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UNPACKING RELATIONS BETWEEN CHILDREN'S SUSTAINED FOCUSED ATTENTION AND MATERNAL STRUCTURING OF ATTENTION FOCUS: CONTRIBUTIONS TO CHILDREN'S USE OF DISTRACTION

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ABSTRACT

Regulating negative emotion is a central task of early childhood (Eisenberg & Fabes, 1992; Kopp, 1989) and contributes to positive and negative outcomes among children, such as social competence and the development of psychopathology (Denham et al., 2003; Halligan et al., 2013; Silk, Steinberg, & Morris, 2003). Emotion regulation strategies that rely on attention control have been found to be effective at reducing young children's negative emotions (Ekas, Braungart-Rieker, Lickenbrock, Zentall, & Maxwell, 2011; Gilliom, Shaw, Beck, Schonberg, & Lukon, 2002). While it is understood that parents play an important role in the development of emotion regulation (see Morris, Silk, Steinberg, Myers, & Robinson, 2007), this study investigated when in early childhood specific parenting practices lead to increased attention skills rather than occurring *in response to* child skills. Additionally, the study examined whether parental support of attention acts as a pathway through which children's attention control capacities predict later use of an attention-based emotion regulation strategy. 120 mother-child dyads were observed in the laboratory at 18, 24, 36, and 48 months during free play, reading, and waiting tasks. Children's sustained focused attention during free play and distraction during a difficult wait were coded, as was the frequency of mothers' structuring of children's attention focus during a reading task. Hypothesized bidirectional longitudinal relations between children's sustained attention and mothers' structuring of children's attention focus were not supported. These behaviors were stable over time but unrelated longitudinally to one another. Path analyses did not support the hypothesis that children's sustained attention skills and mothers' structuring of attention focus is associated with children's use of distraction during a frustrating wait 6 to 12 months later. Results are discussed with respect to individual differences among dyads, the impact of task context on results, and study design.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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Chapter 1. INTRODUCTION

It is understood that learning to successfully regulate emotion (particularly negative emotion) is a critical task of early childhood and an important aspect of social development (Eisenberg & Fabes, 1992; Kopp, 1989; Tronick, 1989). Research links young children's emotion regulation capacities to positive outcomes such as social competence and academic achievement (Belsky, Friedman, & Hsieh, 2001; Denham et al., 2003; Graziano, Reavis, & Keane, 2007; Howse, Calkins, Anastopoulos, Keane, & Shelton, 2003). Emotion regulation skills also impact mental health, such that children who exhibit difficulty regulating their negative emotions are more likely to experience psychological problems both concurrently and in the future (Cole, Michel, & Teti, 1994; Halligan et al., 2013; Silk et al., 2003). Given the importance of these skills for children, understanding what factors contribute to their development is critical for prevention of and intervention for emotion regulation deficits.

Models of regulatory development and empirical work suggest that parents play an instrumental role in successful emotion regulation in infancy and a supportive role later in the toddler and preschool years as children improve in their capacity to modulate their emotions and arousal (Jahromi, Putnam & Stifter, 2004; Kopp, 1989; Morris et al., 2007). A preponderance of evidence documents links between various parenting behaviors and children's emotion regulation (see Morris et al., 2007). Additionally, theory and research point to an important role for attention control capacities in children's emotion regulation skills (Rueda et al, 2005). Indeed, young children's attention-based strategies for regulating their negative emotions in a distressing situation have been linked to brief declines in observed anger (Buss & Goldsmith, 1998; Ekas et al., 2011; Gilliom et al., 2002). Despite empirical support for relations between parenting and children's emotion regulation, relatively few studies have documented evidence

that specific parenting behaviors *contribute to* the development of emotion regulation capacities above and beyond the natural growth of skills that support emotion regulation (i.e., attention). Reviewers of the literature on emotion regulation development and its relation to parenting have called for researchers to employ statistical modeling and longitudinal designs to explore the contribution of cognitive skills to regulatory development (Eisenberg, Champion, & Ma, 2004; Eisenberg & Valiente, 2004) and to disentangle bidirectional relations between parenting and children's development in various domains over time (Sameroff & Mackenzie, 2003). To understand the contribution of parenting to children's early development of emotion regulation (and, therefore, to direct appropriate interventions when these skills are lacking), research is needed to determine when and how parents add to the development of emotion regulation above and beyond simply responding to their children's increasing regulatory skill.

The present study seeks to address this gap in the literature by examining the influence of a particular parenting practice thought to support the development of sustained attention on children's engagement in an attention-based emotion regulatory strategy during a period of rapid growth in children's regulatory skills. The study first aims to disentangle bidirectional relations between children's sustained attention during free play and mothers' efforts to support their children to focus their attention during a reading activity measured repeatedly from 18 to 36 months of child age. By specifying bidirectional pathways, it may be possible to determine when during early childhood mothers' structuring of their children's attention focus leads to greater observed sustained attention skill in children, and alternately, when this parenting practice is responsive to the skill level of the child. Secondly, the dissertation seeks to contribute empirical support for an explicit contribution of parenting practices to children's ability to use an emotion regulation strategy (distraction) independently 6 to 12 months later. Documentation of

whether and when in early childhood parenting serves as a link between children's attention capacities and their ability to use these skills to engage in an attention-based emotion regulatory strategy will allow for improved interventions that target specific parenting behaviors at a particular time in childhood.

Emotion Regulation Strategies: Development and Importance

As mentioned, learning to modulate arousal and affect is thought to be a key component of development in early childhood (Kopp, 1982). However, prior to discussing the important role of emotion regulation in childhood, it is important to specify what is meant when this phrase is invoked. Although various definitions of emotion regulation have been adopted by researchers and theorists (see Cole, Martin, & Dennis, 2004), in the present study this capacity is conceptualized as the ability to monitor, evaluate, and modify (i.e., enhance, maintain, or inhibit) emotional arousal (e.g., Cole et al., 1994; Thompson, 1994). A valuable aspect of this definition is its attention to temporal features of emotion regulation. For example, a child could engage in behaviors to forestall negative emotion or maintain positive emotions. It has been shown that preschool-aged children use strategies to regulate their arousal and frustration when required to wait, or delay gratification, and that use of these regulatory strategies relates to both short-term success at forestalling anger (Cole et al., 201l; Gilliom et al., 2002) and long-term career and personal success into adulthood (Mischel et al., 1989). Indeed, children's emotion regulation skills have been tied to important indicators of development in a number of domains.

Although numerous domains of development have been examined in relation to emotion regulation, three child outcomes have been frequently associated with this skill: social competence, emotional competence, and the development of psychopathology. Emotion regulation skills have repeatedly been tied to social competence (for a review see Eisenberg &

Fabes, 1992). For example, 3- and 4-year-olds' observed and mother-reported emotion regulation skills predicted concurrent ratings of likeability and positive social behaviors (e.g., cooperation) as well as subsequent ratings of these qualities during kindergarten (Denham et al., 2003). Additionally, emotion regulation skills have been identified as an important aspect of children's emotional competence (i.e. exhibiting situationally- and socially-appropriate emotional expressions and emotion-based behaviors, like comforting) and linked to children's understanding of emotions in oneself and others (Garner & Power, 1996; Lindsey & Colwell, 2003; Raver, Garner, & Smith-Donald, 2007). Finally, difficulty regulating negative emotions in early childhood has been linked to both internalizing and externalizing symptoms in childhood (Cole, Luby, & Sullivan, 2008; Cole, Zahn-Waxler, & Smith, 1994; Eisenberg, et al., 2001; Eisenberg, Spinrad, & Eggum, 2010; Halligan et al., 2013; Hill, Degnan, Calkins, & Keane, 2006; Rubin, Coplan, Fox, & Calkins, 1995) and predicts whether individuals develop psychological disorders later in life (Cole, Zahn-Waxler, Fox, Usher, & Welsh, 1996). Taken together, these findings highlight the importance of skillful modulation of negative emotion in early childhood for understanding and exhibiting appropriate emotions, establishing positive social relationships with others, and avoiding behavioral and psychological problems.

Emotion regulatory actions can be observed early in development in the ways that infants begin to respond to their environment during their first few months of life. Although these systematic responses appear to be instinctive rather than the result of effortful or conscious action on the part of infants, such behaviors mark the emergence of emotion regulation. For example, when presented with a distressing situation, infants as young as 3 months old have been observed to try to distance themselves from the source of their distress or engage in self-soothing actions like putting their hands in their mouths (Feldman, 2009). Researchers studying infants

have also observed that they instinctively divert their visual attention away from emotionally evocative stimuli, which serves to temporarily reduce their emotional arousal, though at this early stage such attention-shifting is thought to be a spontaneous response and not representative of purposeful action on the part of infants (Gusella, Muir, & Tronick, 1988; Stifter & Moyer, 1991). These early antecedents to behavioral regulation are understood to emerge in infancy, but continue to develop over the course of early childhood (Rothbart, Ziaie, & O'Boyle, 1992). Although infants engage in these distress-reducing behaviors, during infancy caregivers frequently engage in regulatory strategies to reduce their babies' distress, such as caressing, rocking and holding, and vocalizing (Jahromi et al., 2004). Further development in children's emotion regulation skill continues as infants enter toddlerhood and gain increasing control over their cognitions, emotions, and behavior.

As children enter their second year of life, the variety and complexity of the regulation strategies they use grows, in part because they can deploy skills emerging in other domains (e.g., attention, language) to help them regulate their emotions more effectively by themselves and with the support of their caregivers (Kopp, 1989). Building on rudimentary emotion-regulatory behaviors in infancy (e.g., gaze shifting; non-nutritive sucking), in their first year of life babies begin to show increasingly diverse regulatory capacities in emotion-eliciting situations. Studies examining emotion regulation during the infancy and toddler periods find that young children are likely to exhibit a constrained set of regulatory behaviors (i.e., self-soothing, visual orientation) that decline as infants add new regulatory behaviors to their repertoire in their second year of life. These emerging strategies include communication-based strategies like social referencing, information-seeking, and directing, and cognition-based strategies like distraction and problem-solving (Cole et al., 2011; Diener & Mangelsdorf, 1999; Grolnick, Bridges, & Connell, 1996;

Parritz, 1996; Rothbart et al., 1992; Stifter & Braungart, 1995). This growth in regulatory strategies during toddlerhood points to increasing capacities for *self*-regulation of emotion, although the research reviewed highlights that toddlers continue to rely on caregivers to support emotion regulation.

The preschool years mark the development of increasingly autonomous and complex emotion regulation strategies that are supported by further development of children's cognitive capacities. Observational studies show that during the preschool-age years, young children continue to engage in regulatory behaviors to moderate their negative arousal and suggest that these strategies become more effective during this period. Observations of young children's self-initiated regulatory behaviors during a frustrating wait show that from 24 to 48 months of child age, children use distraction and calm bids to their mother earlier and for longer duration, and that these regulatory behaviors are related to shorter and delayed expressions of anger (Cole et al., 2011). Preschool-aged children have also been observed using other strategies in emotionally-challenging situations that rely on cognitive and linguistic skills, including information-seeking and cognitive reappraisal (Gilliom et al., 2002; Stansbury & Sigman, 2000). These studies show that children's use of emotion regulation strategies undergoes dramatic development during the first five years of life and that these changes represent an important aspect of self-regulatory development (Kopp, 1989). Although a number of skills appear to be important components of successful development of emotion regulation (e.g., language, planning, inhibitory control), a strong body of research points to an important role for attention.

Development of Attention and its Relationship to Emotion Regulation

During early childhood notable development has been observed in children's attention capacities and in their ability to harness their attention in the service of their goals, such as

coping with negative emotions in distressing situations. Early in infancy children have been observed to shift their attention away from objects in order to limit their exposure to stimuli that are emotionally-arousing, though at this early stage such attention-shifting is thought to be reflexive and not purposeful (Stifter & Moyer, 1991). Empirical study shows that when infants orient attention away from sources of distress, this action correlates with their observed level of distress (Ekas, Lickenbrock, & Braungart-Rieker, 2013; Rothbart et al., 1992), suggesting that diversion of attention has important relations to negative emotion even in the first year of life. Additionally, during infancy, children begin to engage in shared or joint attention in social situations which may provide important practice for the development of social cognition and understanding of the function of attention in goal-directed cognitions and behaviors (Mundy & Newell, 2007). Relations between these aspects of early attention and emotion regulation skills are suggested by research showing that 6-month-olds' ability to orient gaze was positively associated with toddlers' engagement in collaborative joint attention with their mothers at 24 months, which in turn related positively with their concurrent emotion regulatory strategies at 24 months of age (Morales, Mundy, Crowson, Neal, & Delgado, 2005). Further, observations of children's sustained focused attention during play with toys show that the duration of bouts of focused attention increases from late infancy through the preschool-age period (Ruff & Capozolli, 2003; Ruff & Lawson, 1990). Links between children's attentional capacities and self-regulation generally, and emotion regulation, specifically, continue to evolve during children's third year of life.

It has been asserted that changes observed in children's self-regulatory skill in the toddler and preschool-age years, including increased capacity to constrain negative emotion, may be partially attributable to the emergence of effortful control of attention. Specifically, Rueda and

colleagues (2005) suggest that the executive attention system emerges around 30 months of age, allowing children to transition from a reactive or stimulus-driven attention selection system to a more voluntary and controlled attention system. Consistent with descriptions of the development of the executive attention system, observational data show an increase from 17 to 24 months in the amount of sustained attention children exhibit during play with toys (Choudhury & Gorman, 2000). Also, developmental increases in inhibitory control have been noted during the preschool-age years based on both behavioral observations of children, such the amount of time children can refrain from touching an attractive toy (Friedman, Miyake, Robinson, & Hewitt, 2011), and laboratory-administered batteries of inhibitory control tasks (Reck & Hund, 2011). Observations of toddlers' behavioral inhibition (refraining from touching a desired toy) reveal that this skill is positively associated with orientation of attention to an alternative stimulus (Putnam, Spritz, & Stifter, 2002). Further, it appears that exerting attentional control during this stage of childhood has lasting relations with positive indicators of development. For example, positive relations exist between preschool-aged children's tendency to direct their attention away from a desired object, or delay their gratification, and their skillfulness at inhibiting their behavior in a cognitive control task ten years later (Eigsti et al., 2006). These observational indicators of growth in children’s self-regulatory capacities are mirrored in parent-reported increases in children’s self-control from the age of 4 years old into middle childhood (Vazsonyi & Huang, 2010). Taken together, this line of research supports the notion that the toddler and preschool-age years are important for the development of self-regulation.

Beyond relations with self-control generally, it is likely that young children’s attention control skills are important for the implementation of attention-based strategies for regulating negative emotion in the preschool-age period, though surprisingly little empirical work has

documented this relationship specifically. Certainly, researchers have noted relations between attention capacities and reduced tendencies towards displaying negative emotion (i.e., Kochanska, Coy, Tjebkes, & Husarek, 1998). Evidence further suggests that attention control and its interaction with increased negativity in the toddler and preschool-age years may be important for later social competence and behavior problems (Belsky et. al., 2001; Lawson & Ruff, 2004). Evidence for explicit links between attention skills (e.g., sustained attention) and attention-based regulatory strategies, however, is uncommon in the extant literature. As has been mentioned, directing attention away from a distressing stimulus and sustaining attention focus on a distracting activity has been shown to contribute to children's capacity to regulate their negative emotions, and longitudinal observational data document increases in the duration of focused distraction concomitant with reduced and delayed anger displays (Gilliom et al., 2002; Mischel et al., 1989). Fewer studies have used longitudinal or sequential designs to provide direct evidence that distraction reduces or forestalls anger. Those that exist, however, suggest that shifting attention away from a source of anger and sustaining it on a distracting activity can have effects on the timing and amount of expressed anger. Researchers using contingency analyses to examine the impact of attention-based emotion regulation strategies (i.e., distraction) on subsequent expression of anger have documented brief decreases in observed anger following these attention shifts (Buss & Goldsmith, 1998; Ekas et al., 2011; Jahromi, Meek, & Ober-Reynolds, 2012). Also, when children were observed repeatedly during frustrating waits between the ages of 18 and 48 months old, developmental changes in the duration of self-distraction (which occurred earlier and for longer duration as children aged) predicted greater latency to anger expression in the task (Cole et al., 2011). Taken together, these studies highlight the importance of identifying the cognitive skills (such as the capacity to sustain

focused attention) that may help children increase the duration of their attention shifts during times of frustration. In light of these studies suggesting the importance of attention control for effective emotion regulation, investigation of whether and how sustained attention skills can be strategically employed in the service of emotion regulation is clearly warranted.

It is important to note that parental input appears to play a supportive role in the development of attention control skill. Numerous studies have documented associations between young children's attention control and positive aspects of parental behavior, including responsiveness (Graziano, Calkins, & Keane, 2011), emotion coaching (Wilson et al., 2014), autonomy support (Bindman, Pomerantz, & Roisman, 2015), and attention maintaining behaviors (Bono & Stifter, 2003). Given the theorized role of parents in helping children apply their emerging skills to the regulation of behavior and negative emotion (Kopp, 1982, 1989), it is likely that parental support also contributes to young children's success in applying these emerging capacities in the service of emotion regulation.

Parenting and Emotion Regulation

Models of emotion regulation development and empirical work suggest that parents play an instrumental role in young children's emotion regulation by engaging in practices to reduce children's negative arousal in infancy and by increasingly supporting children's autonomous regulation of negative emotion (Jahromi et al., 2004; Kopp, 1989). Given that numerous emotion regulation strategies employed by young children involve support-seeking from caregivers (e.g., infants' orientation of attention to their mothers, older children's bids or information-seeking communications), it is not surprising that aspects of parental responding and engagement with young children have been linked with children's skill at regulating emotion. Evidence has accumulated documenting links between positive aspects of parenting and young

children's emotion regulation, including sensitivity (Feldman, Dollberg, & Nadam, 2011; Halligan et al., 2013), responsiveness (Davidov & Grusec, 2006; Graziano et al., 2011) and global parenting constructs combining several positive parenting practices (Bocknek, Brophy-Herb, & Banerjee, 2009; Brophy-Herb, Stansbury, Bocknek, & Horodynski, 2012). Other parental behaviors have been shown to contribute to poorer emotion regulation outcomes for young children, such as emotional unavailability (for a review see Field, 1994) and maternal controlling behavior (Mathis & Bierman, 2015; Smith, Calkins, Keane, Anastopoulos, & Shelton, 2004). A major focus of the extant literature on parenting as it pertains to emotion regulation has been the contribution of relationship aspects of the parent-child interaction to children's management of negative emotion. For example, research has repeatedly revealed differences in emotion regulation skill as a function of young children's attachment history (Berlin & Cassidy, 2003; Cassidy, 1994; Diener, Mangelsdorf, McHale, & Frosch, 2002). Additionally, the more mutually positive and responsive to distress parents are to infants, the better able and the more motivated children are to develop autonomous self-regulation (Kochanska, Aksan, & Carlson, 2005; Kochanska, Forman, Aksan, & Dunbar, 2005).

Morris and colleagues (2007) highlight that in addition to creating an emotional climate and developing a parent-child relationship supportive of children's emotion regulation development, parents also contribute to children's development of emotion regulation through specific parenting practices such as emotion coaching, modeling, and teaching. Such a model is in line with aspects of Kopp's (1982) framework that highlight the involvement of several domains of cognitive development influencing the development of self-regulation as well as the important role of parental input in consolidating these skills in service of successful emotion regulation. As part of her conceptualization of the development of self-regulation, for example,

Kopp (1982) emphasizes that children use emerging speech and attention skills to regulate social and emotional behavior. Following this theory, parents of young children contribute to children's development of self-regulation by fostering the integration of language and cognition for the purpose of dealing with emotion. According to these models of parental input and emotion regulation, then, in addition to the establishment of a positive and responsive parent-child relationship, another important parental contribution to emotion regulation may entail whether or not, and the manner in which, parents recruit children's cognitive and linguistic skills to encourage children to self-regulate their emotion.

Structuring Emotion Regulation Behavior

There is no standard method of assessing how parents recruit children's cognitive and linguistic skills to encourage emotion regulation. One useful conceptual framework, however, is the concept of scaffolding or structuring. These terms, inspired by the work of Lev Vygotsky (1978), have been used variously in the child development literature (Biringen, 2000; Conner, Knight, & Cross, 1997; Neitzel & Stright, 2003). Generally the different uses of the terms convey the idea that an adult can serve as a platform (or scaffold) for a child's development by fostering a child's use of skills to engage in appropriate behavior that the child may not be able to execute successfully without the adult's guidance. That is, parents can utilize their children's available skills to help them engage in behaviors that are socially desirable aspects of the competencies they must develop. The important feature of scaffolding or structuring is that rather than commanding or prohibiting behavior or directly achieving a goal on the child's behalf, structuring enables the child to engage in the behavior more autonomously. This type of caregiving has been studied mainly in regard to children's cognitive development, focusing on parents and teachers as experts who are instrumental in helping children accomplish what they

could not do on their own (Vygotsky, 1978). In line with this theory, positive relations have been found between maternal scaffolding (conceptualized as transference of responsibility to children) during dyadic pretend play interactions and higher IQ assessed when the children were 5 years old (Morrissey & Brown, 2009). Mothers' engagement in scaffolding behavior and transference of responsibility to their 4-year-old children in the context of a problem-solving task completed in their home was positively related to children's tendency to independently problem-solve and regulate their behavior in a school setting a year later (Neitzel & Stright, 2003). Further, mothers' use of autonomy-supporting behavior during children's first three years of life predicted their observed executive functioning skills, including the degree to which they sustained attention during a computer task (Bindman et al., 2015). While these studies focus on a diverse array of child outcomes and child skills harnessed in parental structuring attempts, they suggest that children's learning and skill development may be bolstered by support from their parents in employing their developing skills to achieve their goals and function with increased autonomy and mastery.

The concept of scaffolding has also been applied to how parents structure children's emotion regulation skills. Consistent with the hypothesis that parental structuring supports children's development of emotion regulation over time, it was found that the more mothers engaged in scaffolding of 3-year-olds' self-regulation (defined as providing support for children to accomplish what they did not do independently) the less emotion dysregulation and behavior problems were reported when children were 4 years old (Hoffman, Crnic, & Baker, 2006). Such findings are consistent with Kopp's (1989) view that the development of autonomous self-regulation of emotion involves parental structuring of the cognitive and linguistic abilities that

enhance children's regulation. The present study represents an important contribution to the scant literature examining Kopp's (1989) proposed model empirically.

As a whole, however, the body of work examining relations between structuring and emotion regulation is somewhat mixed and suggests the need for careful consideration of definitional, age, and sample differences. For example, when researchers examined the relations between parental structuring during a problem solving task (operationalized as offering suggestions or task-solving help) and observations of global emotion regulation and regulatory strategies employed by school-aged children with and without attention-deficit/hyperactivity-disorder, they did not detect significant associations (Melnick & Hinshaw, 2000). Additionally, researchers have concluded that a form of parenting called positive guidance, which shares similarities with structuring but includes praise and positivity directed towards a child, was related only to behavioral regulation but not to emotion regulation or physiological indices of regulation in children (Calkins, Smith, Gill, & Johnson, 1998). It could be that definitions of structuring adopted by researchers are sensitive to the degree to which researchers examine *specific* parenting skills that may contribute to a *particular* regulatory capacity or behavioral strategy.

Other research suggests that relations between parental structuring behavior and emotion regulation may vary as a function of individual differences in characteristics of the children being studied or may be sensitive to child age. Researchers have noted, for example, that children's level of genetic risk for psychopathology impacts relations between structuring and outcomes associated with emotion regulation, such that parental structuring is related to fewer behavior problems for children at high risk, but is related to more behavior problems in low-risk children (Leve et al., 2009). This study provides preliminary support for the conclusion that

structuring may be beneficial only for some children who are at higher risk. However, the type of structuring examined in this study included parental directives and commands, which may have more to do with parental control than parental support. Thus, though similar terminology is used, the construct used by these authors may be qualitatively different from structuring as it is defined in the present study, which emphasizes parental support of children's *autonomous* behavior. Another study found that, though maternal structuring contributed to children's tendency to verbally generate regulatory strategies, it was not related to regulatory behaviors when coping with frustration (Cole, Dennis, Smith-Simon, & Cohen, 2009). An important limitation of this study, however, was that it was cross-sectional in nature; it may be that parental contributions to children's self-regulation are best understood within the context of development *over time*, or that relations emerge only at specific child ages. Taken together, these mixed results suggest that the relations between structuring and children's emotion regulation development may be complex in nature, and that differing results likely have much to do with the population examined, the time course of the study, and the way that parental structuring behavior is conceptualized.

Bidirectionality in Links between Parenting and Emotion Regulation

While the preceding discussion of structuring highlights the potential of this parenting practice to *foster* children's development of more masterful skills in the domain of emotion regulation, a more nuanced approach to understanding the associations between these constructs considers the possibility that children's behaviors and skills may also *evoke* parenting behavior. The notion that children contribute to parenting behavior is captured by theories positing parenting as a transactional process between a parent and a child. Parenting theorists have long understood that parents and children mutually influence one other from moment-to-moment and

over longer periods of time; this view has underscored research in a variety of domains of child development (Sameroff, 2010). For example, this transactional model of parenting has been applied to understanding the development of behavior problems in which parents and children develop negative patterns of interaction that reinforce problematic behaviors (Patterson, 1986). The model has also been used to inform research on parental scaffolding in which parents instruct their children within a zone of proximal development, building off of what a child can do to help them acquire new skills (Vygotsky, 1978).

Consistent with the idea that parents may *respond* to their children's developing skills by supporting their emotion regulatory development through specific parenting practices, an interesting question to consider is whether parental structuring of attention focus should be expected to contribute to increases in the duration of sustained attention as parents foster and anticipate their children's emerging regulatory skills, or whether children's attentional capacities determine whether parents engage in structuring behaviors. When considering longitudinal changes in parenting behavior, one line of reasoning would suggest that much of children's environmental and social input is child-driven as children seek out and pull for environmental stimulation in accordance with their age-specific caregiving needs. Indeed, positive relations between sensitivity and responsiveness and children's emotion regulation development (i.e., Davidov & Grusec, 2006; Halligan et al., 2013) might lead one to conclude that such a relationship is likely, given that these parenting constructs involve attunement to children's developmental level and responsiveness to child needs. Consistent with this line of reasoning, longitudinal research on maternal behavior towards distressed infants suggests that mothers engaged in less physical soothing behaviors as their infants developed (Jahromi et al., 2004). Another study examining mother-toddler dyads repeatedly over the toddlerhood period found

that as toddlers aged, their mothers less frequently engaged them in an alternate activity to help them tolerate a frustrating wait (Planalp & Braungart-Rieker, 2015). The results of these studies are consistent with the idea that mothers follow the lead of their young children as they became more capable of regulating their distress with less frequent input from their parents

On the other hand, there is some evidence that parents anticipate their children's regulatory skills in early childhood, supporting the prediction that parental structuring of attention focus will foster growth in children's emerging attention control skills. Jahromi and colleagues (2004) showed that parents increasingly attempted to use distraction (a regulatory strategy shown to be effective for toddlers at reducing distress) over time, though their infants did not increase their own use of this strategy during the time frame investigated. Possibly, mothers were anticipating development in their children's ability to regulate their emotions by shifting and focusing their attention on a distracting activity.

A third scenario considers the possibility that pathways exist in both directions depending upon the age period under investigation or individual differences in characteristics of the child. Because abundant evidence points to the third year of life as an important milestone in the organization of and voluntary control over attentional processes as the executive attention system emerges (Rueda et al., 2005; Rueda, Posner, & Kieras, 2008), it may that parental structuring plays an anticipatory role as children approach and prepare for this milestone. As children increase their capacity to regulate their behavior and emotions autonomously across the preschool-age years, however, it may be that individual differences in children's success and skillfulness at emotion regulation during this period (Cole et al., 1996) lead to the appearance of child-driven pathways, as those children who still need caregiver support of their regulatory efforts elicit this input. Clearly, determining when and if parents' recruitment of children's skills

contributes to children's emotion regulation development (and vice versa) during the toddler and preschool period is necessary to clarify these competing hypotheses.

Implications for Intervention

A growing recognition is emerging among some parenting researchers of the need to dismantle broad parenting constructs into their component elements in order to better understand whether and how different components may contribute to child outcomes. Proponents of this movement have discussed and provided evidence that distinct aspects of parenting comprise several well-studied parenting constructs, including competent or positive parenting (Davidov & Grusec, 2006; Teti & Huang, 2005) and responsiveness (Bornstein, Tamis-LeMonda, Hahn, & Haynes, 2008). In their discussion of the importance of considering the specificity of maternal responsiveness, for example, Bornstein and colleagues (2008) point out that while two parents may exhibit similar levels of contingent responding, they might target different child behaviors in their responses. These different responsive behaviors, moreover, may relate to different aspects of child development. While much of the extant parenting research has examined parenting at a global level, employing such constructs as parenting style, sensitivity or responsiveness to child needs (e.g., Ainsworth, Blehar, Waters, & Wall, 1978; Landry, Smith, & Swank, 2006), such approaches may limit the specificity with which parenting researchers can delineate relations between parenting and the emergence of specific child skills, such as the employment of a particular strategy for regulating emotion.

In addition to allowing for increased specificity in understanding the contribution of parenting to child outcomes, focusing on particular parenting practices rather than broad parenting dimensions allows for the decomposition of these global constructs into specific behaviors that can be easily targeted for the purposes of intervention. When included in

parenting models, structuring or scaffolding has typically been understood as one aspect of a broader construct of high quality parenting. Constructs such as responsive parenting, for example, capture an array of parental behaviors that can be construed as structuring, such as maintaining a child's attention or interest in an object or activity, or verbally scaffolding in the course of conversation with a child by providing hints or prompts related to the context of the interaction (Landry, Smith, Swank, & Guttentag, 2008). Thus, according to this conceptualization, structuring is just one kind of behavior exhibited by responsive parents. Similarly, the notion of parental structuring of children's experiences is also a component of parental emotional availability (Biringen, 2000), which describes emotionally available parents as those who actively encourage children's exploration and learning while respecting their autonomy by attending to children's cues and behavior. For the purpose of contributing useful knowledge to those working to design effective parenting interventions, embedding contingent parenting (i.e., structuring) within a larger framework that includes more global aspects of parenting style (such as warmth and sensitivity) obscures much of the knowledge from parenting research that may be helpful to interventionists. By adopting such an approach, it becomes difficult to examine more closely the specific ways that parents encourage children's development of skills and competencies and difficult to describe these behaviors in ways that could be "digestible" to parents hoping to improve their skillfulness at parenting.

Finally, research on the efficacy of parenting interventions for improving child outcomes suggests that it is important to consider the timing of interventions by carefully considering *when* in childhood interventions are introduced. When examining the efficacy of an intervention to increase mothers' affectively and cognitively responsive behaviors, Landry and colleagues (2008) found that mothers exhibited increases in these two kinds of responsive parenting

practices according to the age of the child, such that increases in warm responsive behaviors occurred most during the infancy period, and cognitively responsive behaviors improved the most during the toddlerhood and preschool-age years. This finding suggests that carefully considering the timing of a parenting intervention with respect to the age and developmental stage of the child might be crucial for optimizing intervention work. Thus, research delineating *when* in children's development *specific* parenting practices contribute to children's developmental skills (i.e., emotion regulation) has the potential to contribute in important ways to the extant literature on parenting interventions.

Child and Familial Factors and Attention Control, Parenting, and Emotion Regulation

Study of emotion regulation development in childhood requires acknowledgement that characteristics of children and their families may impact the development of attention skills and emotion regulation as well as parents' efforts to support their children's acquisition of these skills. Several lines of research have noted gender differences in early childhood attention skills and emotional expression and regulation which tend to favor girls during this period. For example, when gender differences have been examined in preschool-aged children's performance in computerized attention tasks, girls exhibited superior visual attention skills (Klenberg, Korkman, & Lahti-Nuuttila, 2001) as well as responded more quickly in a sustained attention task (Groot, de Sonneville, Stins, & Boomsma, 2004). Furthermore, gender differences have been noted in children's regulation of negative emotion as early as 6 months of age, when male infants show greater emotional dysregulation during a still-face procedure with their mothers than do female infants (Weinberg, Tronick, Cohn, & Olson, 1999). During the toddlerhood and preschool periods, meta-analytical review of studies that include measures of observed emotion expression revealed that boys exhibit greater externalizing emotions (e.g., anger) than do girls (Chaplin &

Aldao, 2013). Further, a study examining trajectories of externalizing behavior problems from toddlerhood to the preschool-age period revealed that 2-year-old boys were observed to exhibit poorer emotion regulation than were girls at this age, as defined by use and effectiveness of distraction and global ratings of their emotional regulation in frustrating tasks (Hill et al., 2006). Given these gender differences in both emotion regulation and attention control in the toddler and preschool-age years, researchers studying these constructs must be mindful to consider the impact of gender on analyses conducted on groups of children that include both girls and boys.

Further research suggests that familial factors relate to emotion regulation and related cognitive skills (e.g., attention control) as well as parental efforts to support growth in these domains. For example, parental education has been positively linked to children's performance on standardized assessments of executive functioning skills, including visual attention (Klenberg et al., 2001) and the degree of negative emotion and behavior problems seen in children in their first two years of life (Lawson & Ruff, 2004). Numerous studies suggest that parental education may also have a meaningful impact on interactions between a parent and child. It is well-documented that maternal education level is related to more positive parenting behaviors directed at young children including sensitivity (Braungart-Rieker, Hill-Soderland, & Karrass, 2010), responsiveness (Magnuson, Sexton, Davis-Kean, & Huston, 2009) and cognitive and linguistic stimulation (Rowe, 2012; Son & Morrison, 2010). Higher maternal education level has also been linked to mothers' increased use of scaffolding to support their early school-aged children's success in a block construction task (Carr & Pike, 2012). Other research suggests that parents may exhibit different behaviors towards children depending on their birth order status. Indeed, one study on maternal socialization practices in response to emotion found that the degree to which mothers reported responding to their emotional child with distraction was explained

partially by child birth order, such that mothers used this strategy more with later-born children (Ersay, 2014). Taken together, this body of work suggests that researchers examining the contribution of parenting to children's development of self-regulation must consider how these constructs relate to parent and family characteristics when seeking to understand contributions to children's emerging emotion regulation skills.

Study Aims and Hypotheses

Parental structuring, which constitutes efforts to foster young children's use of emerging skills to engage in self-regulated behavior, is believed to be a parenting practice that contributes to emotion regulation development (Hoffman et al., 2006; Kopp, 1982). Previous examination of maternal structuring revealed that mothers increasingly structured children's attention focus in a wordless reading task from 18 to 36 months of child age (Lindeke, 2011). However, it could not be determined whether this change was responsive to children's development of attention control or was instrumental in helping children develop this skill. Furthermore, little is known about whether the development of children's skill at sustaining attention and parental structuring efforts to support children to sustain focused attention in common parenting contexts (e.g., reading) contribute to the use of emotion regulation strategies involving attention control (e.g., distraction) in an emotionally-challenging situation. Given that parents are widely encouraged to read to their children throughout early childhood, it would be highly informative to determine whether structuring attention focus during this common parental activity contributes to children's ability to use attention-based emotion regulation strategies in challenging contexts. To that end, after controlling for any relevant demographic covariates, the present study sought to:

(1) examine bidirectional relations between repeated measure of children's sustained attention skill and maternal structuring of child attention focus during a period of growth in attention control capacities in early childhood and,

(2) test a model representing longitudinal pathways between young children's ability to sustain attention and maternal structuring of attention focus and children's use of distraction in an emotion regulation context 6 to 12 months later.

With regard to the first aim which explored longitudinal, bidirectional relations between children's sustained attention during free play and mothers' structuring of attention focus in a reading task, it was expected that a model delineating bidirectional relations between these two skills would best fit the data and that significant longitudinal relations would emerge at different child ages. Specifically, significant paths from maternal structuring of attention focus at 18 months to children's observed sustained attention during play at 24 months were expected given theoretical backing for a supportive role of parents in children's attention control development during the toddler years (Kopp, 1982). At later child ages it was expected that increased structuring of attention focus would be driven by children who elicit structuring from their mothers because they have less well-developed independent emotion regulation skills. Such a finding would be in line with evidence that at 36 months of child age, mothers who engaged in more structuring had children with poorer regulatory skills (Cohen, 2001). It would follow that significant negative relations would emerge between children's sustained attention skill at 24 months of age and mothers' structuring of focused attention at 36 months of child age.

With regard to the second aim of the study, it was hypothesized that children's sustained attention skill and maternal structuring of child attention focus would relate to temporal aspects of children's use of distraction 6 to 12 months later. Specific longitudinal pathways were

predicted at different child ages. Specifically, it was hypothesized that during the earlier ages under investigation, mothers' structuring of their toddlers' focused attention (18 months) would relate to the use of distraction as an emotion regulation strategy (36 month) and that this path would operate via children's sustained attention skills at child age 24 months. Again, this hypothesis is in line with the role of parents suggested by models of emotion regulation development in the toddler and preschool-age years (Kopp, 1982). With regard to later time points, given documented individual variability in preschool-aged children's emotion regulation skills (Cole et al., 1996), it was expected that relations between child skill and structuring would be driven by children who continue to elicit parental support of their regulatory efforts due to less well-developed skill at self-regulating emotion. Specifically, it was hypothesized that maternal structuring of attention focus at 36 months would be negatively associated with children's use of distraction when children were 48 months old.

Chapter 2. METHOD

Participants

Data for this study were obtained from a previously collected longitudinal data set known as the Development of Toddlers Study (D.O.T.S.; Cole, Crnic, Nelson, & Blair, 2000) which investigated the development of emotion regulation and understanding in lower income, typically developing children aged 18 to 48 months old. Participants for this study and their families were recruited from a semi-rural Northeastern community by a number of methods including: birth announcements, community outreach including recruitment at community events and by community leaders, and by word-of-mouth through participants enrolled in the study. Interested families were contacted by phone and interviewed to determine fulfillment of inclusion and exclusion criteria. Families were included whose income fell within a range determined to represent economic strain but not poverty. This income range was defined as falling above the federally defined threshold of poverty but below the median national income based on family size applicable for each family. Included families had legal guardianship for at least 3 months of a child within the target age range for the study. Additionally, families were excluded if they were planning on moving within the time frame of the study or if children had medical or psychological disorders or physical handicaps that would interfere with study administration.

From an initial sample of 128 families, two families did not meet financial criteria for eligibility, five families did not successfully complete the tasks at the first time point, and one child was significantly older than the target age at the time of the first laboratory visit. Thus, the final sample consisted of 120 families (65 boys, 55 girls) who were on average 18.44 months old (SD = .57) at the initial 18 month visit. The age of children at each laboratory visit was within two weeks before or after the target age for each laboratory visit. At the first time point of the

study when children were 18 month old, mothers were on average 30.45 years old (*SD* = 5.29). Based on demographic data of families collected at 18 months, the majority were white (93.3%); 6.7% were biracial. The sample consisted of 51 (42.5%) first born children and 69 (57.5%) later-born children. The average income of the households reported by families at the 18 month time point was $40,460 (*SD* = 14,171). Most mothers in the study had attended some college or obtained a college degree (65%); 35% had attended high school only.

Procedures

From a larger battery of assessments, interviews, questionnaires addressing child and family characteristics, and observations conducted in the home and the laboratory that were included in the D.O.T.S. investigation, this study examined laboratory-based tasks that took place when children were 18, 24, 36, and 48 months old. To participate in these visits, children and their mothers visited the Child Study Center at The Pennsylvania State University. During the visits, children and mothers took part in several tasks that varied somewhat according to the age of the child but which included tasks that alternated between those designed to be emotionally challenging (e.g. frustrating, disappointing) and those that were not emotionally challenging. During some tasks children interacted with research assistants (RAs) and in others with their mothers, in which case mothers were informed of task procedures prior to the task and given written instructions to which they could refer during the tasks. Tasks took place in an observation room that contained a child-sized table with two chairs and a small adult-sized table and chair in the corner, as well as several developmentally-appropriate posters on the walls. Each laboratory visit was videotaped using a video camera on the other side of a one-way mirror looking into the observation room. Videotapes were retained for later coding of child and

maternal behaviors. The three tasks from which observational data were drawn are described below.

Free Play Task. Children's sustained focused attention during play was coded at child ages 18 and 24 months from a free play task in which they played with a box of toys in the presence of their mothers. Mothers were engaged in a phone conversation in the corner of the room to divert their attention away from their child. Researchers have previously examined toddlers' and preschool-aged children's play with age-appropriate toys to measure growth in young children's attentional persistence during early childhood (Belsky et al., 2001; Choudhury et al., 2000; Ruff & Lawson, 1990). Prior to this task, mothers were told that their children would be given toys to play with for approximately 5 minutes, during which time mothers and children could play together as they normally would. Mothers were told that their children did not have to play with the toys if they did not want to. Mothers were informed that they would then receive a phone call via cellular phone and that their children would be allowed to play independently for 5 minutes while they spoke with study personnel. With the child and his or her mother seated at the child-sized table, an RA said to the child, "Let me show you some toys you can play with." After this, the RA placed each of a number of age-appropriate toys on the table and named each one for the child. The mother and child were then left for 5 minutes to play with the toys as they saw fit. After 5 minutes of free play, mothers received a phone call on a cellular phone that they had been given prior to the beginning of the task. They were instructed to move away from the table where the child and toys were located to another table located in the corner of the room. Mothers were engaged in conversation with study personnel for 5 minutes before returning to the table to resume free play with their children. The degree to which children sustained focused attention on the toys was coded from the period of time in which mothers'

attention was taken away from the child so that the child was playing independently. If their child attempted to interact with them, mothers were instructed by study personnel to refrain from engaging with their child.

Waiting Task. Children's use of distraction as an emotion regulation strategy was coded at child ages 24, 36, and 48 months from a boring wait task. Such tasks are frequently used to observe child self-regulation (Dennis, 2006; Kochanska, Murray, Jacques, Koenig, & Vandegeest, 1996; Silk, Shaw, Skuban, Oland, & Kovacs, 2006). According to the procedure (adapted from Vaughn, Kopp, & Krakow, 1984), each mother was instructed to tell her child that he or she must wait to open a gift until after the mother finished her work, which consisted of paperwork mothers had been given by study personnel to complete during the task. Evidence from previous research suggests that this kind of waiting situation is frustrating for children across the ages investigated (Cole et al., 2011). At each age point, before the task began, mothers were first briefed about the nature of the task. Then the RA gave the mother her "work" and gave the child a boring toy with which to play during the task. Children were given a rubber lilypad at 18 months, one of a pair of cloth cymbals at 24 months, a toy car missing its wheels at 36 months, and a toy horse missing some of its legs at 48 months. Following this, an RA placed a gift wrapped in shiny paper and ribbons on the child's table and stated, "This is a surprise for you." Upon the departure of the RA from the room, each mother then instructed her child that he or she had to wait to open the gift until the mother completed her work. The RA returned after 8 minutes had elapsed and allowed the child to open the gift.

Wordless Reading Task. Maternal structuring of children's attention focus was coded at child ages 18, 24, and 36 months from a joint reading task in which mothers and children read a wordless picture book together. Joint reading tasks have long been used to study children's

language development and ability to formulate narratives (Bamberg, 1985), and have also been used as a context in which to observe parental scaffolding behavior during interactions with young children (Reynolds & Evans, 2009). For the purposes of this study, the joint reading task was intended to reflect a common activity in which mothers and their children were likely to participate at home, thus providing a opportunity for the observation of common parenting behaviors. Additionally, the nature of the task draws for children to employ a number of skills, including attention control, in order to engage with their mothers in "reading" a wordless storybook. Given the importance of self-regulatory skills, such as attention focusing and shifting, for children's school readiness (Eisenberg, Valiente, & Eggum, 2010), the nature of this task afforded the opportunity to observe how mothers promoted several of these important skills. Mothers and children were led to a room containing a table and chairs and two wordless picture books. Mothers were instructed to read to their children for five minutes but told that it was acceptable if their children refused to read the books and that they need not force them to engage in the task. The books did not contain a written narrative but illustrated compelling stories involving children and animals and were generally engaging for the young children in the present study.

Coding of Child and Maternal Behavior

Independent coding teams staffed by undergraduate and graduate students coded child behavior from the free play task and waiting task and maternal behavior from the reading task. Within each team, coders were trained to at least 80% accuracy with master coders of each coding system. Each coding team met regularly to discuss their work, review difficult videotapes, and discuss issues not addressed fully by the coding handbook. Inter-rater reliability was calculated from at least 15% of cases for each coding system. Coders were unaware of

which cases were used to calculate reliability. For all observed study variables, reliability is presented using Cohen's (1960) kappa statistic. The details of each coding system are described below.

Children's Sustained Focused Attention on Toys. Coding of children's sustained focused attention during free play followed a system that has previously been used to capture the development of sustained attention over the child ages under investigation (Ruff & Lawson, 1990). Consistent with the coding system developed by these authors, focused attention was coded on a second-by-second basis and was indicated when coders judged that children were concentrating on or engaging in some activity with an object during their play. Observers attended to facial expression (i.e., serious, interested) and orientation and direction of eye gaze (i.e., towards a goal or focused on an object) to determine whether a child's attention was focused. Focused attention was not scored if children were: a) speaking to their mother while looking at the toys, b) moving their eyes across the set of toys or picking each one up in succession without focusing on a specific toy, c) exhibiting positive affect (i.e., laughing or smiling), d) engaged in a repetitive or stereotyped activity (e.g., moving a toy car rapidly back and forth), or e) looking at a toy without engaging in an activity. The authors of this coding system reported that the coding system allows flexibility in capturing a range of possible activities (e.g., trying to remove the cap from a bottle or building an elaborate structure out of toys). While the developers of this coding system reported that children's focused attention with play objects manifested differently from 1 year to 4.5 years of age, they reported good inter-rater reliability across all of the ages under investigation in the present study (Ruff & Lawson, 1990).

From these observations, variables were created capturing the frequency and duration of focused attention. Duration variables included the mean duration of each bout of focused

attention and longest bout of focused attention. Following the procedures of the previously-developed coding system, a break in focused attention of less than 1 second in duration was incorporated into the bout of focused attention surrounding it. Kappa for coding of sustained focused attention was $\kappa = .88$.

Children's Focused Distraction During a Frustrating Wait. Children's focused distraction was coded from the wait task described above. Coding of distraction was taken from a larger coding system which captured children's use of a variety of regulatory strategies. An independent coding team of undergraduate and graduate RAs watched video recordings of children participating in the wait task (in the presence of their mothers) and coded children's regulatory behavior at a second-by-second level. The present study focused on child-initiated distraction, defined as attentional focus on an alternative, appropriate activity that did not involve the gift or mother (e.g., playing with the boring toy or looking at posters in the room). Focused distraction was differentiated from "brief" or cursory engagement in a distracting activity (e.g., child touches the boring toy while looking around the room or glances at the poster as he or she passes by). When focused distraction was observed, coders marked the onset and offset of the behavior. If children glanced away briefly during a bout of focused distraction, the bout was considered continuous if they then returned to the distracting activity. The average kappa across ages was $\kappa = .82$ (range .73 - .91). From this coding, several variables were generated including frequency of distraction bouts, longest bout of distraction, and average bout duration of distraction.

Maternal Structuring of Child Attention Focus. Coding of maternal structuring of child attention focus used videotaped data from the 18, 24, and 36 month reading tasks, which were coded using the structuring coding system described below. Mothers' structuring of

children's attention focus was one aspect of a more comprehensive coding system. The structuring coding system examined six child skills that mothers could have targeted in their structuring as well as the strategy used to structure (i.e., language, physical movement, or emotion), quality, and effectiveness of mothers' structuring behavior.

The 5 minute task was divided into 15 second epochs and coded as to whether mothers attempted to harness children's attention focusing skill during each epoch. Structuring of attention focus was coded when mothers attempted to encourage their children to sustain the focus of their attention on a task. Mothers were considered to be structuring attention focus if they provided support for their child in maintaining attention on a stimulus to which he or she was already attending. For example, a mother may have attempted to keep the child's attention maintained on the storybook by pointing to or asking a question about the picture the child was looking at, or using an excited tone of voice to further engage the child in the story. Structuring was not coded if the mother used only directive commands such as "don't touch" or "turn the page," without allowing the child to use his or her own regulatory skills. As mothers may have targeted more than one skill in their structuring attempt, it was possible for more than one child skill to be coded within a 15 second epoch. For example a mother may have redirected a child's attention back to a book after they became off-task and within the same 15 seconds asked a follow-up question to further engage the child's focused attention on the story once they were attending to it. For the purposes of this study, however, only structuring of the child skill of attention focusing was examined due to its expected relationship with the degree to which children can sustain focused distraction. Kappa values indicating inter-rater agreement on this variable ranged from $\kappa = .70 - .81$ depending on the child age at which structuring behavior was observed. A variable was created representing the frequency of structuring of focused attention,

which captured the number of epochs within the 5-minute task in which mothers harnessed their children's focused attention skill by structuring. This value was divided by the total number of epochs in which mothers structured over the course of the 5 minute task to create a proportion variable representing the percent of epochs in which mothers structured attention focus.

Chapter 3. RESULTS

Overview of Analyses

Before addressing the study aims, preliminary analytic steps included assessment of missing data and examination of the descriptive statistics for each of the variables analyzed (children's sustained focused attention at child ages 18 and 24 months, mothers' structuring of child attention focus at child ages 18, 24, and 36 months, and children's use of distraction at child ages 24, 36, and 48 months). These steps included examining the zero-order correlations between study variables, examining the data for outliers, and examining the skew and kurtosis of study variables. Based on the examination of outliers and skew and kurtosis of variables, replacement of outlying data points was used to address these concerns. This is discussed in greater detail where descriptive statistics are reviewed.

Additionally, several child and familial demographic variables that have been found in previous research to relate to child attention control, emotion regulation, or parental support of emotion regulation development (see introduction for review of relevant literature) were examined to identify possible covariates to be included in the path models tested. Further, the percentage of epochs in the reading task in which children were determined by coders not to be attending to the study task (e.g., tying their shoe, discussing the need to go to the restroom) was included as a covariate to control for the impact of children's off-task behavior on mothers' efforts to structure children's attention focus in the reading task at each age. Acknowledging the transactional relationship between children's and parents' behavior is in line with the theoretical view that children's behavior impacts parent-child interactions from moment to moment (Sameroff, 2010). This variable was created by dividing the number of off-task epochs by the

number of coded epochs in the reading task and was calculated separately for each age at which structuring of attention focus in the reading task occurred (18, 24, and 36 months of child age).

The study's first aim was to examine bidirectional longitudinal relations between children's sustained attention and mothers' structuring of children's attention focus. The purpose of these analyses was to determine the strength and directionality of these relations from child ages 18 to 36 months. To address this aim, a structural equation modeling (SEM) approach was used to test cross-lagged models of longitudinal relations between the multiple observations of the two variables using the Mplus Version 7 (Muthén & Muthén, 1998-2011) statistical package. Comparisons were conducted of four SEM models to determine which yielded the best fit to the data (Figure 1). The baseline model (M_1) examined the longitudinal stability of the variables without cross-lagged pathways. The subsequent two models examined cross-lagged paths from children's sustained attention to maternal structuring of child attention focus (M_2) and from maternal structuring to children's sustained attention (M_3). The final model included both sets of cross-lagged pathways representing bidirectional longitudinal relations between the variables (M_4).

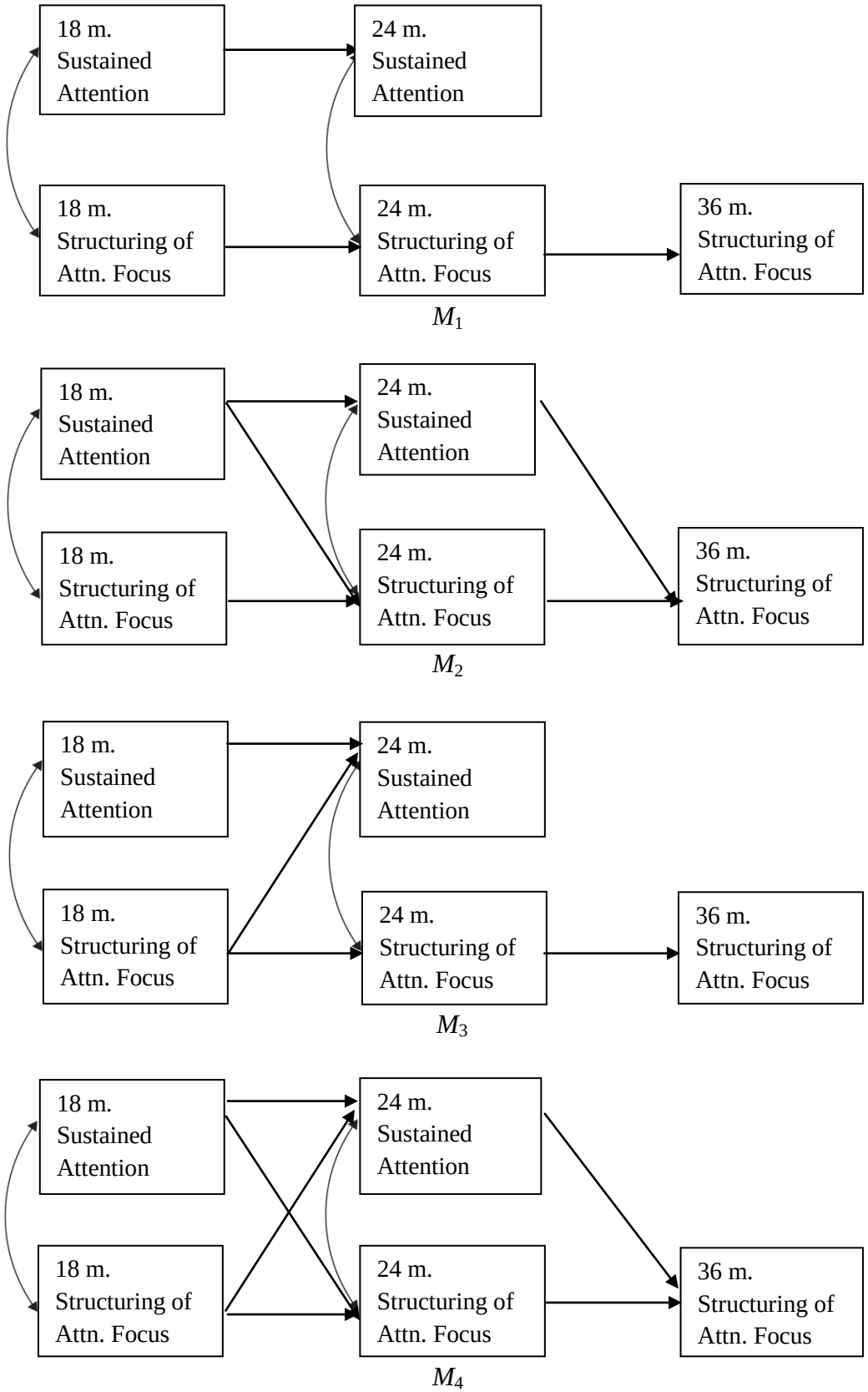

Figure 1. Aim 1 models.

The second aim of the study was to examine the relative contribution of maternal structuring of children's attention focus (measured at child ages 18, 24, and 36 months) and children's sustained focused attention during free play (at child ages 18 and 24 months) to children's observed sustained distraction in an emotionally-challenging situation at child ages 24, 36, and 48 months. To address this aim, a path model was tested examining the contribution of children's sustained focused attention and maternal structuring of child attention focus to later use of distraction as an emotion regulation strategy (Figure 2). To compare competing Aim 1 models and to assess the goodness of fit of the Aim 2 model, several fit indices were examined, including the Chi-square (χ^2), comparative fit index (CFI; Bentler, 1990), root-mean-square error of approximation (RMSEA; Steiger, Shapiro, & Browne, 1985), Tucker-Lewis Index (TLI; Tucker & Lewis, 1973) and standardized root mean square residual (SRMR; Jöreskog & Sörbom, 1996). Model fit is considered good if the chi-square is found to have a *p*-value $\geq .05$, if the CFI is ≥ 0.90, if the RMSEA is ≤ 0.08, and if the value for the SRMR is ≤ 0.08 (Marsh, Hau, & Wen, 2004).

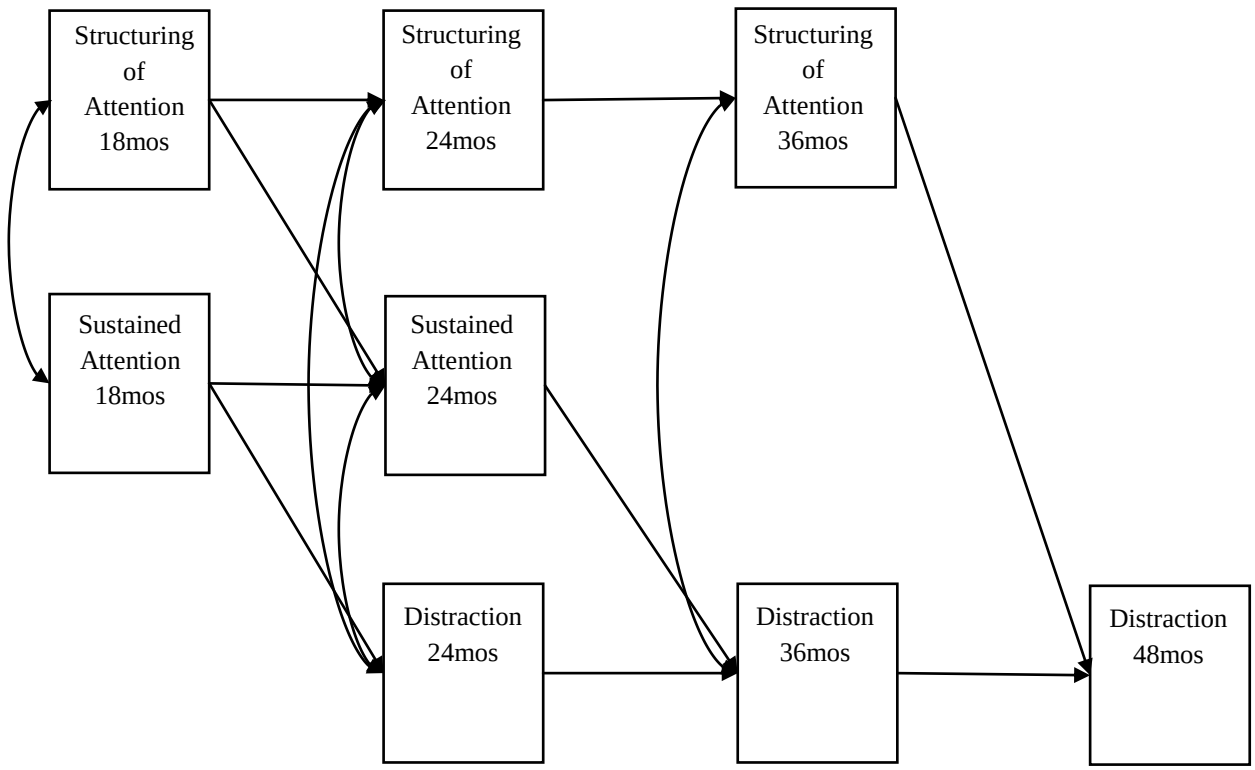

Figure 2. Aim 2 model.

Follow-up analyses employed a multiple group comparison approach in SEM to explore whether the values of the parameters tested in the Aim 2 model were different for subgroups in the sample who differed at the median on initial (18 months) levels of structuring of attention focus and duration of sustained attention. This analysis was conducted because qualitative exploration of dyads who differed on levels of these variables revealed differences in the nature of parent-child interactions observed in the reading task. Finally, to explore the possibility that the median split did not adequately capture alternative ways that structuring and attention may interact with one another, multiple linear regression models were used to predict duration of focused distraction in the preschool-age period (child ages 36 and 48 months) using earlier level of sustained attention and structuring of attention focus as well as a centered interaction term of

structuring and sustained attention. Such an approach would allow probing of additional moderating effects of structuring and sustained attention if the interaction term is found to explain variance in the duration of distraction.

Missing Data

Of the 120 mother-child dyads included in the study, several were missing data from one or more of the tasks examined. At the 18 month visit, data were missing from one dyad from the reading task because the task was not administered due to the child having difficulty recovering from the previous task and time constraints on the visit. At the 24 month visit, three dyads were missing data from the wait task; in one case the task was not administered by study personnel and in two others mothers failed to administer the prohibition. At the 36 month visit, data were missing for three dyads for all tasks because family problems (e.g., illness) interfered with completing the visit. At the 36 month visit, data from the reading task are missing for a fourth dyad due to technical errors causing only a brief portion of the task to be captured on video. One dyad missed the 48 month visit because the child was ill. Finally, for one dyad both parents were in the room at both the 36 and 48 month visits due to child separation issues; thus, data from this case were omitted due to the atypical condition.

Missing data represented a small percentage of the data (0.8 to 5%) and were assumed to be missing at random. Therefore, missing data were estimated in the models tested. Item-level missing data were estimated using Maximum Likelihood Ratio (MLR), a type of full-information maximum-likelihood (FIML) estimation.

Descriptive Statistics

Study variables were first examined with regard to outliers and their degree of skew and kurtosis. Descriptive statistics for all study variables are presented in Table 1. Significant

outliers were identified for maternal structuring of child attention focus at 36 months, average bout duration of distraction at 24, 36, and 48 months, longest bout duration of distraction at 48 months, and average and longest bout duration of sustained attention at 18 and 24 months. Outlier values were replaced with the value for the 95th percentile for each variable. Once outliers were addressed, problematic values of skew (< ± 3.00) were significantly reduced. Log-transformations were conducted on 48 month distraction due to unacceptable skew (exceeding ± 3.00). This transformation reduced skew to an acceptable value (within ± 3.00) resulting in an acceptable variable for analyses. Intercorrelations among all study variables were calculated and examined (see Table 2).

Table 1

Descriptive Statistics of Major Study Variables

Variable	*N*	*M*	*SD*	Range	Skew	Kurtosis
Proportion of structuring of attention focus						
18 months	119	0.77	0.19	0.16-1.0	-0.53	-0.51
24 months	120	0.85	0.20	0.23-1.0	-1.43	1.13
36 months	115	0.86	0.23	0.05-1.0	-2.28	4.64
Distraction 24 months						
Number of bouts	117	4.39	3.03	00.00-14.0	0.54	-0.27
Average bout duration	117	15.33	16.66	0.00-161.00	6.35	52.26
Longest bout duration	117	28.14	23.77	0.00-161.00	2.12	7.90
Distraction 36 months						
Number of bouts	116	6.42	4.15	0.00-20.00	0.78	0.34
Average bout duration	116	18.53	13.20	0.00-79.75	1.93	5.73
Longest bout duration	116	41.44	31.03	0.00-185.00	1.33	3.07
Distraction 48 months						
Number of bouts	116	6.60	3.22	0.00-15.00	0.35	-0.12
Average bout duration	116	26.98	36.77	0.00-397.00	9.02	90.89
Longest bout duration	116	58.74	50.59	0.00-397.00	3.42	18.11
Sustained attention 18 months						
Number of bouts	120	13.36	4.54	2.00-24.00	0.01	-0.37
Average bout duration	120	7.38	3.50	2.80-30.57	3.04	15.85
Longest bout duration	120	23.46	16.65	4.00-116.0	2.34	8.36
Sustained attention 24 months						
Number of bouts	120	13.64	5.25	3.00-26.0	0.15	-0.25
Average bout duration	120	8.71	3.79	3.95-24.50	1.80	4.24
Longest bout duration	120	26.96	16.17	6.00-102.00	1.90	4.71

Note. Values in table are based on raw data before outliers were replaced.

Table 2

Correlations Among Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Proportion of structuring of attention focusing																		
1. 18 month	-																	
2. 24 month	.51**	-																
3. 36 month	.20*	0.17	-															
Self-distraction 24 months																		
4. Number of bouts	0.03	0.14	0.15	-														
5. Average bout duration	0.18	0.11	0.06	.28**	-													
6. Longest bout duration	0.13	0.11	0.06	.40**	.73**	-												
Self-distraction 36 months																		
7. Number of bouts	0.12	0.14	0.16	0.16	0.23*	0.23*	-											
8. Average bout duration	0.05	-0.10	0.21*	0.01	0.14	0.08	-0.03	-										
9. Longest bout duration	0.11	-0.02	.26**	0.03	0.23*	0.15	.19*	.85**	-									
Self-distraction 48 months																		
10. Number of bouts	0.08	-0.13	-0.14	-0.08	0.14	-0.00	-0.03	0.07	0.06	-								
11. Average bout duration	-0.02	0.08	0.07	0.15	-0.04	0.02	0.18	-0.02	0.02	-0.14	-							
12. Longest bout duration	0.00	0.07	0.03	0.10	0.06	0.06	0.11	0.06	0.06	.11	.79**	-						
Sustained attention 18 months																		
13. Number of bouts	-0.02	-0.11	0.10	0.01	-0.03	-0.02	0.09	-0.01	-0.06	-0.04	-0.12	-0.06	-					
14. Average bout duration	0.10	-0.02	0.12	0.04	0.19*	.17	-0.04	0.05	0.05	0.02	-0.09	-0.06	-0.08	-				
15. Longest bout duration	0.00	0.01	0.16	0.11	0.16	0.15	0.00	0.14	.21*	-0.05	-0.12	-0.12	0.14	.80**	-			
Sustained attention 24 months																		
16. Number of bouts	-0.09	-0.11	-0.18	-0.02	-0.02	-0.06	0.07	-0.08	-0.03	.18	0.10	0.06	0.04	-0.10	-0.15	-		
17. Average bout duration	-0.01	0.04	0.01	0.06	0.07	-0.02	-0.01	-0.03	-0.08	0.01	-0.06	0.04	0.09	.25**	0.18	-.24**	-	
18. Longest bout duration	-0.07	0.00	-0.01	-0.03	0.00	-0.06	-0.06	-0.08	-0.11	0.03	-0.04	0.04	0.10	.28**	.22*	-0.01	.82**	-

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

Preliminary analyses explored whether the mean values of the study variables were statistically different over time. With respect to child sustained attention, paired sample *t*-tests revealed no difference over time in number of bouts of focused attention but indicated a small but statistically significant increase in the average bout duration of focused attention between observations at 18 (M = 7.12, SD = 2.52) and 24 months of age (M = 8.53, SD = 3.21), $t(119) = -4.34$, $p < .001$. Further, there was a non-significant trend of increasing longest bout duration of focused attention between 18 months (M = 23.46, SD = 16.65) and 24 months of child age (M = 26.96, SD = 16.17), $t(119) = -1.86$, $p = .07$.

One-way repeated measures analysis of variance (ANOVA) tests were used to determine whether means of proportion of maternal structuring of child attention focus and child distraction variables changed over time. When this test was used to measure change over time in proportion of maternal structuring of attention focus, Mauchly's test indicated that the assumption of sphericity had been violated, $X^2(2) = 20.26$, $p < .001$. Therefore, degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity. Results revealed a main effect of change over time in the proportion of maternal structuring of child attention focus, $F(1.72, 193.91) = 7.90$, $p < .01$. Follow-up paired-samples *t*-tests indicated that the proportion of structuring of child attention focus was significantly lower at child age 18 months (M = .78, SD = .19) than it was at 24 months (M = .85, SD = .20), $t(118) = -4.27$, $p < .001$, or 36 months (M = .86, SD = .23), $t(113) = -3.46$, $p < .01$. However, there was no statistically significant difference in the proportion of structuring at the two latter time points, $t(114) = -.67$, $p = .50$.

One way repeated measures ANOVA tests were also used to examine change over time in distraction variables. A statistically significant main effect of time was found for the number of bouts of distraction, $F(1.94, 215.10) = 13.61$, $p < .001$. Follow-up paired-samples *t*-tests

indicated that children engaged in fewer bouts of distraction at 24 months (M = 4.42, SD = 3.05) than they did at 36 months of age (M = 6.45, SD = 4.18), $t(112) = -4.52$, $p < .001$, or 48 months of age (M = 6.58, SD = 3.23), $t(112) = -4.90$, $p < .001$. No difference was found in number of bouts of distraction at child age 36 and 48 months, $t(114) = -0.39$, $p = .70$. Analyses revealed that the assumptions of sphericity per Mauchly's test had been violated for average bout duration, $\chi^2(2) = 10.32$, $p < .01$, and longest bout of distraction, $\chi^2(2) = 38.39$, $p < .001$. Therefore, Greenhouse-Geisser corrections were used to correct degrees of freedom in ANOVAs reported for these variables. A main effect of time was found for average bout duration of distraction, $F(1.84, 203.75) = 34.58$, $p < .01$. Follow-up paired-samples t-tests revealed statistically significant differences in average bout duration at all ages. Average bout duration of distraction was shorter at child age 24 months (M = 13.31, SD = 7.10) than it was at 36 months (M = 17.66, SD = 10.36), $t(112) = -3.89$, $p < .001$, or 48 months (M = 24.02, SD = 12.00), $t(112) = -8.12$, $p < .001$. Furthermore, the average duration of distraction increased between child ages 36 and 48 months, $t(114) = -4.26$, $p < .001$. A main effect of time was also revealed for longest bout of distraction, $F(1.54, 169.64) = 23.32$, $p < .001$. Again, paired-samples t-tests indicated statistically significant differences in longest bout duration at each time point. Longest bout duration of distraction was shorter at child age 24 months (M = 26.51, SD = 20.15) than it was at 36 months (M = 40.88, SD = 30.81), $t(111) = -4.46$, $p < .001$ or 48 months (M = 58.52, SD = 50.77), $t(112) = -6.38$, $p < .001$. Furthermore, means of longest duration of distraction increased between child ages 36 and 48 months, $t(113) = -3.18$, $p < .01$.

Covariates. Several demographic variables (child gender, birth order, and maternal education) were examined with respect to their relation to the variables of interest in the study as they have previously been shown to relate to child attention, emotion regulation, or parental

support of emotion regulation development (see introduction for review of relevant literature). None of the predictors or outcome variables differed significantly by child gender so it was not included as a covariate in analyses. With respect to birth order, first born children had longer average bout duration of sustained attention at 24 months (M = 9.52, SD = 4.07) than later-born children (M = 8.10, SD = 3.47), t(118) = 2.07, $p < .05$. Further, there was a non-significant trend for distraction bout frequency at 48 months between first born children (M = 7.18, SD = 3.38) and those who were later born (M = 6.18, SD = 3.05), t(114) = 1.68, $p = .097$. Maternal education was correlated with several child attention-related variables: average bout duration of distraction at 36 months, $r(116) = .19$, $p = .05$), longest bout duration of distraction at 36 months, $r(116) = .21$, $p = .05$, and number of bouts of focused attention at 24 months, $r(120) = -.19$, $p < .05$. Additionally, the association between maternal education and maternal proportion of structuring of child attention focus at 36 months approached but did not reach significance, $r(115) = .16$, $p = .098$. As a result, both birth order and maternal education were included as covariates in analyses.

Finally, percent of time that the child was off-task in the reading task, a proxy index of child attentiveness, was included as a covariate to control for its influence on maternal structuring proportion. Off-task behavior was calculated for each time point in which structuring of child attention focus occurred and was included as a covariate in paths including each of the three structuring variables (18, 24, and 36 months). The covariate variables were examined for central tendency and distributional abnormalities. Despite acceptable levels for skew (values within ± 3.00) boxplots revealed numerous outliers (beyond ± 3 standard deviations) for all three off-task behavior variables (Figure 3). Rather than replacing the numerous outliers at this stage, square root transformations were first performed to reduce outliers. Square root transformations

are preferred in this case over log transformation because the data contain values of zero, the log of which is undefined. Square root transformations revealed reductions in outliers and improved (within the acceptable range) values for skew for the 18 and 24 month variables (Figure 4). The 36 month off-task variable, while improved, still contained several outliers beyond 3 standard deviations. Outliers were replaced with the value for the 95th percentile (.68), which further improved skew and reduced outliers. Although some outliers persist, this is a much improved version of the variable that is acceptable for use in analyses as a covariate.

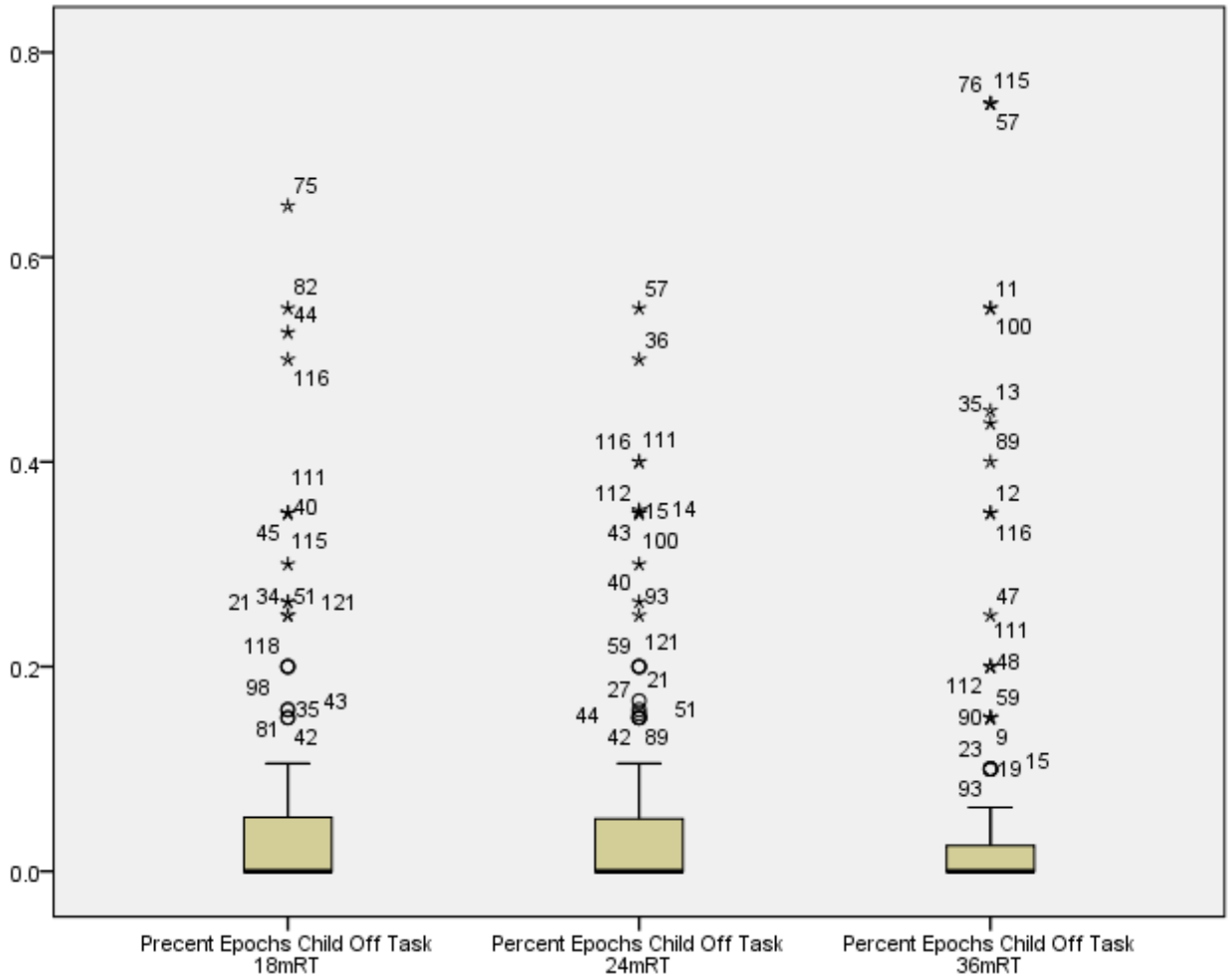

Figure 3. Boxplots of percent off task variables (raw data).

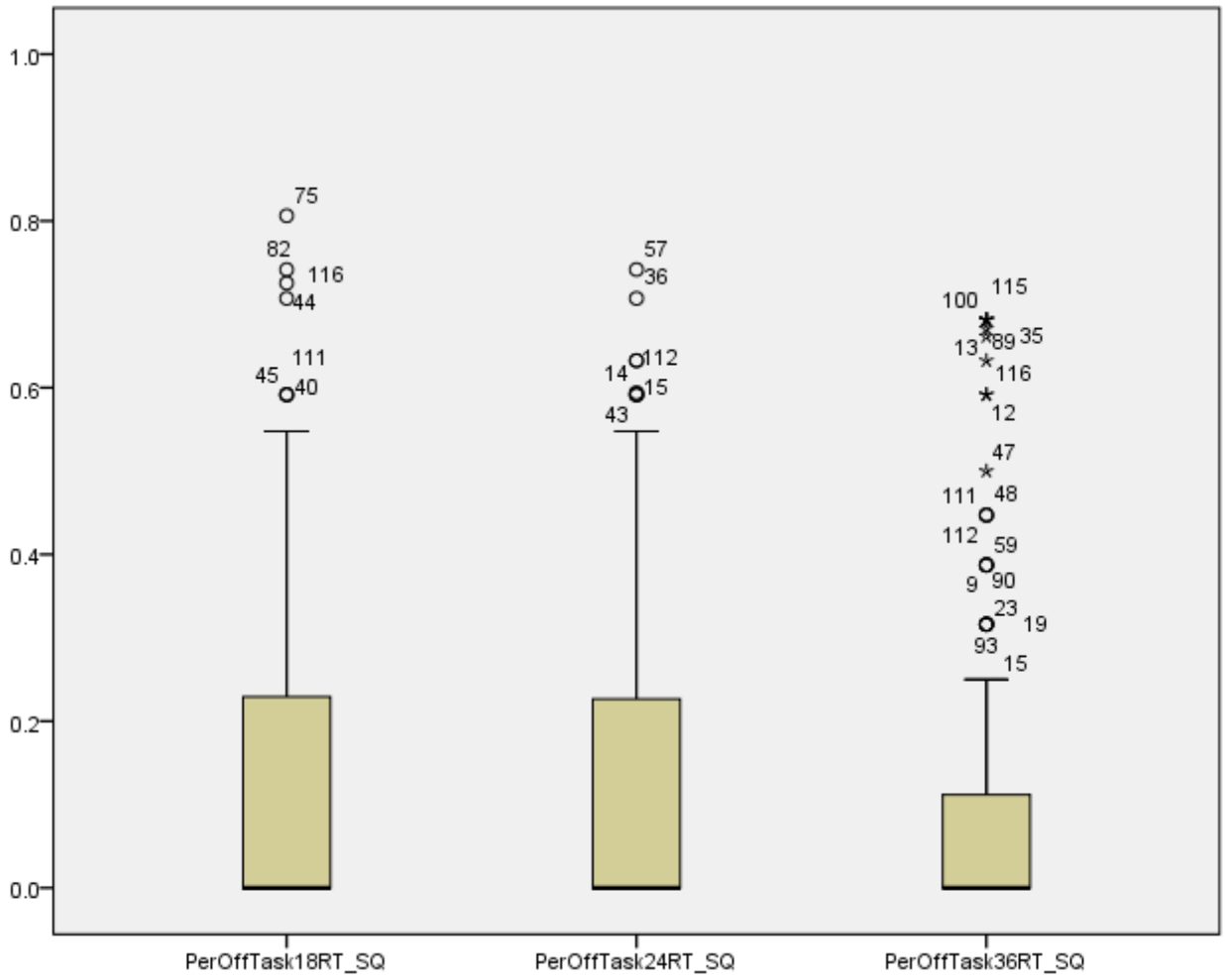

Figure 4. Boxplots of final percent off task variables. Data are presented after square-root transformations on all three variables and trimming of outliers for the 36 month variable. These versions of the variables were used in the path models.

Study Aim 1 Results

The objective of Aim 1 was to examine longitudinal relations between sustained focused attention at child ages 18 and 24 months and maternal structuring of child attention focus at child ages 18, 24, and 36 months. These analyses were conducted using children's longest bout of focused attention in the free play task as a proxy for children's sustained focused attention skill based on the assumption that this variable would capture children's capacity to sustain their

focused attention while at play. Average and longest focused attention bout were highly positively correlated at both 18 months, $r(120) = .84$, $p < .01$, and 24 months of child age, $r(120) = .77$, $p < .01$, and use of a duration variable is in line with previous research that has used temporal aspects of focused attention bouts (such as duration) to capture the development of sustained attention in early childhood (Ruff & Lawson, 1990). The four proposed models were examined using path analysis. Model fit was determined based on an examination of multiple fit indices: χ^2, RMSEA, CFI, TLI, and SRMR.

Analyses revealed that each of the four proposed Aim 1 models represented poor fit to the data considering all fit indices. Results for Aim 1 Model 1 are reported as a representation of results of these models, as no additional significant pathways were revealed in analyses of the remaining Aim 1 models (Aim 1 models 2 through 4).

Aim 1 Model 1: Baseline Model (showing stability over time). Education and birth order did not emerge as significant covariates in any path in the model, however, off-task behavior was associated with maternal structuring of child attention focus at 24 months ($b = -.53$, $S.E. = .09$, $p < .001$) and 36 months ($b = -.87$, $S.E. = .10$, $p < .001$; Table 3). As coefficients were negative, these relations indicate that higher percentage of child off-task behavior was associated with lower proportions of maternal structuring of child attention focus. Path parameters revealed that maternal structuring of child attention focus at 18 months is positively associated with structuring of attention focus at 24 months ($b = .33$, $S.E. = .08$, $p < .001$) and sustained attention at 18 months is positively associated with sustained attention at 24 months ($b = .27$, $S.E. = .09$, $p < .01$). In both cases, positive coefficients indicate modest stability in the proportion of structuring and sustained attention between these two age points in the toddler period. No other paths are statistically significant. The model demonstrated poor fit by all

indices: χ^2 is significant, CFI and TLI are lower than the acceptable value, and RMSEA and SRMR are higher than the acceptable value (Figure 5).

Table 3

Model Estimates for Aim 1, Model 1

Standardized Path	Estimate	*S.E.*	Est./*S.E.*	*p*-value
PSTRC_36 ON				
PSTRC_24	-0.03	0.09	-0.35	0.73
EDUC	0.01	0.01	0.81	0.42
B_ORDER	0.02	0.03	0.60	0.55
OFFT_36	-0.87	0.10	-8.50	< .001
PSTRC_24 ON				
PSTRC_18	0.33	0.08	4.00	< .001
EDUC	-0.00	0.01	-0.16	0.88
B_ORDER	-0.00	0.03	-0.13	0.90
OFFT_24	-0.53	0.09	-6.09	0.00
MAX_FA24 ON				
MAX_FA18	0.27	0.09	2.83	0.01
EDUC	-1.23	0.66	-1.87	0.06
B_ORDER	-3.83	2.50	-1.53	0.13
MAX_FA18 WITH				
PSTRC_18	0.01	0.23	0.02	0.98
MAX_FA24 WITH				
PSTRC_24	0.26	0.15	1.69	0.09

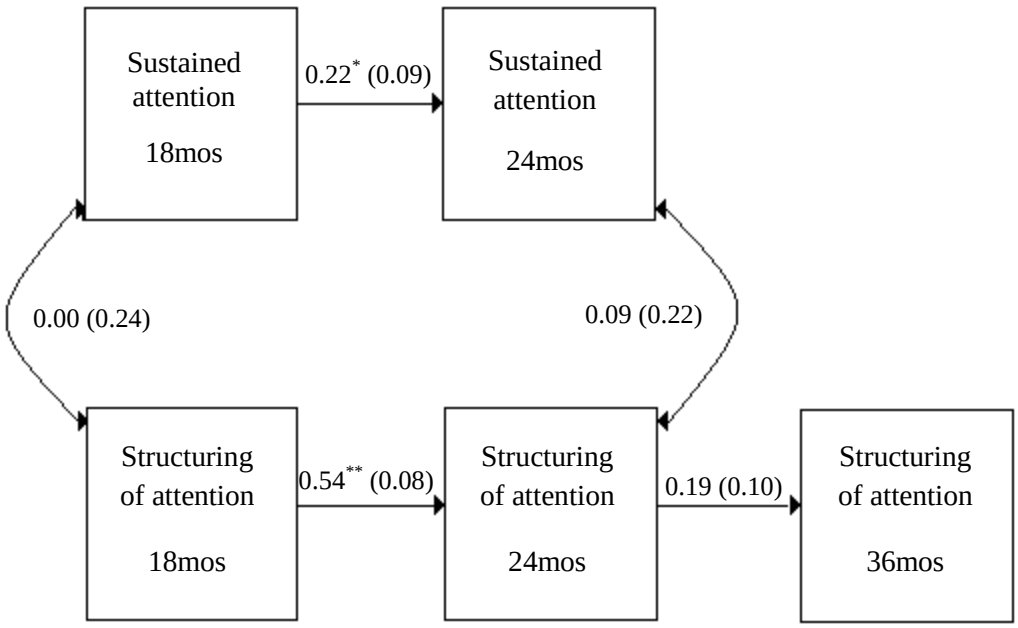

Figure 5. Aim 1, Model 1. Only statistically significant values are provided. Values presented are standardized coefficients with standard errors in parentheses. See table 3 for information on covariates and non-significant paths. $\chi^2(20) = 68.56$, $p < .001$; RMSEA = .15; CFI = .74; TLI = .65; SRMR = .12.

$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .01$.

Chi-square difference testing was performed to determine whether the addition of paths across the Aim 1 models resulted in improved fit (see Table 4). Chi-square difference testing can also be used to determine if any one Aim 1 model demonstrates improved fit over another Aim 1 model. The test works by comparing the chi-square values of two models. The difference between the two values is a statistic with a chi-square distribution. Therefore, the difference in the degrees of freedom between the two models can be used as the new degrees of freedom for the difference test. A significant difference between chi-square values indicates that the model with the lower chi-square value demonstrated a better fit to the data than the model it was

compared to. Chi-square difference testing did not reveal any significant differences between models, indicating that the addition of paths in each model did not result in a better fit over the previous models. Stated differently, the most parsimonious model (Aim 1 Model 1 showing stability pathways over time for sustained attention and maternal structuring of child attention focus) explains the data equally well as when cross-lagged pathways are added between the two constructs.

Table 4

Chi-square Difference Testing for Aim 1 Models

Model	Comparison model	Chi-square (Diff)	*df* (diff)	*p*-value	BIC
1	2	1.54	2	0.46	1669.07
	3	0.29	1	0.59	
	4	1.85	3	0.60	
2	3	1.25	1	0.26	1660.88
	4	0.32	1	0.57	
3	4	1.57	2	0.46	1664.48
4					1656.28

Study Aim 2 Results: Aim 2 Model

The objective of Aim 2 was to test a model in which children's sustained focused attention (at child ages 18 and 24 months) and maternal structuring of child attention focus (at 18, 24, and 36 months) predicted child distraction 6 to 12 months later. Specifically, the model tested paths between maternal structuring of child attention focus (18 months) and child sustained attention (24 months) and, subsequently, duration of children's distraction (36 months). These paths were tested based on theory supporting an important role for mothers during toddlerhood in helping their children apply developing skills, such as attention control, to self-regulatory efforts (Kopp, 1982). Further, the model examined paths between structuring of

attention at 36 months and distraction at child ages 36 and 48 months of child age, due to previous work linking 36 month structuring to poorer regulatory skills among preschool-aged children (Cohen, 2001). This model was tested using longest bout of focused attention and distraction as proxies for children's sustained focused attention and distraction skills, as these variables were thought to capture the capacity of a child to sustain their focused attention and distraction efforts. Duration of distraction was selected as an appropriate measure of distraction as it has been linked previously in this sample to reduced and delayed expression of anger, suggesting that this temporal aspect of distraction is relevant to children's capacity to regulate their negative emotions (Cole et al., 2011). This model (Figure 2) was examined using path analysis. Model fit was determined based on an examination of multiple fit indices, as described for Aim 1.

Birth order did not emerge as a significant covariate in any model relations. Maternal education is significantly associated with distraction at 36 months of child age (b = 3.41, $S.E.$ = 1.654, $p < .05$; Table 5). Off-task behavior is associated with maternal structuring of child attention focus at 24 (b = -.55, $S.E.$ = .09, $p < .001$) and 36 (b = -.80, $S.E.$ = .10, $p < .001$) months. Negative coefficients indicate that as the proportion of structuring of child attention focus increases, off-task behavior decreases. In terms of the primary paths of interest (i.e., between main study variables), maternal structuring of child attention focus at 18 months is positively associated with maternal structuring of child attention focus at 24 months (b =.33, $S.E.$ = .09, $p < .001$) and sustained attention at 18 months is positively associated with sustained attention at 24 months (b = .27, $S.E.$ = .09, $p < .01$; Figure 6). Positive coefficients suggest that increases in the proportion of maternal structuring of child attention focus at 24 months are related with increased proportion of maternal structuring of child attention focus at 36 months.

Similarly, for sustained attention, longer duration of sustained attention at 18 months was related to longer duration of sustained attention at 24 months. The correlation between maternal structuring of child attention focus at 36 months and duration of distraction at 36 months is also significant (the figure depicts the unstandardized value for the correlation). The standardized value is $r = .15$ ($p < .05$). No other paths in the model are statistically significant at the $p < .05$ level. The model demonstrated poor fit considering all indices: χ^2 is significant, CFI and TLI are lower than the acceptable value, and RMSEA and SRMR are higher than the acceptable value.

Table 5

Model Parameters and Fit for Aim 2 Model

Standardized Path	Estimate	*S.E.*	Est./*S.E.*	*p*-Value
PSTRC_36 ON				
PSTRC_24	-0.02	0.09	-0.23	0.82
EDUC	0.01	0.01	1.32	0.19
B_ORDER	0.01	0.03	0.22	0.83
OFFT_36	-0.80	0.10	-8.20	< .001
PSTRC_24 ON				
PSTRC_18	0.33	0.09	3.82	< .001
EDUC	-0.01	0.01	-0.52	0.60
B_ORDER	-0.00	0.03	-0.16	0.88
OFFT_24	-0.55	0.09	-6.46	< .001
MAX_FA24 ON				
MAX_FA18	0.27	0.09	2.90	0.00
PSTRC_18	-4.04	6.67	-0.61	0.54
EDUC	-1.19	0.68	-1.76	0.08
B_ORDER	-4.31	2.59	-1.66	0.10
DIST36 ON				
MAX_FA24	-0.18	0.15	-1.22	0.22
DIST24	0.17	0.11	1.52	0.13
EDUC	3.41	1.65	2.06	0.04
B_ORDER	2.08	5.47	0.38	0.70

Table 5, continued

Standardized Path	Estimate	*S.E.*	Est./*S.E.*	*p*-Value
DIST48 ON				
DIST36	-0.03	0.04	-0.93	0.35
PSTRC_36	1.09	1.66	0.66	0.51
EDUC	0.54	0.50	1.09	0.28
B_ORDER	0.89	1.54	0.58	0.56
MAX_FA18 WITH				
PSTRC_18	-0.03	0.23	-0.11	0.91
PSTRC_24	0.20	0.19	1.06	0.29
DIST24	33.52	22.23	1.51	0.13
MAX_FA24 WITH				
PSTRC_24	0.28	0.15	1.82	0.07
DIST24	-4.87	22.85	-0.21	0.83
PSTRC_36 WITH				
DIST36	0.61	0.29	2.14	0.03
DIST24 WITH				
PSTRC_18	0.38	0.39	0.97	0.33
Chi-Square(45)	262.23	$p < .001$		
RMSEA	0.21			
CFI	0.47			
TLI	0.33			
SRMR	0.14			

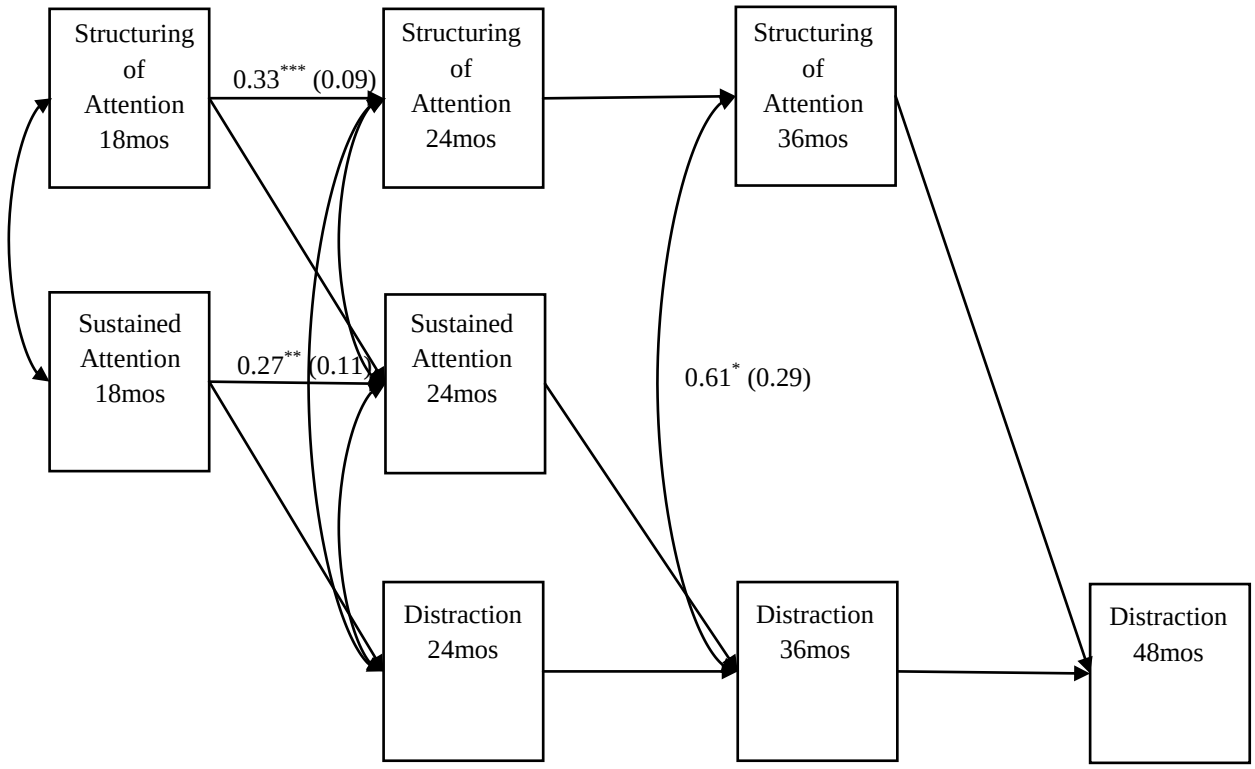

Figure 6. Aim 2 model. Only statistically significant values are provided. Values presented are unstandardized coefficients with standard errors in parentheses. See table 5 for information on covariates and non-significant paths.

$^{*}p < .05$. $^{**}p < .001$.

Multiple-Group Comparison Analyses

The lack of fit in the models tested was potentially attributable to considerable individual differences among the mother-child dyads. Given documented individual variability in focused attention skill in early childhood (Gaertner et al., 2008; Ruff, Lawson, Parrinello, & Weissberg, 1990), it was believed that relations between child sustained attention and maternal structuring of

attention focus may operate differently for groups who differ on levels of child attention skills and mothers' tendency to structure. Such a theory was suggested by previous work which found a negative relation between maternal structuring and self-regulation in the preschool period (Cohen, 2001), suggesting that in the preschool period, parental structuring may be driven by the need to support children whose regulatory skill is less well-developed. It was believed that parental structuring, then, would be differentially related to child skill and emotion regulation development based on the skill level of the child. The Aim 2 model, therefore, was tested to determine if the interaction between the length of children's longest bout of sustained attention and the proportion of maternal structuring of child attention focus at 18 months revealed moderated effects. Longest bout of sustained attention at 18 months was used to capture initial levels of toddler attention due to moderate stability between these variables at 18 and 24 months in the present sample, $r(120) = .22$, $p < .05$, which was consistent with other research indicating stability in individual differences in focused attention skill during toddlerhood (Gaertner et al., 2008). Structuring of child attention focus at 18 months of child age was selected in line with theory positing that parental support in the toddlerhood period is particularly important for helping children apply developing cognitive capacities (e.g., attention control) to self-regulatory efforts (Kopp, 1982).

Multiple-group comparison analyses were conducted, as they allow one to test whether a structural equation model is invariant across subgroups identified in a sample and to determine whether group differences influence conclusions about the association among variables included in structural equation models (Little, 2013). To explore the data for relevant subgroups based on levels of 18 month structuring of child attention focus and sustained attention, chi-square tests of association were conducted to test whether levels of the variables were associated with one

another. Initially, the chi-square test was run comparing four levels of each variable based on variable quartiles. The chi-square test was non-significant, $\chi^2(9, 119) = 7.83$, $p = .55$, indicating that, overall, differences in the observed and expected values of the cells were not statistically significant. This suggests that the variables were independent, such that they do not differ systematically based on the level of the other. In an effort to maximize sample size of subgroups used to test the interaction between maternal structuring of child attention focus and child sustained attention to increase the capacity for multiple-group comparison to be effective in revealing group differences, further analyses were conducted to determine whether groups split at the median level of each variable also reflect independent groups. To this end, participants were identified as high or low based on whether they fell above or below the median for longest bout duration of sustained attention (23.5 seconds) and proportion of maternal structuring of child attention focus (.81). Again, lack of significance of a chi-square test indicated that the levels of each variable were unrelated to one another suggesting independence in the groups, $\chi^2(1, 119) = 1.90$, $p = .18$. Thus, model parameters were tested for four different subgroups in the sample: (a) low structuring, low sustained attention ($n = 33$); (b) low structuring, high sustained attention ($n = 27$); (c) high structuring, low sustained attention ($n = 25$); and (d) high structuring, high sustained attention ($n = 34$).

A model with all paths constrained to be equal across groups revealed numerous relations between main study variables and covariates. Maternal structuring of child attention focus at 24 months was related to birth order ($b = .04$, $S.E. = .02$, $p < .05$) and off-task behavior ($b = -.50$, $S.E. = .07$, $p < .001$) such that higher proportion of structuring was related to later-born status and less off-task behavior (Table 6). Maternal structuring of attention focus at 36 months was also related to off-task behavior ($b = -.89$, $S.E. = .07$, $p < .01$) such that a higher proportion of

structuring was related to less off-task behavior. Sustained attention at 24 months is related to birth order (b = .28, $S.E.$ = .09, p < .01) such that greater duration of sustained attention is associated with first born status (b = -5.09, $S.E.$ = 2.30, p < .05). Finally, greater duration of distraction at 36 months is associated with higher levels of maternal education (b = 4.095, $S.E.$ = 1.442, p < .01). Only one structural path is significant at the p < .05 level. Longer duration of distraction at 36 months was partially accounted for by longer duration of distraction a year earlier (b = .24, $S.E.$ = .11, p < .05). The model demonstrated poor fit considering all fit indices: χ^2 is significant, CFI and TLI are lower than the acceptable value, and RMSEA and SRMR are higher than the acceptable value (see Figure 7).

Table 6

Constrained Model Estimates for Multiple-Group Comparison Model

Standardized Path	Estimate	*S.E.*	Est./*S.E.*	*p*-value
PSTRC_36 ON				
PSTRC_24	-0.10	0.07	-1.38	0.17
EDUC	0.00	0.01	0.14	0.89
B_ORDER	0.02	0.02	0.96	0.34
OFFT_36	-0.89	0.07	-12.43	< .001
PSTRC_24 ON				
PSTRC_18	0.17	0.13	1.32	0.19
EDUC	0.01	0.01	1.78	0.08
B_ORDER	0.04	0.02	2.21	0.03
OFFT_24	-0.49	0.07	-7.62	< .001
MAX_FA24 ON				
MAX_FA18	0.11	0.14	0.79	0.43
PSTRC_18	-7.03	12.69	-0.55	0.58
EDUC	-0.94	0.65	-1.46	0.14
B_ORDER	-5.09	2.30	-2.22	0.03

Table 6, continued

Standardized Path	Estimate	*S.E.*	Est./*S.E.*	*p*-Value
DIST36 ON				
MAX_FA24	-0.19	0.15	-1.27	0.20
DIST24	0.24	0.11	2.10	0.04
EDUC	4.10	1.44	2.84	0.01
B_ORDER	2.05	5.25	0.39	0.70
DIST48 ON				
DIST36	0.01	0.01	0.58	0.56
PSTRC_36	-0.17	1.00	-0.17	0.86
EDUC	-0.06	0.15	-0.38	0.70
B_ORDER	-0.30	0.45	-0.68	0.50
MAX_FA18 WITH				
PSTRC_18	-0.03	0.05	-0.57	0.57
PSTRC_24	0.03	0.05	0.51	0.61
DIST24	-5.66	7.90	-0.72	0.47
MAX_FA24 WITH				
PSTRC_24	0.01	0.10	0.12	0.91
DIST24	16.36	19.89	0.82	0.41
PSTRC_36 WITH				
DIST36	0.56	0.25	2.24	0.03
DIST24 WITH				
PSTRC_18	-0.10	0.28	-0.38	0.71

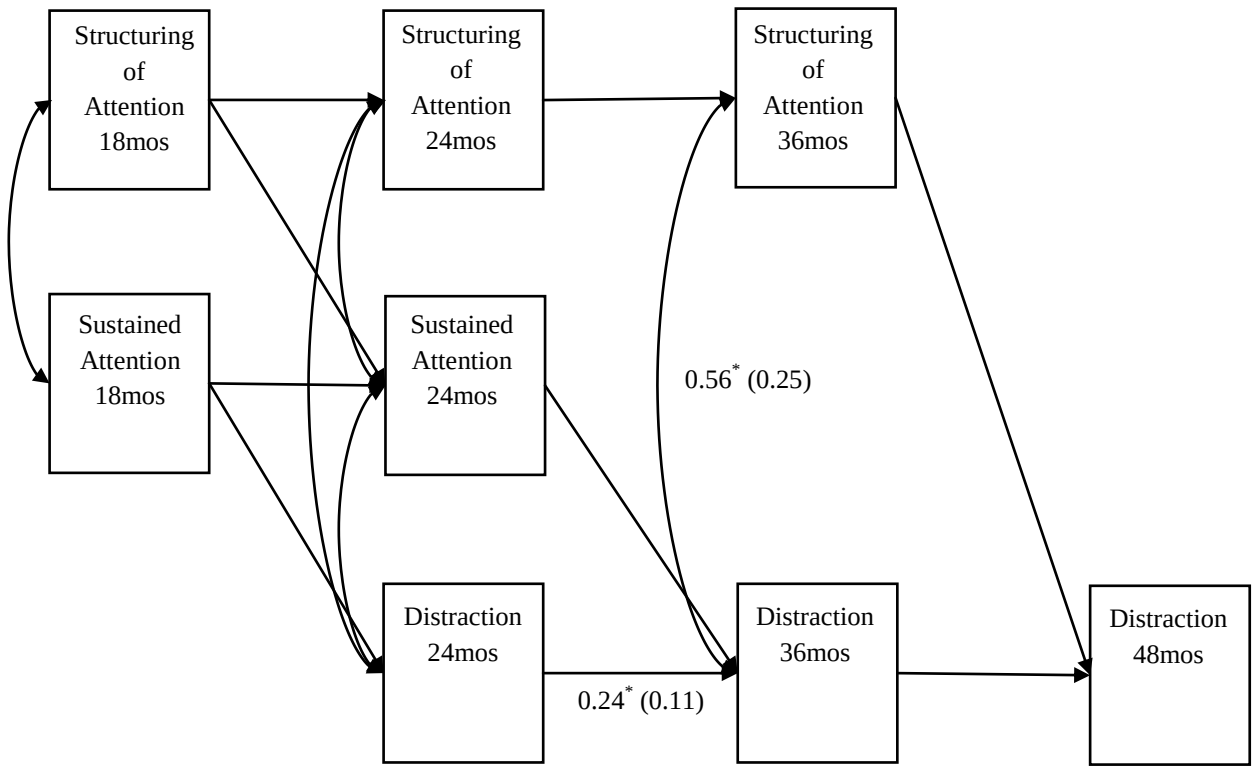

Figure 7. Multi-group comparison, constrained model. Only statistically significant values are provided. Values presented are standardized coefficients with standard errors in parentheses. See table 6 for information on covariates and non-significant paths. $\chi^2(210) = 304.68$, $p < .001$; RMSEA = .13; CFI = .66; TLI = .71; SRMR = .17.

$^{*}p < .05$. $^{**}p < .001$.

Poor model fit coupled with few significant structural relations suggests that constraining coefficients across groups (i.e., assuming identical structural relations across groups) may not be appropriate. This assertion is tested by comparing the chi-square value of the constrained model to an unconstrained model where path coefficients are free to vary across groups (i.e., assuming different structural relations across groups). However, because of the small cell sizes in each of the groups and the increase in the number of parameters estimated when path coefficients are freed across groups, the model becomes difficult to reliably estimate and yields untrustworthy

parameter estimates. Unconstrained multi-group models with the three largest groups (high-high, low-low, and low-high) yielded similar issues, as did a model with the two largest groups (high-high and low-low). Therefore, interpretations of the unconstrained multi-group model and its relation to the constrained model should be undertaken cautiously but observed relations will be described here for consideration.

Chi-square difference testing. Chi-square difference testing using the Satorra-Bentler scaled chi-square difference test revealed improved fit for the unconstrained model, $\Delta\chi^2$ (78) = 108.10, $p < .05$. In other words, model fit is improved by allowing path coefficients to vary across groups, suggesting that group differences may exist in parameter estimates for paths tested in the model. There are some differences in structural relations between groups (see Table 7). Regarding covariates, maternal structuring of child attention focus at 24 and 36 months is negatively associated with off-task behavior at 24 and 36 months (respectively) for all groups. This negative association indicates that greater levels of child off-task behavior in the reading task relates to lower proportions of structuring in the same task at the same time point. Maternal education is not similarly related across groups. Maternal education is positively correlated with 36 month maternal structuring of child attention focus in the low structuring, low attention group and 24 month structuring in the high structuring, low attention group. Further maternal education is positively correlated with 36 month distraction in the low structuring, low attention group and 48 month distraction in the high structuring, high attention group indicating that higher levels of maternal education are associated with higher proportions of structuring of attention and longer duration of distraction in these groups. Conversely, maternal education is negatively associated with 24 month structuring for the low structuring, low attention group and sustained attention at 24 months in the high structuring, high attention group, suggesting lower

levels of maternal education are associated with more parenting and longer bouts of sustained attention at certain ages in these groups. Birth order is positively related to 36 month structuring of attention focus in the high structuring, low attention group and 24 month structuring in the high structuring, high attention group, indicating that later born children tended to be in dyads with higher levels of these variables among these groups. Regarding structural relations, maternal structuring of child attention focus at 24 months is negatively associated with structuring at 36 months in the high structuring, high attention group, and distraction at 24 months is positively associated with distraction at 36 months in the low structuring, high attention group. No correlations were significant within the model at the $p < .05$ level.

Table 7

Unconstrained Model Estimates for Multi-Group Comparison Model

	Low Struc.-Low Attn.			Low Struc.-High Attn.			High Struc.-Low Attn.			High Struc.-High Attn.		
Standardized Path	Est.	*S.E.*	*p*-value	Est.	*S.E.*	*p*-value	Est.	*S.E.*	*p*-value	Est.	*S.E.*	*p*-value
PSTRC_36 ON												
PSTRC_24	0.25	0.16	0.11	-0.08	0.12	0.50	-0.12	0.20	0.57	-0.24	0.07	< .001
EDUC	0.04	0.02	0.04	-0.01	0.02	0.61	0.02	0.01	0.08	-0.01	0.01	0.49
B_ORDER	-0.05	0.06	0.34	-0.07	0.05	0.19	0.12	0.06	0.03	0.04	0.03	0.15
OFFT_36	-0.72	0.14	< .001	-0.61	0.23	0.01	-1.06	0.13	< .001	-0.92	0.07	< .001
PSTRC_24 ON												
PSTRC_18	0.44	0.30	0.14	0.28	0.21	0.19	0.09	0.21	0.66	-0.03	0.22	0.90
EDUC	-0.03	0.01	0.02	0.01	0.02	0.70	0.02	0.01	0.04	0.02	0.01	0.13
B_ORDER	-0.06	0.07	0.34	-0.02	0.07	0.79	0.05	0.03	0.11	0.07	0.03	0.04
OFFT_24	-0.60	0.16	< .001	-0.61	0.15	< .001	-0.37	0.08	< .001	-0.56	0.15	< .001
MAX_FA24 ON												
MAX_FA18	0.36	0.41	0.38	0.26	0.24	0.29	0.19	0.61	0.76	-0.03	0.18	0.86
PSTRC_18	8.37	21.27	0.69	15.17	23.27	0.52	-45.36	22.87	0.05	8.23	29.03	0.78
EDUC	-1.32	1.30	0.31	-2.15	1.73	0.21	-0.22	0.84	0.80	-4.11	1.67	0.01
B_ORDER	-11.20	4.81	0.02	-13.81	9.16	0.13	-5.43	2.90	0.06	3.10	4.26	0.47
DIST36 ON												
MAX_FA24	-0.36	0.33	0.28	-0.12	0.25	0.62	0.90	0.90	0.32	-0.24	0.32	0.45
DIST24	0.05	0.29	0.85	0.43	0.19	0.03	-0.04	0.26	0.87	0.20	0.20	0.31
EDUC	4.62	1.78	0.01	1.84	3.06	0.55	2.73	4.00	0.50	8.19	4.68	0.08
B_ORDER	-7.31	10.95	0.51	-8.10	9.49	0.39	24.94	23.49	0.29	15.33	10.22	0.13

Table 7, continued

	Low Struc.-Low Attn.			Low Struc.-High Attn.			High Struc.-Low Attn.			High Struc.-High Attn.		
Standardized Path	Est.	*S.E.*	*p*-value	Est.	*S.E.*	*p*-value	Est.	*S.E.*	*p*-value	Est.	*S.E.*	*p*-value
DIST48 ON												
DIST36	0.03	0.02	0.23	0.00	0.01	0.96	0.01	0.01	0.48	-0.03	0.02	0.28
PSTRC_36	0.63	2.93	0.83	1.39	2.38	0.56	-1.02	1.18	0.39	0.15	1.98	0.94
EDUC	0.17	0.27	0.54	-0.12	0.25	0.63	-0.22	0.19	0.24	0.85	0.24	0.00
B_ORDER	-2.08	1.24	0.09	0.02	0.76	0.98	0.18	0.74	0.81	0.52	1.01	0.61
MAX_FA18 WITH												
PSTRC_18	-0.22	0.15	0.15	-0.04	0.23	0.85	0.01	0.04	0.88	-0.10	0.13	0.45
PSTRC_24	-0.16	0.24	0.52	0.60	0.45	0.19	0.02	0.05	0.71	0.05	0.22	0.81
DIST24	-7.45	12.69	0.56	-77.80	47.87	0.10	0.93	10.43	0.93	25.09	33.27	0.45
MAX_FA24 WITH												
PSTRC_24	0.35	0.25	0.15	0.37	0.31	0.22	-0.12	0.14	0.39	0.18	0.20	0.38
DIST24	31.36	24.36	0.20	-44.87	65.93	0.50	41.20	38.92	0.29	-69.83	38.43	0.07
PSTRC_36 WITH												
DIST36	0.43	0.54	0.43	0.39	0.73	0.60	0.57	0.83	0.49	0.61	0.31	0.05
DIST24 WITH												
PSTRC_18	-0.07	0.26	0.79	1.03	0.70	0.14	0.08	0.22	0.71	0.16	0.25	0.52

Path-level multiple-group analyses. Due to the lack of expected structural relations and poor overall fit of the Aim 2 model when examining group differences, each major path was analyzed separately and visually inspected for differences between groups. Parameter estimates for each path by group are presented in Table 8 and Table 9. Estimates were visually inspected for cases where the structural relations (i.e., with the variables of interest, not the covariates) within paths appeared to differ between groups. The objective was to see if there might be differences between groups when looking at each path separately. Two comparisons were identified: path one between maternal structuring of child attention focus at 24 and 36 months of child age (low structuring, low attention group versus high structuring, high attention group) and path four between 24 month sustained attention and 36 month distraction (low structuring, high attention group versus high structuring, high attention group).

Table 8

Model Parameters by Relevant Paths for High Structuring-High Attention and Low Structuring-High Attention Groups

	High Struc.-High Attn. Group				Low Struc.-High Attn. Group			
	Est	SE	Est./SE	*p*-value	Est	SE	Est./SE	*p*-value
Path 1								
PSTRC_36 ON								
PSTRC_24	0.22	0.14	1.50	0.14	-0.08	0.12	-0.63	0.53
EDUC	0.04	0.02	2.01	0.04	-0.01	0.02	-0.51	0.61
B_ORDER	-0.05	0.06	-0.93	0.35	-0.07	0.05	-1.32	0.19
OFFT_36	-0.75	0.15	-5.15	0.00	-0.60	0.24	-2.54	0.01
Path 2								
PSTRC_24 ON								
PSTRC_18	0.48	0.32	1.48	0.14	0.13	0.20	0.65	0.52
EDUC	-0.03	0.01	-2.52	0.01	0.01	0.02	0.45	0.66
B_ORDER	-0.06	0.07	-0.94	0.35	0.01	0.07	0.07	0.94
OFFT_24	-0.55	0.16	-3.51	0.00	-0.64	0.15	-4.40	0.00
Path 3								
MAX_FA24 ON								
MAX_FA18	0.35	0.40	0.88	0.38	0.35	0.40	0.88	0.38
PSTRC_18	8.67	21.30	0.41	0.68	8.67	21.30	0.41	0.68
EDUC	-1.26	1.27	-0.99	0.32	-1.26	1.27	-0.99	0.32
B_ORDER	-11.44	4.89	-2.34	0.02	-11.44	4.89	-2.34	0.02
Path 4								
DIST36 ON								
MAX_FA24	-0.32	0.32	-1.00	0.32	-0.16	0.23	-0.70	0.49
DIST24	0.01	0.29	0.03	0.97	0.47	0.16	3.02	0.00
EDUC	4.67	1.80	2.60	0.01	1.83	3.15	0.58	0.56
B_ORDER	-6.95	10.95	-0.64	0.53	-8.11	10.26	-0.79	0.43
Path 5								
DIST48 ON								
DIST36	0.03	0.02	1.20	0.23	-0.01	0.18	-0.05	0.96
PSTRC_36	0.63	2.93	0.22	0.83	0.12	0.20	0.60	0.55
EDUC	0.17	0.27	0.62	0.54	-0.09	0.19	-0.48	0.63
B_ORDER	-2.08	1.24	-1.68	0.09	0.01	0.17	0.03	0.98

Table 9

Model Parameters by Relevant Paths for High Structuring-Low Attention and Low Structuring-Low Attention Groups

	High Struc.-Low Attn. Group				Low Struc.-Low Attn. Group			
	Est	SE	Est./SE	*p*-value	Est	SE	Est./SE	*p*-value
Path 1								
PSTRC_36 ON								
PSTRC_24	-0.13	0.20	-0.62	0.54	-0.22	0.07	-3.04	0.00
EDUC	0.02	0.01	1.81	0.07	-0.01	0.01	-0.67	0.50
B_ORDER	0.12	0.05	2.23	0.03	0.04	0.02	1.66	0.10
OFFT_36	-1.07	0.13	-8.11	0.00	-0.96	0.08	-12.56	0.00
Path 2								
PSTRC_24 ON								
PSTRC_18	0.05	0.21	0.24	0.81	-0.03	0.22	-0.14	0.89
EDUC	0.02	0.01	1.92	0.06	0.02	0.01	1.66	0.10
B_ORDER	0.06	0.03	1.82	0.07	0.07	0.03	2.08	0.04
OFFT_24	-0.35	0.10	-3.62	0.00	-0.54	0.13	-4.04	0.00
Path 3								
MAX_FA24 ON								
MAX_FA18	-0.04	0.58	-0.07	0.94	-0.04	0.18	-0.23	0.82
PSTRC_18	-40.13	23.63	-1.70	0.09	9.27	29.17	0.32	0.75
EDUC	0.14	0.86	0.16	0.87	-3.82	1.67	-2.28	0.02
B_ORDER	-7.30	2.92	-2.50	0.01	3.06	4.18	0.73	0.46
Path 4								
DIST36 ON								
MAX_FA24	0.94	0.92	1.02	0.31	-0.41	0.31	-1.33	0.18
DIST24	-0.07	0.28	-0.24	0.81	0.23	0.18	1.28	0.20
EDUC	2.78	3.94	0.71	0.48	7.61	4.51	1.69	0.09
B_ORDER	25.07	23.31	1.08	0.28	15.97	10.10	1.58	0.11
Path 5								
DIST48 ON								
DIST36	0.01	0.01	0.70	0.48	-0.03	0.02	-1.08	0.28
PSTRC_36	-1.02	1.18	-0.86	0.39	0.15	1.98	0.08	0.94
EDUC	-0.22	0.19	-1.16	0.24	0.85	0.24	3.47	0.00
B_ORDER	0.18	0.74	0.24	0.81	0.52	1.01	0.51	0.61

Path one: Structuring of attention focus between 24 and 36 months of child age. Differences between the low structuring, low attention and high structuring, high attention groups on path one (between maternal structuring of child attention focus at 24 and 36 months of child age) were examined by excluding participants in the other two groups and running the model two ways in order to do chi-square difference testing: one with parameter estimates free and one with parameter estimates constrained. Chi-square difference testing was completed using the Satorra-Bentler scaled χ^2 which is appropriate in cases where missing data are estimated using MLR. Significant differences between the groups were revealed, suggesting that the freed path model was a better fitting model, Satorra-Bentler $\chi^2(12) = 26.36$, $p < .01$. This indicates that the structural relations for path one are significantly different between these groups. Specifically, for mother-child dyads in the low structuring, low attention group, higher proportion of maternal structuring of child attention focus at 24 months is related to higher proportions of structuring at 36 months. Conversely, for dyads in the high structuring, high attention group, higher proportion of maternal structuring of child attention focus at 24 months is related to lower proportions of structuring at 36 months.

Path four: 24 month sustained attention to 36 month distraction. Differences between the low structuring, high attention group and low structuring, low attention groups on path four (between 24 month sustained attention and 36 month distraction) were tested in the same way. Chi-square difference testing did not reveal a significant difference in fit between the free and constrained models, indicating that there are not statistically different structural relations between these groups on path four parameters, Satorra-Bentler $\chi^2(4) = 3.68$, $p = .45$.

Regression Analyses: Predicting Distraction from Sustained Attention, Structuring of Child Attention Focus, and Interaction Variables

To explore the possibility that there may be other relevant subgroups within the sample that differ in levels of maternal structuring of child attention focus and child sustained attention that were not captured in the four groups used in the multiple-group comparison, multiple linear regression models were tested in which interaction terms between these variables were included as predictors of duration of distraction at the two preschool-age time points (36 and 48 months of child age). Regression models were identified based on the hypothesized relations proposed for the Aim 2 model (described above where Aim 2 results are presented). The models explored hypothesized relations between structuring of child attention focus and sustained attention in the toddler period and preschool-age distraction use as well as hypothesized relations between maternal structuring of child attention focus and subsequent use of distraction by children in the preschool-age period. Interaction terms were included in the model based on these hypothesized relations and group differences noted for specific paths tested in the multiple-group comparison analyses (i.e., differences in the path between structuring at 24 and 36 months of child age). Significant interaction effects could be probed with follow-up analyses to explore the nature of any moderating relationship between maternal structuring of attention focus and sustained attention on children's use of distraction.

Regression model for 36 month duration of distraction. A multiple linear regression model was tested to predict the longest duration of child distraction at 36 months of child age based on earlier levels of maternal structuring of child attention focus (at child age 18 months), child sustained attention (at child age 24 months), and the interaction between 18 month sustained attention and maternal structuring of child attention focus (Table 10). As previously

described, selection of these variables reflected the proposed role that parents play in supporting toddlers in applying developing cognitive skills to self-regulation (Kopp, 1982) and the possibility that individual differences in child skills relevant to emotion regulation, including attention control (Gaertner et al., 2008), may result in a relevant interaction between levels of child skill and parental support of attention with regard to their contribution to children's use of distraction.

Table 10

Multiple Regression Analysis Predicting 36 Month Duration of Distraction

Variables in Each Step	β	ΔR^2	ΔF	*df*	*p*-value
Step 1		.06	2.35	3, 115	.08
% Child Off-Task 18m Reading Task	-0.25				.78
Birth Order	-0.05				.59
Maternal Education	0.23*				.01
Step 2		.03	1.10	3, 112	.12
Maternal Structuring 18m	-0.81				.45
Longest Bout Focused Attention 24m	0.13				.17
Longest Bout Distraction 24m	-0.74				.43
Step 3		.00	.24	1, 111	.17
18m Attention X 18m Structuring	-0.04				.63

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

Covariates found to be associated with study variables (maternal education, birth order, and percent of child off-task behavior in the 24 month reading task) were included as a block in the first step of the regression model to determine the explanatory value of the predictors over and above the possible contribution of these covariates. Results indicated that the covariate block explained 5.8% of the variance in 36 month longest duration of distraction though the

model did not reach statistical significance at the $p < .05$ level, $F(3, 118) = 2.35$, $p = .08$. In the next step, maternal structuring of child attention focus at 18 months, longest bout of sustained attention at 24 months, and longest bout of distraction at 24 months were included and explained an additional 2.7% of the variance in 36 month duration of distraction, though again the regression model was not statistically significant, $F(6, 118) = 1.73$, $p = .12$. Finally, in the third step, the interaction between 18 month maternal structuring of child focused attention and child sustained attention were entered, but inclusion of this step did not explain additional variance in 36 month distraction, $F(7, 118) = 1.51$, $p = .17$. Because the interaction term of 18 month maternal structuring of child attention focus and child sustained attention was not significant in this model, no follow-up analyses were used to probe moderating effects of these variables.

Regression model for 48 month duration of distraction. A multiple linear regression model was tested to predict the longest duration of child distraction at 48 months of child age based on earlier levels of maternal structuring of child attention focus (at child age 36 months), child sustained attention (at child ages 18 and 24 months), and the interaction between 18 month sustained attention and maternal structuring of child attention focus and between 24 month sustained attention and 36 month maternal structuring of attention focus (Table 11). As was discussed where Aim 2 is described, these predictors were selected based on the premise that self-regulation in the preschool-age years has been linked to earlier parental scaffolding (Hoffman et al., 2006) and attentional persistence (Belsky et al., 2001). Additionally, an interaction term between 18 month duration of sustained attention and maternal structuring of child attention focus was included to explore the possibility that known individual differences in toddler attention skill (Gaertner et al., 2008) may result in a relevant interaction between levels of child attention skill and parental support of attention with regard to their contribution to

children's use of distraction to regulate emotion. Further, exploration of group differences in the Aim 2 model when examining each path separately suggested that for one group (high structuring, high attention group), the proportions of maternal structuring of child attention skill at 24 and 36 months were negatively associated while for another (low structuring, low attention group) the association was positive. These findings were consistent with previous research which revealed negative relations between 36 month structuring and child self-regulation (Cohen, 2001) but suggested this association may only apply to some dyads within the sample. To explore the possibility that there may be a moderating effect between toddler attention skill and proportionate level of structuring of child attention focus in the preschool period with regard to prediction of child use of distraction, the interaction between 24 month duration of child sustained attention and 36 month maternal structuring of child attention focus was included in the regression model.

Table 11

Multiple Regression Analysis Predicting 48 Month Duration of Distraction

Step Variables	β	ΔR^2	ΔF	*df*	*p*-value
Step 1		.02	.47	4, 109	.76
% Child Off-Task 18m Reading Task	0.06				.49
% Child Off-Task 36m Reading Task	0.03				.75
Birth Order	0.11				.27
Maternal Education	-0.01				.94
Step 2		.02	.18	4, 105	.96
Longest Bout Focused Attention 18m	-0.02				.85
Longest Bout Focused Attention 24m	-0.06				.55
Maternal Structuring 18m	-0.05				.69
Maternal Structuring 36m	0.06				.73
Step 3		.02	.02	2, 103	.99
18m Attention X 18m Structuring	0.02				.86
24m Attention X 36m Structuring	0.01				.92

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

Again, covariates found to be associated with study variables (maternal education, birth order, and percent of child off-task behavior in the 18 and 36 month reading tasks) were included as a block in the first step of the regression model to determine the explanatory value of the predictors over and above the possible contribution of these covariates. Results of this model showed that the covariates did not predict variance in 48 month longest bout duration of distraction at a statistically significant level, $F(4, 113) = 0.48$, $p = .76$. In the next step, longest bout of sustained attention at 18 and 24 months and maternal structuring of child attention focus at 18 and 36 months were included but did not significantly explain variance in 48 month duration of distraction, $F(8, 113) = 0.32$, $p = .96$. Finally, in the third step, the interaction between 18 month maternal structuring of child attention focus and longest bout of sustained

attention was entered as well as the interaction between 36 month maternal structuring of child attention focus and 24 month longest duration of sustained attention, but inclusion of this step did not explain variance in 48 month distraction at a statistically significant level, $F(10, 113) = 0.26$, $p = .99$. Because neither of the interaction terms included in the regression model was significant, no follow-up analyses were used to probe moderating effects of these variables.

Chapter 4. DISCUSSION

Theoretical models and empirical work suggest that parental behavior supports children's efforts to successfully regulate their emotions and behavior in the toddler and preschool-age years (Brophy-Herb et al., 2012; Feldman et al., 2011; Kopp 1989; Morris et al., 2007). Indeed, attention control is understood to be an important component of the processes underlying emotion regulation (Rueda et al., 2005) and empirical work links aspects of parenting with the development of this skill in early childhood (Belsky, Fearon, & Bell, 2007; Gaertner, Spinrad, & Eisenberg, 2008; Graziano et al., 2011). Further, self-regulation in the preschool-age years has been linked to earlier parental scaffolding (Hoffman et al., 2006) and attentional persistence (Belsky et al., 2001), so temporal aspects of attention-based regulation strategies may rely on the development of the capacity to sustain attention. Most studies, however, have examined these relations concurrently or measure each construct at one point in time, which limits the specificity of our understanding of the timing of these effects. This gap in knowledge persists despite calls for longitudinal studies capturing the contribution of emerging cognitive capacities to emotion regulation development (Eisenberg et. al., 2004) and for studies that disentangle bidirectional contributions of parenting and child skills, over time, on children's development in early childhood (Sameroff & Mackenzie, 2003). The present study employed a longitudinal design with repeated measurement of each construct to investigate the extent to which maternal structuring of attention control, and children’s individual attention skills, contributed to young children’s use of an emotion regulation strategy. The analytic approach of the study also recognized the possible influence of several child and family characteristics on these constructs by including them as covariates in study analyses.

The study's first aim was to disentangle longitudinal relations during toddlerhood between children's sustained attention skills and mothers' efforts to support their children in maintaining their attention focus during a reading activity. Analyses compared competing models to determine whether and when in early childhood mothers' structuring of their children's focused attention skill relates to subsequent increases in duration of observed sustained attention as well as when the skill level of the child is related to subsequent levels of this parenting practice. Models included a stability model (maternal and child behaviors associated with themselves over time), two models including paths from maternal behavior to child behavior and vice versa, and a bidirectional model including cross-lagged paths between maternal and child behaviors. It was hypothesized that a bidirectional model would best fit the data and specific unidirectional pathways were predicted within this model. Because theory and research suggest that parents play a supportive role in the development of attention control in toddlerhood (Kopp, 1989), it was anticipated that maternal structuring of attention focus when children were 18 months old would be associated with the degree to which children sustained their attention focus at 24 months of child age. At later ages, however, it was hypothesized that maternal structuring would be elicited by the need for parental support among those children whose skill at shifting and maintaining focused attention was less well-developed, based on previous evidence negative relations between maternal structuring and child self-regulation skill in the early preschool-age years (Cohen, 2001). Neither of these proposed hypotheses was supported by the results of the present study, which revealed that only stability paths were significant. Significant pathways in this model revealed that both the level of child engagement in sustained attention during free play and of mothers' structuring of their children's attentional

persistence showed modest stability during toddlerhood. Predicted longitudinal relations between maternal behavior and child sustained attention skill were not found.

The second aim of the dissertation was to employ a longitudinal design to investigate parenting practices targeted at young children's attention control skills and their contribution to children's use of an attention-based emotion regulation strategy 6 to 12 months later. Examination of associations between maternal structuring of attention focus and children's observed sustained attention skills measured repeatedly in toddlerhood and children's subsequent use of distraction during a wait measured yearly between 24 and 48 months of child age would document whether and when parenting supports young children's use of sustained attention skills to engage in an attention-based emotion regulation strategy autonomously. It was hypothesized that children's sustained attention skill would be associated with the proportion of time mothers structured children's focused attention, which in turn would be related to the degree to which children were able to sustain a distraction after shifting their attention away from a source of frustration 6 to 12 months later. These hypotheses were put forth based on the understanding that parental structuring builds upon children's developing skills and has been positively linked to children's emotion regulation development during the preschool period (Hoffman et al., 2006). The study's findings did not support the hypotheses regarding relations between maternal structuring of children's attention focus while reading, children's sustained focused attention during play, and children's self-distraction during a frustrating wait. In particular, the prediction that maternal structuring of focused attention serves as a link between children's earlier sustained attention skills and later ability to sustain self-distraction during a frustrating wait was not supported.

In an effort to understand the lack of expected relations between parenting, attention control, and emotion regulation, follow-up analyses explored the possibility that relations between these constructs may not be equivalent for subgroups in the data who differed on levels of maternal structuring and child sustained attention. While the size of identified groups limited conclusive understanding of how the model developed for this study may operate differently for subgroups within the sample, these follow-up analyses offer rationale for adopting a person-centered approach in future studies exploring these constructs. These analyses offered preliminary suggestion that this interaction may be relevant for some aspects of the models tested, such as stability off structuring of child attention focus from toddlerhood to the preschool-age years.

The discussion reviews the contribution of the study's findings of stability and change in structuring of attention focus and sustained attention in the second year to the extant literature on the stability of individual differences in sustained attention and parenting practices that support attention development in toddlerhood as well as to the literature on temporal growth in sustained attention skill in early childhood. Subsequently, the discussion focuses on two themes. First, the potential benefit of adopting a person-centered approach in future studies is discussed to understand differences in how parenting, attention control, and distraction operate among dyads who differ from one another on mother or child characteristics relevant to emotion regulation development. Secondly, the apparent lack of relation between sustained attention skill in a play context and the degree to which children sustained distraction after shifting their attention from a source of frustration is discussed within the context of literature on differences in children's self-regulatory skills when assessed in situations that do or do not tend to elicit young children’s emotions. Finally, study design issues are discussed with suggestions for future research.

Stability and Growth in Children's Sustained Attention Skills in Toddlerhood

The evidence of both stability and growth in young children's sustained attention during the toddler years is consistent with previous literature on individual differences in attention skill and theory and research related to the development of attention control in early childhood. Positive relations between children's levels of sustained attention skill over time indicated rank-order stability between ages 18 and 24 months in the degree to which young children sustained attention focus. That is, children who sustained their focused attention for longer periods during play at 18 months tended to exhibit longer durations of focused attention at 24 months of age. These findings support previous research indicating that individual differences in children's capacity to focus attention persist over time in early childhood (Gaertner et al., 2008; Ruff, Lawson, Parrinello, & Weissberg, 1990). Both of these studies found that global ratings of toddlers' observed focused attention skills significantly predicted the same skills measured 12 to 18 months later. Thus, supporting children's development of attention control as early as possible may be important in light of persistence of individual differences in attention skill and the known links between attention control and important developmental outcomes such as academic readiness and behavior problems (e.g., Bellanti & Bierman, 2010; Belsky, et al., 2001; Razza, Martin, & Brooks-Gunn, 2012).

Moreover, small but statistically significant increases in children's average duration of focused attention between ages 18 and 24 months demonstrated the growth in an aspect of the executive attention system during toddlerhood predicted in the literature (Rueda et al., 2005) and shown in other studies (Ruff & Capozolli, 2003; Ruff & Lawson, 1990). Temporal growth in children's attentional persistence is evident from the results, which revealed that children increased the duration of their sustained attention during play in toddlerhood. These results are

consistent with previous evidence that the average bout duration of sustained attention observed during play increases from late infancy to the preschool-age years (Ruff & Capozolli, 2003; Ruff & Lawson, 1990). Qualitative observations of children's attention in this study revealed that at the 18 month visit, many of the children in this sample frequently appeared to focus their attention during play in a reflexive manner. That is, children often shifted their attention from one object among the array of toys to another, and tended to become briefly interested in objects that crossed their visual paths. For example, a child interested in a toy phone accidentally knocks it to the floor, and in shifting his body and attention to the floor, notices a pile of Legos. He then picks up a Lego briefly, dropping it after several seconds, before returning his attention to the toy phone. While this kind of transient bout of focused attention was observed frequently in both the 18 and 24 month observations, increases in the quality and duration of sustained focused attention were noted between the visits. On average the duration of bouts of focused attention increased by approximately 1.5 seconds and the average longest bout increased by 3.5 seconds (though the increase in longest bout duration was not statistically significant at the $p < .05$ level). Moreover, children appeared to increasingly engage in goal-directed and intentional play as they aged. These observations conform to the theory of attention development that proposes the emergence of cursory attentional control in toddlerhood as the executive attention system develops, which prompts increasingly volitional and controlled attention deployment (Rueda et al., 2005). These authors point out that while in the first year of life attention is largely reactive to stimuli, in subsequent months children increasingly develop voluntary control over attention in ways that support of their goal-directed behavior. Thus, the present study offers further evidence of growth in attention control skills during a period of development of the executive attention system.

Stability in Maternal Structuring of Children's Attention Focus

Maternal structuring of child attention focus showed moderate stability over time with respect to inter-correlations among the proportionate frequency of structuring of attention focus exhibited by mothers as well as the degree to which higher levels of structuring at 18 months predicted more frequent structuring at 24 months of child age. Evidence of stability in parents' structuring over time is consistent with prior evidence of rank-order stability during early childhood in several domains of positive parenting (Braungart-Rieker, Hill-Soderland, & Karrass, 2010; Corwyn & Bradley, 2002) as well as aspects of parental behavior that have been specifically associated with aspects of children's attention development including maternal control (Gaertner et al., 2008) and autonomy support (Bindman et al., 2015; Dallaire & Weinraub, 2005). This study is among the first, however, to provide evidence for rank-order continuity in the tendency of mothers to engage in parenting practices specifically targeting children's attentional deployment in the toddler and early preschool years. Research exploring continuity and change in parenting practices that support children's attention skills has tended to focus on the infancy period. For example, mothers efforts to redirect their children's attention during play were positively correlated between observations at 10 and 18 months of age (Bono & Stifter, 2003). Additionally, mothers significantly increased the proportion of time spent distracting their infants during an inoculation procedure between 2 and 6 months of child age (Jahromi et al., 2004). In another study, mothers of very-low birthweight children declined and then increased in their responsive parenting efforts targeting attention maintenance when observed repeatedly during free play with toys between 6 and 13 months of child age (Landry et al., 2006). Within the present sample, previous analyses using growth curve modeling also revealed evidence of longitudinal change with regard to the frequency with which mothers

structured their children's attention focus, which increased between 18 and 36 months of child age (Lindeke, 2011). These findings were mirrored in the repeated measures analyses of variance tests employed in this study, which revealed increases in the proportion of maternal structuring over the toddler and preschool-age period. The current study also adds to this knowledge of longitudinal patterns in parenting practices that support attention by contributing evidence of longitudinal stability in structuring of attention focusing in the second year of life and rank order stability in this parenting behavior from 18 to 36 months of child age.

While longitudinal stability was apparent in mothers' structuring of attention during the toddler years, qualitative changes were noted by coders in the way that mothers in this study structured their children's focused attention over time. Observations of mothers' structuring behaviors suggested that as children aged, mothers made more of an effort to verbally engage their children in the story as they increasingly developed language skills, though they continued to use many physical attention-eliciting cues as well (e.g., pointing to the book). These increasingly complex strategies to engage attention through structuring also may contribute to the statistically significant increase in proportion of maternal structuring apparent between 18 and 24 months of child age noted in this study. This increase may have occurred as a result of mothers' capacity to draw upon a wider variety of child skills that emerge in the toddlerhood, such as growth in child vocabulary (Hart & Risley, 1999). Many mothers appeared to encourage their children to take a more active role in the book reading activity as they grew older. This approach was reflected in their tendency to ask more questions to focus children's attention, such as encouraging them to reflect on characters' emotions and actions in the story or to use future-oriented thinking to consider what might happen next. These findings and observations fit well with the few studies that examine longitudinally mothers' use of various strategies to support

children's attentional deployment during parenting interactions. Among mothers of very-low birthweight children, longitudinal changes were apparent from child ages 6 to 13 months in the frequency of both efforts to maintain and to redirect their infants' attention during play with toys (Landry et al., 2006), suggesting that mothers used different strategies to support children's attention according to their age. Further, in a study examining sensitive parenting behaviors in a joint attention context, positive associations were found between mothers' efforts to follow the focus of their children's attention during joint play when their children were 15 months old and their engagement in facilitative parenting at 30 months of child age, defined as attending to children's interests and facilitating their engagement in the activity (Bigelow et al., 2010). Similarly, the mothers in the present study appeared to be tailoring the manner in which they supported children's engagement in the reading task to the ability level of their children as they developed more advanced cognitive and linguistic skills. The present study, then, provides qualitative support for age-related changes in the manner in which structuring of attention is exhibited while contributing to a scant literature addressing stability and change in parenting practices that target attention in the toddler and early preschool-age years.

Group Differences in Children's Sustained Attention Skills and Parenting

Results of the present study did not support the hypothesized longitudinal relations between children's sustained focused attention during play and mothers' structuring of attention focus during reading interactions or relations between these constructs and duration of children's distraction in a frustrating wait task. Examination of models reflecting different patterns of longitudinal relations between sustained attention and maternal structuring of attention focus revealed independent and longitudinally stable patterns of these two constructs during toddlerhood. Moreover, these aspects of child and maternal behavior did not relate

longitudinally to children's use of distraction during a frustrating wait. Such relations were expected given evidence for longitudinal relations between parenting quality and practices and young children's attention skills, measured in numerous ways including standardized attention control tasks and parent and teacher ratings (Mathis & Bierman, 2015) and observations of infant engagement in joint attention (Mendive, Bornstein, & Sebastián, 2013). Further, rationale for examination of parental structuring of attention focus was further supported by evidence linking mothers' efforts to maintain their 18-month-old children's attention to the amount of focused attention they exhibited during a problem-solving task (Bono & Stifter, 2003). Lack of evidence of longitudinal relations between the constructs studied may be explained by several factors reflecting individual differences among dyads. One possibility is that different relations exist between these behaviors for subgroups within the sample. This possibility was explored with group-level analyses, which yielded preliminary evidence that relations between some study variables operate differently depending upon dyads' level of child skill and amount of observed parenting. Both qualitative and quantitative examination of groups differing in levels of sustained attention and the proportion of maternal structuring of attention focus suggested that these groups may differ in meaningful ways with regard to how parenting and attention are longitudinally related and are associated with emotion regulation development. Four groups of mother-child dyads were examined in follow-up quantitative analyses and qualitative observations: low structuring/low sustained attention skill, low structuring/high sustained attention skill, high structuring/low sustained attention skill, and high structuring/high sustained attention skill groups. Further, it may be that individual differences in the quality of the structuring observed or style in which it was delivered influence whether this parenting practice

supports children's attention development but were not captured by examining only the frequency of parental structuring.

Quantitative analyses revealed that among those dyads in which mothers structured frequently during toddlerhood and children exhibited longer durations of sustained attention, the proportion of structuring of attention at 24 months was negatively related to the proportion of this parenting practice that was observed when children were 36 months old. This association was in contrast to the negative association between structuring of child attention focus at 24 and 36 months of child age among dyads in which mothers structured infrequently and children exhibited shorter duration of focused attention in toddlerhood. This difference provides preliminary evidence that the degree to which parents persist in their efforts to support children's attention during a reading task between the toddler and preschool-age periods is related, at least to some extent, on the level of attention control skills exhibited by their children. This conclusion is consistent with evidence that parents adapt their parenting efforts to the age (and, presumably, skill level) of their children. For example, mothers observed repeatedly with their children during a frustrating wait initiated fewer efforts to actively engage their children in an activity between the ages of 12 and 32 months (Grolnick, Kurowski, McMenamy, Rivkin, & Bridges, 1998). Among some dyads in which children may be lagging in development of attention control, parental support of children's efforts to maintain their attention appears to remain stable into the preschool-age period. This is consistent with previous research suggesting that parental structuring at 36 months of age was negatively associated with child self-regulation in the preschool-age period (Cohen, 2001). Taken together, these results suggest that adopting a strictly developmental approach to understanding relations between attention development, parenting, and emotion regulation does not appreciate the possibility that the time frame of

children's development can be variable and characteristics of dyads may be important for unpacking relations among these constructs. While limitations in the size of groups identified for follow-up analyses indicated that quantitative analyses of group-level differences in the relations between study variables should be interpreted tentatively, these results suggest that it may be important to consider individual characteristics of children when exploring how parenting contributes to child outcomes such as emotion regulation.

The present study contributes to the extant literature by providing support for the notion that person-centered approaches may be beneficial for researchers exploring parental contributions to attention control and emotion regulation development. That some differences were evident between subgroups in associations between these constructs among this relatively low-risk sample raises the possibility that differences may be even more pronounced if subgroups were examined that differed greatly on individual characteristics of either mothers or children. Indeed, some studies have shown that relations between maternal scaffolding and emotion regulation differ depending on child characteristics related to different domains of risk. When mothers' scaffolding and children's emotion regulation were examined longitudinally between child ages 3 and 8 years old, significant bidirectional relations were found between the behaviors for a subgroup of children with developmental delays but not for those who were typically-developing (Norona & Baker, 2014). This research suggests that the contribution of parental support to children's regulatory development may differ based on children's developmental level. Another study found positive associations between maternal verbal scaffolding and toddlers' observed affect during free play if children were born preterm but not for dyads including a child born full term (Erickson et al., 2013). Taken together, these lines of research suggest that parental efforts to support children in their skill development may be

particularly important for children at risk for delayed development and other developmental challenges.

Additionally, research suggests that parental support of emotion regulation development may be less effective for some parents than others depending on their personal characteristics. One parental characteristic that has been found to relate to child emotion regulation development is mental health status. For example, research suggests that depressed mothers are less effective in their emotion-related scaffolding directed at their preschool-aged children than are their non-depressed counterparts (Hoffman et al., 2006) and that maternal depression is related to delayed emotion regulation development in early childhood (Blandon, Calkins, Keane, & O'Brien, 2008). These studies point to the possibility that parental support may be more beneficial for some children than others and that parenting efforts of some mothers may be more helpful than those of others. In light of these differences, it will be beneficial for future studies to adopt methodological approaches sensitive not only to whether, but for which children parental input is particularly beneficial for the development of emotion regulation.

Review of the dyadic interactions of these four groups also revealed qualitative differences in the style and effectiveness of structuring of attention focus used by mothers in these respective groups. Differences were noted among mothers with high proportions of structuring of attention focus but with children who exhibited longer periods of sustained attention when compared to those whose children showed more transient attention to toys during play. When observed engaging with their children in a reading task, both of these groups of high-structuring mothers appeared highly engaged with their children and frequently exhibited physical and verbal efforts to harness their children's focused attention to the task. Such efforts often included pointing to pictures or asking children to label characters or events in the story.

Both of these groups of mothers were also notable in their use of positive affect to engage their children in story-telling, such as gasping when a surprising event occurred or telling the story with a fluctuating or sing-song vocal tone. Despite these similarities, differences were noted in ways in which structuring attempts were delivered between these groups of mothers. Those mothers who structured frequently and whose children sustained attention longer during play appeared to follow their children's lead and to be less directive in their structuring behavior than were mothers who structured frequently but had children with poorer attention skills. For example, when their children suggested looking at a different book or became disinterested in the story and walked to a poster in the room, these mothers followed the focus of their children's attention and engaged them further in the object or activity to which they were attending (e.g., asking questions about the poster). On the contrary, the mothers of children with poorer attention skills who structured frequently worked hard through their animated tone and frequent pointing behavior to keep their children engaged in the story, redirecting them and re-engaging them in the story when they briefly became off task.

Differences were also noted among those mothers who rarely structured, though review of the interactions of these dyads reflected mothers' difficulty maintaining their children's interest in the reading task for both children with better and poorer attention control skills. Qualitative impressions of two dyads including mothers who rarely structured but whose children were among those with better skill at sustaining attention revealed that these mothers rarely attempted to engage the children in the reading task at all, and allowed their children to roam around the room or encouraged them to take the lead in reading the story with little parental input. These qualitative observations offer further support for the notion that mothers whose young children are able to sustain their focused attention appropriately may not feel that it is necessary to

intervene to ensure that their children attend to tasks requiring concentration when they lack the desire and motivation to do so. In contrast, those children with poorer attention control whose mothers structured rarely in the reading task were frequently off-task and distressed by their mothers' attempts to engage them in reading the story, to which they appeared to have neither the ability nor inclination to attend for longer than brief periods of time. These mothers frequently made efforts to redirect their children back to the book or to set limits on their children's behavior (e.g., preventing them from leaving the room) and occasionally attempted to support children in attending to the books through their structuring efforts despite their children's evident lack of interest. For example, mothers in this group sometimes used a sing-song voice to capture their children's attention even when children were crying loudly or were struggling to get free from their lap.

These qualitative differences in the style of structuring of attention observed between these two groups may offer meaningful insight into the tendency of parents to adapt their parenting behavior to the unique needs of their children. On one hand, it may be beneficial for mothers of children with poorer attention control to work hard to engage their children throughout the reading task to provide them experience maintaining their attention. These mothers may be responding to perceived needs of their children for support in maintaining their attention in a way that could foster growth in attentional control over time. It is also possible that the child-directed style observed among the parents of children with better sustained attention skills is particularly beneficial for children and contributes to emotion regulation development in ways that other approaches to socialization do not. Generally, researchers who have studied differences in parenting behavior across domain have posited that a less controlling style of parental socialization is most appropriate for parent-child interaction occurring within

the context of mutually positive and reciprocal interactions, like book reading (Bugental, 2000). Empirical research supports this assertion, as infants engaged in longer durations of sustained attention when interacting with unfamiliar individuals who followed the focus of their attention than when they interacted with more intrusive interaction partners who led infants' attention focus (Miller, Ables, King, & West, 2009). Others have found that parental practices supporting children's autonomy during the first 3 years of life predict the degree to which preschool-aged children sustained attention during a computer task (Bindman et al., 2015). Thus, the less directive style of structuring perceived among parents of those children with better capacities to sustain attention may reflect a style of structuring that offers greater benefits to young children than when parents exert control during a parenting situation by working to keep children engaged in tasks of parents' choosing. In light of these observations, it may be helpful in future studies to consider the quality and style of parental structuring when examining its benefits to children's development of skills such as emotion regulation.

Implications of Cross-Task Differences

Contrary to hypotheses, neither maternal structuring of attention focus nor children's sustained attention skill predicted the degree to which children sustained self-distraction during a frustrating wait at a later time. The lack of these relations even among different subgroups within the sample suggest that it is important to consider differences in aspects of executive attention skill and situational contexts in which it is observed. Such relations were expected in light of studies linking emotion regulation skills to both attention development (e.g., Belsky et al., 2001; Hill et al., 2006) and parenting practices (e.g., Calkins et al., 1998; Davidov & Grusec, 2006). Specifically, it was anticipated that both the ability to sustain focused attention and maternal structuring of child attention focus would contribute to children's ability to sustain self-

distraction efforts during early childhood. It was hypothesized that parental structuring of attention focus may represent a pathway by which children's ability to sustain their attention is harnessed to support children to use attention control purposefully by shifting their attention from a source of distress and maintaining attention on a distracting activity during an emotionally challenging situation. Several reasons may explain the lack of evidence for these expected relations, including the possibility that executive attention skills in an emotionally-charged situation are fundamentally different than those exhibited in a situation with few emotional demands, or that parental support of attention control skills does not generalize well across context. Each of these explanations will be explored within the context of literature on attention control and parenting practices.

The lack of predicted longitudinal relations between children's sustained attention in a free play task and their ability to sustain bouts of focused self-distraction may be due to distinctions between children's attention-based emotion regulation skills and executive attention skills observed when they do not feel emotional pressure. Despite the links between attention control and emotion regulation abilities noted earlier, some researchers have argued that executive functioning, of which executive attention is a component, is comprised of separate but distinct factors representing emotional and behavioral regulation. A confirmatory factor analysis of items comprising the Behavior Rating Inventory of Executive Function (BRIEF) supported separate factors for emotional and behavioral regulation when fourth graders were rated by their parents and teachers regarding their executive function skills (Egeland & Fallmyr, 2010). Other researchers have found that children's effortful control, or the ability to suppress a dominant response in favor of a subdominant response, operates differently during emotionally-charged tasks than those which are abstract or do not tend to elicit strong emotions. Specifically, in one

study preschoolers were observed during a "hot" delay of gratification task and a "cool" task in which they exerted effortful attention (e.g., stroop-like tasks where children must attend to one aspect of a stimuli but not another). The authors found that the two types of tasks did not contribute to the same child outcomes, such that "hot" tasks predicted academic outcomes while "cool" tasks predicted behavioral outcomes (Kim, Nordling, Yoon, Boldt, & Kochanska, 2013). These lines of research suggest that the degree to which a child is emotionally aroused in a situation is an important factor when considering children's engagement in higher order cognitive processes (such as attention control) and the behaviors associated with these executive systems.

While the studies cited above do not focus explicitly on the process of sustaining attention, they do offer some explanatory basis for why relations between sustained attention during play and children's ability to sustain distraction during a frustrating wait task were not significant as was predicted. The present study suggests that developing the ability to engage focused attention for prolonged periods of time does not in and of itself provide the foundation needed for children to divert their attention away from a blocked goal and maintain it in an alternate activity when attempting to delay gratification. Perhaps experiencing a heightened emotional state interferes with the attentional processes that children are able to exhibit outside of frustrating situations. In order to successfully sustain a distraction, other skills may be more important than children's capacity to sustain their focused attention. It may be that other skills related specifically to emotion regulation (such as future-oriented thinking, language, or distress tolerance) must also be well-developed in order for children to call upon their attention control skills to enact regulatory behavior during a frustrating wait.

Contrary to hypothesized relations, parental support of children's attention focus in a reading task did not predict children's ability to sustain self-distraction in a wait task. Such

relations were expected in light of evidence that self-regulation in the preschool-age years has been linked to earlier parental scaffolding (Hoffman et al., 2006) and attentional persistence (Belsky et al., 2001), which was the child skill targeted in the parental structuring efforts examined in the current study. While it was believed that parental support of attention control skills would contribute to children's distraction skill, in light of the lack of longitudinal relations between these skills it may be important to consider the impact of the context in which these parenting practices were observed. Several researchers have proposed that parental socialization is best understood as domain-specific, such that parental socialization practices differ depending on the type of social interaction in which caregiving occurs (Bugental, 2000; Grusec & Davidov, 2010). For example, some situations may require more child compliance (e.g. cleaning up toys, getting ready to leave the house) while other situations may engender more opportunities for guided learning (e.g. mother-child play time). A domain-specific approach would posit that the parental behaviors observed in a reading task may operate differently than behavior exhibited by parents while supporting their children through a frustrating wait.

Indeed, some researchers have suggested that there may be an important distinction between positive parental input provided when a child is in distress and that which is offered during a neutral or positive interaction. Leerkes, Blankson, and O'Brien (2009) observed mothers' sensitivity to distress and nondistress when their children were 6 months old and found that sensitivity to distress was uniquely related to fewer behavior problems and higher social competence when their children were 24 and 36 months old. The authors found that for children high in negative reactivity, their mothers' sensitivity to distress was associated with less affect dysregulation. Further, sensitivity to nondistress only predicted lower affect dysregulation in the context of high sensitivity to distress. While this study focused on parenting of infants and not

toddlers or preschool-aged children and did not focus specifically on parenting practices targeting attention, it offers one possibility for why parental structuring of attention focus in a reading task was not a salient contributor to children's attention-based emotion regulation efforts. In line with the study described above, one could conclude that parental support of attention may be helpful for children's emotion regulatory efforts *only* when it is offered in response to a child's distress. That is, while it is possible that parental structuring during a reading task could support children's skill development in some areas (such as academic engagement or pre-literacy skills), perhaps only structuring of attention focus in response to distress supports children's use of self-regulatory skills in an emotion regulation task.

Limitations & Future Directions

That findings of the present study did not support the predicted relations between children's sustained focused attention, maternal structuring of attention focus and children's subsequent distraction use highlights the need for additional research to answer questions about how children come to increase the duration of their distractions. Examination of the results of the study within the context of the extant literature on parenting and child attention control raises important questions for future research and points to several limitations of the study design that may have impacted its findings.

One limitation of the study was that parental structuring of attention focus during reading occurred quite frequently among many of the mothers in the sample so may not have shown sufficient variability to allow for robust prediction of the other behaviors examined. Specifically, on average, mothers targeted their children's attention focusing more than 75% of the time they structured during the reading task at each age. One infers, then, that the behaviors observed (e.g., pointing, asking questions about what a child is focused on) are common forms of

parental input among mothers of young children during a reading task. As such, they may not be powerful determinants of temporal dynamics of distraction behavior, which in the present sample showed a great deal of variability as indicated by standard deviations that tended to be equal or greater than the average mean.

The design of this study reflects a relatively stringent test by focusing on a very specific aspect of parental behavior and looking for predictive relations across time and task. This was a mindful decision, as it was hoped that evidence could be found that children's development of distraction is aided by a parenting practice that is commonly exhibited among many parents and because parental book reading has been widely targeted as an important contributor to literacy development (see Bus, van IJzendoorn, & Pelligrini, 1995 for a meta-analytic review). The results suggest, however, that future research should broaden the scope of parental behavior examined, such as by looking at specific parenting behaviors exhibited within a different context of interaction or by considering the interaction between parenting practices and parenting quality.

Given theoretical models proposing that parental socialization practices are domain-specific (e.g., Grusec & Davidov, 2010), it may have been more prudent to assess parenting behavior in the context of the desired child outcome. That is, whether parental structuring of children's attention focus predicts children's ability to sustain their efforts at self-distraction when both are measured within emotionally-challenging situations remains an open question for future research. Indeed, there is some support for this possibility, given evidence that parental responses to distress are more salient to children's emotion regulation development than responses to nondistress (Leerkes et al., 2009). Future research, then, may be more successful at identifying relevant parenting behaviors that support children's distraction skills by considering

how parents encourage their children to delay their gratification and focus on an alternate activity when distressed. Further, while cross-lagged pathways were not significant between any of the ages examined in the models tested in this study, there is evidence that the timing of parental interventions is important for child outcomes (Landry et al., 2008). In light of this, it remains important for future research on parental contributions to child development to focus on identifying specific periods of time in early childhood in which parenting practices have a meaningful relation to child outcomes.

In light of qualitative differences observed in the manner in which parents engaged in structuring of attention focus, it may be important to consider the quality with which specific parenting practices are displayed. As discussed earlier, some parents attempted to structure children's attention to the story to little effect because their children were already highly dysregulated and unmotivated to read with their parents. Further, mothers differed in the degree to which their structuring efforts fostered active engagement from their children rather than a passive role as an attentive listener in the task. While this dissertation represented an effort to move beyond measures of parenting quality to highlight specific parenting practices offering clinical utility due to their teachable nature, more robust results may have emerged if only high-quality parental structuring behaviors had been considered, or if interactions between frequency and quality of parenting practices were examined. Certainly, there is ample evidence that the quality of parenting behavior matters for a variety of child outcomes including cognitive development (Lugo-Gil & Tamis-LeMonda, 2008), social adjustment (Haskett & Willoughby, 2007), and emotion regulation (Calkins et al., 1998). To be useful for clinicians attempting to support parents' efforts to parent their young children effectively, however, researchers must focus on identifying specific parenting practices that can be modeled and taught. As such, it may

be useful to identify qualitative aspects of the structuring behaviors observed in this study that were more or less effective at harnessing children's attention.

The results presented were conducted at a group level in hopes of capturing developmentally-specific relations among children's observed distraction skills and parental structuring behavior. However, follow-up qualitative and quantitative examination of groups of dyads within the sample suggest that a person-centered analytic approach may have better captured the relations between the constructs measured in this study. Indeed, researchers have noted individual differences in early childhood both in children's ability to deploy focused attention during play (Gaertner et al., 2008; Ruff et al., 1990) and their ability to regulate their emotions effectively (Blandon et al., 2008). In light of these individual differences, it is a limitation that this study was developed to examine group-level relations between parental and child behavior and that the size of the groups identified in follow-up analyses limited the ability to fully interpret comparisons of the study models across groups. Future researchers may be more likely to detect longitudinal relations between parental structuring of attention, children's attention control skills, and development of self-distraction by designing and carrying out research studies that adopt a person-centered approach to capture variability in relations between parenting and emotion regulation development among individuals who differ systematically from one another. Such an approach would take into account that children's development of attention control and emotion regulation occurs on a variable timeline and that parents likely respond to the unique needs and developmental level of each individual child.

Another limitation of the study is its focus exclusively on the behavior of mothers towards their children without considering the role of fathers. The inclusion of only mothers in this dissertation occurred because videotaped observations of father-child interactions were not

available due to the design of the longitudinal study, which limited parenting observations to mothers who were more often available to bring their children to the laboratory. However, we do not assume that structuring of focused attention is a behavior exclusive to mothers or that the behavior of fathers does not play an important role in the development of a young child. Indeed, there is growing acknowledgement that the ways in which fathers engage with their children have a measurable impact on their children's outcomes in a variety of domains (for reviews of relevant literature, see Sarkadi, Kristiansson, Oberklaid, & Bremberg, 2008, and Parke, 2004). In fact, one study in which mothers and fathers were observed during semistructured play with their 10 month old infants revealed that mothers and fathers were equally likely to exhibit efforts to engage their babies in joint attention and fathers were less intrusive in these efforts than were mothers (Martins, Mateus, Osórui, Martins, & Soares, 2014). While assessment of fathers' structuring behavior was outside of the scope of this dissertation, future studies should explore how fathers' efforts at supporting children's attention control development contribute to child outcomes including emotion regulation.

Furthermore, this study focused on a relatively specific population of economically-strained families. Sampling for families that fit these criteria was an intentional decision of the principal investigators of the longitudinal study from which data for this dissertation were drawn. Focus on economically-strained families was undertaken to increase variability in several study variables of interest including parenting quality and language development, but to avoid negative factors related to poverty or protective factors associated with economic advantage (Hart & Risley, 1995). While this decision offered advantages with respect to increasing the variability of behaviors and outcomes, it impacts the degree to which study results can be generalized, as

the patterns observed cannot be assumed to apply to families living in different socio-economic environments.

Finally, the present study was limited by the decision to observe and code children's sustained attention skills at two time points (18 and 24 months of child age) rather than at three time points as was initially planned by the author of the dissertation. Initially, it was anticipated that children's sustained attention would be observed during a period of free play in which mothers were present at the table with their children. However, when coding of these interactions began, it became apparent that mothers were highly engaged in the free play activities of their children, such that children's sustained focused attention could not be effectively measured due to frequent interruptions by their mothers during their play. Measuring children's sustained attention while mothers' attention was diverted allowed the opportunity to better measure children's independent sustained attention skills, but limited the availability of observations to only two time points rather than the three initially intended. While it is possible that relations between sustained attention and other study variables would have emerged at 36 months of child age, given the stability of attention skills across the two time points examined and lack of relations with maternal structuring of attention focusing, significant longitudinal pathways may not have emerged had this additional time point been included in the study. Nonetheless, it remains an open question whether relations between structuring of focused attention and children's sustained attention skills exist that were not captured within the timeframe of the study. It may be that parental structuring of children's attention during reading contributes to children's sustained attention skills during infancy or after 48 months of age. A longitudinal design capturing a broader span of time may reveal periods of time where such parental input is important for the development of sustained attention and self-distraction.

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Curriculum Vitae

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EDUCATIONAL BACKGROUND

Ph.D.	Clinical Psychology, The Pennsylvania State University, August 2015
M.S.	Clinical Psychology, The Pennsylvania State University, December 2011
B.A.	Psychology, Williams College, June, 2006

AWARDS AND HONORS

2013 & 2014	Linda Brodsky Strumpf Liberal Arts Centennial Graduate Endowment Travel Award
2010-2012	The Faris Endowment Travel Award (recipient each year)
2008-2009	The Pennsylvania State University Distinguished Graduate Fellowship
2006	Inducted into Sigma Xi, The Scientific Research Society
2005-2006	Williams College 1960's Scholar in Psychology
2003-2006	Williams College Dean's List

GRADUATE EXPERIENCE

Clinical: Doctoral Intern, Devereux Brandywine Residential Treatment Facility, 2014-2015
Neuropsychological Evaluator, The Penn State Psychological Clinic, 2010-2014
Staff Therapist, The Penn State Psychological Clinic, 2009-2013

Research: Research Assistant, Development & Context Lab, Penn State University, 2010-2014
Coding Supervisor, Development of Toddlers Study, Penn State University, 2008-2014
Research Assistant, Collaborative Family Study, Penn State University/UCLA, 2009-2010
Study Interviewer, Maternal Emotion Regulation Project, Penn State University, 2008

Teaching: Graduate Instructor, Introduction to Clinical Psychology, Penn State University Park Campus, Spring 2014
Graduate Instructor, Introduction to Clinical Psychology, Penn State World Campus, Fall 2013
Graduate Instructor, Adolescence, Penn State World Campus, Summer 2013

SELECTED PAPERS AND PRESENTATIONS

Witherspoon, D., **Daniels, L. L**., Mason, A., & Smith, E. (submitted) Racial attitudes in context: Examining mediation of neighborhood factors on children's adjustment. *Journal of Child and Family Studies.*

Mary A. E. Lindeke, Phyllis Lee, & Pamela M. Cole. Parent Stress and Parenting Quality and Quantity in Early Childhood. Paper presented at the Biennial Meeting of the Society for Research in Child Development. April 20, 2013. Seattle, Washington.

Mary A. E. Lindeke, Keith A. Crnic, & Pamela M. Cole. Parenting as Adaptation: Relations Between Early Childhood Temperament and Maternal Structuring. Paper presented at the Biennial Meeting of the Society for Research in Child Development. April 1, 2011. Montreal, Quebec, Canada.