkins & Fox, 2002). Second, maltreated children are faced with inconsistent emotional demands imposed by their environment and must attempt to develop self-regulatory strategies that serve to protect them (Thompson & Calkins, 1996). Although these strategies may be optimal to employ with dangerous caregivers, they can cause problems when utilized in a normal environment such as at daycare or in school (Thompson & Calkins, 1996). For instance, a toddler that cries excessively to get attention in a neglectful household may fare poorly with such attempts at daycare; in fact, he may even be reprimanded by his daycare providers. Research investigating the effects of maltreatment on children's regulation is growing; few studies, however, have investigated multiple components of regulation including emotional, behavioral, and physiological in at-risk toddlers, particularly at the important age of 2 when self-regulation has developed but is not yet fully stable.

Because of the key role that caregiving plays in determining children’s developing regulation, the parenting behaviors exhibited by maltreating parents is of particular concern. Beyond discipline techniques, little is known about parenting behaviors that maltreating parents utilize. In one important study, Trickett and Susman (1988) compared abusive parents to a control group of non-maltreating parents on a variety of parenting measures including discipline strategies and emotional climate of the home. They found that abusive caregivers employed more controlling strategies and provided less nurturance to their children as well as expressed positive emotions less frequently than non-maltreating caregivers (Trickett & Susman, 1988). Maltreatment also
appears to be associated with the overall caregiving environment. In the Minnesota Mother-Child Project, a longitudinal study designed to elucidate factors associated with maltreatment, several significant differences in the home environments were found between maltreating and non-maltreating families (Pianta, Egeland, & Erickson, 1989). The homes of maltreating families were more disorganized, had fewer play materials, and were characterized by less parental involvement and responsivity to children. Other studies have found that abusive parents, in comparison to non-abusive controls, tend to be less encouraging of their child's autonomy (Trickett, Aber, Carlson, & Cicchetti, 1991) and utilize reasoning less frequently (Trickett & Kuczynski, 1986). Although these studies contribute to understanding how multiple parenting behaviors differ for maltreating caregivers, less articulated is how many behaviors deemed essential for developing regulation are influenced. Furthermore, the majority of these studies are cross-sectional, limiting our understanding of maltreatment's impact over time on parenting.

**Risk for Maltreatment**

Abusive and neglectful parenting is the result of numerous factors (Belsky, 1980, 1984, 1993; Chance & Scannpiecco, 2002). According to Belsky’s (1980, 1984, 1993) theoretical model, different levels of risk impact the family and likelihood of maltreatment including influences in the immediate environment such as maternal characteristics, to those farther removed such as prevailing social attitudes about children (Belsky, 1980, 1984, 1993). Because maltreatment instances have been documented in a wide-range of families with a variety of demographic characteristics (Chance &
Scannapieco, 2002; Straus & Savage, 2005), and risks within the immediate family can be targets for intervention (Lutzker & Bigelow, 2002), considerable research has been devoted to the identification of early risks associated with maternal characteristics. Frequently discussed sources of risk include attitudes about parenting and children’s behaviors, a parent’s past history of abuse, and unrealistic expectations about children’s development (Belsky, 1984; Borkowski, Bisconti, Weed, Willard, Keogh, & Whitman, 2002; Chance & Scannapieco, 2002).

Multiple investigations have documented the relationship between a mother's past history of childhood maltreatment and victimization of her own children (Kotch, Browne, Dufort, Winsor, & Catellier, 1999; McCloskey & Bailey, 2000; Woodward & Fergusson, 2002; Zuravin, McMillen, DePanfilis, & Risley, 1996). It has been suggested that patterns of childrearing may be transmitted across generations (Patterson, 1998) and that relational expectations are developed in early childhood and influence all subsequent relationship experiences, including parenting (Bowlby, 1969; Belsky, 1980). For instance, a mother who had experienced a controlling, physically punitive environment as a child will likely utilize the same strategies in forming a relationship with her own offspring. Several empirical investigations have provided support for the intergenerational transmission of maltreatment (Kaufman & Zigler, 1987; Pianta et al., 1989; Woodward & Fergusson, 2002). In one such investigation, Woodward and Fergusson (2002) found a positive linear association between mothers' histories of physical punishment and their children's reports of specific maternal punitive behaviors including being hit around the head or body with fists and receiving a severe beating. In the Minnesota Mother-Child Project, among the mothers that reported a history of childhood maltreatment...
abuse or neglect, 40% maltreated their own children in the early years of the children's lives (Pianta, et al., 1989). Severity of the victimization may also play a role in the transmission of abuse. For instance, in a sample of single mothers who had experienced childhood maltreatment, Zaruvin and colleagues (1996) examined the relationship between abuse in the mothers’ family of origin and maltreatment of their own children. They found that mothers who had experienced severe sexual abuse (coitus versus lesser forms) were more likely to have a maltreated child.

Parenting orientations, specifically unrealistic expectations and rigidity regarding these expectations, have also been frequently identified as risk factors for child maltreatment (Azar & Rohrbeck, 1986; Chance & Scannapieco, 2002; Twentyman & Plotkin, 1982). It has been suggested that when developmentally inappropriate behaviors are expected by the mother, the child’s failure to meet such standards on difficult tasks may be seen as defiance rather than an unintentional inability to perform, resulting in undeserved punishment. Twentyman and Plotkin (1982) have argued that when expectations are particularly deviant, the resulting parental frustration from children’s non-compliance may function as an important cause of child abuse. Empirical support for the relationships among unrealistic expectations and rigidity towards these expectations and child maltreatment has been found within at-risk families. For example, Azar and Rohrbeck (1986) compared the expectations of mothers that were perpetrators of child abuse to the expectations held by mothers when their spouse was the documented abuser. The findings revealed that maltreating mothers held more unrealistic expectations than the comparison mothers with maltreating spouses. Moreover, findings from discriminant
function analyses revealed that maternal unrealistic expectations correctly identified 83% of the 30 mothers into abusive or nonabusive groups (Azar & Rohrbeck, 1986).

The aforementioned risks appear to be over-represented in certain groups of mothers with inconclusive findings suggesting that a mother's age, socioeconomic status, and educational background may set the stage for parenting difficulties. For instance, it has been suggested that because of their young age, adolescent mothers are more likely to hold unrealistic expectations than older mothers (Bolton, 1990; Whitman, et al., 2001). In addition, adolescent mothers are more likely to have been maltreated themselves (Herrenkohl, Herrenkohl, Egolf, & Russo, 1998). In a review of fatal maltreatment cases, young parental age was a common factor among parents involved in deadly maltreatment (Chance and Scannapieco, 2002). Socioeconomic status also appears to be associated with maltreatment (Sedlak & Broadhurst, 1996). For instance, Sedlak and Broadhurst (1996) reported that families who had annual incomes below $15,000 were more likely to be identified as neglectful than families with annual incomes above $30,000. This finding was also supported in Chance and Scannapieco's (2002) review, with unemployment and a lack of employment skills common characteristics found in the caregivers involved in the child fatalities (Chance & Scannapieco, 2002). Related, Ondersma (2002) found a small relationship between maternal educational level and neglect status in low-socioeconomic status families, with neglectful families indicating fewer years of education than non-neglectful families. It has been suggested that the relationship among low-socioeconomic status, educational attainment, and maltreatment may be partly due to these parents adhering to at-risk parenting orientations, including beliefs about authoritarian punishment, providing less nurturance, and discouraging child autonomy (Leyendecker,
Harwood, Comparini, & Yalcinkaya, 2005). It appears that mothers with certain demographic characteristics, specifically those of a young age, low socioeconomic status, and little education, are overrepresented in maltreatment risk reviews because of increased likelihood of having problematic parenting orientations and increased risk of having experienced childhood maltreatment. The majority of these findings, however, were derived from samples using families with a report of substantiated abuse or neglect and worked retrospectively in determining factors related to its manifestation. Few studies have examined these factors in a prospective longitudinal design including participants with a range of different levels of risk (e.g. age and educational differences). Therefore, it is uncertain how the maltreatment risks may operate to impact parenting over time in a sample of mothers with considerable variability concerning age, economic status, and educational level.

**Current Study**

The literature on at-risk parenting and children’s regulation has three major gaps. First, little is known about how maternal maltreatment risk impacts early parenting practices at different times during the first 18 months of life; even less is known about how changes in parenting behaviors impact children's growing self-regulatory capabilities. Second, much of the past research has examined the relationship between parenting and regulatory development in homogeneous populations (e.g. documented maltreatment cases or middle-class samples), without employing a diverse sample of participants with a wide-range of age, ethnic, economic, and educational characteristics. Utilization of a sample of participants that include different characteristics would
contribute to the generalizability of findings and our understanding of how processes
work in families with various educational and ethnic backgrounds. Third, several
investigations have utilized longitudinal designs to understand the development of
regulation, but few have employed statistical techniques that best capture change over
time and maximize the information gained from a multi-method approach to measuring
risk, parenting, and self-regulation.

The present project used two statistical methodologies, Structural Equation
Modeling (SEM) and Hierarchical Linear Modeling (HLM) to examine relationships
between early maltreatment risk and the development of children's early regulation as
mediated by parenting over time in a sample with wide demographic variability. The
proposed study utilized data from the ongoing Parenting for the First Time Project which
was designed to understand low-levels of neglectful parenting among mothers and their
first-born children. The multi-site design included a racially diverse sample with
variability in participants' ages, economic status, and educational backgrounds.

Figure 1 presents an overview of the proposed relationships among the latent
constructs of prenatal maltreatment risk, parenting behaviors at 4, 8, and 18 months, and
children's regulation at 24 months. The model postulated direct paths from maltreatment
risk to parenting at each time point as well as direct paths from parenting at each time to
children’s regulation. Direct paths are also shown between 4 and 8 month parenting and 8
and 18 month parenting, suggesting that earlier parenting influences later parenting. An
indirect path between maltreatment risk and regulation was also included, highlighting
the hypothesized mediational role of parenting between early maltreatment risk and
children’s developing self-regulation.
Figure 1. Prenatal maltreatment risks, 4, 8, and 18 month parenting, and 24 month child regulation
The first goal of the present study was addressed by employing SEM to examine the relationship between maternal maltreatment risk and children's emergent regulation as mediated by parenting over the first 18 months of life. It was expected that higher maltreatment risk would be related to less optimal parenting behaviors at each time point and that problematic parenting behaviors would be predictive of children’s regulatory functioning. It was also expected that the overall specified model including the measures utilized for each construct and the proposed paths between the constructs, would fit the data satisfactorily.

The second aim was to ascertain the nature of changes in early parenting behaviors by employing HLM and regression analyses to: (1) determine the nature of change in parenting behaviors including the rate and direction, (2) discern the relative influence of the prenatal maltreatment risk factors on change in each parenting behavior, and (3) examine relationships among rates of change in parenting behaviors, 18 month parenting outcome scores, and children's regulation. It was hypothesized that each maltreatment risk factor would be associated with changes in specific components of parenting behaviors. For example, maternal histories of neglect would be associated with neglectful caregiving (e.g., providing little or no stimulation in the home). It was also expected that maltreatment risk would be predictive of negative changes in parenting behaviors over time and lower 18 month parenting outcome scores, and that such changes would be associated with children’s compromised self-regulation at 2 years of age.
METHOD

Participants

Participants were drawn from the Parenting for the First Time Project which was designed to understand low-levels of neglectful parenting among mothers and their first-born children. A sample of 304 women was recruited through medical and social agency facilities in five cities including South Bend, Indiana; Kansas City, Kansas and Missouri; Washington, D.C.; and Birmingham, Alabama. The sample of first time mothers consisted of 3 groups: 158 or 52% were adolescents (less than 19 years of age at the time of child’s birth); 67 or 22% were low-resource adults (older than 21 years but less than 2 years of college education); and 79 or 26% were high-resource adults (over 21 years with at least 2 years of college completed).

Mothers varied considerably in age, ethnicity, and economic status. Mothers ranged in age from 15 to 36 years of age at the time of the children’s births, with a mean age of 22 years (SD = 5). The sample was 60.2% Black, 21.7% White, 13.5% Latina; 4% multiracial and .6% American Indian or Asian. Financial resources also varied with mothers reporting monthly incomes ranging from less than $415 to more than $16,665. Each of the three groups had mothers endorsing the lowest income of less than $415, however, the upper bound of incomes differed with the highest income range endorsed for adolescent mothers' families at $8,336-$12,500 (mode = less than $415 to 835), for low-resource mothers' families $4,166 - $5,000 (mode = less than $415), and for high-
Despite a large variability in economic resources, many mothers reported receiving food and formula supplementary aid from Women, Infants, and Children (WIC): 80.7% of teens, 71.2% of low-resource mothers, and 32.8% of high-resource mothers. Educational attainment also showed a large range. Adolescent mothers' educational levels ranged from less than 8\textsuperscript{th} grade to having some college with a mean of completing 10\textsuperscript{th} grade. Low-resource mothers showed the largest educational variability with 22.5% not completing high school, 31.3% having a high school diploma, and 46.2% completing at least one semester of vocational school or college. Ninety percent of high resource mothers had completed at least 2 years of college with 20% having at least one year of graduate studies.

At birth, the infants varied considerably in weight and length. Infants ranged in weight from 2 pounds to 11.4 pounds with a mean of 7.2 pounds (SD = 1.35). The infants’ lengths varied from 15 to 24 inches with a mean of 19.9 inches (SD = 1.25). In addition, 47% of the children were female.

Participants from the larger project were excluded from the present study if they did not have complete data on each of the four maltreatment risks and at least one parenting measure at 4, 8, or 18 months. Although the current sample and the subjects lost to attrition did not differ on the number of people living in the home, community needs wanted and received, or depression and externalizing problems, a few significant differences between the two groups were found: the sample in the present study had slightly higher intelligence scores (94 versus 87), additional educational experience (an
average of at least a high school diploma versus 11th grade), and higher monthly incomes ($1,666-$2,085 versus $836-$1,250).

Design and Procedure

Data were obtained for the dyads at multiple time points throughout the first two years of the child’s life. Both laboratory-based and home-based interviews and observations were employed in the design with 4, 8, and 18 month visits being completed in the home. The prenatal, 6 month, and 24 month visits were designed to take place in the laboratory, however, these visits were also conducted in the home when it was convenient for the families.

During the prenatal visit which occurred during the last trimester of pregnancy, maternal expectations about children’s development and behaviors were assessed with the Parenting Style Expectations Questionnaire (PSE) and child abuse potential was measured with an abbreviated form of the Child Abuse Potential Inventory (CAPI). Additional maltreatment risk factors were assessed at 6 months with self-report measures including the History of Neglect (HN), an assessment of childhood histories of neglect, and the Childhood Trauma Questionnaire (CTQ), a measure of childhood emotional and physical neglect, and emotional, physical, and sexual abuse.

At 4, 8, and 18 months, parenting was assessed by observational ratings of 7 parenting skills (i.e. protect, comfort, guide, celebrate, language stimulation, mentor/rehearse, recognize/respond, and encourage exploration) adapted from Ramey and Ramey’s (1999) work with parenting essentials. Additional parenting behaviors were also rated during a 25 minute observational period according to the coding scheme.
developed by Landry and colleagues (2001) and included display of positive affect, warmth/sensitivity, contingent responsiveness, and general verbalness. In addition, the HOME (Caldwell & Bradley, 2001), the Supplemental to the Home Scale for Impoverished Families (SHIF) rating scales (Ertem, Forsyth, Avni-Singer, Damour, & Cicchetti, 1997), and four additional questions were obtained as measures of the parenting environment addressing parental interaction, home safety, and stimulation in the home.

Children’s regulation was measured at 24 months with a mother report. The Infant-Toddler Scale for Emotional regulation (ITSEA) measured children's early physiological, emotional, and behavioral regulation abilities. Mothers were compensated financially after each visit with a gift card ranging from $25 for the prenatal visit to $55 for the 24 month visit.

Maltreatment Risk Measures

Parenting Style Expectations Questionnaire (PSE). The Parenting Style Expectations Questionnaire was employed to assess parenting style and philosophy. The total score consists of the summation of four subscales: Empathetic Awareness, Physical Punishment, Abuse/Neglect, and Authoritarianism. Both empathetic awareness and physical punishment subscales were drawn from the AAPI (Bavolek, 1984). Specific items within the scales are, “Children will quit crying faster if ignored,” and “Parents should slap their children when he/she has done something wrong.” The respondent rated her agreement on a Likert-type scale, ranging from 1 (strongly agree) to 5 (strongly
disagree). This tool has shown an internal consistency coefficient of .89 (Whitman, et al, 2001). The total score was employed in analyses.

*Child Abuse Potential Inventory (CAPI).* A shortened version of the Child Abuse Potential Inventory was utilized to assess maternal child abuse potential (CAPI; Milner, 1986). The 25 items composing the abbreviated CAPI were selected primarily from the unhappiness and rigidity scales. Rigidity, according to the CAPI creator, concerns parental attitudes about children’s appearance as well as their behaviors. Example items from the rigidity scale are “Children should be quiet and listen” and "A little boy should never play sissy games." The unhappiness scale addresses maternal feelings about others in the world as well as how she perceives others to view her. Example items from the unhappiness scale include “People expect too much from me” and "I laugh every day." Mothers responded with either agreement or disagreement to these statements. The full CAPI has a one week test-retest reliability index of .90. The total score is derived from item summation with higher scores indicative of greater child abuse potential. The total score was utilized for analyses.

*History of Neglect.* The History of Neglect is a retrospective measure that assesses the participants' childhood experience with neglectful parenting. This measure is an abbreviated version of the Strauss “About My Family” and consists of a total of 8 items. Each of the items is rated on a 4-point scale indicating the extent to which the mother agreed/disagreed with the individual statements. Sample items include “My parent(s) did not tell me they loved me,” and “My parent(s) helped me with my homework.” The individual items were reverse coded to have higher scores indicative of neglectful experiences. A total score was then derived from the summation of these
individual scale items. The overall neglect score from the short form has an internal consistency reliability of .89 (Lounds, Borkowski, & Whitman, 2004) and has been found to highly correlate with the full scale total score (.95: Straus, Kinard, & Williams, 1995). The total score was used in all analyses.

**Childhood Trauma Questionnaire (CTQ).** The Childhood Trauma Questionnaire is an additional retrospective measure of the participant’s childhood experiences with abuse and neglect (CTQ; Bernstein, & Fink, 1998). This measure contains 28 questions that begin with “When I was growing up …” and end with a statement about different types of maltreatment. Example items include, “I didn’t have enough to eat” and “People in my family hit me so hard that it left me with bruises or marks.” Each item is rated on a 5-point scale ranging from 1 (never true) to a 5 (very often true). Four different factors emerge from this measure: physical and emotional abuse, emotional neglect, physical neglect, and sexual abuse. Internal consistency coefficients for the four factors range from .79 to .94. In addition, the CTQ has a high test-retest reliability over a period of months (interclass correlation = .88). A total score was derived from the summation of the individual items with higher scores indicative of greater trauma experience. The total score was utilized for each analysis.

**Parenting Measures**

**Observational Rating of the Essentials.** The observational ratings of the essentials are based on the parenting essentials by Ramey and Ramey (1999). The essentials are considered to be key parenting behaviors necessary for children’s successful development and include seven dimensions: protect, comfort, guide, celebrate, language stimulation,
mentor and rehearse, recognize and respond, and encourage exploration. These parenting dimensions were coded on a 3 point scale, from -1 (negative parenting behavior observed) to a +1 (positive parenting behavior observed). This measure was completed by the interviewer at the 4, 8, and 18 month home visit on their observations of any of these parenting behaviors for the entire time that they had been at the participant’s home. Each of the items was recoded on a 0 to 3 scoring system with higher scores indicative of positive behaviors. A total score was formed from summing the scores on the seven dimensions and utilized for all analyses.

*Landry Positive Ratings.* The Landry coding system is designed to capture both positive and negative mother-child interactions in an in-home setting (Landry, et al., 2001). Mothers are instructed to act as naturally as possible and do what is typical for them at that period of time with the only restriction being that they need to stay within the child’s range of vision. The half-hour observation begins with a 2-minute non-coded period (adjustment time), followed by a series of alternating periods of observation and coding: four 5-minute periods of observations and four 2-minutes coding periods. Seven maternal behaviors and three child behaviors are coded on a 5-point scale with a 5 being endorsed for the most optimal behaviors and a 1 being endorsed for problematic behaviors. Raters had to achieve 80% reliability on 5 consecutive videotapes with a trained coder in addition to 80% reliability on two live codes. Three of the parenting behaviors changed from the 8 month to the 18 month assessment to reflect the toddlers’ needs; for this reason, only four behaviors were employed in the total score: display of positive affect, warmth/sensitivity, contingent responsiveness, and general verbalness. Reliabilities for the 4 scales at 4, 8, and 18 months ranged from .85 to .87. The positive
scales were summed together to create one composite Landry Positive ratings score that was used for analyses.

*Home Observation for Measurement of the Environment (HOME)*. The HOME is designed to assess the quality of a young child’s caregiving and home environment (Caldwell & Bradley, 2001). Three versions of the HOME focus on different ages and the infant and toddler form (ages 0-3) was employed with the present project. The HOME measures environment and parenting dimensions that are considered critical for optimal child development including quality of interactions between parent and child, stimulation opportunities, and the child’s daily routines. Administered through observation and structured interview, it is conducted in the child’s home environment. Sample items include 'Parent reads stories to the child at least 3 times a week' and "Parent caresses or kisses child at least once during the visit." Scoring is based on the presence or absence of each item with scores of 1 or 0 endorsed. The HOME has been used in samples with diverse ethnic, cultural, and economic backgrounds (Bradley & Corwyn, 2005). Internal consistency across all versions of the HOME range from .38 to .93 (DeVoe & Kaufman Kantor, 2002).

*The Supplement to the Home Scale for Impoverished Families (SHIF)*. The SHIF was also utilized to measure the total parenting environment. Designed as a supplement for the HOME, this measure consists of 20 items such as "Child has a safe, consistent place to sleep" and "Parent picks child up regularly when not sleeping." Also scored with a 1 or 0 depending upon the presence or absence of each item, these items are incorporated into the HOME administration and add to the total score (Ertem, et al., 1997). In a sample of poor urban families, the HOME and SHIF yielded Kuder-
Richardson coefficients of .80 and .63, respectively. Inter-rater reliabilities ranged from .76 to 1.0 for the HOME and .79 to 1.0 for the SHIF (Caldwell & Bradley, 2001; Ertem, et al., 1997).

*Parenting for the First Time Questions.* Four questions were added to supplement the HOME and SHIF by the Parenting for the First Time investigators to provide additional information about adolescent mother households. The four items are as follows: "Child eats at least one meal a day with mother and other adult in house," "Other adult provides some daily care," "Little noise is generated inside the home," and "Little noise is generated outside of the home." Scores of 1 and 0 were endorsed dependent upon the presence or absence of each item. Raters were required to reach 90% reliability on at least 1 videotape and 2 live home visits for the summed score that included the HOME, SHIF, and added questions. The score used in all analyses utilized the total home environment score derived from the summation of the HOME, SHIF, and PFT additional questions and is referred to only as the HOME for simplicity.

*Children’s Regulation*

*Infant Toddler Social and Emotional Assessment (ITSEA).* The ITSEA was designed to measure young children's social and emotional functioning (Carter & Briggs-Gowan, 2001). The core scale consists of 139 items with additional scales for atypical and clinical problems. Items are rated on a 3-point scale according to how often the child exhibits the specified behavior with (0) for not true/rarely, (1) somewhat/sometimes true, or (2) very true/often. Example items include: “cries or tantrums until s/he is exhausted,” and “keeps trying even when something is hard.” A scale of externalizing behaviors
consisted of twenty-four items such as activity/impulsivity, defiance, and aggression; this factor was considered to be indicative of behavioral regulation. Thirty items including withdrawal, inhibition to novelty, and problems self-soothing were summed together in an internalizing scale and used as an indicator of emotional regulation. Thirty-four items focused on biological regulation difficulties including eating problems and insomnia – the total scale score was utilized as an indicator of physiological dysregulation. Intra-class correlations for test-retest reliability have been found to range from .74 to .88 (Carter & Briggs-Gowan, 2001). Inter-rater reliabilities comparing the parents' scores ranged from .43 to .78 (Carter & Briggs-Gowan, 2001).
RESULTS

In order to address the major research questions regarding relationships among early risk, parenting, and regulation as well as changes in parenting over time and their implication for emergent regulatory skills, three separate methodologies were utilized: structural equation modeling, hierarchical linear modeling, and regression analyses. Structural equation modeling (SEM) was used to examine the relationships among prenatal maternal maltreatment risk; 4, 8 and 18 month parenting; and children’s regulation at 24 months. The results from the SEM analyses were examined first allowing for an investigation of the specific measures identifying each construct in addition to providing an overall picture of proposed relationships. Second, hierarchical linear modeling (HLM; Bryk & Raudenbush, 1987, 1992) was used to assess the dynamic nature of parenting from 4 to 18 months. HLM analyses addressed multilevel questions about inter-individual differences in intra-individual change in parenting behaviors and provided information on how maltreatment risks impacted the rate and direction of change in parenting behaviors as well as the intercept (or ending score) at 18 months. The final analytical methodology included regression analyses using the slopes and intercepts extracted from the residual files to explore how the maternal parenting changes and intercept scores at 18 months influenced children's regulation at 24 months.
Descriptive Information

Table 1 contains the means, standard deviations, and range for each maltreatment risk, parenting measure, and regulation variable. Important descriptive information is highlighted.

Maternal Maltreatment Risk. Scores on the Parenting Style Expectations ranged from 64 to 136, with a mean of 107.9 (SD = 14.13). The abbreviated CAPI also showed considerable variability, with scores ranging from 1 to 19 with a mean of 8.93 (SD = 4.13). Scoring guidelines suggested by Milner (1986) were used to discriminate those parents at high risk for child abuse. Separate cutoffs were listed for each subscale with 40% of mothers at high risk for child abuse on the rigidity scale and 14% on the unhappiness scale. Eight percent of mothers scored above the cutoff level on both scales of the CAPI.

Scores on the CTQ ranged from 25 to 91, with a mean of 37.29 (SD = 12.6). Translation of raw scores to the CTQ clinical ratings of severity of the past abuse and neglect during childhood (Bernstein & Fink, 1998) revealed that many mothers in the present study experienced serious childhood trauma. As can be seen from Table 2, the frequencies of the five types of abuse and neglect ranged from 21.8% to 33.2%. It is interesting to note that physical and emotional abuse and emotional neglect occurred in 33% of the sample. An exceedingly high number of mothers reported at least one form of childhood abuse or neglect (62%), 16% two types, and 25% 3 or more types.
### TABLE 1

**DESCRIPTIVE STATISTICS FOR MEASURES OF EARLY MALTREATMENT RISK, PARENTING AT 4, 8, AND 18 MONTHS, AND CHILDREN’S REGULATION AT 24 MONTHS**

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maternal Maltreatment Risk</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. PSE</td>
<td>107.92</td>
<td>14.13</td>
<td>64, 136</td>
<td>304</td>
</tr>
<tr>
<td>2. CAPI</td>
<td>8.93</td>
<td>4.13</td>
<td>1, 19</td>
<td>304</td>
</tr>
<tr>
<td><strong>Childhood Trauma</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. HN</td>
<td>10.51</td>
<td>4.41</td>
<td>8, 31</td>
<td>304</td>
</tr>
<tr>
<td>4. CTQ</td>
<td>37.29</td>
<td>12.57</td>
<td>25, 91</td>
<td>304</td>
</tr>
<tr>
<td><strong>Parenting at 4 months</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. OE</td>
<td>11.05</td>
<td>2.31</td>
<td>4, 16</td>
<td>232</td>
</tr>
<tr>
<td>7. LPS</td>
<td>14.26</td>
<td>3.50</td>
<td>4.5, 20</td>
<td>260</td>
</tr>
<tr>
<td>8. HOME</td>
<td>53.56</td>
<td>6.45</td>
<td>33, 66</td>
<td>258</td>
</tr>
<tr>
<td><strong>Parenting at 8 months</strong></td>
<td></td>
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<tr>
<td>9. OE</td>
<td>10.88</td>
<td>2.61</td>
<td>2, 16</td>
<td>198</td>
</tr>
<tr>
<td>10. LPS</td>
<td>13.30</td>
<td>3.70</td>
<td>4.40, 19.75</td>
<td>232</td>
</tr>
<tr>
<td>11. HOME</td>
<td>53.57</td>
<td>7.79</td>
<td>28, 67</td>
<td>230</td>
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<tr>
<td><strong>Parenting at 18 months</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>12. OE</td>
<td>11.24</td>
<td>2.50</td>
<td>3, 16</td>
<td>213</td>
</tr>
<tr>
<td>13. LPS</td>
<td>13.05</td>
<td>3.77</td>
<td>5, 19.75</td>
<td>201</td>
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<tr>
<td>14. HOME</td>
<td>54.52</td>
<td>7.71</td>
<td>28, 67</td>
<td>209</td>
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<tr>
<td><strong>Regulation at 24 months</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>15. ITSEA-PD</td>
<td>2.20</td>
<td>1.00</td>
<td>.19, 5.86</td>
<td>194</td>
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<tr>
<td>16. ITSEA- E</td>
<td>2.47</td>
<td>.90</td>
<td>.33, 6.86</td>
<td>178</td>
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<tr>
<td>17. ITSEA- B</td>
<td>1.94</td>
<td>.89</td>
<td>.25, 4.75</td>
<td>191</td>
</tr>
</tbody>
</table>

**NOTE:** PSE = Parenting Style Expectations; CAPI= Child Abuse Potential Inventory; HN = History of Neglect; CTQ = Childhood Trauma Questionnaire; OE = Observed Essentials; LPS = Landry Positive Rating Scales; HOME = Home + SHIF + PFT Questions; ITSEA – PD = Physiological Dysregulation, E = Emotional, B= Behavioral
### TABLE 2
FREQUENCIES OF ABUSE AND NEGLECT EXPERIENCES CATEGORIZED BY LEVELS OF SEVERITY

<table>
<thead>
<tr>
<th>Severity of Subtypes of Childhood Maltreatment</th>
<th>Physical Abuse</th>
<th>Emotional Abuse</th>
<th>Sexual Abuse</th>
<th>Physical Neglect</th>
<th>Emotional Neglect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low to Moderate</td>
<td>(54)</td>
<td>(61)</td>
<td>(19)</td>
<td>(45)</td>
<td>(65)</td>
</tr>
<tr>
<td></td>
<td>17.8%</td>
<td>20.1%</td>
<td>6.3%</td>
<td>14.8%</td>
<td>21.4%</td>
</tr>
<tr>
<td>Moderate to Severe</td>
<td>(25)</td>
<td>(20)</td>
<td>(23)</td>
<td>(22)</td>
<td>(22)</td>
</tr>
<tr>
<td></td>
<td>8.2%</td>
<td>6.6%</td>
<td>7.6%</td>
<td>7.2%</td>
<td>7.2%</td>
</tr>
<tr>
<td>Severe to Extreme</td>
<td>(22)</td>
<td>(19)</td>
<td>(24)</td>
<td>(13)</td>
<td>(13)</td>
</tr>
<tr>
<td></td>
<td>7.2%</td>
<td>6.3%</td>
<td>7.9%</td>
<td>4.3%</td>
<td>4.3%</td>
</tr>
<tr>
<td>Total</td>
<td>(101)</td>
<td>(100)</td>
<td>(66)</td>
<td>(80)</td>
<td>(100)</td>
</tr>
<tr>
<td></td>
<td>33.2%</td>
<td>33.0%</td>
<td>21.8%</td>
<td>26.3%</td>
<td>32.9%</td>
</tr>
</tbody>
</table>
Although the CTQ assessed forms and severity of childhood trauma, the History of Neglect scale assessed only neglectful child experiences. Scores on the History of Neglect measure ranged from 8 to 31, with a mean of 10.53 (SD = 4.42). Using scoring guidelines suggested by Strauss and Savage (2005), the presence of neglectful caregiving on any three out of the eight items from the four domains (emotional, cognitive, supervisory, or physical) is indicative of pervasive child neglect. Eleven percent of mothers reported this severe degree of childhood neglect experiences.

Because both measures of childhood trauma were positively skewed, a square root transformation was performed to correct the asymmetry. The transformed CTQ variable had scores ranging from 5 to 9.54, with a mean of 6.03 (SD = .95), while the transformed History of Neglect scores ranged from 2.83 to 5.57, with a mean of 3.2 (SD = .59). For all further analyses, transformed childhood neglect and abuse measures were used.

Parenting Measures. The mean scores for each of the parenting measures were similar at 4, 8, and 18 months. The mean scores for the observed essentials at 4, 8, and 18 months were: 11.05 (SD = 2.31), 10.88 (SD = 2.61), and 11.24 (SD = 2.50), respectively. The Landry Positive Rating Scale had a mean of 14.26 (SD = 3.50) at 4 months, 13.30 (SD = 3.70) at 8 months, and 13.05 (SD = 3.77) at 18 months. The mean scores for the HOME at 4 months was 53.56 (SD = 6.45), 53.57 (SD = 7.79) at 8 months, and 54.52 (SD = 7.71) at 18 months. In comparison to scores obtained in a normative sample with the lower quarter indicating an environment of high-risk (Bradley & Caldwell, 2001), the majority of mothers in the present study were providing an average to above average home environment for their children at all timepoints. For instance, at 4 months, only 4% of mothers’ scores fell into the lowest fourth of the normative range, while 40% were in
the upper fourth. Nearly 60% of HOME scores at 4 months were in the middle half of the normative range. At 8 months, little change was apparent: 6% of HOME scores were in the lowest fourth of the normative range, 48% were in the middle half, and 46% of scores were in the upper fourth. Assessment of 18 month HOME scores showed 5% were in the lowest fourth of the normative scores, 45% were in the middle half, and half were in the upper fourth.

*Regulation Measures.* The three components of maternal-reported regulation had means of 2.20 (SD = 1.00) for the physiological dysregulation scale, 2.47 (SD = .90) for the emotional scale, and 1.94 (SD = .89) for the behavioral scale. Norms for the individual subscales (that are summed to create the three scales of regulation) are provided separately for boys and girls (Carter & Briggs-Gowan, 2001). In comparison to the scores from the normed sample, the children in the present study evidenced fewer regulatory skills. Means for the boys in the present sample were consistently higher, with higher scores indicative of greater regulatory problems, than those for the boys in the normed sample on every subscale (only one from each factor scale are listed – 3 of 11): activity-impulsivity (.89 versus .75), depression-withdrawal (.17 versus .06), and dysregulation-negative emotionality (.66 versus .50). Girls followed suit: activity-impulsivity (1.03 versus .68), depression-withdrawal (.20 versus .06), and dysregulation-negative emotionality (.68 versus .52); however, on two of the subscales girls were at or below the mean (inhibition to novelty and dysregulation sleep) indicating better regulation in these two domains.

*Correlation Matrix.* Correlations among all indicator measures can be found in Table 3. Parenting expectations were significantly correlated in the expected direction to
every variable with the exception of past childhood abuse experience. For instance, parenting expectations correlated with child abuse potential $r (304) = -.54, p < .001$, childhood histories of neglect, $- .19, p < .01$; all parenting measures with $rs$ ranging from .22 to .40; and all components of maternal reported regulation: $rs$ ranging from -.22 to -.32, $ps < .01$. Child abuse potential was also consistently associated with the other variables. Child abuse potential correlated with maternal childhood histories of neglect, $r (304) = .10, p = .09$ and histories of abuse, $r (304) = .15, p < .05$. It was also significantly related to parenting at each time point, $rs$ ranging from -.19 to -.36 and to the behavioral scale of children’s regulation, $r (191) = .19, p < .01$. Maternal histories of neglect and childhood abuse were less robustly associated with the other variables. The parenting measures were highly correlated to one another both to those obtained at the same and at future timepoints, $rs$ ranging from .26 to .68, all $ps > .001$. The regulation scales were also strongly correlated with one another.

**SEM Analyses:** To examine the hypothesis that parenting over time would be a path responsible for the relationship between early maltreatment risk and later children’s developing regulation, SEM was employed. SEM utilizes information gained from multiple measures, accounting for measurement error, to identify their underlying latent construct. Testing a structural equation model provides two types of results: First, the overall fit of the proposed model is tested, providing information on how the indicators, latent constructs, and specified pathways as a whole represent the data. Second, SEM allows for the examination of individual pathways among the constructs: the paths from maltreatment risk to parenting at each time point, the links from parenting at 4 months to 8 months and from 8 months to 18 months, the paths from parenting to children’s
### TABLE 3

INTER-CORRELATIONS AMONG INDICATOR VARIABLES

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1</td>
<td>PSE</td>
<td>-.54***</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
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<td>-</td>
<td>-</td>
</tr>
<tr>
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<td>.10†</td>
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***p <= .001, **p <= .01, *p <= .05, †p <= .10

**NOTE:** PSE = Parenting Style Expectations; CAPI = Child Abuse Potential Inventory; HN = History of Neglect; CTQ = Childhood Trauma Questionnaire; OE = Observed Essentials; LPS = Landry Positive Scales; HOME = Home Observation Scales; I-PD = Itsea – Physiological Dysregulation; B = Itsea – Emotional = Itsea - Behavioral
regulation at 24 months, and the pathway directly linking maternal maltreatment risk to children's regulation. The specific statistical software employed for these analyses were Analysis of Moment Structures (AMOS, v. 4.01; Arbuckle & Wothke, 1999), which uses the full information maximum likelihood approach (MLE) to handle missing data. Commonly reported indices were used to assess the overall fit of the hypothesized models, including: Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), $\chi^2$ and $\chi^2$ over degrees of freedom ratio. The CFI should be close to one (Bentler, 1990) and the RMSEA should be equal to or less than .08 (Browne & Cudek, 1993) to achieve a satisfactory fit. Also, the ratio of $\chi^2$ over the degrees of freedom should be less than two or three for an acceptable fit (Carmines & McIver, 1981).

**Measurement Model:** The measurement model began with the model proposed in Figure 1. Maltreatment risk was identified by two measures of at-risk parenting orientations: Parenting Style Expectations and Child Abuse Potential Inventory and two measures of maternal childhood trauma including the History of Neglect and Childhood Trauma Questionnaire. Each parenting construct was identified by the same three measures at each timepoint: the Observed Essentials ratings, Landry Positive scales, and the HOME measure (consisting of the HOME, SHIF, and additional questions, but referred to as the HOME for simplicity). Children's regulation consisted of three components of the ITSEA including physiological dysregulation, emotional, and behavioral scales. Fit indices from the measurement model based on the indicators and latent constructs specified in Figure 1 were a CFI = .84; RMSEA = 0.08, 90% CI = .07 - .10; $\chi^2 [94, N=304] = 294.82, p < 0.001; and $\chi^2$/df = 3.14. The fit indices coupled with
non-significant correlations among the four maltreatment risks led to separating the two measures of childhood abuse and neglect into a childhood trauma construct and the two measures of child abuse potential and parenting expectations into a maltreatment risk construct. Each of the measures was a significant indicator of its latent construct and this measurement model exhibited a significantly better fit: $\Delta \chi^2 = 83.19$, $\Delta df = 5$, $p < .001$, as well as improved fit indices: CFI = .90; RMSEA = 0.07, 90% CI = .06 - .08; $\chi^2 [89, N=304] = 211.63$, $p < 0.001$, and $\chi^2/df = 2.38$. For these reasons, the modified measurement model served as the foundation for fitting the following structural models.

Pathways Among Maltreatment Risks, Parenting, and Children's Regulation

Model 1 examined the direct relationships among maltreatment risk and early parenting, early parenting and subsequent parenting, and parenting at 18 months and children's 24 month regulation. This model can be seen in Figure 2 and included paths from childhood trauma to maltreatment risk and from maltreatment risk to parenting at 4 months. Paths were also included from 4 month parenting to 8 month parenting and from the 8 month parenting construct to the 18 month parenting construct as well as from the final timepoint of parenting to children's regulation at 24 months. An initial structural equation model showed no significant relationships between 4 or 8 month parenting and children's regulation, and these paths were dropped in the subsequent models to keep the models as parsimonious as possible. Three error inter-correlations were specified between the Observed Essentials and Landry Positive ratings at each parenting time-point due to their similar observational measurement. The overall fit of the model was satisfactory with a CFI = .90; RMSEA = 0.07, 90% CI = .06 - .08; $\chi^2 [96, N=304] =$
230.05, \( p < 0.001 \); and \( \chi^2/df = 2.40 \). All of the specified paths were significant. Past childhood trauma significantly predicted maltreatment risk, \( \beta = .26, p < .05 \), with mothers who had experienced more childhood abuse and neglect having higher maltreatment risk (less optimal parenting expectations and higher rigidity). Maltreatment risk was significantly predictive of less optimal parenting behaviors at 4 months, \( \beta = -.58, p < .001 \). Parenting at each time-point was related to the following parenting construct: 4 months to 8 months, \( \beta = .94, p < .001 \), and 8 months to 18 months, \( \beta = .86, p < .001 \). Parenting at 18 months showed a negative relationship to maternal reports of children's regulation, \( \beta = -.22, p < .05 \), such that mothers showing less optimal parenting behaviors had children exhibiting greater dysregulation.

Figure 3, which builds upon Model 1, shows the additional paths from maltreatment risk to each parenting time point and to children's regulation. Model 2 had a significantly better fit than Model 1: \( \Delta \chi^2 = 20.09, \Delta df = 3, p < .001 \), as well as improved fit indices: CFI = .91; RMSEA = 0.06, 90% CI = .05 - .08; \( \chi^2 [93, N=304] = 209.96, p < 0.001 \), and \( \chi^2/df = 2.26 \). The majority of paths discussed in Model 1 remained highly significant, despite the inclusion of additional paths from maltreatment risk to each parenting construct. Maltreatment risk was significantly associated with fewer positive behaviors at 8 months, \( \beta = -.17, p < .05 \), but this negative effect attenuated by 18 months, \( \beta = -.01, p = .89 \). Inclusion of the additional paths, led to the relationship between 18 month parenting and children's regulation falling to nonsignificance, \( \beta = .08, p = .50 \); however there was a strong direct effect observed between early maltreatment risk and regulation such that mothers evidencing greater maltreatment risk had children with more regulatory problems, \( \beta = .48, p < .001 \).
Figure 2. Model 1 including maltreatment risk, early parenting, and children's regulation
Figure 3. Model 2 including maltreatment risk, early parenting, and children's regulation

***p <= .001, **p <= .01, *p <= .05
In summation, mothers with more childhood abuse and neglect experiences had greater maltreatment risk which in turn was related to less optimal early parenting behaviors at 4 months. Parenting at each timepoint was strongly associated with the following parenting timepoint. Although the first model offered support for parenting as a mechanism through which maltreatment exerts its influence on children’s emergent regulation, the second model including additional paths from maltreatment risk to each of the later constructs, suggested that risk has a strong direct impact on regulation at 24 months. Taken together, it appears that maltreatment risk sets the stage for early problematic parenting which is a key determinant of later parenting. Moreover, it seems as though both parenting and maltreatment risk have implications in determining children’s regulatory development.

Longitudinal Analyses: Parenting Trajectories in Relation to Early Maltreatment Risks

To expand upon the structural relationships and investigate parenting as a dynamic process, HLM was used to examine how parenting changes with respect to time through investigating multilevel questions and describing trajectories of change (Singer & Willett, 2003). HLM also examined the relationship between maltreatment risks and changes in parenting behaviors. In addition, this analytical tool handles missing data in an optimal manner with Maximum Likelihood Estimation. For these reasons, HLM was employed to examine the hypothesis that parenting changes over time and that these changes would be predicted by prenatal maltreatment risks.

Two types of models, one addressing intra-individual differences (Level-1 model) and the other addressing inter-individual differences (Level-2 model) were
utilized. In the Level-1 model, the parenting behaviors measured at 4, 8, and 18 months were entered as the dependent variable and time was entered as an independent variable.

\[ \text{Parenting}_{ij} = \pi_{0ij} + \pi_{1ij}(\text{time}) + \epsilon_{ij} \]

According to this equation, the parenting construct, Parenting\(_{ij}\) is a function of the unobserved initial status of individual \(i\) in group \(j\), a growth trajectory, and residual error. The growth trajectory is defined by a slope factor (\(\pi_{1ij}\)). Three different Level-1 models were analyzed, one for each of the three measures of parenting. In addition, with three waves of data, only linear growth trajectories were possible for analyses. Furthermore, because structural modeling revealed no significant relationships between 4 or 8 month parenting and children's regulation, the outcome of focus was 18 months. In order to examine the outcomes of parenting at 18 months and have the intercept term reflect parenting scores at 18 months, the time variable was recoded by subtracting 18 from each time point. For instance, time was coded -14 for parenting measured at 4 months, -10 for parenting measurements taken at 8 months, and 0 for parenting recorded at 18 months. Furthermore, all the estimates were drawn from estimates without robust standard errors due to the less rigid assumptions about missing data.

**Unconditional models.** Three unconditional models were fitted to provide baseline information for use in comparison to models involving more substantive predictors. The Level-1 model utilized was presented above (for each parenting measure), while the Level-2 unconditional model for each parenting measure was represented by the following equations:
Conditional models. After the unconditional models were fitted, maltreatment risks were added as predictors of inter-individual differences of parenting trajectories. Because of the significant correlations between the Parenting Style Expectations and Child Abuse Potential Inventory and the History of Neglect and Childhood Trauma Questionnaire, summed constructs were created. Z-score transformations for each measure were carried out and in the case of the Parenting Style Expectations reverse scored to have high scores indicative of risk. Next, the appropriate measures were summed together. The Level-2 models provide information about how the individuals differ from one another and include the two maltreatment risk constructs – Parenting Orientations (Parenting Style Expectations and Child Abuse Potential Inventory) and Past Trauma (History of Neglect and Childhood Trauma Questionnaire) as predictors of the changes in parenting behaviors over time. Different models were run to allow examination of the two summed constructs of maltreatment risk: Parenting orientations and Past Trauma, in terms of both their individual and cumulative impact on changes in parenting. None of the variables were centered. The full Level-2 model can be represented by the equations:

\[ \pi_{0i} = \gamma_{00} + \zeta_{0i} \]

\[ \pi_{1i} = \gamma_{10} + \zeta_{1i} \]

Observed Essentials. In the unconditional model, results showed that the estimated overall mean observed essentials parenting score at 18 months was \( \gamma_{00} = \)
11.17 and was significantly different from zero (p < .001). The overall mean growth rate was $\gamma_{10} = .015$ and was not significantly different from zero (p = .26). This means that, on average, mothers' scores on the observed essentials were significantly greater than zero when their children were 18 months, but did not evidence significant change over time. The variance components of this model revealed that there was significant heterogeneity among individuals as evidenced by the intercept term ($\tau_{a00} = 3.08$, p < .001), however, the slope variance term was not significant suggesting that there was little variability in how parenting changed over time ($\tau_{e10} = .001$, p = .34). The correlation between 18 month outcome intercept and slope was .59. The positive correlation indicates that steeper slopes, indicating greater change, were associated with higher parenting outcome scores at 18 months. The reliability estimate for the intercept term was .41 and the estimate for the slope term evidenced little reliability at .03.

A subsample of 75 randomly selected individual trajectories of Observed Essentials scores were plotted and can be seen in Figure 4. The graph provides a visual confirmation of the variability in outcome scores at 18 months and few differences in the trajectories of change.

The two summed constructs of maltreatment risk – parenting orientations and past trauma – were then entered individually and the results showed variability in the predictive utility of each of the risks. Parenting orientations predicted the intercept at 18 months $\gamma_{01} = -.15$, p < .001, while Past Trauma had no significant effects on either the 18 month intercept or rate of change. The full model with both constructs entered as predictors can be found in Table 4. According to this model, parenting orientations
continued to be a strong predictor of 18 month outcome status. Chi-square testing revealed that the full model fit the data significantly better than the unconditional model.

![Observed Essentials scores over time – 75 cases chosen randomly](image)

Figure 4. Observed Essentials scores over time – 75 cases chosen randomly

*Landry Positive Parenting.* In the unconditional model, results showed that both the intercept and rate of change was significantly different from zero: the estimated overall mean Landry Positive parenting score at 18 months was $\gamma_{00} = 12.82$, $p < .001$, and the overall mean growth rate was $\gamma_{10} = -.08$, $p < .001$. In other words, mothers' Landry scores on average were decreasing at a rate of nearly a tenth of a point per month. The variance components of this model revealed significant
heterogeneity in both individuals’ intercept at 18 months ($\tau_{\pi00} = 9.44, p < .001$), and slope ($\tau_{\pi11} = .02, p < .01$). The correlation between 18 month outcome status and slope was .46, indicating that mothers with greater rates of change in behaviors over time had higher parenting outcome scores at 18 months. The reliability estimates for the intercept and slope terms were .50 and .20, respectively.

Individual trajectories of Landry Positive ratings scores are depicted in Figure 5. The subsample of 75 randomly selected individual trajectories highlight considerable variability in both outcome scores at 18 months and how mothers change over time. Although some trajectories show positive growth over time, the general trends suggested negative change from 4 to 18 months.

Conditional models proceeded to be fit individually for each of the two summed constructs of maltreatment risk – parenting orientations and past trauma – with the final model including both. In the first individual model, parenting orientations, again was a strong predictor of the 18 month intercept status, $\gamma_{01} = -.26$, $p < .001$ but not of the slope. Past trauma was not a significant predictor of either intercept or growth rate. The full model with both constructs entered as predictors can be found in Table 5. According to this model, parenting orientations continued to be a strong predictor of 18 month outcome status. Again, chi-square testing supported the inclusion of predictors in comparison to the unconditional model.
TABLE 4
MALTRAITMENT RISKS AS LEVEL-2 PREDICTORS OF INITIAL STATUS AND SLOPE OF THE OBSERVED ESSENTIALS

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<td>.10</td>
<td>-.87</td>
<td>.385</td>
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</table>

| **Model for Growth Rate** |             |     |        |        |
| Mean Growth Rate $G_{10}$ | .03         | .03 | 1.03   | .304   |
| MR-PO $G_{11}$           | .00         | .002| -.74   | .462   |
| MR-PT $G_{12}$           | .00         | .01 | .33    | .740   |

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***p <=.001

NOTE: MR- PO = Maltreatment Risk – Parenting Orientations; MR- PT = Maltreatment Risk – Past Trauma
Figure 5. Landry Positive Ratings scores over time – 75 cases chosen randomly

**HOME ratings.** In the unconditional model for the HOME scores, results showed that both the estimated overall mean score at 18 months and the growth rate were significantly different from zero, $\beta_0 = 54.24, p < .001$ and $\beta_1 = .073, p < .05$, respectively. Both the variance components for the intercept term ($\tau_{\pi 00} = 45.91, p < .001$) and slope term ($\tau_{\pi 10} = .02, p < .05$) were significant. The correlation between outcome status and slope was .67. The positive correlations indicated that greater rates of change were associated with higher HOME outcome scores at 18 months. The reliability estimate for the intercept term was .60 and the estimate for the slope term was poor at .10.
### TABLE 5
MALTREATMENT RISKS AS LEVEL-2 PREDICTORS OF INITIAL STATUS AND SLOPE OF THE LANDRY POSITIVE RATINGS

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**p <= .01, ***p <= .001

NOTE: MR- PO = Maltreatment Risk – Parenting Orientations; MR- PT = Maltreatment Risk – Past Trauma
In Figure 6, individual trajectories of HOME scores are plotted. From the graph, wide variability in outcome scores can be seen, however the significant variability in the individual rates of change (as indicated by the variance term) is less obvious.

Table 6 provides the full model results for the HOME parenting scores. As seen with the other parenting behaviors, in both the individual and full models, only the maltreatment risk construct of parenting orientations was a significant predictor of the outcome status at 18 months, $\gamma_{0l} = -.51, p < .001$. Mothers evidencing problematic early parenting orientations had lower 18 month intercept scores. Chi-square tests supported the full model in comparison to the model without the predictors.

Figure 6. HOME Scores over time – 75 cases chosen randomly
TABLE 6
MALRTREATMENT RISKS AS LEVEL-2 PREDICTORS OF INITIAL STATUS AND SLOPE OF THE HOME

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**p <= .01, ***p <= .001

NOTE: MR- PO = Maltreatment Risk – Parenting Orientations; MR- PT = Maltreatment Risk – Past Trauma
Summary of longitudinal results. In summary, parenting orientation associated with maltreatment risk was a key determinant and consistent predictor of the intercept term in all three parenting behaviors at 18 months. Despite significant variability in the rates of change for both the Landry Positive ratings and the HOME, neither parenting orientations nor past childhood trauma were predictive of the rate of change. This may be partially due, however, to the low reliability of the slope variance term.

Slopes and intercepts at 18 months as predictors of regulation. Finally, it was hypothesized that the individual trajectories of parenting would be associated with children’s emergent regulatory skills, such that negative changes would be associated with greater dysregulation. It was also expected that mothers with lower outcome intercepts at 18 months would have children showing greater dysregulation. Regression analyses were used employing extracted slopes and intercepts from the Level-2 residuals of the HLM analyses as predictors: separate equations were ran for slopes as predictors of each regulation scale and intercepts as predictors of each regulation scale resulting in a total of 6 equations.

Table 7 contains the results from testing changes in maternal parenting behaviors and outcome intercepts at 18 months as predictors of children’s physiological, emotional, and behavioral regulation. Negative changes in the Observed Essentials behaviors showed a suggestive association to greater physiological dysregulation, $\beta = -.16$, $p = .07$. In addition, changes on the HOME measure significantly predicted behavioral regulation, $\beta = -.19$, $p < .05$, such that mothers changing negatively over time on the HOME had children evidencing greater behavioral dysregulation. The HOME intercept at 18 months was also significantly related to the behavioral scale scores, $\beta = -.20$, $p < .05$: mothers
with lower HOME scores at 18 months had children with more dysregulated behaviors. There was also a suggestive correlation between the Observed Essentials 18 month intercept score and children’s behavioral dysregulation, however the regression coefficient was nonsignificant. The results suggest that changes in certain parenting behaviors are important for the development of specific regulatory components (e.g. changes in a safe, nurturing home environment as measured by the HOME scales impact children’s behavioral dysregulation).

In summary, maternal histories of neglect and abuse were significant predictors of maltreatment risk, as indexed by child abuse potential and problematic parenting orientation. Once in place, maltreatment risks set the stage for early parenting problems that tend to continue on throughout the first 18 months of the children’s lives. Although 18 month parenting was a significant predictor of children’s regulation at 24 months, once maltreatment risk was considered, it had a stronger, direct effect on emergent regulation.

Maltreatment risk was also a strong, consistent predictor of maternal parenting outcomes at 18 months but not of changes in these parenting behaviors. Childhood histories of maltreatment had little effect on either end point or rates of change in parenting. In the final set of analyses, support was found for the link between changes in certain parenting behaviors and specific regulatory abilities. For instance, negative changes in the home environment were associated with greater behavioral dysregulation but not in greater physiological or emotional dysregulation.
### TABLE 7

**PREDICTING CHILDREN'S REGULATION FROM MATERNAL PARENTING SLOPES AND INTERCEPTS**

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<tr>
<td><strong>Physiological Dysregulation</strong></td>
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</tr>
<tr>
<td>OESL</td>
<td>-.70†</td>
<td>.39</td>
<td>-.16</td>
<td>-.14*</td>
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<td>LPSL</td>
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<td>.21</td>
<td>.09</td>
<td>.03</td>
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<tr>
<td>HOMESL</td>
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<td>-.03</td>
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<tr>
<td>R² = .03</td>
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<tr>
<td>OEIN</td>
<td>-.03</td>
<td>.03</td>
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<td>-.09</td>
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<tr>
<td>LPIN</td>
<td>-.00</td>
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<td>HOMEIN</td>
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<td>R² = .01</td>
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<tr>
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<td>R² = .00</td>
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<td>R² = .00</td>
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<td><strong>Behavioral Dysregulation</strong></td>
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<tr>
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<td>R² = .05</td>
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* p <= .05, ** p <= .01, † p <= .10.

**NOTE:** OESL = Observed Essentials Slope; LPSL = Landry Positive Ratings Slope; HOMESL = HOME Slope; OEIN = Observed Essentials Intercept; LPIN = Landry Positive Ratings Intercept; HOMEIN = HOME Intercept
Taken as a whole, the findings lend support to maltreatment risk as a key determinant of parenting throughout the first 18 months. Maltreatment risk was also a significant influence on children’s regulation, whereas the impact of changes in parenting behaviors on children’s self-regulation was more component specific (e.g. only predicted behavioral regulation). It appears that developing regulation is the result of a complex interplay of factors and that both maltreatment risk and parenting changes impact its emergence.
DISCUSSION

The present study investigated parenting as a process responsible for the relationship between prenatal maltreatment risk and children's self-regulation. Structural equation modeling was used to explore the overall relationships among six latent constructs: maternal childhood trauma, maltreatment risk, parenting at 4, 8, and 18 months, and children's regulation at 24 months. A more detailed investigation of specific parenting behaviors and how they changed over time, including antecedent risks and children's regulatory consequences, was provided through hierarchical linear modeling and a series of regression analyses. Four key findings emerged that contribute to the extant literature: (1) maternal histories of childhood abuse and neglect were significantly associated with maltreatment risk, as indexed by child abuse potential and unrealistic expectations about children; (2) maltreatment risk was a significant predictor of early parenting, which in turn, predicted later parenting; (3) maltreatment risk was a consistent and strong predictor of maternal parenting outcomes at 18 months; and (4) children’s self-regulation, assessed by physiological, emotional, and behavioral scales, was influenced by parenting at 18 months; changes in specific parenting behaviors (especially the quality of the home environment); and prenatal maltreatment risks.
Maternal Histories of Abuse and Neglect, Maltreatment Risk, and Parenting

A significant body of research lends support to the hypothesis that maternal histories of childhood abuse and neglect are related to the subsequent maltreatment of their own children (Herrenkohl, et al., 1998; Woodward & Fergusson, 2002; Zuravin, et al., 1996). Mothers in the present sample reported significant exposure to childhood victimization: 63% experienced at least one type of childhood abuse or neglect. Theory suggests that these early childhood experiences of maltreatment compromise parenting, especially in forming realistic expectations about parenting and parent-child relationships, thus fostering the ongoing cycle of abuse and neglect across generations (Bowlby, 1969; Patterson, 1998). McCloskey and Bailey (2000) examined the intergenerational transmission of risk for child sexual abuse among 179 preadolescent girls in high-risk families (i.e. family history of spousal abuse). In this risk sample, 54 of the mothers experienced childhood sexual abuse and 23 of their daughters reported being sexually abused. Although other risk factors were examined (i.e. drug use, unemployment, infrequent family contact), the presence of maternal sexual abuse history increased girls’ odds of being sexually victimized by 3.6 times. The results of the present study were in line with past findings, highlighting an important relationship between maternal histories of maltreatment and elevated risk for victimizing their own children, thus setting the stage for the cyclical nature of maltreatment.

Past research has shown that supportive parenting behaviors are necessary for children's developing mature regulatory abilities in samples of primarily Caucasian middle-class parents (Calkins, et al., 1998; Eisenberg, et al., 2005; van den Boom, 1994) and that these behaviors may be absent in maltreating families (Pianta, et al., 1989;
Trickett & Susman, 1988). In fact, previous research has documented differences between abusive and nonabusive parents, with abusive caregivers utilizing fewer reasoning strategies, having disorganized home environments, and providing less encouragement to their children (Trickett & Susman, 1988; Pianta, et al., 1989; Trickett, et al., 1991). For instance, Trickett and colleagues (1991) used a cross-sectional design to compare abusive parents to non-abusive parents on multiple caregiving factors. After controlling for SES and other demographic variables, results showed that abuse status was significantly associated with less parental enjoyment of the child and the parenting role as well as less encouragement of children’s autonomy. No research to date, however, has examined how risk for maltreatment impacts parenting – conceptualized as a dynamic, comprehensive construct – during the first 18 months of children's lives in a sample of mothers with diverse racial, educational, and economic backgrounds. Importantly, results from the present study bridge both risk and non-risk literature on parenting, showing that in a diverse sample of mothers, maltreatment risk had a negative impact on multiple positive parenting behaviors such as providing comfort, verbalizing towards the child, displaying positive affect, mentoring and rehearsing new skills, and providing appropriate stimulation, at both 4 and 8 months.

Many studies have shown differences in parenting behaviors between maltreating and non-maltreating caregivers, but little is known about parenting over time in abusive and neglectful families. In fact, the majority of studies utilizing maltreated children are cross-sectional, obscuring possible differential effects of maltreatment on parenting over time. In the prospective, longitudinal Minnesota Mother-Child Project several significant differences in the home environments were found between maltreating and non-
maltreating families (Pianta,, 1989); however no follow-up investigations into how parenting changed over time and subsequent developmental sequelae were conducted. Findings from the present study's hierarchical linear analyses provided a more detailed examination of changes in parenting behaviors over time, highlighting a consistent relationship between maltreatment risk and parenting scores at 18 months for three discrete parenting measures: Mothers at higher risk for maltreatment had lower 18 month parenting outcome scores on measures of the Observed Essentials, Landry Positive ratings, and the HOME.

*Changes in Parenting and Regulation*

Contrary to studies of high-risk families, in non-risk samples, many studies have examined parenting behaviors at multiple times and their effects on children's regulation. For instance, Eisenberg and colleagues (2003) examined parents' emotional expressivity at two time-points and children's self-regulation. Parents' negative expressivity was assessed for the first time when children were between the ages of 4.5 to 8 years and again 24 months later. Self-regulation, indexed by attention focusing, inhibitory control, and task persistence, was measured during the second assessment. Results showed that parental negative expressivity was strongly related to later expressivity and to children's self-regulation. However, only later expressivity was examined as a predictor of children's regulation. Landry and colleagues (2001) extended these findings into a younger sample and examined responsive parenting behaviors beginning at 6 months and ending at 4 years. Investigation into the relationship between early versus later parenting did not support early parenting as most crucial in children's development; rather they
found that consistent responsiveness over time was associated with optimal outcomes. Findings from the present study support these conclusions. Results from structural equation modeling suggested highlighted both direct and indirect effects of maltreatment risk and parenting on children’s regulation. In one model, higher maltreatment risk was associated with children’s compromised regulation. In another model, maltreatment risk impacted early parenting behaviors that fostered subsequent parenting behaviors, which, in turn, were associated with children’s physiological regulatory difficulties including eating and sleeping difficulties; emotional regulatory problems such as withdrawal, inhibition to novelty, and problems self-soothing; and impulsive and non-compliant behaviors. It appears that once problematic parenting is set in motion, it is likely to continue and have detrimental consequences for developing regulation. The present study builds on the past findings and furthers what is known in two important ways. First, the present study employed a comprehensive conceptualization of regulation, including physiological, emotional, and behavioral components, thus providing a broader picture of the multi-faceted impact of maltreatment risk and parenting on children’s regulatory repertoire. Second, the present study assessed early parenting and emergent regulation. Measuring parenting at three time-points during the first 18 months of age allowed for an in-depth look at caregiving behaviors during early development. Coupled with the measurement of regulation at 24 months, before self-regulation abilities become coherent and stable (Kochanska, et al., 2000; Vaughn, et al., 1984), the findings are more applicable to prevention/intervention programming.

A body of work, based on the longitudinal NICHD study of children’s development, has supported parenting behaviors such as autonomy support and
sensitivity, and their influence on components of children's regulation including persistence and affect dysregulation. For instance, Kelly and colleagues (2000) examined parenting and regulation in toddlers and found that negative maternal evaluation at 24 months predicted children’s shame at 36 months, but maternal autonomy-supporting control was associated with children’s later persistence (Kelly, et al., 2000). In another study, the NICHD Early Child Care Research Network (2004) examined maternal parenting behaviors and affect regulation in a sample of toddlers. Less maternal sensitivity and stimulation was related to children's affect dysregulation at 24 months. These studies elucidated relationships between parenting behaviors and regulatory skills, however, with the intense measurement scheme employed in the NICHD study, additional questions could have been answered with the utilization of analytical techniques that maximize the information from multiple data time-points and best capture the dynamics of parenting. Using analytical techniques to capitalize on the data available and best examine change, findings from the present study showed that changes in specific parenting behaviors were instrumental in fostering different components of regulation. Negative changes in the home environment were associated with poorer behavior regulation, but not physiological or emotional regulatory difficulties. In addition, fewer instances of protecting, comforting, and responding, as assessed by the Observed Essentials measure, were correlated with children’s greater physiological dysregulation including problems regulating sleeping, eating, and affect.
**Prevention Implications and Future Research Directions**

The overall results from the present study showed that maltreatment risk, as assessed by child abuse potential and unrealistic expectations, played an instrumental role in determining early parenting and children’s regulation. For this reason, it is clear that prevention efforts must target mothers at risk for maltreatment in order to promote positive parenting and foster children's emerging regulation. Because maltreatment's effects on parenting were apparent by 4 months, with parenting at this time point being strongly predictive of subsequent parenting, program curricula should target the risks associated with maltreatment and begin service delivery early in order to address problematic parenting practices before they become habitual and less amendable to change (Daro, 1996). In order to best prevent problematic parenting behaviors that persist over time, prevention programming should begin during the prenatal period or early in infancy (Daro, 1996; Schatz, 2006).

Because maternal childhood histories of maltreatment were strong predictors of maltreatment risks, the selection of participants for intervention studies based on maternal histories of abuse and neglect would ensure that mothers most in need of support received the limited services available in most communities. Program components that teach mothers about child development would foster appropriate expectations and reduce the risk for maltreatment. Additionally, self-regulation’s influence on cognitive, emotional, and social development is well noted (Maughan & Cicchetti, 2002; Shields & Cicchetti, 1998), a curriculum that includes components that strengthen parenting behaviors such as sensitivity (Spinrad & Stifter, 2002), contingent responsiveness (van den Boom, 1994), and developmentally-appropriate stimulation (Calkins, et al., 1998) would support
children’s growing regulatory skills and contribute to their later academic and social success.

Future work should include additional measures of parenting and regulation. The inclusion of parenting assessments at additional time points would allow for the testing of more complex change processes and the examination of potential higher order models of change (i.e. curvilinear growth) in parenting. Elucidating these parenting processes would tell us about periods of stability and rapid or slow rates of change as well as their implications for growing regulation. Moreover, despite the abundance of research suggesting that regulation begins to stabilize around 3 years of age, no study to date has included a measurement scheme with frequent assessments of children’s comprehensive regulatory skills from birth to 3 years of age. The incorporation of multiple measurements of regulation would better elucidate early factors associated with regulation’s stability and define areas for prevention.

In summary, the results from the present study highlighted the strong and pervasive influence that maltreatment risk has on parenting and children’s emergent regulation. Beginning the parent-child relationship from a foundation of unrealistic expectations about children, rigidity, and personal unhappiness, sets the course for compromised parenting behaviors that persist over time and result in detrimental regulatory consequences for children. Prevention programs that support mothers at risk for maltreatment would help to ensure that all children will be raised in a healthy environment and develop to their fullest potential.
REFERENCES


