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**CHILD EMOTION REGULATION AND ATTENTION CONTROL IN PRE-
KINDERGARTEN: ASSOCIATIONS WITH PARENTING STRESS, PARENT WARM-
SENSITIVITY, AND PARENT NEGATIVE CONTROL**

A Thesis in

Psychology

by

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ABSTRACT

The ability to regulate emotions and to control attention plays a central role promoting children's school readiness. These two aspects of self-regulation demonstrate remarkable growth during the preschool years, and enhance children's abilities to modulate their reactions and direct their attention, behavior, and emotion in goal-oriented ways. Parenting represents an important and understudied influence on the development of emotion regulation and attention control among preschool children. This study evaluates hypothesized associations between three aspects of parenting and child attention control and emotion regulation skills among pre-kindergarten children growing up in economically disadvantaged families. It focused on three aspects of parenting: 1) stress and distress in the parenting role, 2) the degree of warm-sensitivity evident in the parent-child relationship, and 3) parental negative control. Using multiple measures to assess aspects of each construct, structural equation modeling was used to assess the relationship between the three aspects of parenting and child emotion regulation as well as attention control. Parenting stress and parent negative control was found have a significant, unique relation with child emotion regulation. In addition, parent negative control was found to have a significant, unique relation with child attention control. Parent negative control was not found to mediate the relation between parenting stress and child emotion regulation. Implications for practice and policy are discussed.

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Introduction

Two aspects of self-regulation – the ability to regulate emotions and the ability to control attention – play a central role promoting children’s school readiness (Blair, 2002). These two aspects of self-regulation demonstrate remarkable growth during the preschool years, and enhance children’s abilities to modulate their reactions and direct their attention, behavior, and emotion in a goal-oriented manner (Cole, Martin & Dennis, 2004; Hughes, 2011). Although inter-twined developmentally, existing research suggests that emotion regulation and attention control each contribute in unique ways to children’s capacities to engage effectively in the classroom, as they promote flexible problem-solving skills and goal-oriented learning, and allow children to form positive relationships with teachers and peers (Blair, 2002; Raver et al., 2011). Children who enter school with significant delays in either emotion regulation or attention control are at considerable risk for academic and behavioral adjustment difficulties (Graziano, Reavis, Keane and Calkins, 2007; Raver & Knitzer, 2002; Shonkoff & Phillips, 2000). Given the importance of self-regulation skill development to school readiness, more research is needed to explore and understand the developmental determinants of these skills.

Parenting represents an important and understudied influence on the development of emotion regulation and attention control among preschool children (Lengua, 2002). Existing research suggests that children growing up in poverty are often delayed in the development of these regulatory skills – an effect that might operate largely through its impact on parenting. For example, researchers have found that economically disadvantaged parents experience elevated rates of stress and depression, which may in turn negatively affect their children (Liaw & Brooks-Gunn, 1994). Socio-economic disadvantage is also associated with reduced levels of warm-sensitivity and availability in the parent-child relationship (Eccles & Harold, 1996). In

addition, socio-economic disadvantage stresses parenting and can contribute to higher rates of harsh and inconsistent parenting practices as well as negative control tactics (Brody et al., 2003; Conger, Ge, Elder, Lorenz & Simons, 1994; Pianta and Egeland, 1990).

Although existing research suggests that these aspects of parenting and parent-child relationships during early childhood are associated with the development of child self-regulation skills and associated school readiness, this research is limited in a number of ways. Relatively little research is focused on how aspects of parenting and the parent-child relationship quality are associated with individual differences in the specific preschool self-regulation skills that have a direct impact on social and academic success in school. In addition, researchers interested in the child's development of attention control often use different measures in their assessments of child skill development and parenting determinants than researchers interested in the child's development of emotion regulation. This leaves open the question of how inter-related emotion regulation and attention control are as children prepare to enter kindergarten, and whether the qualities of parenting and parent-child relationships that support these two areas of regulatory control are similar or different.

This study addressed these issues by evaluating hypothesized associations between three aspects of parenting and child attention control and emotion regulation skills among pre-kindergarten children growing up in economically disadvantaged families. It focused on three aspects of parenting that have been linked theoretically and empirically with the development of child emotion regulation and attention control skills in early childhood: 1) stress and distress in the parenting role, 2) the degree of warm-sensitivity evident in the parent-child relationship, and 3) parental negative control. In the following sections, I review existing research describing attention control and emotion regulation skills as they are typically defined and measured during

the preschool years. Then, I review existing research documenting links between parenting and parent-child relationship quality and these two aspects of self-regulation in early childhood.

Finally, I present the hypotheses, analysis and findings of the study.

Self-Regulation of Attention and Emotion

Self-regulation is a broad term used to describe various aspects of self-modulation including the regulation of behaviors, emotions and attention in response to environmental demands. It includes the ability to comply with requests and commands (even when unwanted), to delay obtaining a wanted item or goal, to start and stop actions according to the expectations of a particular setting, and to generate socially acceptable emotional reactions. Claire Kopp (1982; 1989; 2002) describes several phases of self-regulation development, as children mature from infancy through the late preschool period. Over the course of these years, dramatic progressions occur, as young children shift from a reliance on external sources (primarily caregivers) to provide regulatory control of behavior, attention, and arousal to the capacity for self-regulation using internal cues and skills (Spinrad, Stifter, Donelan-McCall & Turner, 2004). During infancy and early toddlerhood, children are heavily dependent on caregiver support for regulatory control. They require their caregiver to direct their attention to important aspects of the environment and direct their attention away from events that are too emotionally arousing (Crockenberg and Leerks, 2004; Gross & Thompson, 2007; Jahromi, Putnam & Stifter, 2004). However, as children mature, language and other cognitive capacities come on board, such as the ability to recognize their own different states of arousal and their understanding that these states can be altered by caregivers or by themselves (Dunn, Bretherton & Munn, 1987). They also begin to develop their recall memory which allows them to remember past events so that they can organize and categorize what makes them upset and attribute a cause to their feelings as well

as recall what can reduce their arousal state and thus build their repertoire of regulation strategies (Cole, Dennis, Smith-Simon & Cohen, 2009). This combined with the capacity to anticipate events, learn from past experience, and plan their behaviors allows for the child to begin regulating themselves on their own and they become increasingly capable of independently monitoring and regulating their own behavior (Cole et al., 2011; Kopp. 1989). These cognitive capacities are required before a child is able to regulate their internal states as well as have the capacity to internalize parental and societal expectations of behavior and apply those expectations to their current situation. Kopp suggests that this transition from external to internal control begins at about two years old and the transition continues through about age four years old (Cole et al., 2011). Given that self-regulation is a very broad construct, this study is interested in two specific aspects of self-regulation: the regulation of emotion and the control of attention.

Emotion regulation refers to an individual's ability to initiate or change the intensity and/or duration of an activated emotion depending on the goals of the individual as well as their current circumstances (Cole et al., 2004; Gross & Thompson, 2007). Being able to regulate emotions in accordance with one's goals and social context is an important and complex skill-set that undergoes significant development during the preschool years (Cole, Michel, Teti, 1994). Emotion regulation skills promote school adjustment, allowing children in preschool to cope effectively with new learning and social demands. In addition to supporting the initiation of social interactions and learning activities, emotion regulation is needed to sustain persistence in the face of obstacles or challenges. Preschool children who have high levels of emotion regulation are able to cope well with disappointment or frustration and are able to control their temper when there is a disagreement. On the other hand, preschool-aged children who have low

levels of emotion regulation are more emotionally reactive, are less likely to cope well with frustration and are less able to accept when things are not going their way (Eisenberg, Fabes, Murphy, & Maszk, 1995).

Attention control is defined as the ability to maintain focused attention on relevant aspects of the environment while successfully ignoring distractors over a period of time. It also includes the capacity to shift attention, as needed, and to sustain attention over time. Attention control undergoes considerable development between the ages of 3 and 5, when there is an increase in neural connectivity and rapid growth of the prefrontal cortex. This neural growth supports the maturation of a set of specific cognitive skills that enable planned, goal-directed activity and flexible problem-solving. These inter-related skills, which include working memory, attention set-shifting and inhibitory control, are referred to as executive function (EF) skills (Blair, 2002; Eslinger, 1996; Klein, 2003; Shonkoff & Phillips, 2000; Welsh, 2002; Zelazo & Frye, 1998; Zelazo, Muller, Frye & Marcovitch, 2003). EF skills enhance children's capacities to control attention in challenging settings and to allocate attention resources effectively and efficiently in the preschool classroom (Blair, 2002; Blair & Diamond, 2008). In the classroom setting, preschool children who have high levels of attention control are able to complete activities before moving on to the next task, are alert and interactive, and are able to stay on task in the classroom (Blair & Diamond, 2008). Preschool-aged children who have low levels of attention control tend to be off-task more often, have poorer inhibitory control, and are easily distracted (Campbell, 2002).

Emotion regulation and attention control tend to be correlated as each one relies, in part, on the other. For example, a useful strategy for regulating emotion is shifting attention away from the emotion evoking stimulus (Kopp, 2002). Eisenberg et al. (2005) assessed attention

control via teacher and parent report as well as emotion regulation via a frustration tolerance task and found that emotion regulation was significantly correlated with parent ratings of attention ($r = .20$) and teacher ratings of attention ($r = .22$). Children with deficits in either emotion regulation or attention control tend to have poor social relationships with peers, receive more negative attention from teachers, and demonstrate poorer academic achievement at school entry (Hughes & Ensor, 2009a; Eisenberg et al., 2005).

Research on the development of emotion regulation during infancy and early childhood has featured parenting and parent-child relationship quality centrally as a potential source of individual differences in children's development of emotion regulation skills (Dennis, 2006; Eisenberg et al., 2003). Studies on the developmental roots of low attention control at school entry have tended to focus on genetic or biological explanations, but increasingly there is a recognition that parenting and parent-child relationship quality may also affect the development of attention control (Campbell, 2002; Kochanska, Murray, & Harlan, 2000; Lengua, Honorado, & Bush, 2007). However, it is not clear whether similar aspects of parenting are associated with child emotion regulation and attention control during the preschool years, or whether different aspects of parenting may contribute uniquely to emotion regulation vs. attention control. In the following sections, I review the existing research literature to summarize the available evidence linking various aspects of parenting and parent-child interaction quality to the development of child emotion regulation and attention control skills. The review is organized into three sections, examining the effects of: 1) parenting stress, 2) parental warm-sensitivity, and 3) parent negative control.

Parenting Stress and Child Self-Regulation

Children in low-income, disadvantaged families are often at high risk for entering school with deficits in self-regulation (Lengua, 2002; Noble, McCandliss, & Farah, 2007). Children who grow up in poverty are more likely than their advantaged peers to experience a number of family risk factors including: parental emotional distress, negative family life events and parental depression (Anthony, Anthony, Morrel, & Acosta, 2005; Liaw & Brooks-Gunn, 1994; Rutter, 1993; Sameroff & Seifer, 1990). The impact of poverty on parents' emotional well-being may affect their children's development of self-regulation. Parents who are economically disadvantaged often experience high levels of stress and demoralization, hindering their ability to provide a strong foundation for their child's development (Liaw & Brooks-Gunn, 1994).

Stress that parents experience in their daily lives may influence how parents interact with their child and thus, effect the development of children's regulatory skills (Blair, 2006; Ceci, 1991; Cicchetti, 2002). Specifically, the everyday demands of the parenting role can create significant stress in all parents at some point in time. For example, every parent experiences frustration at cleaning up messes, a child's complaining, and arguments about bedtime, but if these parenting stresses accumulate over a period of time, and it becomes a chronic source of frustration it can become a significant stressor in a parent's life. Likewise, it can lead to a lack of perceived closeness between themselves and their child and/or a sense that their child does not fully appreciate or support them in their parenting role (Arnold, O'Leary, Wolff, & Acker, 1993). Abidin (1992) suggests that parenting stress is the discrepancy between the demands of parenting (e.g. emotional, physical and/or monetary) and the resources available to meet those demands. Parents who experiences this discrepancy and the resulting stress are more likely to get into arguments with their children, yell, and physically reprimand their children. Thus,

researchers have hypothesized that parents who are experiencing stress in the parenting role are more likely to act in ways that model maladaptive regulation strategies and are less likely to teach their children effective regulation strategies likely resulting in maladaptive regulation skills in their children (Arnold et al., 1993, Halberstadt, Crisp & Eaton, 1999; Sroufe, 1995). For example, parenting stress has been found to be a predictor of poorer parenting practices (Calkins, Hungerford, & Dedmon, 2004; Kazdin & Whitley, 2003) as well as higher levels of behavior problems in children (Barry, Dunlop, Cotten, Lochman & Wells, 2005; Crnic, Gaze & Hoffman, 2005; Crnic & Greenberg, 1990, Podolski & Nigg, 2001; Tervo, 2010).

Additionally, if a child has a tendency to be dysregulated, this would increase the demands on the parenting role and therefore increase the likelihood of parents feeling stress in that role. Thus, stress in the parenting role is affected by the family environment and it also affects the family environment. Therefore, it has the power to disturb the whole family system. For instance, Patterson (1983; Patterson & Fisher, 2002) describes that parents who experience minor daily stresses were more likely to have negative responses to their children and these negative responses, in turn, increased the likelihood of children responding aggressively to the parents creating a cycle of stress and distress. Because of this feedback relationship, the direction between parenting stress and child behavior problems is difficult to tease apart (Crnic & Low, 2002).

Parenting stress and child emotion regulation. While the relation between parenting stress and child behavior problems is well supported, the relation between parenting stress and some of the regulatory mechanisms that might contribute to this relation, such as the regulation of emotion, is less well studied. One of the few studies that has looked at the relation between parenting stress and emotion regulation was conducted by Chazan-Cohen and colleagues (2009)

who measured parenting stress using the Parenting Stress Index – Short Form, when the child was 14 months old. Four years later, when children were 5 years old, their emotion regulation skills were assessed by observers following the child assessment protocol. Results showed that parents who felt less stressed in the parenting role when the child was 14 months old had children with higher levels of emotion regulation skills when the child was 5 years old.

One other study that looked at the association between parenting stress and emotion regulation was conducted by Williford, Calkins and Keane (2007). The authors measured parenting stress using the Parenting Stress Index – Short Form which was completed by the primary caregiver when the child was two, four and five years old. In addition, they measured child emotion regulation at age 2 using two tasks from LAB-TAB (a locked-box task, and restraint in a high chair without toys or food). Emotional reactivity ratings reflected the frequency of child distress observed during the tasks and emotion regulation ratings reflected the child's use of both effective and ineffective regulatory behaviors. Child emotional reactivity predicted parenting stress at age 2 (along with single parenthood, maternal psychopathology, and child anger proneness), and child emotion regulation predicted stability (or change) in parenting stress over time among children who also had externalizing problems. These two studies thus suggest developmental links between parenting stress and child emotion regulation.

Parenting stress and child attention control. Several studies have also documented associations between parenting stress and attention control in children (Breznitz & Friedman, 1988). For example, Barry et al. (2005) examined the association between stress in the parenting role and child attention control in elementary-school-aged children. Parenting stress was assessed using the Parenting Daily Hassles measure and attention control was assessed by parents and teachers using the attention subscale of the Child Behavior Checklist and the Teacher Report

Form, respectively. Stress in the parenting role was significantly related to parent-reported child attention control and marginally related to teacher-reported child attention control.

Razza, Martin and Brooks-Gunn (2010) also examined the relation between maternal stress (a combined score reflecting depressed mood and stress in the parenting role) when children were 3 years old and child attention when children were 5 years old (as measured by the attention sustained task from the Leiter International Performance Scale – Revised). They found no significant effects linking parenting stress and child attention control, but there was a separation of two years between the assessment of parenting stress and child attention control, which may have reduced any possible association.

From a theoretical standpoint, it has been postulated that exposure to high levels of stress (including unavailability, or irritability) may impede the development of child attention control in early childhood by over-stimulating the child's stress receptors (Blair, 2002; Essex et al., 2011). That is, stress activates the hypothalamic-pituitary-adrenal axis (HPA axis), one of the body's stress response systems, which regulates the release of cortisol and cortisol, in turn, activates the amygdala. Chronic stress stimulation due to exposure to extreme stress may affect brain development and may alter the body's biological reactivity to stress (Cicchetti, 2002; Essex et al., 2011). Supporting this hypothesis, children who experience abuse, trauma, neglect or other incidents that cause great stress in the early years of development tend to have problems with attention, as well as with emotion dysregulation and delays in language development (Cicchetti, 2002; O'Connor et al., 2000). When children are exposed to less extreme types of stress, such as stressful daily hassles, studies have similarly found that children exhibit atypical cortisol levels (Brennan et al., 2008; Essex, Klein, Cho, & Kalin, 2002; Halligan, Herbert, Goodyer, & Murray, 2007; Lupien, King, Meaney & McEwen, 2000) reflecting heightened activation of the amygdala

(Davis, Walker & Lee, 1997) which is detrimental to the development of attention (Blair, 2002). This may be one mechanism whereby children whose parents are experiencing stress may be more likely to have developmental delays in their self-regulatory skills (both emotion regulation and attention control) compared with children who do not have these experiences (Goldsmith & Rogoff, 1997; Lengua et al., 2007; Li-Grining, 2007). However, the available empirical support for this hypothesis is weak. The significant association between parenting stress and child attention control found by Berry et al. (2005) may reflect shared method variance, given that parenting stress was significantly associated only with parent-rated attention control, and Razza et al. (2010) found no significant association.

In summary, stress in the parenting role is often associated with behavior problems in young children and the regulatory mechanisms that might be associated with this relation need to be explored. To some extent, this association may reflect the direct impact of parental distress and negative affect on child development, transmitted via the modeling of negative affect, and the elicitation of HPA stress reactivity in the child. In addition, researchers suggest that parenting stress may affect the development of self-regulation skills indirectly, by reducing the quality of parent-child interactions, particularly parental warm-sensitivity (Bureau, Easterbrooks, & Lyons-Ruth, 2009; Feng, Shaw, Skuban & Lane, 2007; Gunnar & Vasquez, 2006; Meaney & Szyf, 2005; Sanchez, 2006).

Parental Warm-Sensitivity and Child Self-Regulation

Theoretical models of child social-emotional development highlight the role that high-quality parent-child relationships play in supporting the development of children's regulation skills during early childhood (Calkins & Johnson, 1998; Cole, Teti, & Zahn-Waxler, 2003). In particular, parental warm-sensitivity has been identified as an important scaffold for child

regulation. Sensitivity has been defined as the parent's availability, attentiveness and appropriate responses to the child's cues. Sensitivity also requires that the parent accurately interprets their child's signals and responds accordingly (Calkins, & Hill, 2007; Dennis, 2006). For example, during a play activity, a sensitive parent will be highly attentive to the child's activities and often comment on the activities in a way that encourages the child's interest and ideas and responds to the child's remarks with stimulating comments of their own. Kopp (1989) describes a sensitive mother as one who uses appropriate techniques to soothe their infant based on the child's need. For example, a mother who always uses physical contact or food to sooth their infant, no matter what the child's ailment, is not being sensitive to the child's specific needs. In contrast, a parent who uses soothing techniques geared toward the child's particular distress, such as using physical contact when the child experiences pain and using distraction and engagement in the environment when the child experiences boredom, is being sensitive to the child's needs and responding accordingly. In this way, the child is able to learn a collection of techniques to modulate their arousal level which has implications for the child's later self-regulation. Parental warmth reflects the degree to which parent-child interactions are characterized by positive affect (e.g. smiling, laughing) and expressed affection (e.g., praise, tenderness, physical affection) (Darling & Steinberg, 1993). For example, during a play activity, a warm parent will use a lot of praise and explicit shows of affection (either spoken or physical). Children who receive warm and sensitive parenting are likely to show enhanced social-emotional development and school readiness skills (Campbell, 2002; Denham et al., 2000; Eisenberg & Fabes, 1998; Landry, Smith, Swank, & Miller-Loncar, 2000).

According to Kopp (1982), the caregiver's warm-sensitivity plays an important role in the development of self-regulation in young children. In the first few months of life, the state of a

child's arousal level is significantly dependent upon and facilitated by the caregiver's interventions including social interactions which direct the child's attention to important aspects of the environment as well as daily routines which support the regulation of sleep/wake cycles. As children grow and are between a year to a year and a half old and the child becomes mobile, the caregiver's role in aiding the child to learn self-control is extended to how the child interacts with other people and their environment. By two and three years old, the development of self-regulation starts to shift from external control to internal self-direction. However, children at this age are just starting to use strategies for self-control, so they cannot yet generate multiple complex strategies or reason and extrapolate the consequences for their actions and modify their behavior appropriately (Cournoyer & Trudel, 1991; Stransbury & Sigman, 2000). Thus, at this stage, it is vital that the caregiver is sensitive to the child's capabilities and provides support and guidance to their child when and how they need it to allow the child to continue building on their current skills. Therefore, the parent's ability to be sensitive to their child's needs and their ability to respond appropriately to them is an important skill that is necessary for the child to regulate their arousal levels in the first few years of their life. However, the parent's role shifts from directly affecting their child's arousal state to facilitating the child's capacity to regulate for themselves as the child matures.

Evidence of the parent's role in aiding the development of children's self-regulation also comes from physiological studies. Decreased cortisol responses to stress begin in the first year of life and continue into childhood, but these relations have been found only among children with warm-sensitive parents. Studies have also found that toddlers and preschoolers, who have supportive relationships with their parents, have decreased cortisol reactivity during stressful life situations such as a doctor's visit, exposure to new people, to new environments or to scary toys;

whereas children with less sensitive and non-supportive parents show increased cortisol reactivity (Gunner & Donzella, 2002; Gunner & Quevedo, 2006; Gunner & Vasquez, 2007). This suggests that warm and sensitive parents help their children regulate their arousal and stress levels early in life and as these children get older and move into the preschool years, they become better able to regulate their own arousal in stressful situations.

Interestingly, some researchers posit that the link between parental warm-sensitivity and the development of attention control is due, in part, to parent's use of language when they are responding with warm-sensitivity to their children. Parents who respond sensitively to their child's needs often use both non-verbal behavior and verbal cues to support their child's behavior. The verbal cues involved in parental sensitivity may aid children in using speech to self-calm and self-direct, thereby allowing them to better regulate their own behavior in situations when the parent is not present (Hammond, Muller, Carpendale, Bibok & Liebermann-Finestone, 2011; Lengua et al., 2007). In other words, parental sensitivity aids the child in shifting from using language solely as a way to communicate to also using language as a way to self-direct their behavior. This type of sensitive responding can especially be noticed is during teaching tasks or activities when a parent who is sensitive to their child's capabilities provides information or suggestions to the extent that the child needs help, while also allowing the child to figure out something, unhindered, when the parent knows that it is within the child's capacity to do so.

Parental warm-sensitivity and child emotion regulation. A number of studies have documented links between parent warm-sensitivity and the development of children's emotion regulation skills specifically in infancy and early childhood. The prevailing conceptualization of this process is that warm and sensitive parents serve as effective emotional co-regulators during

early childhood, providing external support to assist children with the regulation of emotion and providing models and strategies that children then internalize to support self-calming (Kopp, 1982). For example, warm-sensitive parents might aid children in coping with difficult emotions by modulating their exposure to emotionally evocative stimuli or events, and by providing a combination of comfort and encouragement to gradually increase (or scaffold) the child's ability to manage stressful situations and feelings (Crockenberg & Leerkes, 2004; Gross & Thompson, 2007).

There is a considerable body of research that suggests that, beginning in infancy, parental behaviors are linked with infants' capacities to regulate their emotions. Warm-sensitive parents demonstrate emotion regulating strategies to help their infants cope with distress, including distracting or engaging their child, facilitating the child's gaze aversion from the emotion provoking stimulus, and using soothing behaviors (Crockenberg & Leerkes, 2004; Gross & Thompson, 2007; Jahromi et al., 2004). For example, Braungart-Rieker, Garwood, Powers and Wang (2001) showed that parent sensitivity during mother-child interactions, assessed via observer ratings as "the parent's ability to perceive infant's signals accurately and vary his or her behavior appropriately", was significantly and positively correlated with infant positive affect, and with the infant's capacity to self-soothe during an emotion-challenge task (e.g., mother still-face).

The quality of parent-child interactions continues to support the development of emotion regulation skills during the toddler years. For example, Calkins and Johnson (1998) assessed toddlers' emotion regulation skills by coding child distress and child use of self-soothing and constructive coping strategies during a set of challenges designed to elicit frustration (having a toy taken away, waiting for a visible snack, waiting for a visible toy). Maternal interactive style

was evaluated during a separate set of parent-child interaction tasks. Maternal warm-sensitivity (e.g., positive verbal expressions, physical affection, and support/guidance) was related to child emotion regulation skills, particularly the tendency to use distraction and constructive coping to regulate distress during the challenge tasks.

Less research has focused on links between maternal warm-sensitivity and child emotion regulation during the preschool years, as children approach school entry. However, existing studies suggest that the effects of parental warm-sensitivity may become more specific as children move into the preschool years, and less central to developing emotion regulation. For example, Dennis (2006) found that observed parental warmth (e.g., laughter, smiling, physical affection) during parent-child interactions was significantly correlated with preschoolers' compliance, but was not correlated with their emotion regulation (persistence, frustration tolerance) during two challenge tasks (trying to open a locked box with a set of unmatched keys; trying to draw a "perfect" circle). This leaves open the question of whether there is a relation between parental warm-sensitivity and child emotion regulation in the preschool years.

Additionally, Eisenberg, et al. (2010a) assessed supportive versus unsupportive parenting at three time points (i.e. when the children were 18, 30 and 42 months old) by using parents reports of their use of supportive and unsupportive strategies when they respond to their child's negative emotions, as well as observer codes of warm-sensitivity during a free play and teaching task. Children's effortful control, a necessary skill to regulate emotion, was assessed by parents and a non-parental caregiver using the Early Childhood Behavioral Questionnaire and the Child Behavior Questionnaire as well as a snack delay task. The results showed that unsupportive parenting at 18 months was related to low effortful control skills at 30 months. However, unsupportive parenting at 30 months was not related to children's effortful control at 42 months

suggesting that the role of supportive parenting in the development of regulation skill may change as the child ages.

Parental warm-sensitivity and child attention control. A few studies have documented links between parent warm-sensitivity and the development of children's attention control in early childhood (Hughes, 2011). Theoretical models suggest that parent's sensitive responding provides a scaffold for children to develop attention control (Kiff, Lengua & Zalewski, 2011; Mistry, Benner, Biesanz, Clark & Howes, 2010). Sensitive parents notice and extend their child's attention focus by shaping, selectively reinforcing and extending it via mechanisms of joint attention and response to infant/child gaze and interest (Smith, Landry, Miller-Loncar & Swank, 1997). Therefore, sensitive parents provide feedback that allows children to refine their attention focus and they provide warm-sensitivity that encourages children to extend their concentration and effort. In this way, parental warm-sensitivity provides a scaffold to support children's developing attention control in much the same way that it serves as a scaffold for the development of emotion regulation skills.

Biological measures also support a link between parental warm-sensitivity and child attention control. For example, Hane and Fox (2006) found that that warm-sensitivity in the mother-child relationship was related to frontal electroencephalographic (EEG) asymmetry, often considered a marker of positive affect, as well as to positive joint attention. The prefrontal cortex is an area of the brain that that matures slowly over a long period of time which provides a relatively large window for caregiver influence on development. Apoptosis, which results in the decrease in neural density, does not begin in the frontal lobe until children are about 7 years old (Huttenlocher, 2002). Therefore, the preschool age of 4 to 5 years old is a prime time to examine the impact parenting practices might have on attention control.

A few researchers have examined the relation between parenting practices and children's attention control. Bernier, Carlson and Whipple (2010) investigated the links between the quality of parent-child interactions and subsequent child attention control, specifically attention set-shifting (using a developmentally appropriate Stroop task). Maternal sensitivity was assessed by observation during a home visit and self-reports. Findings revealed that maternal sensitivity when children were 26 months was correlated with child attention set-shifting skills at 26 months. These are interesting findings that should be examined in a preschool population.

Hughes and Ensor (2009b) tested four models of possible social influences on the development of attention control using a longitudinal method assessing participants between 2 and 4 years old. In this study, maternal sensitivity was measured during a ten minute, mother-child structured play task that was coded for open-ended questions, praise, encouragement and elaboration. Attention control was measured using a series of tasks including a Stroop task, a multi-location search task, attention set-shifting tasks and a problem solving task. Results showed that even after controlling for verbal ability, maternal sensitivity predicted improvement in attention control scores for children between 2 and 4 years old.

In one study examining the use of sensitive, supportive language, Neitzel and Stright (2003) measured the way that mothers helped their 5-6 year old children during a problem solving task. In particular, they coded the mother's language use in terms of how much the mother discussed techniques and strategies for task management, tried to help the child understand how the task was set up, and gave rationales for why a particular strategy should be used. Attention control was measured by observers who coded children's on-task behavior while watching them for 48 minutes in their kindergarten classroom. The study found a significant, positive association between the quality of the parent's supportive language and the child's

attention control in the kindergarten setting. Similarly, Eisenberg et al., (2010b) assessed maternal supportive language and children's attention control at 18, 30 and 42 months. Maternal supportive language was assessed at all three time points by instructing the mother to help their child complete a task. Observers coded for cognitive assistance where the mother tried to help the child understand the task or complete it more effectively (e.g. "We are going to match the animals with their picture", "Try turning the pieces around"). Attention control was measured at time 1 and time 2 using an effortful control questionnaire, the Early Childhood Behavior Questionnaire (ECBQ), filled out by the mother using the subscales attention focusing (the ability to concentrate on a task), attention shifting (the ability to move attention from one activity to another) and inhibitory control (the ability to voluntarily control behavior). Parent's sensitive cognitive assistance during the task at time 1 was positively related to children's attention control at time 2 and time 3. Additionally, parent's sensitive cognitive assistance at time 3 was positively related to children's attention control at time 3. These studies suggest that the amount and quality of sensitive and supportive language during instructional and problem-solving tasks may be a significant factor in the development of children's attention control.

Parental Negative Control and Self-Regulation

Parental negative control is generally defined as parenting that is directive and unilateral, characterized by commands rather than dialogue, with low levels of rationales and reasoning and elevated levels of criticism, threats, and punishment (Lagacé-Séguin & d'Entremont, 2006; Pong, Johnston & Chen, 2010; Robinson, Mandleco, Olsen & Hart, 1995). This type of parenting is usually focused on obtaining child obedience rather than focused on the child's thoughts or feelings (Ang & Goh, 2006). Theoretical models suggest that negative control in the parent child relationship may affect that development of social-emotional skills in childhood. Parent-child

relationships that are characterized by negative control often fail to recognize or support the child's developing ideas and reasoning, and thus fail to scaffold the child's ability to self-regulate their emotions or solve problems on their own (Eisenberg et al., 2010b). Directives often involve parental commands that require a behavioral response, such as, "don't hit", and "put this block next to the red block." Such commands offer little support for language development, and stands in contrast to parental efforts to support child autonomy by encouraging child decision-making and problem-solving skills such as, "where do you think this block should go?", and "what do you think we should do next?"

Similarly, negativity in the parent-child relationship is theorized to have a negative effect on the development of social-emotional skills in childhood. All parents get frustrated with their children sometimes. However, when negativity becomes an inherent quality of the parent-child relationship, it exposes children to rejecting or despairing comments that may undermine the child's developing self-efficacy and feelings of security. Negativity, reflected in the frequent expression of annoyance or frustration with the child, is often accompanied by intrusive and excessive commands to control the child's behavior (Calkins & Johnson, 1998; Gilliom & Shaw, 2004; Graziano, Keane and Calkins, 2010; Iruka, LaForett, & Odom, 2012). Theoretically, this type of intrusive, controlling and critical parenting will undermine the development of child self-control in early childhood, both because the parents using these strategies may have low expectations for their child's independence, and also because of the lack of support it provides for developing language and reasoning skills (Kopp, 1982) Relatedly, children whose parents use high rates of power control strategies and physical punishment are more likely to have emotional and behavioral problems, including depression, aggression, non-compliance, and impulsivity (Crockenberg & Litman, 1990; Power & Chapieski, 1986; Conger et al., 1994; Straus, Sugarman

& Giles-Sims, 1997; McLoyd, Jayaratne, Ceballo & Borquez, 1994). In turn, these children often experience challenges with school adjustment and delays in academic skills compared to peers whose parents who are more inductive and who support the child's autonomy in their parenting interactions (Campbell & von Stauffenberg, 2008).

One possible mechanism linking parent negative control with child self-regulation is the impact of parent negative control on the child's development of intrinsic motivation. Bradley and Corwyn (2005) suggest that self-regulation develops when children are provided with opportunities to engage in activities that interest them. The hypothesis is that intrinsic motivation fuels the child's efforts at task mastery, supporting the development of sustained attention focusing and strategic planning in order to achieve their goals. In a stimulating, supportive environment at home, children are likely to engage in intrinsically motivated behavior and have more opportunity for feedback on prior performance. This feedback is often then used to make modifications to future behavior improving the child's use of effective strategies. Parents who support children's autonomous task exploration with questions, comments, and suggestions, rather than directing child behavior with commands may foster child persistence and problem-solving skills, whereas a reliance on direct commands may encourage dependency on adult direction for problem-solving or elicit resistance to adult control. Support for autonomous functioning allows children to practice regulating their emotions and behavior, particularly when offered in the context of tasks that interest them and elicit effortful and goal-oriented behaviors. When parents control, direct, and criticize child efforts, support for autonomous functioning is minimized, and intrinsic motivation may be undermined, thus reducing the child's opportunities to practice anticipatory planning, persistence, and goal-oriented problem-solving (Grolnick, 2009; Grolnick, Deci, Ryan, Grusec & Kuczynski, 1997; Grolnick & Ryan, 1989). Children

whose parents do not verbally assist them and instead use directive commands may increase, rather than reduce frustration in learning contexts, and may also fail to support focused attention and concentration (Grolnick, 2009).

Parent negative control and child emotion regulation. Some researchers suggest that parental negative control has a direct and specific effect on the development of child emotion regulation. The use of criticism, threats, and punishment to control or chastise children who are upset may simply escalate the child's distress, which may interfere with the child's development of emotion regulation capacities (Hoffman, 2000; Manire & Power, 1992). Therefore, instead of scaffolding and modeling the appropriate ways for the child to regulate their emotional arousal, the parent is instead inciting emotional arousal in their children and increasing the regulatory challenge instead of helping children de-escalate.

For example, Calkins and Johnson (1998) assessed toddlers' emotion regulation skills by coding child distress and child use of self-soothing and constructive coping strategies during a set of challenges designed to elicit frustration (having a toy taken away, waiting for a visible snack, waiting for a visible toy). Maternal negative control was evaluated during a separate set of parent-child interaction tasks and was the combination of the frequency of negative verbal expressions (e.g., scolding, anger), frequency of physical control (e.g. pulling, pushing, hand slapping) and frequency of verbal control (e.g., directing the child's activities). The authors found that maternal negative control was associated with high levels of child distress during the challenge tasks. Similarly, Linver, Brooks-Gunn and Kohen (2002) examined the relation between parental negative control when the child was 3 years-old and child behavior problems reflecting emotion dysregulation when children were 3 and 5 years-old. Observers evaluated parental negative control during a free play task and rated parents on their punitive orientation

and orientation toward using directives with little tolerance for verbal discussion about the rules. Child behavior problems were measured using the Child Behavior Checklist (CBCL). Parental negative control at age 3 was significantly related to child behavior problems at age 3 and marginally related to child behavior problems at age 5.

Parent negative control and child attention control. There is also evidence for an association between parental negative control and the development of child attention control. Hughes and Ensor (2006) examined the effects of parental negative control on the development of attention control in toddlers. Negative control was conceptualized as the use of physical control, criticism, and negative affect such as frowning and using a cold/harsh voice and child attention control was measured using a series of laboratory tasks. The authors found that negative control was related to child attention control.

Eisenberg et al., (2010b) assessed parental negative control and children's attention control at 18, 30 and 42 months. Maternal negative control was assessed at all three time points by instructing the mother to help their child complete a task. Observers coded for use of directive commands (e.g. "put it here", "don't do that"). Attention control was measured and time 1 and time 2 using an effortful control questionnaire, the Early Childhood Behavior Questionnaire (ECBQ), filled out by the mother using the subscales attention focusing (the ability to concentrate on a task), attention shifting (the ability to move attention from one activity to another) and inhibitory control (the ability to voluntarily control behavior). Parent's use of directives at time 1 was negatively related to children's attention control at time 2. These studies suggest that parental negative control may be a significant factor in the development of children's attention control. However, more work is needed that looks at whether this relation continues into the preschool years.

The Indirect Relation between Parenting Stress and Self-Regulation

Warm-sensitivity and negative control are both parenting behaviors that are exhibited directly in the context of parent-child interactions and hence are sometimes considered proximal parent influences on child behavior and development. In contrast, parenting stress represents feelings reported by parents which are not necessarily shared with children. As such, it remains unclear whether parenting stress affects child outcomes directly, or whether its impact on child outcomes is indirect, and mediated through the negative impact that parenting stress may have on proximal parenting behaviors such as by reducing warm-sensitivity or increasing negative control. The assumption has been that stress affects parenting practices that, in turn, are associated with the development of child self-regulatory skills. However, this may occur directly, if stressed parents model emotional displays or outbursts in ways that encourage dysregulated behaviors and relationships (Masten and Coatsworth, 1998) or indirectly if stressed parents behave in more withdrawn or detached ways with their children or express irritability in the form of negative control. Few studies have actually tested the theory that there is a relation between stress in the parenting role, parenting behaviors and child outcomes. Only one study by Deater-Deckard and Scarr (1996) found a small, but significant association in which authoritarian parenting (e.g. using physical punishment and little use of reasoning) mediated the association between parenting stress and child behavior problems. Although some studies have found that parents who experience higher levels of stress in their role as a parent are more negative toward their children, are more punitive and more oriented toward obedience (Belsky, Woodworth, Crnic, 1996; Deater-Deckard & Scarr, 1996), and it is clear that parenting stress affects parent's reports of their parenting, there is still a question whether parenting stress actually affects parenting behavior and the quality of the parent-child relationship.

In fact, Crnic and Greenberg (1990) did not find that parenting stress levels predicted parenting behaviors towards their children. The authors suggested that they may not have found this relation because they observed parents and children interacting during laboratory tasks, which by nature are not as natural as the everyday interactions between parents and their children. Thus, the authors suggested that more naturalistic observations in the home be used in the future when trying to answer this question. However, some argue that no relation was found because the effect is a direct relation between parenting stress and child outcomes. Denham, Mitchell-Copeland, Strandberg, Auerbach and Blair (1997) describe that the overall affective environment in the home could explain the direct association between parenting stress and child self-regulation. The authors argue that if the home environment is one in which family members consistently express negative emotions, not necessarily toward the child, then this may affect the child through what the authors call the “contagion of affect effect.” Conversely, children who are exposed to an environment where a wide range of emotions are expressed are better able to link situations to emotions and are better able to learn how and when to appropriately express emotions. Denham et al., (2000) goes on to explain that stable predispositions to emotional reactions as well as how parents relate to each other (e.g. hostile vs. warm and open) has an effect on the child’s emotional environment even though the emotion is not necessarily being directed at the child. In this way, parenting stress could exhibit a direct effect on the development of child self-regulation that does not operate through parenting behaviors. Crnic, Gaze and Hoffman (2005) examined the mediating effect of parenting behavior on parenting stress and child behavior problems. Parenting stress was measured using the Parenting Daily Hassles measure, parenting interactions were examined using a home observation coding system that coded for maternal negativity and positivity, child negativity and positivity, dyadic pleasure and

expressed conflict. Child behavior problems were measured using the Child Behavior Checklist. While the authors found that parenting daily hassles were related to both the parent-child relationship and to child behavior problems, they did not find evidence that the parent-child relationship mediated the association between parenting daily hassles and child behavior problems. Similarly, Anthony et al., (2005a) was also interested in discovering if parenting behaviors mediated the association between parenting stress and child behavior problems and social competence. Parenting stress was measured using the Parenting Stress Index, parenting behaviors were measured using the Parenting Behaviors Checklist and child behavior problems were measured using teacher-reports on the Social Competence and Behavior Evaluation. Again, the authors found that the association between parenting stress and child behavior problems was not mediated by parenting behaviors. Given these findings, additional research is needed to extend our understanding of the relations between parenting stress and child outcomes.

The Current Study

There is a need for research that examines the influence of parenting on the development of self-regulation skills in preschool children. Examining the influence of multiple parenting variables on emotion regulation and attention control in a single study is especially important, because research examining parental influences on children's emotion regulation and attention control often use different measures, making the findings difficult to compare. Examining these associations together in the same study will foster better understanding of the degree to which emotion regulation and attention control are related during the preschool years, and whether the qualities of parenting and parent-child relationships that support these two areas of regulatory control affect the development of these skills in children in similar or different ways.

This study focused on understanding links between three dimensions of parenting (parenting stress, parental warm-sensitivity, and parental negative control) and child self-regulation skills in preschool children from disadvantaged families. These young children are at increased risk for experiencing delays in oral language, emergent literacy skills and social-emotional development. They are also more likely to grow up in families with parents who are under more emotional stress, experience more daily hassles in their role as a parent, use harsh and coercive parenting practices and have a less warm and sensitive relationship compared to their more economically advantaged peers. Additionally, the preschool period is the ideal time to examine this relation as self-regulatory skills are beginning to become more established as children are preparing for kindergarten the following year. The more we understand about the relation between aspects of parenting and self-regulation and the factors that play a role in this relation, the better able we will be at developing effective, evidence-based prevention programs in the future. Therefore, the goal of this study was to assess the effects of parenting stress, parental warm-sensitivity and parental negative control on children's development of emotion regulation and attention control in a sample of preschool children living in disadvantaged communities who attend the Head Start program.

This study had two aims. Aim 1 was to examine the direct relations between the 3 domains of parenting and child attention control as well as child emotion regulation skills. Aim 2 was to determine if parenting stress operates indirectly on self-regulation via its impact on parental warm-sensitivity and parental negative control. There appears to be evidence that parenting stress is related to the development of emotion regulation, and little evidence that it is related to child attention control except when there is shared method variance. Therefore, it was hypothesized that parenting stress would be associated with child emotion regulation, but not

with child attention control. There is little research to suggest whether there is a relation between parental warm-sensitivity and child emotion regulation or attention control in the preschool age-group. However, since there is evidence of the relation at younger ages, it was hypothesized that high levels of warm-sensitivity would be associated with both child emotion regulation and child attention control. It was also hypothesized that negative control in the parent-child relationship would be associated with reduced levels of both child emotion regulation and child attention control. Lastly, the indirect relation between parenting stress and child self-regulation through specific parenting behaviors was explored. Given that the small amount of research in this area has not found support for this mediational association, it is hypothesized that the association between parenting stress and child self-regulation would not be mediated through specific parenting behaviors and would instead be a direct relationship.

Methods

Participants

Children and their parents were recruited from Head Start Programs in three counties of Pennsylvania. These programs served a range of small urban, suburban, and rural communities. Participants included two cohorts of four-year-old children (total $N = 210$, 55% girls; 20% Hispanic, 25% African-American, 55% European American) recruited from 26 Head Start classrooms in three counties in Pennsylvania. At the time of assessment, children were on average 4.80 years old ($SD = .29$, range = 4.26–5.36). The caregivers who participated in this study (hereafter referred to as “parents”) were 88.57% mothers, 4.27% fathers, 5.24% grandmothers, and 1.92% other (e.g. other relative, stepparent, or foster parent). Parent’s annual income ranged from \$2,400 to \$72,000 with a median income of \$18,000. Single parents made up 35.7% of the sample while parents who were married or living with a partner made up 64.3%

of the sample. Children and caregivers were recruited for an intervention study evaluating two alternative parent support programs (e.g., a home visiting program or mail-home materials) and they understood they would be randomly assigned to condition. The current study uses pre-test data collected during the pre-kindergarten year before the randomization process and before intervention began.

Data Collection Procedures

Recruitment letters were distributed to caregivers of children attending Head Start. Parents who indicated an interest in the study were visited in their homes by a team of two research assistants. Informed consent was attained and pre-assessment parent ratings were collected via a structured interview with one of the trained research assistants, while the other assistant played with the child. At this time, the two research assistants also video-taped a structured parent-child interaction, in which parents engaged in a book-reading, free play, and teaching task with their child. Parents were compensated \$50 for participating in the assessment. All parent ratings used in this study were collected during this home visit. In addition, immediately after completing each home visit, the two research assistants each completed a set of measures to provide their impressions of the parent and the parent-child relationship.

About two months into the school year, a research assistant met with each teacher to explain the teacher-rating measures and obtained the teacher's informed consent. All teachers agreed to participate. Teachers completed the ratings on their own time, and mailed them back to the project office. Teachers were compensated \$10 per student to complete student rating forms. Child assessments were conducted at school by trained research assistants during two individual 'pull-out' sessions (30-45 minutes each), scheduled in coordination with the teacher.

Video Coding Procedures

The videotaped interactions of parents and children engaging in book reading, a play task and a teaching task (tangram puzzles) were later coded in the laboratory by an independent set of research assistants (who were not part of the home visit), using a system developed for this project, which focused on the assessment of parent-child communications. The coding system included counts of specific speech forms during the parent-child interaction, with the goal of tracking levels of directives/commands (described below) relative to other conversation forms (e.g., statements, questions.) In addition, the coding system included qualitative ratings that allowed raters to judge the valence of the interactions, particularly with regard to the warm-sensitivity versus negative affect evident in the parent-child interactions. All ratings utilized a five-point scale ranging from never to always, with examples at each anchor and at the midpoint. Video coders were trained using six video tapes of parent-child interactions, which were not part of this research project, and were paired together to practice coding for several weeks until they established agreement between each other as well as with the master coder. Then the video coders were given three additional tapes that they coded independently until they achieved a minimum of 80% agreement with the master coder. At that point, coders were able to rate tapes independently, although the master coder continued to code 20% of the videos for each rater project to check for and remediate any observer drift over the course of the coding process. The video coders had to be within one point of the master coder to be considered in agreement.

Video coders first watched each videotape from start to finish in order to become accustomed to the parent and child. They then watched the videotape a second time, counting the number of directives and other conversational forms (e.g., statements, questions) used by parents

during the interaction. Finally, they watched the videotape a third time to made qualitative ratings of parent warm-sensitivity.

Measures

Parenting stress and hassles. Parent's ability to regulate their emotions when dealing with parenting-related stress was assessed using 10 items that comprise the *over-reactivity subscale* of the Parenting Scale (Arnold, O'Leary, Wolff, & Acker, 1993). The measure presented challenging parenting situations, and parents indicated their typical response on 7-point scales with unique anchors. Examples include: "When my child misbehaves... (1) = I usually get into a long argument with him/her to (7) = I don't get into an argument (7)"; "When my child misbehaves... (1) I handle it without getting upset to (7) I get so frustrated or angry that my child can see I'm upset". A total score was used in analyses, with higher scores indicating elevated emotion dysregulation in the parenting role ($\alpha = .66$).

Stress experienced on a daily basis in the context of parenting activities and family responsibilities was assessed using the *Parenting Daily Hassles* measure (Crnic & Greenberg, 1990). Parents indicated the degree of stress felt about 12 daily events using a 4-point scale ranging from *rarely* to *almost always* (e.g., cleaning up messes; trouble getting children ready for school or leaving on time). A total score was used in analyses, with higher scores indicating elevated stress associated with parenting ($\alpha = .77$).

Negative feelings that the parent has about his/her relationship with the study child were assessed using nine items from the *Parenting Stress Index* (Abidin, 1983; Loyd & Abidin, 1985). On this measure, parents used a 5-point scale (ranging from *agree* to *disagree*) to indicate their feelings about the parent-child relationship (e.g., "When I do things for my child I get the feeling that my efforts are not appreciated very much.") A total score was used for analyses, with higher

scores indicating more negative feelings or feelings of dissatisfaction with the parent-child relationship ($\alpha = .77$).

Parental warm-sensitivity. *Parent warmth and sensitivity* was completed by video coders and included six items, each rated with a 5-point scale, tapping availability and warmth, sensitive responsiveness, collaboration, emotional support, parent gratification and parent communication style. The percent agreement for these ratings ranged from .87 to .96 and their ratings were averaged across items to create a total score representing parent sensitivity.

Given the central role that supportive language plays in fostering regulatory control, we include it as an aspect of warm-sensitivity in the parent-child relationship. Therefore, the video coders completed a set of five-point ratings regarding parent-child interaction quality during each of the three tasks. Ratings assessing the *parent's support for the child's learning* ("Parent is very encouraging and provides information, explains or clarifies, or offers suggestions or ideas in a way that informs, supports, or expands the scope of child's understanding or play") were coded for each of the three tasks and averaged. Percent agreement between coders was .92.

Additionally, *parent's teaching style* was assessed using a five-point scale. Parent's teaching style used the parent's support for learning codes as well as codes for parent's teaching ("Parent appears to make direct attempts to teach new concepts, ideas, information, or vocabulary that may be new and challenging for the child"). Percent agreement across these various items was .94 and the ratings were averaged across all three tasks and combined to make a final score that represented parent teaching style.

Preliminary examination of the correlations among these three video code scales revealed high levels of covariation ($r = .78$ to $.95$), suggesting that these scales represent a single

dimension of supportive parenting and so were combined to form a single composite called *warm-sensitive on tasks*.

Immediately following the home visit interview with the parent and administration of the videotaped parent-child interaction task, the research team interviewer completed a modified version of the *Post-Visit Inventory (PVI)* (Dodge, Bates & Pettit, 1990). Based upon observations of the caregiver's behavior toward the child and responses to questions about parenting practices and discipline, and based also on the child's behavior toward the parent during the visit, the two research assistants who conducted the home visit rated the *parent's warmth and sensitivity* using 11-items (e.g. "spoke to child with a positive tone", "gave rationales (not lectures) when appropriate) and "gave attention when child talked") each rated on a 3-point scale (didn't occur, occurred once, occurred more than once) (inter-rater $r = .60$). These ratings were composited to assess warm-sensitivity in the parent-child relationship.

In addition, following the home visit, the two research assistants used the PVI to rate parents on a set of items that paralleled those used to rate the videotaped interactions. These included six items that rated the *parent's sensitivity* by evaluating: availability, warmth, responsiveness, collaboration, emotional support and gratification. Raters used a 5-point scale ranging from never to always (inter-rater $r = .55$). Lastly, following the home visit, the lead research assistant also rated the richness and *supportiveness of teaching* provided by the parent using a five-point scale ranging from always to never. The home visit research assistants rated parents for positive support for learning (e.g. "parent provides information, explains or clarifies, offers suggestions or ideas that inform or expand the child's understanding"), vocabulary and cognitive challenge ("parent uses rich and varied vocabulary and deliberately introduces word or concepts that may be new or challenging"), elaboration ("Makes extended, elaborated comments

with complex syntax”) and decontextualized language (“parent talks about non-present objects and events”). These ratings were combined with a second research assistant who also rated the parent’s supportiveness of teaching (inter-rater $r = .61$).

Preliminary examination of the correlations among these three PVI scales revealed high levels of covariation ($r = .58$ to $.76$) suggesting that these scales represent a single dimension of supportive parenting and so were standardized into z-scores, (due to the different scales used) and combined to form a single composite called *warm-sensitive at home*.

Parent negative control. The videotaped interactions of parents and children were examined for language use and all child-directed utterances by the parent were classified as being either directives (which function to control children’s behavior) or conversation (e.g., questions or comment/statements). This study examined the rate of *directives* per minute as an indicator of a controlling parent-child relationship.

In addition, on the *PVI*, the lead home visit research assistants also rated 5-items describing *parent negativity*, reflecting the level of hostility and negativity in the parent-child relationship observed (e.g. “parent shouted at child” and “parent expressed anger toward child”), using a 3-point scale (didn’t occur, occurred once, occurred more than once). The second research assistant also rated the parent’s negativity to the child (inter-rater $r = .71$). These ratings were combined to assess negativity in the parent-child relationship.

Child emotion regulation. Child emotion regulation was represented by three teacher-rated scales. Teachers completed the Social Health Profile (SHP; CPPRG, 1999) and the 6-item *emotion regulation* subscale was used for this study. Teachers rated children on a six-point scale ranging from *almost never* to *almost always* for behaviors such as, “accepts things not going his or her way” and “stops and calms down when frustrated or upset” ($\alpha = .91$). The 6-item

internalizing and withdrawn subscale of the SHP was also used for this study. Teachers (rated children on a six-point scale ranging from *almost never* to *almost always* for behaviors such as, “sad, unhappy” and “low energy, lethargic, or inactive” $\alpha = .86$). Lastly, teachers completed the Strengths and Difficulties Questionnaire (Goodman, 1997) and the 5-item *emotional symptoms* subscale was used for this study. Teachers rated children on a three-point scale ranging from *not true* to *certainly true* for behaviors such as, “many worries or often seems worried”, “often unhappy, depressed, or tearful” and “nervous or clingy in new situations, easily loses confidence” ($\alpha = .80$). All three scales were scored such that higher scores reflected better emotion regulation in the child.

Child attention control. Child attention control was represented by an executive function task, teacher ratings, and observer ratings. The *Peg Tapping* Task (Diamond & Taylor, 1996) was used as a direct measure of the child’s ability to regulate and shift attention during an executive function task. Children were asked to tap a peg twice when the interviewer tapped once, and vice versa. Scores represented the number of trials (out of 16) that the child did correctly.

In addition, teachers rated child attention control in the classroom using five items from the *ADHD Rating Scale* (DuPaul, 1991; $\alpha = .94$; inter-rater $r = .76$) that specifically assessed problems with inattention (e.g. “Is easily distracted” and “Blurts out answers inappropriately”) using a six-point scale. These ratings were combined with three additional items reflecting attention control, drawn from an inventory developed for this study (e.g., “Is careful with his or her work”) using a four-point scale and reverse-scored. Items were standardized into z-scores and averaged to make a total *inattention score*. Average items scores are used in analyses, with higher scores representing better attention control.

After completing each child assessment session, in which the child was asked to do a number of structured tasks and tests, assessors rated the child's attention control using the *Interviewer Checklist* (Roid & Miller, 1997; Smith-Donald, Raver, Hayes & Richardson, 2007). The 13 items focus on the child's attention, sustained concentration, conscientiousness, and compliance in the testing situation; each item was rated on a 4-point scale. Items were scored or reverse scored, such that higher numbers indicated that the child had a higher level of attention control.

Results

Plan of Analysis

Data analyses were conducted in three steps. First, correlations were computed to examine associations between individual measures of parenting behavior and self-regulation in children. Second, a measurement model was estimated to determine if the observed measures were acceptable indicators of the hypothesized latent constructs. Third, a series of structural equations models were estimated to test the hypotheses regarding the associations of each of the three parenting variables to each of the child-self regulation variables. Finally, tests of mediation were conducted to evaluate hypothesis 3. All of the analyses in this study were performed using SPSS 19 and AMOS 20. AMOS 20 allowed maximum likelihood estimation of individual parameters and model fit statistics based on every participant in the sample, even if the participant was missing data on some of the measures. Only small amounts of data were missing. The median percentage of missing data for each measure was 1.9% with a range from 0.9% to 10.4%.

Descriptive Analyses

Descriptive statistics, including means, standard deviations, and number of participants for all measures included in this study are presented in Table 1. The means of the parenting stress measures show that the parenting over-reactivity has a mean above the scale mean for that measure, the mean for parenting daily hassles is about the same as the mean of the scale and parenting daily stress has a mean below the mean of the scale. This suggests that the parents in this sample are more likely to be over-reactive and have daily hassles with their children than to score highly on the parenting stress measure. For warm-sensitivity, parents were more likely to be rated highly on the tasks than they were in the home as the mean for warm-sensitivity on the tasks is above the average for the scale and the mean for warm-sensitivity in the home is the average for the scale. Lastly, parental negative control, parents were averaging almost two and a half directives per minute and the parent negativity measure has a mean below the average for the scale.

For the child measures, parents were more likely to rate their children as having problems with emotion regulation than they were to rate their children as being internalizing and withdrawn. The emotional symptoms mean is about the average of the scale. For the attention control measures, on average, children were able to complete about 9 out of the 16 trials. The mean for the teacher rated inattention measure is about the same as the mean for the scale and the observer rated attention control and on task behavior was above the mean for the scale.

Pearson correlations were computed to examine the associations among parenting variables (see Table 2) and the variables were found to be well correlated within each parenting domain with weaker correlations between parenting domains. This is similar to other samples, suggesting that parenting stress, parent warm-sensitivity and parental negative control share

Table 1
Descriptive Statistics

	Mean	SD	N
<u>Parenting Stress</u>			
Parenting Over-Reactivity (P)	5.54	.794	210
Parenting Daily Hassles (P)	1.91	.504	210
Parenting Stress Index (P)	1.78	.573	210
<u>Parental Warm-Sensitivity</u>			
Warm-Sensitive on Tasks (V)	2.72	.668	191
Warm-Sensitive at Home (O)	.00*	.882	208
<u>Parental Negative Control</u>			
Directives (V)	2.39	1.264	194
Parent Negativity (O)	.11	.248	208
<u>Child Emotion Regulation</u>			
Emotion Regulation (T)	4.02	.945	206
Internalizing/Withdrawal (T)	2.06	.767	206
Emotional Symptoms (T)	1.08	1.437	207
<u>Child Attention Control</u>			
Peg Tapping (A)	9.07	6.169	210
Inattention (T)	.00*	.876	205
Interviewer Checklist (O)	2.65	.475	210

Note. P = Parenting report; V = Video codes; O = Observer ratings; T = Teacher report; A = Direct assessment; * = Standardized score

some variance, but are mostly independent of each other. These correlations show that warm-sensitivity across the two contexts (structured tasks and unstructured interactions at home) shows common variance, but also some context specific differences. Lastly, this table shows that warm-sensitivity has very small associations with directive control, suggesting that being directive is

almost orthogonal to be warm and sensitive. Parental negativity is significantly inversely associated with the warm-sensitive measures, but they still only share a small amount of variance, suggesting that they are distinct and not simply opposite ends of the same spectrum.

Table 2
Inter-Correlations between Parenting Domains

	1.	2.	3.	4.	5.	6.
1. Parenting Over-Reactivity (P)						
2. Parenting Daily Hassles (P)	.28**					
3. Parenting Stress Index (P)	.37**	.40**				
4. Warm-Sensitive on Tasks (V)	.12	-.12	-.22**			
5. Warm-Sensitive at Home (V)	.11	-.16*	-.22**	.46**		
6. Directives (V)	-.04	-.01	.05	-.15*	-.10	
7. Parent Negativity (O)	-.03	.22**	.19**	-.20**	-.28**	.38**

Note. V = Video codes; O = Observer ratings; T = Teacher report; ** $p < .001$; * $p < .01$; $p < .05$

Additionally, Pearson correlations were computed to examine the associations among the child regulation variables (see Table 3). Correlations among the three measures selected to index child emotion regulation were moderately and significantly correlated, with their absolute values ranging from $r = .40$ to $.48$. Similarly, correlations among the three measures selected to index child attention regulation were moderately and significantly correlated, with their absolute values ranging from $r = .40$ to $.50$. For two of the three measures of child attention regulation, cross-domain associations with measures of emotion regulation were lower than within-domain associations; for example peg tapping showed correlations whose absolute values ranged from $r = .17$ to $.32$ with the three measures of emotion regulation, and the interviewer checklist showed

correlations whose absolute values also ranged from $r = .17$ to $.32$ with the three measures of emotion regulation. In contrast, teacher ratings of inattention were more highly correlated with teacher ratings of emotion regulation ($r = .61$) and teacher ratings of withdrawal ($-.52$) than with the other measures of attention regulation ($r = .43$ and $-.50$, respectively). This probably reflects the shared method variance associated with the teacher rating, as well as some shared true variance across these two types of self-regulation skills.

Table 3
Inter-Correlations between Self-Regulation Domains

	1.	2.	3.	4.	5.
1. Emotion Regulation (T)					
2. Internalizing/ Withdrawal (T)	-.42**				
3. Emotional Symptoms (T)	-.40**	.48**			
4. Peg Tapping (A)	.18**	-.32**	-.17*		
5. Inattention (T)	.61**	-.52**	-.30**	.43**	
6. Interviewer Checklist (O)	.32**	-.24**	-.17*	.40**	.50**

Note. T = Teacher report; A = Direct assessment; O = Observer ratings; ** $p < .001$; * $p < .01$; * $p < .05$

Then, Table 4 shows Pearson correlations calculated to provide information about the associations between the parenting behaviors and child self-regulation (e.g., emotion regulation and attention control). Considering the three measures of parenting stress, there were no significant correlations of Parent Over-Reactivity with either the child emotion regulation or attention control measures. Parenting Daily Hassles was significantly correlated with one emotion regulation measure (emotional symptoms) and two child attention control measures, (teacher-rated inattention and the interviewer checklist). Lastly, the Parenting Stress Index was significantly correlated with all three emotion regulation measures as well as one attention control measure, (the interviewer checklist). Considering the two measures of parental warm-

sensitivity, warm-sensitivity on the tasks was correlated with two child attention control measures, (peg tapping and the interviewer checklist) and none of the child emotion regulation measures. Warm-sensitivity in the home was not correlated with any measures of emotion regulation or attention control. Lastly, considering the two measures of parental negative control, parent directives is correlated with one measure of child emotion regulation, internalizing/withdrawal and all three measures of child attention control. Parental negativity measure was significantly correlated with all three emotion regulation measures and all measures of child attention control except for one (peg tapping). These correlations are consistent with expectations with the exception of the lack of association between parental warm-sensitivity and child emotion regulation. The magnitude of the associations, in the small to moderate range, was commensurate with expectations based upon prior research studies.

Table 4

Correlations between Parenting Domains and Child Emotion Regulation and Attention Control

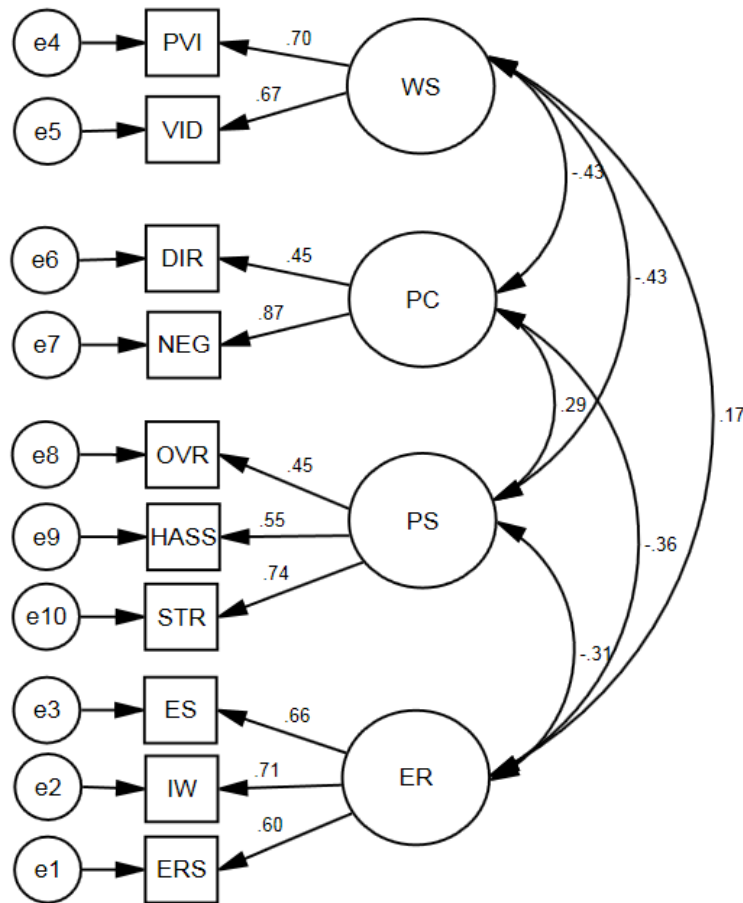
Parent Domains	Child Emotion Regulation			Child Attention Control		
	ER	IW	ES	PT	TI	IC
<u>Parenting Stress</u>						
Parenting Over-Reactivity	-.02	-.01	-.11	.03	.00	-.05
Parenting Daily Hassles	-.11	-.06	-.18*	-.14*	-.15*	-.05
Parenting Stress Index	-.21**	-.17*	-.15*	-.11	-.13	-.14*
<u>Parental Warm-Sensitivity</u>						
Warm-Sensitive on Tasks	.01	.08	.13	.16*	.11	.16*
Warm-Sensitive at Home	.09	.05	.11	.11	.13	.13
<u>Parental Negative Control</u>						
Use of Directives	-.06	-.20**	-.09	-.25**	-.30**	-.35**
Parent Negativity	-.24**	-.25**	-.14*	-.13	-.29**	-.36**

Note. ER = Emotion regulation scale; IW = Internalizing/withdrawal subscale; ES = Emotional symptoms subscale; PT = Peg tapping; TI = Teacher-rated inattention; IC = Interviewer checklist ** $p < .001$; * $p < .01$; $p < .05$

Measurement Models

The next step in data analyses was to estimate the measurement model for each outcome (attention control and emotion regulation) to assess relations among observed measures and latent constructs. This analysis is equivalent to a confirmatory factor analysis that determines whether the hypothesized measurement model adequately fits the data, and that evaluates the degree to which each measure contributes to the common variance representing the latent construct. The measurement model for the emotion regulation outcomes is presented in Figure 1. The fit indices of this measurement model suggest that the hypothesized relations between the observed measures and the latent constructs accurately represented the variance in the data, χ^2 (df = 29, N = 212) = 28.80, $p = 0.48$. The Comparative Fit Index (CFI; Bentler, 1990), which is ideally above 0.95, was 1.00, the Tucker–Lewis Index (TLI, also known as the Bentler–Bonett Non-normed Fit Index; Bentler & Bonett, 1980), which is ideally above 0.95, was 1.00 and the Root Mean Square Error of Approximation (RMSEA, Browne & Cudeck, 1993), which is ideally below 0.05, was 0.00. The measurement model revealed that the observed measures served as acceptable indicators of their respective latent constructs as the fit indices were in the suitable range. Therefore, we judged the fit of the model to be good. All relations between observed measures and latent constructs were statistically significant at the 0.01 or 0.001 probability level. Most of the other factor loadings were between 0.55 and 0.87, with just two factor loadings slightly smaller (.45). Relations between all pairs of latent constructs ranged from small ($\phi = -0.23$) to moderate ($\phi = -0.43$) in magnitude and were statistically significant between the 0.05 and 0.001 probability level.

Figure 1. *Measurement Model for Parenting Variables and Emotion Regulation*

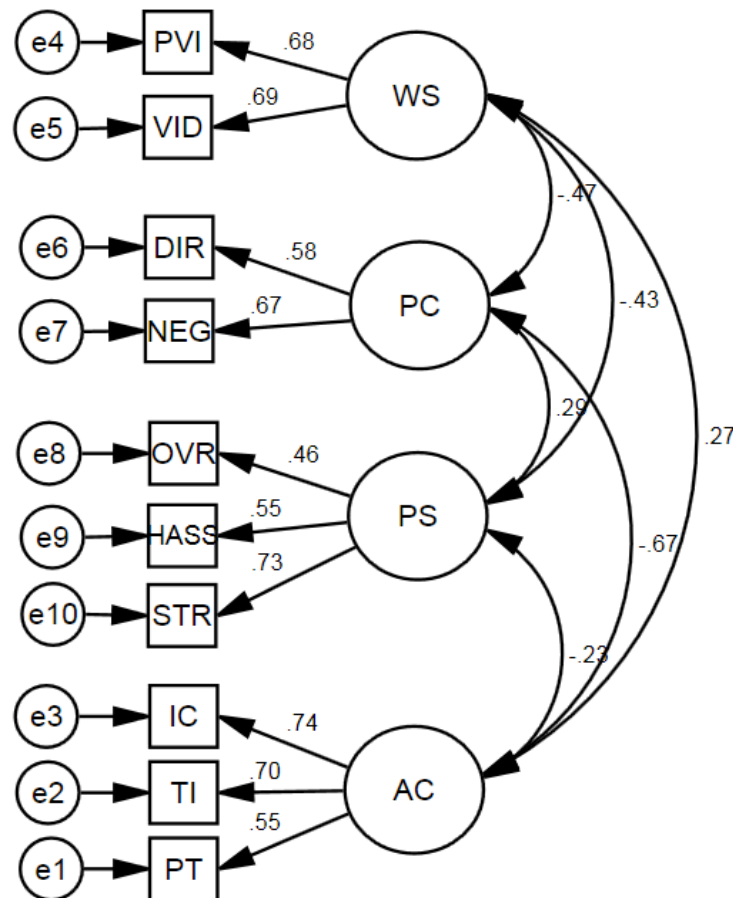


Note. WS = Warm-sensitivity; PC = Parenting control; PS = Parenting stress; ER = Emotion regulation; PVI= Warm-sensitive at home; VID = Warm-sensitive on tasks; DIR = Directives; NEG = Observer-rated negativity; OVR = Over-reactivity subscale; HASS = Parenting daily hassles; STR = Parenting stress index; ES = Emotional symptoms subscale; IW = Internalizing/withdrawal subscale; ERS = Emotion regulation subscale

The measurement model assessing the three parenting constructs and the child attention control outcome is presented in Figure 2. The fit indices of this measurement model suggest that the hypothesized relations between the observed measures and latent constructs accurately represented the variance in the data, χ^2 (df = 29, N= 212) = 33.74, $p = 0.25$. The Comparative Fit Index (CFI; Bentler, 1990) was 0.99. The Tucker–Lewis Index (TLI, also known as the Bentler–Bonett Non-normed Fit Index; Bentler & Bonett, 1980) was 0.97 and the Root Mean Square Error of Approximation (RMSEA, Browne & Cudeck, 1993) was 0.03. The measurement model revealed that observed measures served as acceptable indicators of their respective latent

constructs as the fit indices were in the suitable range. Therefore, we judged the fit of the model to be good. All relations between observed measures and latent constructs were statistically significant at the 0.001 probability level. All of the other factor loadings were between 0.55 and 0.74, with the exception of one factor loading that was 0.46. Relations between all pairs of latent constructs ranged from moderate ($\phi = -0.23$) to large ($\phi = -0.67$) in magnitude and were statistically significant between the 0.05 and 0.001 probability level.

Figure 2. Measurement Model for Parenting Variables and Attention Control



Note. WS = Warm-sensitivity; PC = Parenting control; PS = Parenting stress; AC = Attention control; PVI= Warm-sensitive at home; VID = Warm-sensitive on tasks; DIR = Directives; NEG = Observer-rated negativity; OVR = Over-reactivity subscale; HASS = Parenting daily hassles; STR = Parenting stress index; IC = Interviewer checklist; TI = Teacher-rated inattention; PT = Peg tapping

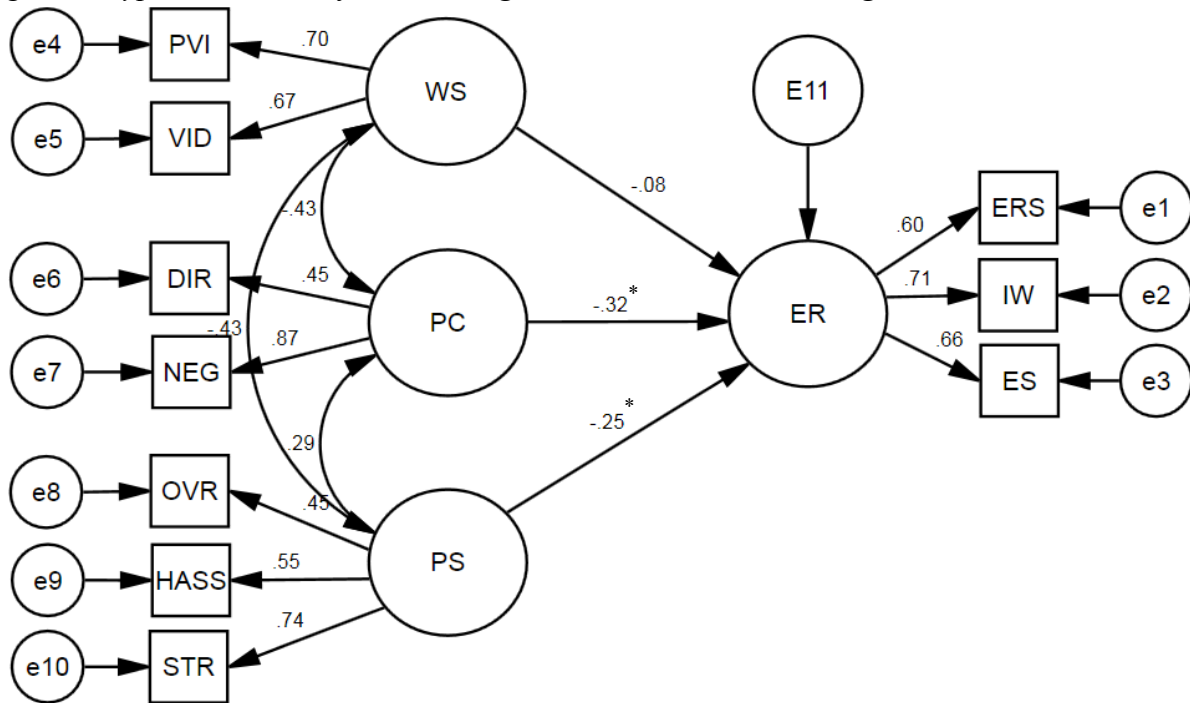
Structural Equation Models

In the third stage of data analyses, a series of structural equation models were estimated. The purpose of these analyses was to test hypotheses concerning the relations between the three parenting variables and the two child outcomes -- child attention control and child emotion regulation. In addition, structural equation models were used to test for mediation.

The first hypothesis was that parenting stress, parental warm-sensitivity and parental negative control would all be related to child emotion regulation. The structural equation model testing this hypothesis model is presented in Figure 3. The results indicated that parental negative control shows significant and unique associations with child emotion regulation with a standardized path coefficient of -0.32 , $p = 0.05$. Parental warm-sensitivity also emerged with a significant and unique association with child emotion regulation with a standardized path coefficient of -0.25 , $p < 0.05$. However, parenting stress did not show a significant, unique association with child emotion regulation with a standardized path coefficient of -0.08 , $p = 0.59$. These results partially support our hypothesis as parenting stress and parental negative control were both found to be associated with child emotion regulation. However, the hypothesis that parental warm-sensitivity would be associated with child emotion regulation was not supported as no association was found.

The second hypothesis was that parental warm-sensitivity and parental negative control would be related with child attention control, but parenting stress would not be related to child attention control. The structural equation model testing this hypothesis is presented in Figure 4. The results indicate that parental negative control has a significant and unique association with child attention control with a standardized path coefficient of -0.68 ($p < 0.001$).

Figure 3. Hypothesis Model for Parenting Variables and Emotion Regulation

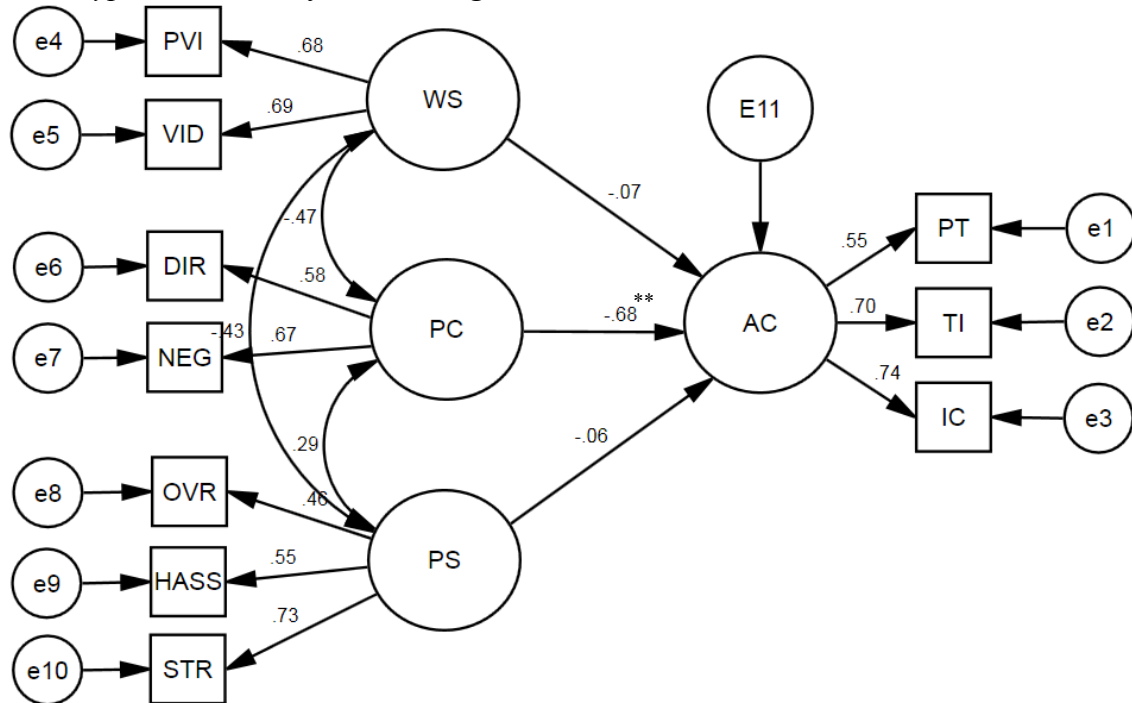


Note. $\chi^2(29, N = 212) = 28.80, p = .48$; CFI = 1.00, RMSEA = .00; WS = Warm-sensitivity; PC = Parenting control; PS = Parenting stress; ER = Emotion regulation; PVI= Warm-sensitive at home; VID = Warm-sensitive on tasks; DIR = Directives; NEG = Observer-rated negativity; OVR = Over-reactivity subscale; HASS = Parenting daily hassles; STR = Parenting stress index; ES = Emotional symptoms subscale; IW = Internalizing/withdrawal subscale; ERS = Emotion regulation subscale; ** $p < .001$; * $p < .01$; * $p < .05$

Parental warm-sensitivity and parenting stress did not show significant unique associations with child attention control with standardized path coefficients of -0.07 ($p = 0.62$) and -0.06 ($p = 0.60$), respectively. These results support our first hypothesis that parental negative control would be related to child attention control and parenting stress would not be related to child attention control. However, these findings do not support our hypothesis that parental warm-sensitivity would also be related to child attention control.

Next, parental negative control was examined as a mediator in the association between parenting stress and child emotion regulation. It was hypothesized that parental negative control would not mediate the association between parenting stress and child emotion regulation. The first step in these analyses was to establish that the data met the necessary prerequisites to assess

Figure 4. Hypothesis Model for Parenting Variables and Attention Control



Note. $\chi^2 (29, N = 212) = 33.742, p = .25$; CFI = .99, RMSEA = .03; WS = Warm-sensitivity; PC = Parenting control; PS = Parenting stress; AC = Attention control; PVI= Warm-sensitive at home; VID = Warm-sensitive on tasks; DIR = Directives; NEG = Observer-rated negativity; OVR = Over-reactivity subscale; HASS = Parenting daily hassles; STR = Parenting stress index; IC = Interviewer checklist; TI = Teacher-rated inattention; PT = Peg tapping; ** $p < .001$; * $p < .01$; $p < .05$

mediation (Holmbeck, 1997; 2002). For the mediation hypotheses, the predictor needs to be related to the outcome. In a structural equation model in which only this relation was estimated, we found that early parenting stress was a significant predictor of child emotion regulation with standardized path coefficients of $-0.32, p < 0.01$. In the second step for the mediation hypothesis, the predictor needs to be related to the hypothesized mediator and the hypothesized mediator needs to be related to the outcome. In a structural equation model in which only these relations were estimated, we found that the model would not converge without the path from the predictor to the outcome indicating that the hypothesized mediator does not mediate the relation between the predictor and the outcome. Instead, there is a direct relationship between the predictor (parenting stress) and the outcome (emotion regulation), as well as a direct relationship between negative parental control and emotion regulation. These findings support the hypothesis that

parenting stress may have an independent impact on child emotion regulation, rather than an indirect impact carried by its association with negative parenting.

Discussion

In recent years, evidence documenting the important role that child self-regulation skills play in school readiness has grown dramatically (Blair, 2006). In addition to knowing their letters and numbers, children's abilities to form positive relationships with teachers and with peers, and to follow directions and complete assigned tasks plays a central role in their behavioral adjustment and academic attainment after they transition into formal schooling (Coolahan, Fantuzzo, Mendez, & McDermott, 2000; Denham & Burton, 2003; Ladd, Buhs, & Seid, 2000; McClelland, Acock, & Morrison, 2006). For this reason, a better understanding of the developmental roots of self-regulation skills is needed, with a particular focus on the role played by parents during the preschool years. This study adds to the empirical literature on this topic, extending it by examining associations between parenting and child self-regulation during the pre-kindergarten year, and by testing models to examine potential commonalities and differences in associations between parenting and child emotion regulation versus attention control skills. These two aspects of self-regulation are often not examined together in the same study, particularly during the prekindergarten year. The first aim of the current study was to examine the direct relations between three domains of parenting (parenting stress, warm-sensitivity, and negative control) and two aspects of child self-regulation (emotion regulation and attention control). Emotion regulation and attention control were conceptualized as related but distinct aspects of child's self-regulation and it was predicted that the different aspects of parenting would relate to the development of these self-regulation domains. In particular, it was anticipated that parenting stress would be associated with child emotion regulation and not child

attention control and that parenting stress and parental warm-sensitivity would be related to both child emotion regulation as well as child attention control. These hypotheses were tested by creating latent constructs and using structural equation modeling to examine the pattern of associations.

Central Findings: Associations of Parenting and Child Self-Regulation Skills

Currently, much of the literature examining relations between parenting stress and the development of child emotion regulation has focused on toddlers or very young preschool children. In these studies on younger children, researchers have found a negative link between parenting stress and the development of emotion regulation, such that the development of emotional regulation skills appear delayed in young children whose parents are experiencing elevated stress and distress in the parenting role (Chazan-Cohen, 2009; Williford, et al., 2007). Similarly, it has been well established that parental warm-sensitivity is an important predictor of the development of emotion regulation skills in infants and toddlers (Braungart-Rieker et al., 2001; Calkins and Johnson, 1998), whereas high levels of parental negative control appears to impede child emotion regulation in the toddler age group (Calkins and Johnson, 1998; Linver et al., 2002). However, relatively few studies have examined these links as children age through the late-preschool years. The purpose of this study was help to shed light on how these relations change or stay the same as children get older by evaluating multiple parenting practices simultaneously in the preschool age group.

This study found that parental negative control and parenting stress were both significantly and uniquely related to child emotion regulation; lending evidence that each continues to play an important role in supporting children's emotion regulation, even into the late-preschool years. However, parental warm-sensitivity was not related to child emotion

regulation, suggesting that as children get older, parental warm-sensitivity plays less of a key role in the development of emotion regulation than in the earlier childhood years.

Similar to the emotion regulation literature, much of the empirical literature examining relations between parenting stress and the development of child attention control skills has focused on younger children, although in general, parental influence is less studied in terms of associations with child attention control compared to child emotion regulation skills. In these studies on children in other age groups, some researchers have found a negative link between parenting stress and the development of attention control in young children, suggesting that parenting stress impedes the development of attention control skills as it does for child emotion regulation skills (Barry et al., 2005; Razza et al., 2010). However, in addition to the paucity of studies that have examined this link, those that are available often use parental report to assess both parenting stress and child attention control (Barry et al., 2005). This raises the possibility that the association may be inflated due to shared method variance. There has been little research examining associations between parental warm-sensitivity and the development of attention control in preschool-aged children. However, studies examining a younger population have found a significant positive relation (Bernier et al., 2010; Eisenberg et al., 2010b; Hughes and Ensor, 2009b; Neitzel and Stright, 2003), so it is beneficial to see if this relation continues into the preschool age. Finally, relations have been found between parental negative control and the development of attention control in infants and toddlers (Eisenberg et al., 2010b), so the next step is to see if these relations continue into the preschool age. This study addressed both the need to disentangle shared method variance from the true relations and the need to examine an older age group by evaluating children who are preschool-aged and using a multiple method design.

The major findings of the study were that parenting stress and negative parental control were associated with child emotion regulation, whereas parental warm-sensitivity was not. These associations were independent, such that the link between parenting stress and child emotion regulation was direct, and not mediated by negative parental control. Parental negative control was also uniquely associated with child attention control, whereas neither parenting stress nor parental warm-sensitivity showed unique associations with child attention control.

Parent Negative Control and Child Self-Regulation

Given the prominence of negative parental control in the associations that emerged with both child attention control and emotion regulation, it is worth considering the possible mechanisms that might account for its influence on child self-regulation when children are 4-5 years old. Given the cross-sectional nature of the data, it is not possible to infer causality, but existing theory and empirical research offer some suggestions regarding the possible nature of the association. One possibility is that negative parental control is associated with child externalizing behavior problems which were not studied here, but which often co-vary with emotion regulation and attention control difficulties. In a model that was articulated and well-documented by Patterson and colleagues (Patterson, 1983; Patterson & Fisher, 2002), parents sometimes become entangled in escalating conflicts with their young children, termed coercive cycles, that foster non-compliant and aggressive responding and may undermine developing self-regulation. In this model, parental attempts to control their children with frequent negative commands provoke aggressive or non-compliant responses from their children. Negative child responding is reinforced when parents occasionally give in (positive reinforcement) or withdraw their attempts at control (negative reinforcement). Over time, intermittent schedules of reinforcement produce escalation in the control attempts by parents and the resistance of

children, eliciting escalating angry parent-child conflict, and undermining positive interactions. These coercive cycles are associated with dysregulated emotions and behaviors on the part of the child and parent, as well as learned patterns of angry, reactive interactions with their environment that become habitual (El-Sheikh & Erath, 2011; Erath, El-Sheikh, Hinnant & Cummings, 2011). Thus negative parental control may undermine emotion regulation because it evokes frequent negative affect from children, overwhelming their regulatory capacities. Alternatively, or in addition, negative parental control may prevent children from learning strategies for regulating their feelings and approaching frustrating or difficult situations, reducing their problem-solving and adaptive coping skills. It may also be the case that children who are more impulsive, willful, and emotionally dysregulated elicit more negative control from their parents. A longitudinal study is needed to determine the degree to which developmental effects reflect child versus parenting characteristics.

Although the coercive process model offers a possible explanation for the link between parental negative control and poor emotion regulation skills, it does not explain why negative parental control is also associated with poor attention control. There are two possible theoretical explanations for this association. One is that the stress that the negative controlling parenting style causes the child activates the HPA axis. The HPA axis, one of the body's stress response systems, manages the distribution cortisol, and energy stores such as glucose and oxygen to the amygdala, which is responsible for processing and encoding emotionally significant and stressful events (Gunnar & Quevedo, 2007; Munck & Náráy-Fejes-Tóth, 1994). Cortisol is a steroid hormone that is able to cross the blood-brain barrier. Therefore, the release of cortisol in children who are chronically exposed to emotional and stressful events, such as negative and coercive interactions with their caregivers, may have altered sensor receptivity in their brain resulting in

long-term effects on HPA activity and response to stress (Gunner & Quevedo, 2007). Indeed, children who are exposed to chronic stress have been found to be more likely to have atypical stress reactivity and cortisol levels (Brennan et al., 2008; Essex et al., 2002; Halligan et al., 2007; Hane & Fox, 2006; Lupien et al., 2000). These increase levels of cortisol in children who experience chronic stress further stimulates that activation of the amygdala promoting the development of patterns of connectivity that that increase vigilance to potential threat, rather than the development of more adaptive forms of attention and executive processes (Blair, 2002).

A second theoretical explanation for the link between parental negative control and poor attention control comes from the executive function (EF) literature. EF skills, a set of inter-related skills that includes working memory, attention set-shifting and inhibitory control, go through rapid development during the preschool years (Blair, 2002; Eslinger, 1996; Klein, 2003; Shonkoff & Phillips, 2000; Welsh, 2002; Zelazo & Frye, 1998; Zelazo et al., 2003). EF skills improve children's ability to control their attention, especially in cognitively challenging situations and it allows children to attend appropriately in the preschool classroom (Blair, 2002; Blair & Diamond, 2008). The development of strong EF skills may be partially dependent on the opportunities the child has to practice challenging higher-order thinking and reflection on past performance (Bradley & Corwyn, 2005). When parents use supportive, positive directives in younger childhood, before the child has the capabilities attend and problem-solve on their own, this has a positive influence on development. However, when parents use directives in preschool, when the child has the capacity to build the skills to regulate on their own, the directives are instead intrusive and fail to support autonomous functioning (Grolnick & Pomerantz, 2009). Therefore, when parents are directive and controlling of their preschool-aged children, they are not allowing their child to practice and develop their EF skills. Instead the parent is simply

telling the child what to do, which does not require the child to use skills at planning, considering their options, anticipation or reasoning to come up with the appropriate solution on their own (Grolnick, 2009; Grolnick et al., 1997; Grolnick & Ryan, 1989). This deprives them of the opportunity to reflect on their past performance and receive feedback, which is necessary to foster skill development. Therefore, a controlling parent fails to provide the cognitive stimulation and support the child needs to develop EF and related attention control and instead encourages dependency on adult direction for problem-solving and attention control.

Parent Warm-Sensitivity and Child Self-Regulation

Surprisingly, parental warm-sensitivity was not significantly related to child emotion regulation or attention control. This finding is contrary to similar research on a younger population of children that found a strong association between warm-sensitive parenting and the development of self-regulation, especially for children in the infant and toddler age groups. The lack of findings for this relation in this study has implications for how different aspects of parenting may be differentially important in the child's development of attention control as children grow older. These results, combined with the current literature, suggest that parental warm-sensitivity as well as parental negative control play a significant role in development of children's emotion regulation and attention control at an early age. However, as children grow into their preschool years, warm-sensitivity in the parenting role may become less important and parental negative control may remain an important predictor of children's development of both emotion regulation and attention control.

It was surprising that parental warm-sensitivity was not related to either child attention control or child emotion regulation as we had hypothesized a continued link between these constructs as children got older. Nevertheless, many of the studies that suggest a relation

between parental warm-sensitivity and child self-regulation are done on a younger population than the children found in this study (Bernier et al., 2010; Braungart-Rieker et al., 2001; Calkins and Johnson, 1998; Eisenberg et al., 2010b; Hughes and Ensor, 2009b; Neitzel and Stright, 2003). The mechanism for this lack of finding in the preschool age group may be similar for both the development of emotion regulation and attention control. It may be that parental warm-sensitivity is important for the development of a child's self-regulation when a child is younger, but as the child ages, it becomes more important that the parent child-relationship is not characterized by negativity and the restriction of autonomy. As infants mature and become toddlers and then preschoolers, they shift from needing external sources of control to modulate their arousal, behavior and attention to using internal child factors to regulate themselves (Kopp, 1982). This initial socialization using external sources is necessary in the infancy stage as children in this stage are not able to modulate themselves on their own. However, as children mature the capacity of self-regulation begins to emerge and children begin to be able to independently monitor and regulate their own behavior. Therefore, our findings suggest that preschool children require the opportunity to learn to regulate themselves and practice using their own internal sense of control (Grolnick, 2009; Grolnick et al., 1997; Grolnick & Ryan, 1989). Therefore, if a parent is negative and directive, the parent is not allowing their child to learn to regulate on their own, because they are regulating their behavior for them. This does not allow the child to develop the skills and experience they need to regulate for themselves without their parent's assistance.

Parenting Stress and Child Self-Regulation

Parenting stress emerged as a significant predictor the child's emotion regulation, but not their attention control. There has not been strong evidence for a relation between parenting stress

and attention control in the preschool population and this study lends support to those previous findings suggesting that parenting stress may not play a significant role in the development of attention control in preschool-aged children. However, parenting stress was found to be a predictor of children's emotion regulation suggesting that parents who are experiencing stress in the parenting role are more likely to act in ways that model maladaptive emotion regulation strategies and are less likely to teach their children effective emotion regulation strategies likely resulting in maladaptive emotion regulation skills in their children (Halberstadt et al., 1999; Sroufe, 1995). This is supported by studies that have found that parents who experience stress in the parental role are more likely to yell, get into arguments and physically reprimand their children, and thereby model poor ways to regulate and express strong emotions.

Although researchers have theorized that stress has a significant association with the development of attention control in children by forming maladaptive neural pathways and depleting the child's available cognitive resources (Blair, 2002; Gunnar & Quevedo, 2007), this may not be the case when the stress is being experienced by the parent instead of the child. This would explain why this association between parenting stress and attention control was not found in this study. However, when the stress is experienced by the child specifically (i.e. during negative controlling interactions with caregivers) it may have an effect on the development of attention control. It could be that the irritability associated with parenting stress is associated specifically with the modeling of emotional reactivity and maladaptive emotional responses, which is why this study found the association to be specific to emotion regulation and not attention control. Future research is needed to explore this issue more fully.

This study also explored whether there is evidence for parenting behaviors mediating the relation between parenting stress and child self-regulation. Specifically, this study tested whether

parental negative control mediated the relation between parenting stress and child emotion regulation. Similar to findings by other authors (Anthony et al., 2005a; Crnic and Greenberg, 1990; Crnic, Gaze and Hoffman, 2005), the results of this study showed no evidence for a mediation relation suggesting that the relation between parenting stress and emotion regulation is direct. This would support the Denham, et al., (1997) theory that the overall affective environment in the home in which family members are stressed and are consistently expressing negative emotions affects children directly through the “contagion of affect” effect. These stable predispositions to emotional reactions among family members as well as the possibly hostile relationship between caregivers, contribute to the child’s overall emotional environment. In this way, children are learning maladaptive ways of relating to others and the world around them and parenting stress is exerting a direct effect on the development of child self-regulation that does not operate through parenting behaviors. While more research is needed to determine if parenting behaviors do not play a mediating role, there is little evidence to support this theory. Instead, there is building evidence that parenting stress has a direct effect on child behavior.

In all, the results suggest that some aspects of parenting contribute similarly to both emotion regulation and attention control and other aspects of parenting contribute uniquely to emotion regulation and not to attention control. Namely, in the preschool age group, this study found that parental negative control contributes to the development of both emotion regulation and attention control, parental warm-sensitivity does not contribute to either emotion regulation or attention control, and parenting stress contributes to emotion regulation, but it does not contribute to attention control.

Implications for Practice and Policy

These results may have implications for interventions aimed at improving self-regulation and reducing behavior problems. Interventions focused on intervening with the parents of preschool children such as Playing and Learning Strategies (PALS; Landry, Smith & Swank, 2006) and the Incredible Years (IY; Webster-Stratton, 1998) have been shown to be effective at producing changes in conduct problems, less noncompliance, less negative affect, and more positive affect than control children. These programs are focused, in part, in improving the warm-sensitivity in the parent-child relationship. The current results suggest that stress in the parenting role, independent of the specific parenting practices, is significantly related to children's emotion regulation at the preschool age. Therefore, interventions that are aimed at improving child self-regulation and behavior problems by intervening with the parents might be more effective if they also focused on relieving the stress parents experience in their role as a parent. This suggests doing more than just focusing on parenting behaviors to also finding useful ways to reduce stress such as improving their social support, and their available resources.

Moreover, the interventions described above focus especially on improving parental warm-sensitivity in the parent-child relationship. However, the current study suggests that in addition to that, specific attention should be paid on reducing the amount of negativity and control in the parent-child relationship, as this has a strong association with both the development of attention control and emotion regulation in preschool children likely due to the transition from external support to internal control. Therefore, interventions may find stronger results by focusing on breaking the coercive cycles of interaction between the parent and child, teaching the parent to use guiding language instead of directives and helping the parent develop

coping strategies for regulating their strong emotions to reduce yelling and arguing when the child misbehaves.

Strengths, Limitations and Future Directions

This study is one of the only studies to examine multiple aspects of parenting and how they relate to the child's emotion regulation and attention control, two aspects of self-regulation that are often not examined together in the same study. Additionally, this study used multiple methods of assessment to evaluate the various constructs including parent report, teacher report, direct observation and video coding, reducing the possibility that shared method variance might inflate results.

One of the limitations of this study is that it used cross-sectional data, so the direction of the association between parenting practices and children's self-regulation cannot be determined. Future studies should use longitudinal data to examine the direction of these associations. For example, while it is possible that negative and controlling parents are not allowing their child the opportunity to practice extending their attention on their own, it is also possible that children who have deficits in their attention control are more frustrating to parent and thus these children are more likely to develop a negative relationship with their parents. Longitudinal studies will help tease apart these associations.

The current study assessed parenting stress using parent report. Future studies should consider using direct observation of parenting stress in addition to parent reports. Likewise, child emotion regulation was assessed using teacher reports. Future studies should consider uses laboratory tasks to assess child's emotion regulation capabilities. Direct observations of parenting stress and child emotion regulation will help eliminate any possible reporter bias introduced into the data.

Lastly, one interesting finding of this study is that parenting behaviors did not mediate the associations between parenting stress and child emotion regulation. This may suggest that there is a direct relationship between parenting stress and emotion regulation. Of course it is also possible that the relation between parenting stress and emotion regulation is not a direct relationship, but rather is mediated through another variable or variables that has not been measured in this study or other similar studies to date. Future research should continue to examine the relation between parenting stress and self-regulation as well as behavior problems to gain a better understanding of this relation.

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