Stability of Emotion Regulation Behaviors between infancy and toddlerhood: Bidirectional Effects of Overcontrolling Parenting

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ABSTRACT

STABILITY OF EMOTION REGULATION BEHAVIORS BETWEEN INFANCY AND TODDLERHOOD: BIDIRECTIONAL EFFECTS OF OVERCONTROLLING PARENTING

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Department of Psychology
Northern Illinois University, 2021
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Though emotion regulation has been heavily studied for the last several decades, much of the research to this point has neglected to examine the development of specific strategies across time, particularly across infancy and toddlerhood when such behaviors are first emerging and increasing in complexity. Previous work has shown these early emotion regulation abilities to be easily influenced by external factors and, given young children’s heavy reliance on caregivers during this period of time, parenting is often studied as one such factor. Though positive parenting has been consistently shown to promote normal development, overcontrolling parenting has been less readily studied as a construct and, in particular, in relation to emotion regulation development in children. To address these limitations in the current literature, the current study investigated the stability of three emotion regulation behaviors across three time points (12, 18, and 24 months) and of overcontrolling parenting behaviors across two time points (18 and 24 months), and the bidirectional influence of child emotion regulation on overcontrolling parenting, and vice versa, in the second year of life. Data from a larger longitudinal study involving mother-child dyads was utilized. As part of the longitudinal study, mothers completed questionnaire measures at 4 months post-partum, and attended laboratory
visits with their infants at 12, 18, and 24 months of age where they participated in structured tasks designed to elicit emotional responses. Data from these laboratory visits was coded for child emotion regulation strategy use and maternal use of overcontrolling parenting. Results demonstrated no significant rank order stability between gaze aversion, self-soothing, and self-distraction across time points. Similarly, no significant relationships emerged between gaze aversion or self-distraction and overcontrolling parenting concurrently or over time. Early self-soothing in infancy negatively predicted later maternal use of overcontrolling parenting, but only at 24 months. The implications of these findings, and key directions for future work, are discussed.
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STABILITY OF EMOTION REGULATION BEHAVIORS BETWEEN INFANCY AND TODDLERHOOD: BIDIRECTIONAL EFFECTS OF OVERCONTROLLING PARENTING

BY
MEGHAN JUSTINA KANYA
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DEPARTMENT OF PSYCHOLOGY

Dissertation Director:
David J. Bridgett, Ph.D.
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CHAPTER 1
INTRODUCTION

Over the last thirty years, researchers have increasingly drawn attention to the importance of emotion regulation for normal development and social and psychological functioning across the lifespan (see Zeman, Cassano, Perry-Parrish, & Stegall, 2006 for review). More effective implementation of emotion regulation strategies within a given situation has been generally associated with better social functioning (Eisenberg et al., 1995; Lopes, Salovey, Cote, & Beers, 2005), academic performance (Davis & Levine, 2013; Ivcevic & Brackett, 2014), and well-being (Cote, Gyurak, & Levenson, 2010), while decreased emotional regulation abilities are predictive of increased risk of psychopathology (e.g., Attention-Deficit/Hyperactivity Disorder [ADHD], anxiety disorders), behavioral problems, and social deficits (e.g., Woodward, Lu, Morris, & Healey, 2016). Further, previous research has shown consistent links between emotion regulation abilities in infancy and toddlerhood and outcomes in later developmental periods, suggesting examination of the developmental pattern of regulatory abilities across this time period may be important for understanding later functioning. Increased difficulty regulating emotions in infancy and toddlerhood, for example, was previously shown to be predictive of increased non-compliance (Stifter, Spinrad, & Braungart-Rieker, 1999), behavior problems (Calkins, 2002;
Hill, Degnan, Calkins, & Keane, 2006), and body mass index (BMI) and eating concerns (Graziano, Kelleher, Calkins, Keane, & O’Brien, 2013), and lower executive functioning (Ursache et al., 2013) in later childhood. Although researchers have noted the importance of early independent emotion regulation behaviors in laying the foundation for later functioning, few studies have explicitly examined the developmental growth of individual emotion regulation strategy use between infancy and toddlerhood to understand how behaviors may change as young children age.

Additionally, although previous research has documented the importance of parenting for providing support in children’s development of emotion regulation abilities (e.g., Calkins, 1994; Thompson & Meyer, 2007), few have investigated the reciprocal or bidirectional relations between parenting and emotion regulation within young childhood, here defined as infancy and toddlerhood. With regard to parenting, decades of research have shown positive associations between exposure to positive parenting behaviors (e.g., warmth, responsiveness, supportiveness) and development of emotion regulation abilities (see Morris, Criss, Silk, & Houltberg, 2017 for review). Though less frequently studied than positive or extreme forms of negative parenting (e.g., abuse/neglect), overcontrolling parenting, characterized by controlling, intrusive, and overprotective behaviors, has demonstrated negative concurrent and predictive associations with children’s emotion regulation abilities (e.g., Feldman, Dollberg, & Nadam, 2011; Roque & Verissimo, 2011; Rudd, Alkon, & Yates, 2017). However, these results have been more inconsistent or mixed within the infant/toddler period (Karreman, van Tuijl, van Aken, & Dekovic, 2006; Gaertner, Spinrad, & Eisenberg, 2008), suggesting developmental differences. A handful of studies have demonstrated negative predictive associations from infant and toddler
emotion regulation to later negative parenting behaviors (e.g. Bridgett et al., 2009; Kennedy, Rubin, Hastings, & Maisel, 2004; Premo & Kiel, 2014), though this pathway seems less readily studied within the literature, particularly with reference to overcontrolling parenting specifically. Although a bidirectional relationship between emotion regulation in infancy and toddler and exposure to any type of parenting has yet to be founded (e.g., Feldman, 2015), the existing literature suggests these reciprocal relationships may exist.

The current study aimed to address gaps in the current literature by examining stability of emotion regulation behaviors between 12, 18, and 24 months of age. Additionally, the study employed a cross-lagged panel design using path analysis to investigate the bidirectional relations between children’s independent emotion regulation behaviors and overcontrolling parenting.

Emotion Regulation

Definition of Emotion Regulation

Given its widespread influences on social and academic functioning, health and well-being, and broader self-regulation, emotion regulation as a construct has been investigated by a diverse range of specialties within psychology, including developmental psychology, social psychology, cognitive psychology, clinical psychology, health psychology, and neuroscience. However, researchers have noted important differences in the definitions of emotion regulation used across these fields and have advocated for the use of a common definition (e.g., Adrian,
Zeman, & Veits, 2011; Cole, Martin, & Dennis, 2004; Eisenberg & Spinrad, 2004; Southam-Gerow & Kendall, 2002). James Gross’s process model of emotion regulation (1998) was one of the first to attempt to bring together and differentiate between prior definitions and models of emotion regulation across fields. Due to the flexibility of Gross’s process model to address emotion regulation across the lifespan and within developmental periods, as well as to allow different methods of assessing emotion regulation, it remains one of the most referenced and used models of emotion regulation within the social sciences (Gross, 1998). Central to Gross’s process model is the idea that emotional responses within individuals arise in a predictable linear sequence over time: 1) an emotionally arousing situation or stimulus is encountered; 2) attention is shifted toward the emotionally arousing situation or stimulus; 3) the individual cognitively appraises and interprets the emotionally arousing situation or stimulus; and 4) a resulting emotional response is generated. Gross proposed five types of emotion regulation processes, the first four of which attempt to modulate emotional experience prior to an emotional response being generated (i.e., antecedent-focused), with the final process attempting to adjust the resulting emotional response (i.e., response-focused; Gross, 1998; 2002).

According to the process model, when confronted with an emotionally arousing situation or stimulus, individuals must make an initial decision to either approach or avoid the situation or stimulus (i.e., situation selection; Gross, 1998; 2002). If individuals choose to approach, they then utilize one or more of the remaining three emotion regulation processes to modulate the upcoming emotional response (i.e., situation modification, attentional deployment, cognitive change). Situation modification involves individuals changing the physical environment or external stimuli to change its influence on the emotional response (e.g., increasing or decreasing
physical distance between the individual and emotionally arousing situation or stimulus). Attentional deployment involves the focusing and shifting of attention toward or away from the emotionally arousing situation or stimulus (e.g., averting gaze away, distraction, rumination, or active worrying). Finally, cognitive change occurs when individuals adjust the meaning of the situation or stimulus through alterations in cognitive appraisals (e.g., cognitive reappraisal, cognitive distancing, or use of humor). Once the emotional response is generated, individuals may attempt to change their behavioral, physiological, or experiential response to the emotionally arousing situation or stimulus (i.e., response modulation; e.g., expressive suppression, drug use, savoring, or exercise). In light of this model, emotion regulation is often defined as a set of intrinsic and extrinsic processes which, when utilized, allow individuals to identify, monitor, and modulate (i.e., maintain, enhance, or diminish) the intensity and valence of their emotional experience (e.g., Calkins & Hill, 2007; Gross, 1998; Thompson, 1994).

Originating from a different area of the field than much of Gross’ work, emotion regulation also can be considered to be an aspect of temperament (Rothbart, 2007). Rothbart and colleagues have defined temperament as individual differences in reactivity and self-regulation which are influenced by genetics, development, and experience (the psychobiological model of temperament; Rothbart, Ahadi, & Evans, 2000; Rothbart & Derryberry, 1981). As noted in the definition, one aspect of temperament is an individual’s natural emotional reactivity to familiar and unfamiliar stimuli, which is measurable through behavior and physiology. Emotional reactivity is further differentiated into two dimensions: negative affect (NA) and positive affect (PA) or surgency (Rothbart 1989; Rothbart, et al., 2000). Some children have innately lower thresholds for emotional experiences than others which, in turn, negatively influences their
ability to employ top-down emotion regulatory strategies to effectively modulate reactive emotional generation processes. For example, young children who demonstrate less emotional reactivity to novel stimuli or situations may be more easily soothed and comforted by caregivers, better able to internalize regulatory strategies modeled or taught by caregivers, and better able to execute independent regulatory strategies to modify their emotional experience than children who exhibit increased emotional reactivity (i.e., those who reach higher levels of distress and dysregulation; Stifter & Braungart, 1995; Thomas et al., 2017).

Regarding the second aspect of the psychobiological model of temperament’s definition, self-regulation, or one’s ability to modulate emotional reactions, expressions, and behavior, research differentiates emotion regulation, an aspect of “top-down self-regulation”, from reactive regulatory processes, or “bottom-up reactive self-regulation.” Most researchers recognize two bottom-up self-regulatory processes: behavioral inhibition and impulsivity (see Bridgett, Burt, Edwards, & Deater-Deckard, 2015 for review). Behavioral inhibition is defined as an innate tendency to overcontrol behavior in reaction to novel stimuli and is characterized by fear, shyness, withdrawal, caution, and reservation when approaching unfamiliar stimuli or situations (Aksan & Kochanska, 2004; Eisenberg et al., 2013; Kagan 1997). Impulsivity is defined as an innate tendency to under-control behavior in reaction to novel stimuli and is characterized by quick reactions with limited thought of long-term consequences or potential risks (Eisenberg et al., 2004; Eisenberg et al., 2013; Kagan, Reznick, & Gibbons, 1989). Studies examining the neurological underpinnings of both behavioral inhibition and impulsivity have found activation of different brain regions than those activated during top-down emotion regulation processes (Beaton, et al., 2008; Besson et al., 2010; Buckholtz et al., 2010; Davidson, Jackson, & Kalin,
Similarly, research has consistently found that individuals from all developmental periods who demonstrate worse emotion regulation also engage in more impulsive behavior (Carranza, Gonzalez-Salinas, & Ato, 2013; Eisenberg et al., 2004; Enticott, Ogloff, & Bradshaw, 2006; Gagne, Saudino, & Asherson, 2011; Romer et al., 2009; Schreiber, Grant, & Odlaug, 2012; Schwebel, 2004). Although studies have consistently found similar negative associations between emotion regulation and behavioral inhibition in older children, adolescents, and adults (Affrunti & Woodruff-Borden, 2015; Muris & Meesters, 2009; Schmidt & Fox, 1994; Wilson, Lengua, Tininenko, Taylor, & Trancik, 2009; Wolgast, Lundh, & Viborg, 2011), in younger children findings are mixed, with some results suggesting increased behavioral inhibition may facilitate the development of emotion regulation (e.g., Eisenberg et al., 2013; Thorell, Bohlin, & Rydell, 2004).

Beyond the differentiation between top-down and bottom-up processing, emotion regulation researchers have recently begun to draw more attention to the importance of considering context and individuals’ goals within a given context when studying emotion regulation (e.g., Aldao, 2013; Bridges, Denham, & Ganiban, 2004; Campos, Mumme, Kermoian, & Campos, 1994; Gross & Thompson, 2007; Raver, 2004; Thompson & Meyer, 2007). Similarly, Gross suggested researchers abstain from labeling emotion regulation strategies as purely “good” or purely “bad,” and, instead, encouraged researchers to consider the context in which the regulation is occurring (Gross, 1998). For example, children growing up in environments with low levels of supportive parenting may exhibit different regulatory strategies than children developing in environments with high levels of supportive parenting, but both patterns of regulatory strategy use may be adaptive in their given environments, at least in the
immediate moment (e.g., Keenan, 2006). Relatedly, research, albeit limited, has shown differences in regulatory strategy effectiveness given task demands or elicited emotions. Specifically, Buss and Goldsmith (1998) found children’s (ages 6-, 12-, and 18-months) use of distraction, approach behaviors (e.g., movements toward stimuli or objects), and social referencing (i.e. looking toward caregiver or experimenter) was effective in reducing frustration but not fear. Although commonly labeled as a “maladaptive” emotion regulation strategy, researchers also found children’s use of withdrawal from an aversive stimulus (e.g., backing away, turning away from, attempting to leave room) either decreased their fear response or maintained a low level of fear expression within tasks (Buss & Goldsmith, 1998). Research in toddlers has supported this link, with 18- and 24-month-olds displaying a greater number of regulatory strategies in tasks eliciting frustration than in those eliciting fear (Diener & Mangelsdorf, 1999). Despite recognition that all emotion regulation strategies may be adaptive in different contexts, research, particularly within clinical psychology, has found trends implicating long-term use of certain strategies (e.g., expressive suppression, experiential avoidance, worry/rumination) with psychopathology, including anorexia nervosa (for review see Oldershaw, Lavendar, Sallis, Stahl, & Schmidt, 2015), social anxiety disorder (Blalock, Kashdan, & Farmer, 2016), depression (D’Avanzato, Joormann, Siemer, & Gotlib, 2013), and post-traumatic stress disorder (Amstadter & Vernon, 2008).

Finally, researchers have posited an interplay between emotion regulation, emotional reactivity, bottom-up processing, and context, most recently in the form of a theorized biopsychosocial behavioral system responsible for changes in emotional reactivity and expression dependent on contextual goals (Rothbart & Sheese, 2007). Here, the context (i.e.,
both the emotionally arousing stimulus and factors within the environment influencing interpretation of the stimulus) in which a child experiences high emotional reactivity (e.g., distress; negative affect) or demonstrates high levels of bottom-up processing (e.g., impulsivity; behavioral inhibition) may increase or decrease the likelihood he or she is able to successfully independently regulate emotional experiences. Empirical research supports the transactional nature of emotion regulation, emotional reactivity, bottom-up processing, and context (in the current study, parenting behaviors setting expectations for behavior and responses), such that when children are not provided with adequate opportunities to experiment with independent emotion regulation or are not adequately supported as they experiment, particularly when certain temperament characteristics are present (e.g., heightened emotional reactivity, behavioral inhibition, impulsivity), they are more likely to utilize immature or ineffective emotion regulation strategies (e.g., Calkins, 1994; 2004; Gilliom, Shaw, Beck, Schonberg, & Lukon, 2002; Jaffe, Gullone, & Hughes, 2010; Kiel, Price, & Premo, 2019; Nachmias, Gunnar, Mangelsdorf, Parritz, & Buss, 1996).

Measurement of Emotion Regulation

Self-Report and Other-Report

Self-report measures of emotion regulation strategy knowledge and endorsement of use are more frequently utilized within older populations (i.e., adolescents and adults) than younger populations (i.e., infants, toddlers, and children) due to methodological and practical issues
When used, self-report measures allow researchers to efficiently collect information regarding emotion regulation strategy use over a number of different settings and context, and with little financial cost (Aldao, Nolen-Hoeksema, & Schweizer, 2010). However, self-report measures are highly susceptible to bias, often calling into question the accuracy of subjects’ interpretation of and response to questions within self-report measures (Aldao et al., 2010). Research with older children shows modest associations between self-reported knowledge of and endorsement of use of emotion regulations strategies and objective observation of strategies within standardized tasks (Underwood, 1997). Similarly, a study of 3- to 6-year-old children found modest associations averaged across 10 tasks between children’s observed emotional expression and self-reported experienced emotion (i.e., emotion identification and intensity; Durbin, 2010). Importantly, with regard to this study, associations between objective ratings and child report demonstrated considerable variability depending on task demands, suggesting a lack of consistency across emotions and contexts. Given infants’, toddlers’, and young children’s inability to accurately or effectively report on their emotional experiences verbally (e.g., within standardized or unstandardized interview) or within written questionnaires, most researchers examining emotion regulation within these developmental periods utilize behavioral observation, parent- or teacher- report measures, or physiological measures instead (Cole et al., 2004).

Whereas self-report measures are more common in older populations than younger, the use of other report measures, including parent- and teacher-report more frequently occurs in research involving infants, toddlers, and children than adolescents and adults (Adrian et al., 2011). Differential reports of emotion regulation use across reporters are expected, particularly
when reporters are in different roles and settings (e.g., teacher and parent) or when other report measures are compared to self-report measures (Achenbach, McConaughy, & Howell, 1987). These discrepancies between reporters’ ratings of emotion regulation in children and adolescents may reflect contextual influences on emotion regulation and behavior, resulting in different presentations across settings, as well as other factors (e.g., reporters interpreting questions differently, reporters’ own biases).

**Behavioral Observation**

Behavioral observations, wherein individuals are placed in structured or unstructured situations designed to elicit certain reactions, are utilized significantly more often in infant, toddler, and early childhood samples than in middle childhood, adolescent, or adult samples (Adrian et al., 2011). Behavioral observations can occur within the home environment, providing a more naturalistic view on behaviors and interactions, or in the laboratory setting, allowing for more standardized and structured tasks (Cole et al., 2004). There exist many unstructured, semi-structured, and structured tasks to choose from, depending on a researcher’s area of interest and resources (e.g., physical space, stimuli, time).

Given young children’s reliance on external supports for regulation, tasks designed to measure independent emotion regulation abilities attempt to place children in situations eliciting some form of distress, during which time caregivers are asked to “remain neutral” or refrain from intervening (Parritz, 1996). Tasks fitting these two criteria generally fall into two categories, depending on the task’s primary goal: delay tasks and emotion eliciting tasks. Most delay tasks
present children with an attractive stimulus (e.g., gift, snack, toy) and then have them try to wait (i.e., employ regulatory strategies) for a specified amount of time before receiving the stimulus (i.e., delay of gratification; e.g., Cole, Teti, & Zahn-Waxler, 2003; Grolnick, Bridges, & Connell, 1996; Grolnick, Kurowski, McMenamy, Rivkin, & Bridges, 1998). An alternative form of the delay task asks children to entertain themselves for a given amount of time while their caregiver completes an alternative activity (e.g., filling out questionnaires; e.g., Diener, Mangelsdorf, McHale, & Frosch, 2002). In all forms of the delay task, researchers have the option of asking caregivers to remain neutral or to provide external regulation (i.e., interact normally), depending on the measured construct.

Emotion eliciting tasks examine children’s ability to employ regulatory strategies upon the generation of specified emotions, including frustration (e.g., Calkins, Dedmon, Gill, Lomax, & Johnson, 2002; Calkins & Johnson, 1998; Little & Carter, 2005), fear (e.g., Braungart-Rieker, Hill-Soderlund, & Karrass, 2010; Buss & Goldsmith, 1998; Feldman et al., 2009), sadness or disappointment (e.g., Cole, Michel, & Teti, 1994; Morris et al., 2011; Saarni 1979), and positive affect (e.g., Carlson & Wang, 2007). These types of tasks allow researchers to examine children’s natural reactivity and expression of emotions, in addition to the way in which use of different types of regulatory strategies interact with these factors. For example, Buss and Goldsmith (1998) found differences in the effectiveness of emotion regulation strategies in reducing frustration and fear responses to behavioral tasks. One form of emotion eliciting tasks involves exposing infants and young children to unusual social interactions with caregivers and/or strangers (e.g., still face paradigm, Tronick, Als, Adamson, Wise, & Brazelton, 1978;
strange situation; Braungart & Stifter, 1991; Feng et al., 2008; Parritz, 1996; and stranger approach, Goldsmith & Rothbart, 1999).

Of particular interest to the current investigation are the still face paradigm and stranger approach tasks. The still face paradigm, first introduced by Tronick and colleagues (1978), examines infants’ independent emotion regulatory abilities by presenting them with contradicting social messages, wherein caregivers first interact normally with their infants, then inhibit all social initiations and responses (i.e., remain neutral), and finally re-engage with their infants. Studies utilizing the still face paradigm have consistently found decreased expressions of positive affect, increased use of gaze aversion, and increased expressions of negative affect during caregivers’ social withdrawal (i.e., “still face episode”) compared to normal interactions with caregivers (see Mesman, van Ijzendoorn, & Bakermans-Kranenburg, 2009 for review), thus allowing for the examination of emotional reactivity and regulatory strategy use.

The stranger approach task has typically been utilized to measure fear (e.g., Diaz & Bell, 2011), behavioral inhibition (e.g., Hayden, Klein, Durbin, & Olino, 2006), stress reactivity (e.g., salivary cortisol; Schmidt, Fox, Schulkin, & Gold, 1999), and prosocial behavior, as toddlers and young children are introduced to a stranger with whom they have the opportunity to interact (i.e., stranger offers conversation leads or attempts to initiate interaction with the child) without support from caregivers (i.e., caregiver remains neutral; Goldsmith & Rothbart, 1999). When researchers have used this task to examine regulation of emotional experience and behavior, regulatory abilities have more commonly been assessed via non-specific measures, such as vagal tone (e.g., Schmidt et al., 1999) or EEG (e.g., Diaz & Bell, 2011). Two studies have examined independent regulatory strategies during the stranger approach task in young toddlers (i.e., 18-
month-olds; Mangelsdorf, Shapiro, & Marzolf, 1995) and preschool age children (i.e., 3 years old; Zimmerman & Stansbury, 2003), both utilizing composites of regulatory behaviors. In the only study to use this task to investigate emotion regulation strategies in toddlerhood, Buss, Brooker, and Leuty (2008) examined toddlers’ bids for external regulation from caregivers in a number of distressing and non-distressing situations, including the stranger approach task. However, this study focused solely on attempts by the toddler to gain comfort or engagement from caregivers, not independent regulatory strategies such as those in the current investigation.

**Development of Emotion Regulation**

**Early Childhood**

As noted above, all humans are born with natural predispositions for reactivity toward stimuli and basic regulatory capacities (i.e., temperament), including those for emotion regulation. During the first few months of life, infants’ intrinsic emotion regulation is largely independent of intention, awareness, coordination, and planning, and instead guided primarily by reflexes encompassing approach (i.e., looking or moving toward a stimuli) and withdrawal (i.e., looking or moving away from a stimuli) behaviors (Calkins & Hill, 2007). As such, young infants rely heavily on extrinsic support from caregivers (e.g., soothing vocalizations, warm physical touch, rocking; Kopp, 1989; Rothbart, Ziaie, & O’Boyle, 1992). Between 3 and 6 months of age, infants’ ability to shift and focus attention (i.e., attentional control), to plan motor behaviors, and to coordinate motor movements increases, allowing for increased frequency of
use and effectiveness (i.e., observable decreases in negative affect and distress when confronted with aversive stimuli/situation) of independent emotion regulation behaviors (Johnson, Posner, & Rothbart, 1991). By the end of the first year, infants transition from relying solely on reflexive behavior and extrinsic support to regulate emotions, to demonstrating a range of emotion regulation strategies (e.g., gaze aversion, self-soothing, self-distraction, distancing/escaping, attention-seeking) with somewhat less support from caregivers (Kopp & Neufield, 2003). Although additional research is needed to more thoroughly study the developmental progression of all these independent regulatory strategies in infancy, for the purposes of the current study, only gaze aversion, self-distraction, and self-soothing behaviors will be highlighted for discussion and investigation.

Gaze aversion is one of the first emotion regulation behaviors to develop within young infants and involves the shifting of visual attention away from emotionally arousing stimuli (i.e., attentional deployment; Gross, 1998; Rothbart et al., 1992). Between birth and approximately 2 months of age, infants’ gaze is uncoordinated and unplanned (i.e., attend to any stimuli capturing attention). Infants’ ability to regulate their visual attention increases between 2 and 4 months, such that by 4 months most infants are able to successfully shift their gaze away from emotionally arousing stimuli (Bridges & Grolnick, 1995; Johnson et al., 1991; Rothbart et al., 1992; Tronick, 1989). When compared to other emotion regulation behaviors observed during infancy and toddlerhood, gaze aversion is more frequently utilized by younger infants, suggesting it is an effective regulatory tool particularly early on in development (Mangelsdorf et al., 1995). For example, in a study of infants between 6 and 13 months Rothbart and colleagues (1992) reported negative associations between gaze aversion and distress levels (e.g., increased
use of gaze aversion associated with decreased negative affect) and positive associations between gaze aversion and soothability (e.g., increased use of gaze aversion associated with increased ease of soothing). Given its early development and relative simplicity, it is unsurprising longitudinal research has found little change in the effectiveness of gaze aversion to decrease negative emotions beyond 6 months of age, and yet it remains a readily accessed regulatory strategy across the lifespan, particularly in combination with other strategies. For example, decreases in use of gaze aversion alone between 6.5 and 13.5 months of age and increases in use of gaze aversion and more cognitively challenging strategies, such as self-distraction and social referencing/engagement, have been shown within the same time period (Rothbart et al., 1992).

Self-soothing behaviors, including finger sucking, body rocking, and playing with hands or hair, begin to develop around 3 months of age as infants’ motor abilities increase (Johnson et al., 1991; Kopp, 1982). Findings by Stifter and Braungart (1995) examining infants’ use of self-soothing behaviors at 5- and 10-months during tasks designed to elicit frustration (i.e., arm restraint and toy removal) suggested by 5 months of age self-soothing behaviors are an effective and preferred strategy for decreasing negative affect. More specifically, at both time points, infants were more likely to utilize self-soothing behaviors than avoidance, attentional behaviors (e.g., orientation toward objects or mother, visual scanning), and non-distress vocalizations (e.g., babbling, laughter), provided their hands were free from restraint, and these behaviors were highly associated with decreases in negative affect within tasks (Stifter & Braungart, 1995). Notably, however, additional longitudinal research has shown changes in infants’ use of specific self-soothing behaviors over the first year (i.e., between 3 and 13 months), wherein infants’ use of hand-mouth stimulation (e.g., sucking on fingers, blowing mouth bubbles) declines over time
while use of body self-stimulation (e.g., banging toy with hands, kicking high chair/table) increases (Rothbart et al., 1992). Even by 12 months of age, self-soothing behaviors remain one of the predominate regulatory strategies for young children (Mangelsdorf et al., 1995).

Compared to gaze aversion and self-soothing behaviors, self-initiated distraction behaviors (i.e., looking at and interacting with non-emotionally arousing stimuli) tend to be first observed later in infancy, around 6 months of age (Harman, Rothbart, & Posner, 1997), due to the complex nature of both shifting attention and engaging with another stimuli. Importantly, findings from a group of Head Start preschoolers suggests, although attentional control is necessary for self-distraction, each is a separate construct, with self-distraction predicting individual differences in social competence with peers above and beyond that attributable to attentional control (Raver, Blackburn, Bancroft, & Torp, 1999). Beginning around 3 months of age, infants demonstrate attentional distraction, or the shifting of one’s attention away from distressing stimuli and toward non-distressing stimuli, but only when given toys or non-distressing objects with which to engage. Between 3 and 6 months, infants gain greater cognitive and motor control, allowing for more independent self-distraction. Although infants begin to engage in self-initiated distraction behaviors (i.e., when not given toys or objects) with some effectiveness at 6 months of age (e.g., Rothbart et al., 1992; Stifter & Braungart, 1995), other regulatory strategies (e.g., gaze aversion, self-soothing) are used more frequently throughout infancy and into toddlerhood, sometimes in combination with self-distraction (Mangelsdorf et al., 1995). In a study of 12- and 13-month-old infants and their caregivers, infants who used less distraction and more self-soothing behavior or avoidance/escape demonstrated more distress. In this study, strategies which increased expressions of positive affect include self-distraction,
social referencing (i.e., gazing at parent’s face), and attempts to engage parent (Diener et al., 2002).

Toddlers continue to look toward and rely on caregivers for help in regulating emotions, particularly in unfamiliar or novel situations which trigger feelings of distress. For example, in a study examining toddlers’ use of comfort-seeking behaviors (e.g., running to caregiver, making contact with caregiver) during the stranger approach task, Buss and colleagues found, in general, 24-month-old toddlers utilize comfort seeking behaviors, but for boys, these behaviors increased significantly as levels of distress increased (Buss et al., 2008). Toddlers also consistently demonstrate more visual attention toward caregivers (i.e., social referencing) when in strange situations (Ainsworth & Wittig, 1969; Grolnick et al., 1996). However, developing motor and cognitive abilities enable toddlers to engage in increasingly more independent self-regulatory behaviors, and those engaged in are progressively more sophisticated and flexibly used than in infancy (Kopp & Neufield, 2003). For example, while toddlers continue to utilize self-distraction and gaze aversion (attentional deployment process), and self-soothing behaviors (response modulation process) to regulate emotional arousal and distress at high frequencies, these strategies become more complex (e.g., self-soothing includes self-talk as expressive language increases; Day & Smith, 2013) and they also begin to utilize additional strategies from the situation modification process of Gross’s process model, namely constructive problem-solving (Calkins & Johnson, 1998; Grolnick et al., 1996; Gross, 1998; Parritz 1996).

Specifically, toddlers demonstrate a greater capacity and desire to control distressing situations than infants, as a way of regulating an emotionally arousing or distressing situation (Kopp 1982; Mangelsdorf et al., 1995). For example, within a stranger approach task, 18-month-
old children were more likely than at 6 or 12 months to engage with the stranger and to attempt to control their mother’s behavior or that of the stranger (e.g., taking hand and pulling toward a specific location). Similarly, Atkinson (2018) found increases in attention-seeking behaviors in children ages 12 and 18 months, in addition to self-oriented behaviors (e.g., self-soothing, self-distraction), during periods of maternal unavailability within laboratory tasks. Importantly, toddlers’ ability to flexibly utilize external- and self-driven regulatory strategies given context is adaptive and effectiveness of emotion regulatory behaviors may vary depending on task demands. In a task wherein parents are instructed to be unresponsive to their children (such as that utilized in the current investigation), for example, parent-focused regulatory behaviors (e.g., comfort seeking, attention gaining) would be less effective at decreasing distress, as attempts to engage the parent would be ignored.

In one of the only studies to directly investigate the impact of toddlers’ use of a variety of regulatory strategies on expressions of negative affect, Ekas and colleagues (2011) examined toddler emotion expression and regulation during tasks in which mothers were asked to be unresponsive to their child. Results indicated mother-focused strategies (i.e., parent orientation, directed vocalizations, and directed gestures), gaze aversion, and self-soothing behaviors (physical and vocal) led to increases in negative affect immediately following the execution of the behavior, while engagement in self-distraction (e.g., active play with toy) led to immediate decreases in negative affect (Ekas, Braungart-Rieker, Lickenbrock, Zentall, & Maxwell, 2011). Other studies have similarly found positive associations between negative affect and gaze aversion (Braungart & Stifter, 1991), physical self-soothing (Grolnick et al., 1996), and parent-focused strategies when the parent is unavailable (Grolnick et al., 1996), and negative
associations between self-distraction (i.e., active engagement with object) and negative affect (Braungart & Stifter, 1991; Grolnick et al., 1996). Given these patterns in resultant emotional arousal, it makes sense that use of more active self-distraction would continue to increase throughout toddlerhood, while other strategies with more variable effectiveness (e.g., gaze aversion, self-soothing) would decrease in frequency.

**Neural Development: Early Childhood**

Even in Gross’s seminal paper describing his process model, he noted the importance of examining bidirectional relations between areas of the brain associated with emotion expression and experience (e.g., amygdala, limbic system), and those associated with higher-level processing and regulation of emotions (e.g., cerebral cortex), and cited research suggesting differential brain circuits associated with regulating different emotions (Gross, 1998). Given the state of the literature in 1998, Gross was only able to point to the prefrontal cortex’s role in emotion regulation broadly. More recent research has found activation of the prefrontal cortex (PFC) to be associated with a number of higher order cognitive processes including: working memory, planning, organization, decision-making, attentional control and modulation, and emotion regulation (e.g., Phillips, Ladouceur, & Drevets, 2008; Steinberg, 2005; Zeman et al., 2006). Areas of the PFC implicated in emotion regulation, specifically, are connected to subcortical regions within the limbic system, allowing for the integration of motor and sensory information related to emotional experiences and expression (Phillips et al., 2008). As proposed by Gross’s early work, the amygdala (within the limbic system) has been shown to play an
important role in the interpretation of intrinsic and extrinsic stimuli for emotional experiences and integrating information from the PFC to modify emotional arousal and expression (Zeman et al., 2006). Over the last two decades significant progress has been made using functional magnetic resonance imaging (fMRI), electroencephalogram (EEG), and event-related potentials (ERPs) to determine activation patterns within the brain which coordinate to regulatory behaviors, and the developmental sequence of neural activation patterns.

Although all infants are born with neural structures associated with emotion and self-regulation intact, these structures slowly come “online” during the first few years of life, as activity in and connectivity between the PFC, amygdala, and other emotion-associated cortical and subcortical brain structures increases. Given that these structures demonstrate different developmental patterns and growth trajectories, development of neurological activation patterns associated with emotion regulation is not linear, and instead ebbs as both structures and the connectivity between them changes (Thompson, Lewis, & Calkins, 2008). The anterior cingulate cortex (ACC), for example, associated with regulation of attention, experiences a surge of growth around 10 months of age, corresponding to increases in infants’ independent regulatory abilities (e.g., self-soothing, self-distracting) and visual tracking of stimuli (Bell & Deater-Deckard, 2007), and then remains stable for some time. Between ages 3 and 6, this “attentional executive network” is thought to experience another surge in growth, corresponding to increases in delay of gratification, impulse control, decision making, and emotional awareness (Gao et al., 2009; Fair et al., 2009; Posner & Rothbart, 2000; Rothbart, Sheese, Reuda, & Posner, 2011).

Research has also heavily investigated the activation patterns of brain structures with regard to hemispheric associations to approach or withdrawal behaviors, beginning in infancy
This research has primarily found activation of the left frontal lobe to be associated with approach behavior, while activation of the right frontal lobe relates to withdrawal behavior. These differential activation patterns have been postulated to relate to the way in which individuals regulate positive and negative emotions (e.g., Davidson, & Fox, 1982; Fox, 1994; Fox & Davidson, 1987). For example, when engaged in an emotion processing task (e.g., viewing emotional images), the brains of infants and young children show increased left frontal activity when elicited emotions are approach-related (e.g., happiness, curiosity, interest) and increased right frontal activity when elicited emotions are withdrawal-related (e.g., fear, distress, sadness; Bell & Deater-Deckard, 2007). These patterns of activation appear to persist into adulthood (e.g., Lewis & Stieben, 2004).

**Later Childhood and Beyond**

Researchers have shown that children’s awareness of emotion regulation strategies emerges between 3 and 5 years old (Cole, Dennis, Smith-Simon, & Cohen, 2009; Denham, 1998), presumably due to increases in cognitive abilities, including executive functions, self-concept, and problem-solving, expressive and receptive language abilities, and conscious motor control (Southam-Gerow & Kendall, 2002). Beginning in the preschool years, children transition from using primarily passive emotion regulation strategies (e.g., gaze aversion, self-soothing, waiting for external support) to more active or instrumental strategies (i.e., attempts to change the emotionally-arousing situation through use of language, escaping setting, and distraction/engagement with other objects; Feng et al., 2008; Stansbury & Sigman, 2000). For
example, in one study of 3-year-olds, distraction was the most frequently utilized emotion regulation strategy, followed by self-soothing, instrumental strategies (e.g., attempts to change situation, lack of delay of gratification), and cognitive strategies (e.g., reappraisal) across three different tasks (Zimmerman & Stansbury, 2003). As such, by the age of 3 children are able to access emotion regulatory strategies from all five processes of Gross’s process model, though the effectiveness with which they do so is variable (Gross, 1998). As children age and their awareness and control of regulatory strategies increases, the role caregivers and others (e.g., teachers, peers) play in emotional socialization changes from direct intervention (i.e., external regulatory support), to modeling or scaffolding of appropriate regulatory strategy use, to coaching through verbal prompts, with this progression first becoming more evident during the preschool years (Bailey, Denham, Curby, & Bassett, 2016; Cole et al., 2009).

Within middle childhood (ages 7-12), children’s use of cognitive strategies (e.g., reappraisal, suppression, distraction, problem-solving, distancing) continues to increase, in addition to a greater focus on also regulating physiological arousal through relaxation techniques (Thompson & Goodman, 2010). However, research suggests these cognitive strategies may still be variable in their effectiveness at decreasing emotional responses, particularly those requiring increased cognitive load and control (i.e., reappraisal; de Veld, Riksen-Walraven, & de Weerth, 2012). In addition to cognitive and relaxation strategies, given normative increases in independent behavior and autonomy development associated with middle childhood, additional strategies, such as seeking out social support from peers and isolating oneself from others (e.g., going to bedroom), also increase (Compas et al., 2017; Findlay, Coplan, & Bowker, 2009).

Finally, children in middle childhood demonstrate increased self-awareness and perspective
taking related to how their use of emotion regulation strategies may impact future goals or behaviors, both of themselves and others (Thompson, 1990; Thompson & Goodman 2010).

Between childhood and adulthood, the effectiveness of individuals’ attempts to regulate their emotions increases, due to three factors: 1) learning of additional regulatory strategies; 2) improvement in use of old regulatory strategies; and 3) selective inhibition of regulatory strategies deemed to no longer be effective (Tottenham, Hare, & Casey, 2011; Zimmerman & Iwanski, 2014). By the time individuals reach adolescence, they possess the ability to access strategies from all five types of emotion regulation processes, the use of which improves in effectiveness and complexity across adolescence and adulthood (Garnefski & Kraaij, 2006; Laible, 2007; Gross, 1998; Zeman, & Shipman, 1997; for review see Young, Sandman, & Craske, 2019). Although both adolescents and adults are able to utilize a wide range of emotion regulation strategies, the majority of researchers choose to study two main strategies: cognitive reappraisal and expressive suppression (Gross, 1998; John & Gross, 2004).

In engaging in cognitive reappraisal, individuals change their thoughts or interpretations of an emotionally arousing event or stimuli, which, in turn, changes the resulting emotional experience (Gross, 1998). Given its function, cognitive reappraisal can be used before or after the generation of an emotional response. Emotional suppression, or the inhibition of resulting emotional responses to events or stimuli, on the other hand, can only occur after a response to an emotionally arousing event or stimuli has been initiated (Gross, 1998). Of note, emotional suppression can allow individuals to better control emotional expressions of emotional responses, even though it does not necessarily change the internal experience of an emotion. Of these two emotion regulation strategies, cognitive reappraisal is typically associated with better
functioning, including increased generation of positive emotions and decreased generation of negative emotions (Gross, 1998; Gross & John, 2003), increased executive functioning (Lantrip, Isquith, Koven, Welsh, & Roth, 2016), and less engagement in heavy drinking and marijuana use (Weiss, Bold, Sullivan, Armeli, & Tennen, 2017), while emotional suppression is more commonly associated with worse interpersonal functioning and overall well-being (English, John, Srivastava, & Gross, 2012; Gross & John, 2003; Haga, Kraft, & Corby, 2009).

Neural Development: Later Childhood and Beyond

Across childhood and adolescence, the overall amount of white matter in the frontal, parietal, and occipital cortices of the brain increases due to myelination, while the overall amount of gray matter decreases, presumably due to selective pruning (Sowell, Trauner, Garnst, & Jernigan, 2002; Steinberg, 2005). Myelination and synaptic pruning within the PFC continue throughout adolescence and into early adulthood, leading to continued maturation in risk/reward processing, long-term planning, decision-making, and emotion regulation (Steinberg, 2005). Previous work has shown relative decreases in activation of the PFC as children age, suggesting increased efficiency in neural processing in adolescence and adulthood (Durston et al., 2002; Casey, Giedd, & Thomas, 2000; Luna et al., 2010).

Similar to behavioral research (see above), much of the neurological research involving older children, adolescents, and adults has focused on two emotion regulation strategies (i.e., suppression and reappraisal) and the associated activation and structural patterns. A number of studies have found neurological differences, both in functioning and structure, related to use of
expressive suppression and cognitive reappraisal. In one such study, Goldin and colleagues (2008) found adult females’ use of reappraisal resulted in changes in neurological activation quicker than use of suppression and, though both strategies activated the PFC and decreased reported negative emotional experience, only reappraisal also decreased activation in the amygdala and insular. Similarly, in a sample of children ages 8-10, activation of the PFC was associated with both suppression and reappraisal of negative emotions; however, discrepancies emerged with regard to children and adults’ patterns of activation in this area, with children sometimes demonstrating activation in the same location of the PFC as adults, but opposite hemisphere (Bunge, Dudukovic, Thomason, Vaidya, & Gabrieli, 2002), and with children demonstrating more widespread activation patterns within the PFC (versus more localized; Levesque et al., 2004). Within adults specifically, reappraisal has been linked with activation of very specific areas of the PFC including the dorsal lateral, ventral lateral, dorsal medial, and ventral medial areas (Buhle et al., 2014; Diekhof, Geier, Falkai, & Gruber, 2011), in addition to the ACC and orbitofrontal cortex (OFC; Giuliani, Drabant, & Gross, 2011; Kanske, Heissler, Schonfelder, Bongers, & Wessa, 2011). Suppression, on the other hand, has been linked to increased gray matter volume in the dorsal medial PFC (Kuhn, Gallinat, & Brass, 2011) and activation of the right inferior frontal gyrus (Vanderhasselt, Kuhn, & De Raedt, 2013).

Stability of Behaviors Between Developmental Periods

Research examining the stability of emotion regulation behaviors, both in regard to frequency of use and presentation (i.e., what do these behaviors look like), over time has been
limited. Although much of the research in this area has been cross-sectional, when longitudinal designs are utilized, the research questions more often involve predictive associations than stability of behaviors (Bronson, 2000). That said, stability within either broad self-regulation (with specific measurements of emotion regulation included) or emotion regulation has been found within developmental periods (e.g., Edossa, Schroeders, Weinert, & Artelt, 2017; Feldman et al., 2009; Gaertner et al., 2008; Rothbart et al., 1992), across two developmental periods, including infancy to toddlerhood (e.g., Kannass, Oakes, & Shaddy, 2006; Richards, 1989), toddlerhood to childhood (e.g., Calkins & Keane, 2004; Kochanska, Coy, & Murray, 2001; Ruff, Lawson, Parrinello, & Weissberg, 1990), and early childhood to adolescence (e.g., Raffaelli, Crocket, & Shen, 2005), and across three developmental periods (i.e., infancy to childhood; August et al., 2015; Jusiene, Breidokiene, & Pakalniskiene, 2015). No study thus far has investigated stability across the entire lifespan, though research by Edossa and colleagues (2017) examining stability of emotion regulation between ages 3 and 7 suggested moderate stability in behaviors early in development, with notable increases in the strength of stability by late childhood, such that stability into adulthood may be assumed.

Regarding specific regulatory strategies, even less emphasis has been placed on investigating the developmental patterns in use over time, particularly between infancy and toddlerhood. Previous research has identified infants’ ability to engage in joint attention with a caregiver at 6 months of age to be predictive of emotion regulation strategy use in toddlerhood (i.e., 24 months), such that those infants better at following a caregiver’s gaze (i.e., increased attentional control) demonstrate increased self-directed emotion regulation behavior and less comfort-seeking behavior at 24 months (Morales, Mundy, Crowson, Neal, & Delgado, 2005). In
an unpublished Master’s thesis project, Atkinson (2018) found the demonstration of more “self-reliant” strategies (e.g., self-distract, self-soothing) at 5.5 and 12 months of age predicted increases of “mother-reliant” strategies (e.g., attention-seeking, engagement with mother) at 12 and 18 months, respectively. Additionally, no rank-order stability was found across 5.5, 12, and 18 months for self-reliant strategies, and moderate stability was found in mother-reliant strategies, but only between 5.5 and 12 months, not into toddlerhood (Atkinson, 2018).

Interestingly, although different from stability, one study examined emotion regulation abilities of children at three early childhood time periods (i.e., 14, 24, and 36 months) using latent growth modeling and found overall linear growth between 14 and 36 months; however, the trajectory of developmental growth was steeper (or faster) for children with lower emotion regulation abilities at 14 months (Brophy-Herb, Zajicek-Farber, Bocknek, McKelvey, & Stansbury, 2013). This study may suggest additional factors (e.g., parenting behaviors) at play which may alter growth patterns in emotion regulation abilities, enabling those children “behind” in emotion regulation abilities upon exiting infancy to “catch up” by preschool.

Overcontrolling Parenting and Emotion Regulation

In general, parents are thought to shape children’s acquisition and implementation of independent regulatory behaviors from infancy well into adolescence through a number of mechanisms, including coaching, modeling, and directly teaching, and within parent-child interactions (Calkins, 1994; Thompson & Meyer 2007). Early in infancy, caregivers provide children with external support in regulating emotions during times of distress (e.g., Eisenberg &
Morris, 2002; Field, 1994). Field (1994) posited this external support, which steadily decreases between infancy and older childhood, serves three primary functions: 1) help maintain state of behavioral and physiological homeostasis (e.g., Harman et al., 1997; Grolnick et al., 1998); 2) provide passive modeling and reinforcement of appropriate emotion expression and regulation within various contexts (e.g., Barrett & Campos, 1987; Zeman et al., 2006); and 3) directly teach and provide suggestions for effective strategies to regulate emotions (e.g., Blandon, Calkins, Keane, & O’Brien, 2008; Calkins & Hill, 2007; Diener & Mangelsdorf, 1999). Positive parenting behaviors, including sensitive responsivity to distress, warmth, and positive emotional expressions, in particular, have been shown to be ideal for promoting normal development of emotion regulation in infants, toddlers, and beyond, including use of more flexible and effective use of regulatory strategies (e.g., Calkins, 2002; Calkins, Smith, Gill, & Johnson, 1998; Gaertner et al., 2008).

Overcontrolling parenting, also known as intrusive or overprotective parenting, or lack of autonomy granting within the literature, is characterized by high parental vigilance, inhibition of children’s decision-making, excessive use of directives and commands, controlling of interactions, and limiting of children’s attempts to explore and engage with stimuli independently (e.g., Borelli, Margolin, & Rasmussen, 2014; Eisenberg, Taylor, Widaman, & Spinrad, 2015; Perry, Dollar, Calkins, Keane, & Shanahan, 2018). Given these characteristics, it has been theorized that overcontrolling parenting decreases opportunities for children to practice independent regulation of behavior and emotions, to improve their ability to identify and implement effective regulatory strategies, and to monitor outcomes to reflect on effectiveness or appropriateness for given situational demands (e.g., Graziano, Keane, & Calkins, 2010).
Additionally, other researchers have acknowledged that if, as predicted, children experience overcontrolling parenting as frustrating, demeaning, or hostile, any engagement with the parent while overcontrolling parenting behaviors are used would result in increased physiological arousal and stress, decreasing the child’s ability to learn in that moment (e.g., Eisenberg, Cumberland, & Spinrad, 1998; Hoffman, 2000). Longitudinal research in at-risk mothers has shown significant increases in the use of maternal overcontrolling parenting between the child’s birth and the child’s 3rd birthday, and particularly between ages 1 and 2 years (Clincy & Mills-Koonce, 2013; Hyoun, Pears, Fisher, Connelly, & Landsverk, 2010), while findings from other studies suggest stability in engagement in overprotective parenting behaviors over time (e.g., Calkins, 2002). Given these findings, exposure to overcontrolling parenting in early childhood (i.e., infancy and toddlerhood) would presumably negatively impact children’s adoption of independent regulatory strategies.

**Concurrent Associations between Overcontrolling Parenting and Child Emotion Regulation**

Generally, research examining emotion regulation has shown differences in children’s use of emotion regulatory strategies related to maternal involvement in structured laboratory tasks, such that increased perceived or experienced overcontrolling parenting is associated with decreased efforts by the child to engage in effective regulation of emotional expression. This pattern has been shown across developmental periods, including in middle childhood, during which this type of parenting is associated with increased use of suppression and decreased use of reappraisal (Jaffe et al., 2010), and in the preschool years, during which overcontrolling
parenting has shown relations with increased use of suppression and decreased in willingness to seek out caregiver support during heightened emotions (Berlin & Cassidy, 2003), decreased use of cognitive or distraction strategies and increased focus on emotionally arousing stimuli (Stansbury & Zimmerman, 1999), and decreased emotion regulation abilities within the classroom setting, as rated by preschool teachers (Mathis & Bierman, 2015). Additionally, more recent research combining observational and physiological measures of emotion regulation and parenting found concurrent negative associations between unsupportive maternal reactions to 4-year-olds’ negative emotions and children’s use of distraction, but only when children also demonstrated less vagal suppression (i.e., less ability to activate PNS and achieve state of relaxation; Perry, Calkins, Nelson, Leerkes, & Marcovitch, 2012).

Within the very limited research investigating this relationship in toddlerhood, studies have typically found negative relations between overcontrolling parenting and adaptive emotion regulation (Feldman et al., 2011). In one such study involving a sample of 18-26-month-old toddlers, greater maternal involvement in tasks was associated with greater exploration of stimuli and social initiations with mothers, and decreased use of independent regulatory strategies, including distraction and self-soothing (Roque & Verissimo, 2011). Similarly, in a study by Calkins and colleagues (1998), toddlers, aged 24 months, exposed to increased levels of maternal negative control (i.e., negative verbal expressions, attempts at physical and verbal control of situation and child) demonstrated increased focus on distressing stimuli and decreased levels of self-distraction across two tasks eliciting frustration (i.e., barrier and restrain tasks; Calkins et al., 1998). In a similar study conducted by the same research group, Calkins and Johnson (1998) examined the relationship between maternal behavior and emotion regulation in 18-month-old
children, finding an additional parenting variable, preemptive interference (i.e., instances in which mother’s complete tasks for the child, taking away opportunities for learning or initiative), to be positively related to distress during frustration tasks and use of aggression or “venting” of frustration, particularly as levels of distress increased. Thus far, research examining concurrent relations between overcontrolling parenting and toddler emotion regulation abilities appear to emulate those found in older populations.

Notably, however, in one meta-analysis of only cross-sectional studies, researchers found no relations between negative control, including intrusiveness, over-control, and over-involvement, and emotion regulation abilities in children aged 2-5 years (Karreman et al., 2006), suggesting the relationship between overcontrolling parenting and emotion regulation may be less stable in early childhood than in later childhood. Similarly, in infancy, studies examining this relationship have been mixed, with some finding significant positive relations between maternal negative behavior (i.e., negative affect, intrusiveness, disengagement) and infant withdrawal (e.g., turning away from caregiver; Crockenberg & Leerkes, 2004; Crockenberg, Leerkes, & Lekka, 2007), while others find no relations between overcontrolling parenting and infant negative affect (Haltigan, Leerkes, Supple, & Calkins, 2014). This variability in findings across cross-sectional studies in infancy and early childhood may correspond to the specific emotion regulation behaviors examined. For example, in their meta-analysis, Karreman and colleagues (2006) noted that their analysis of emotion regulation abilities did not allow for the separation of independent internalized strategies (e.g., cognitive strategies), independent instrumental strategies (e.g., self-distraction), and other oriented strategies (e.g., attention-seeking, comfort seeking). It may be that, as children age, the concurrent relationship between
overcontrolling parenting and emotion regulation decreases, as children learn to become more self-reliant and to utilize more independent strategies.

**Longitudinal Effects of Overcontrolling Parenting on Child Emotion Regulation**

As suggested above, many researchers consider psychopathology to be at least partially a product of ineffective regulation of emotions. Using this perspective, research examining the longitudinal effects of overcontrolling parenting on symptoms of psychopathology (e.g., anxiety, depression) can be utilized to extrapolate the potential underlying influences of overcontrolling parenting on emotion regulation abilities. For example, in a study of elementary school aged students, exposure to at least one parent engaging in highly overcontrolling parenting at age 10 predicted higher anxiety symptomatology and increased use of avoidant coping strategies (e.g., avoiding thinking of distressing stimulus; avoiding interacting with someone who produced feelings of negativity in self) at age 12 (Borelli, Margolin, & Rasmussen, 2015). As others have done, Borelli and colleagues suggest overcontrolling parenting impedes children’s development of independent emotion regulation and coping skills. Similarly, in Pinquart’s 2017 meta-analysis, “harsh control,” defined as physical or verbal punishment and/or parental intrusiveness, and “psychological control,” defined as verbal manipulation of emotional experiences, were found to predict increases in externalizing problems over time (mean interval 3.6 years) after controlling for initial externalizing levels, though effect sizes fell in the very small range ($r = .08$ and .06, respectively).
Research across the lifespan has suggested that children exposed to overcontrolling parenting may feel less competent and able to manage stress and exhibit higher levels of dysregulation (e.g., Little & Carter, 2005; Perry et al., 2018; Wagner, Propper, Gueron-Sela, & Mills-Koonce, 2016), even after controlling for maternal anxiety (Gar and Hudson, 2008), depression (Schiffrin et al., 2014), and maladaptive coping patterns (e.g., rumination; Spasojevic & Alloy, 2002; avoidance, Borelli et al., 2015), as they are afforded few opportunities to independently attempt to manage their thoughts, feelings, and behaviors. This negative effect has also been found within physiological indicators of self-regulation (Adrian et al., 2011; Fox, 1994; Moore et al., 2009), such that higher levels of exposure intrusive parenting predict lower respiratory sinus arrhythmia (RSA) recovery (i.e., longer time to recover state of relaxation after presentation of fearful stimulus) in elementary school aged children (Rudd et al., 2017). Additionally, years of research indicating the beneficial nature of positive parenting, characterized by supportiveness, responsiveness, and warmth, for developing effective and appropriate independent emotion regulation abilities between infancy and adolescence (see Morris et al., 2017 for review), suggests the opposite type of parenting (i.e., negative, controlling, intrusive, unsupportive), would be detrimental to normal development of emotion regulation abilities. Finally, research has suggested exposure to overcontrolling parenting by mothers predicts larger decreases in early elementary school children’s emotion regulation, than that of fathers (Cabrera, Shannon, & Tamis-LeMonda, 2007; Chang, Schwartz, Dodge, & McBride-Chang, 2003). There may be a unique factor related to the mother-child relationship specifically (e.g., synchrony, attachment) which makes the experience of overcontrolling parenting behaviors more impactful on children’s development of regulatory abilities.
Specific to infants and toddlers, research related to effects of overcontrolling parenting on emotion regulation has been limited. Previous work, instead, has found higher use of intrusive parenting in infancy to be predictive of lower inhibitory control (i.e., behavioral regulation) at 36 months (Clincy & Mills-Koonce, 2013) and into middle childhood (Olson, Bates, Sandy, & Schilling, 2002). Similarly, toddlers’ demonstration of behavioral inhibition within a semi-structured peer interaction significantly predicted social reticence at 4 years old, but only for children who were exposed to high levels of maternal overcontrol during clean-up, free play, and snack time tasks at 2 years old (Rubin, Burgess, & Hastings, 2002). Finally, maternal control at 18 months has been shown to negatively predict attentional focus at 30 months, but only for toddlers demonstrating low to moderate attention (Gaertner et al., 2008). Taken together, these findings suggest the effects of maternal overcontrolling and related parenting behaviors on self-regulation is observable in young children’s behavioral regulation attempts (e.g., behavioral inhibition), but it is unknown whether similar trends will be observable related to their use of different emotion regulation strategies. Additionally, children with worse emotion regulation abilities (e.g., attentional control) may be more detrimentally affected by increased or continued exposure to more negative parenting (e.g., Poehlmann et al., 2011).

**Longitudinal Effects of Child Emotion Regulation on Overcontrolling Parenting**

Though not commonly studied, researchers have acknowledged that child characteristics influence parenting behaviors, including those involved in emotion socialization (e.g., Premo & Kiel, 2014). The majority of research thus far examining the influence of child effects on
parenting behaviors has examined temperament characteristics, some of which are akin to emotion regulation (as discussed above). In general, research finds infants and young children with “easy” temperaments (e.g., high PA, low NA, easily soothed, low reactivity) are more likely to have parents who engage in positive parenting behaviors, or those characterized by warmth and responsivity, while infants and young children with more “difficult” temperaments (e.g., low PA, high NA, difficult to soothe, high reactivity) are more likely to have parents who engage in more negative parenting behaviors, characterized by rejection, criticism, and negative physical touch, of which overcontrolling parenting behaviors are sometimes included (see Putnam, Sanson, & Rothbart, 2002 for review). Even in older children, more severe displays of emotion dysregulation (e.g., noncompliance, anger, negative affect) in toddlerhood have been shown to predict decreases in quality of parenting behaviors exhibited, including supportiveness, quality of interaction, and limit setting, into the preschool years (Yates, Obradovic, & Egeland, 2010).

Regarding children’s emotion regulation abilities specifically, previous findings are suggestive of a directional influence from child emotion regulation abilities to later parenting behaviors, though only a handful of studies have examined this directional pathway. Studies examining attentional control, for example, find that young children’s attentional abilities predict later parenting, such that higher attentional control is predictive of more sensitive parenting behaviors (Belsky, Fearon, & Bell, 2007), across developmental periods. Similarly, previous research found faster declines in mother reported infant regulatory capacity across the first year of life, a factor comprised of soothability, cuddliness, duration of visual orientation, and expressions of low intensity pleasure, significantly predicted mothers’ use of negative parenting behaviors (Bridgett et al., 2009). Using vagal tone as a measure of child emotion regulation
(Adrian et al., 2011; Fox, 1994; Moore et al., 2009), Kennedy, Rubin, Hastings, and Maisel (2004) found measurements of children’s vagal tone at 2 years of age significantly predicted parental use of restrictive or overcontrolling parenting behaviors (e.g., not allowing questioning of parenting decisions; use of scolding or criticism to change behavior) at 4 years of age, such that children exhibiting lower baseline vagal tone at 2 years had mothers who indicated more use of restrictive or overcontrolling parenting at 4 years. Additionally, children’s vagal tone at 2 years moderated the rank-order stability of mothers’ reported use of restrictive or overcontrolling parenting behaviors between 2 and 4 years, such that mothers of children with more difficulty regulating emotions (i.e., lower baseline vagal tone), reported more restrictive parenting at both time points. Interestingly, although child baseline vagal tone at 2 years also positively predicted later reported use of supportive parenting behaviors, it did not significantly predict maternal reported use of overprotective parenting (i.e., behaviors discouraging independence), suggesting, although overcontrolling and overprotective parenting behaviors may be related and often co-occurring, their use may be differentially influenced by child factors.

Finally, in the only study specifically examining the directional influence of toddler emotion regulation on parenting, increased use of caregiver focused regulatory strategies (e.g., looks to caregiver, contact with caregiver) at 24 months significantly negatively predicted mother’s self-reported use of non-supportive parenting behaviors (e.g., minimizing of negative emotions, punishing or threatening punishment for expressions of negative emotions) one year later, but only in boys (Premo & Kiel, 2014), suggesting boys demonstrating increased need for external support from caregivers in toddlerhood may be viewed by caregivers as requiring increased scaffolding and support for a longer period of time, as independent emotion regulation
is more limited. However, boys’ independent regulatory strategy use (i.e., gaze aversion and self-soothing) and girls’ caregiver focused and independent regulatory strategy use did not significantly predict mother’s self-reported later parenting behaviors, suggesting caregivers may alter parenting practices more readily when development of independent emotion regulation is deemed “delayed” or “abnormal.” Importantly, however, this study focused on emotion socialization parenting behaviors and relied solely on parent-reported parenting behaviors. It may be that emotion socialization behaviors are different from more general parenting behaviors and that parents’ perception of how their parenting may be “felt” varies from that of a trained observer or the child themselves.

**Bidirectional Relations between Overcontrolling Parenting and Child Emotion Regulation**

Developmental theory suggests there exist dynamic, bidirectional relationships between children and their environments, including the parent-child relationship, in which functioning is determined by the interaction of a child’s actions on the environment (i.e., use of independent emotion regulatory behaviors) and the environment’s actions on the child (i.e., overcontrolling parenting behaviors; e.g., Bell, 1968; Burkholder & Harlow, 2003; Lerner, Rothbaum, Boulos, & Castellino, 2002). Examining the bidirectional relations between children and parents requires the collection of data across multiple time points (to determine directionality) and use of advanced statistical modeling techniques (to examine autoregressive and cross-lagged pathways). Though more complex, this type of study design allows researchers to more completely
understand causality and the reciprocal influences between child characteristics (e.g., emotion regulation) and parenting factors (e.g., overcontrolling parenting behaviors).

Given the limited research on bidirectionality within toddlerhood and those specifically examining bidirectional relationships between overcontrolling parenting and children’s emotion regulation, it may be helpful to first consider similar, albeit different aspects of self-regulation, and these relationships in older populations. For example, in a study examining children across 30, 42, and 54 months of age, Eisenberg and colleagues (2015) found effortful control (measured via mother-report questionnaire; i.e., ability to concentrate on task, to shift attention to a different activity, and to voluntarily control behavior) at 30 and 42 months negatively predicted intrusive parenting (i.e., overstimulating the child with toys, using intrusive physical behaviors, and “helping” the child when help is not needed) at 42 and 54 months, controlling for prior levels of parenting, and intrusive parenting at 30 and 42 months negatively predicted effortful control at 42 and 54 months, controlling for prior levels of effortful control. Similar reciprocal relations have been found between preschool and middle childhood (i.e., ages 3-9) with regard to behavioral self-control and harsh parenting (Cecil, Barker, Jaffee, & Viding, 2012).

Within older populations, bidirectionality has been less consistently supported (e.g., Brenning, Soenens, Van Petegem, & Vansteenkiste, 2015; Moilanen, Rasmussen, & Padilla-Walker, 2014; Skripkauskaite, Hawk, Branje, Koot, van Lier, & Meeus, 2015). In one such study, Otterpohl and Wild (2015) examined the cross-lagged relations between parenting and emotion regulation in a sample of middle school students (ages 10-14) across two time points (6th and 7th grade) using two separate models (i.e., parent vs. child report). The parent report model demonstrated support for a cross-lagged pathway between maladaptive emotion regulation
strategy use in 6th grade (e.g., venting, withdrawal, rumination) and decreased parental responsiveness in 7th grade; however, bidirectionality was not fully supported, as parental responsiveness in 6th grade did not significantly predict maladaptive emotion regulation in 7th grade. Additionally, no significant cross-lagged relationships between parental use of psychological control (i.e., expectation of conformity and compliance) and child’s emotion regulation were indicated within the parent-report model (Otterpohl & Wild, 2015). Child-directed effects were also supported within the child-report model, such that increased use of maladaptive emotion regulation in 6th grade predicted increased exposure to psychological control in 7th grade. As with the parent-report model, no parent-directed effects were supported. Though bidirectionality was not supported in this study, previous research has shown diminished impact of parental behavior on adolescents’ emotion regulation abilities (e.g., Yap, Allen, & Sheeber, 2007) given developmental trends in emotion socialization, autonomy, and independent emotion regulation. However, given the greater emphasis of parental interactions within young childhood and reliance of young children on parents for emotion socialization and regulatory efforts, it is more probable reciprocal relations would still be found between overcontrolling parenting and emotion regulation strategy use in early childhood.

Within a slightly younger population, Perry, Mackler, Calkins, and Keane (2014) found increased maternal sensitivity at 2.5 years was positively predictive of children’s vagal suppression at 4.5 years, which in turn was positively predictive of maternal sensitivity at 5.5 years. However, the opposite pattern (i.e., 2.5 years vagal suppression → 4.5 years maternal sensitivity → 5.5 years vagal suppression) was not significant. In explaining these findings, the researchers posited greater parental influence on physiological mechanisms in early
development, as these underlying substrates are first coming online and establishing normative patterns for reactivity and regulation. Later in development, on the other hand, these underlying processes may line up more closely with behavioral strategies, thus impacting parenting in a more explicit manner.

In one of the only studies to examine bidirectional relations of parenting and emotion regulation in early childhood, Feldman (2015) found significant cross-lagged pathways between infancy and toddlerhood, wherein parent-infant reciprocity significantly positively predicted toddler emotion regulation, but infant emotion regulation did not predict parent-toddler reciprocity. Between toddlerhood and year 5, significant bidirectional relations emerged, such that parent-toddler reciprocity significantly positively predicted child emotion regulation, and vice versa. Although this study did not support bidirectional relationships between infancy and toddlerhood, it did demonstrate stability in emotion regulation behaviors between infancy, toddlerhood, and year 5. Additionally, this study utilized a composite of a number of emotion regulation strategies across task demands, contexts, and time points (e.g., infant emotion regulation included measurements from 3, 6, and 12 months of age), which may have obscured the influence of infants’ independent regulatory abilities on later parenting behaviors.

Current Study

As discussed within the preceding review, though emotion regulation strategies appear to develop in a systematic manner throughout the lifespan, few studies have thoroughly examined the stability of individual’s use of specific strategies across developmental periods. Several
emotion regulation strategies develop in infancy (including gaze aversion, self-soothing, and self-distraction), remain heavily utilized into toddlerhood, and lay the groundwork for more cognitively or behaviorally sophisticated strategies later in life (e.g., Ekas et al., 2011; Kopp & Neufield, 2003; Rothbart et al., 1992; Zimmerman & Stansbury, 2003). However, it remains unclear how young children’s use of these behaviors changes between infancy and toddlerhood across two different tasks introducing novel social interactions (i.e., still face paradigm in infancy and stranger approach task in toddlerhood) with limited external support provided by caregivers. Previous work has also noted the susceptibility of early emotion regulation processes to external influences, particularly parenting, in the development of normal and abnormal regulatory functioning (e.g., Calkins, 1994; Field, 1994; Thompson & Meyer 2007). Although concurrent and reciprocal predictive associations have been found between overcontrolling parenting and children’s emotion regulation abilities, studies have been limited in number, have focused on emotion regulation broadly or on only one strategy, have included primarily older populations, and findings have been mixed. As such, it remains unclear whether bidirectional relationships between children’s emotion regulation and overcontrolling parenting exist across infancy and toddlerhood.

To address the aforementioned limitations within the literature, the current study investigated the following: 1) rank-order stability of emotion regulation behaviors (i.e., gaze aversion, self-soothing, and self-distraction) across developmental periods (i.e., infancy to late toddlerhood); 2) associations between infant emotion regulation behaviors and subsequent maternal use of overcontrolling parenting; and 3) theorized bidirectional associations between toddler emotion regulation behaviors (i.e., gaze aversion, self-soothing, and self-distraction) and
maternal overcontrolling parenting between 18 and 24 months. Path analyses using cross-lagged panel models were conducted for all study aims, with separate path models used to test each aspect of emotion regulation being considered (Figure 1). Cross-lagged panel models allow for the estimation of autoregressive effects (i.e., stability of singular variable over time) and cross-lagged effects (i.e., variable A at time 1’s effect on variable B at time 2) while controlling for autoregressive effects and concurrent relations (Kearney, 2016). Researchers have recommended the use of at least three time points in cross-lagged panel models, though two time points are also commonly utilized, and more recent statistical modeling has shown increased validity of pathways when intervals between measurements are stable (Kearney, 2016; Kuiper & Ryan, 2018).

Given previous research, a number of hypotheses were proposed related to the associations between infant emotion regulation at 12 months of age and toddler emotion regulation and overcontrolling parenting at 18 and 24 months of age. First, rank-order stability was anticipated across all three emotion regulation behaviors between the three time points (Hypothesis 1), such that emotion regulation strategy use at 12 months would significantly predict that at 18 months and emotion strategy use at 18 months would significantly predict that at 24 months. Next, it was hypothesized that, of the three emotion regulation strategies included, only infant’s use of self-distraction would significantly predict overcontrolling parenting at 18 and 24 months, such that more use of self-distraction in infancy would predict less use of overcontrolling parenting (Hypothesis 2). Finally, it was anticipated that significant bidirectional relations would emerge between toddler emotion regulation and exposure to overcontrolling parenting, controlling for earlier emotion regulation abilities and parenting (Hypothesis 3), such
Figure 1. Hypothesized associations between infant emotion regulation at 12 months of age and toddler emotion regulation and overcontrolling parenting at 18 and 24 months of age, including covariates. To improve clarity, associations between overcontrolling parenting and covariates are not depicted.

Note: Analyses with proposed model will be conducted three separate times: once with gaze aversion as the emotion regulation strategy, once with self-soothing as the emotion regulation strategy, and once with self-distraction as the emotion regulation strategy.
that increased use of overcontrolling parenting at 18 months would predict decreased use of all three emotion regulation strategies at 24 months and that increased use of all three emotion regulation strategies at 18 months would predict lower overcontrolling parenting at 24 months.
CHAPTER 2

METHODS

Participants

Mothers-infant dyads ($N = 181$) were recruited from a rural community in Illinois as part of a larger, longitudinal study examining the development of self-regulation, temperament, and emotion during the first three years of life and contextual factors impacting development of these attributes. Mothers were recruited via one of three methods: study information distributed to new moms through a local OB/GYN office, flyers posted within the community, and contact of new families who posted birth announcements in local publications. Eligibility was restricted to mothers who were at least 17 years old and to full-term infants who experienced no significant birth complications and had no reported developmental concerns by the age of 4 months. Two dyads were excluded from the larger study prior to the infants’ first birthday after mothers reported their infants had developed a neurodevelopmental disorder or a brain tumor, bringing the final sample size to 179 dyads.

Mothers and infants came from demographically diverse backgrounds. At the initial 4-month visit, the average mother was 27.49 years old ($SD = 6.07$; range 17-42), with 14 mothers
(7.82%) between 17 and 19 years old (i.e., teenage mothers). Mothers were mostly Caucasian (71.51%), with only 15.64% identifying as African American, 8.95% as Hispanic, 1.1% as Native American, and 3.35% as “Other.” Mothers reported completing an average of 14.83 years of education ($SD = 2.76$, range 9-24), although 8.94% of mothers had not completed high school or received a GED. Despite the average family income-to-needs ratio (INR) being 2.15 ($SD = 1.67$), approximately a quarter (25.69%) of reported annual family incomes fell below the poverty threshold (i.e., INR of less than or equal to 1) and just over half (59.22%) fell in the “economically stressed” range (i.e., INR of less than 2). At 4 months postpartum, most mothers indicated being married (56.6%), living with a partner (16.5%), or in a romantic relationship (12.1%). Slightly more female infants (53.07%) were enrolled in the study than male infants (46.93%).

**Power Analysis**

Few studies have been conducted to systematically investigate considerations for sample size requirements when using path analysis, instead, many researchers rely on collectively accepted rules-of-thumb (Wolf, Harrington, Clark, & Miller, 2013). One of the most widely used rules-of-thumb is a minimum sample size of between 100-200 (Kline, 2005; 2011; Tabachnick & Fidell, 2007). Additionally, in previous published work utilizing cross-lagged panel path analysis within a developmental context, sample sizes have ranged between 125 and 250 (e.g., Combs-Ronto, Olson, Lunkenheimer, & Sameroff, 2009; Eisenberg et al., 2015; Feldman, 2015;
Halligan et al., 2013). Thus, based on this information, it is assumed that final sample size of 169 (see below) provided adequate power to test hypotheses.

Procedure

Data collection for the current investigation occurred across four participant visits to the lab at 4, 12, 18, and 24 months. At 4 months postpartum, mothers visited the laboratory without their infants. Approximately two weeks prior to the visit, mothers were mailed a packet of questionnaires including a demographic questionnaire and the Emotion Regulation Questionnaire (ERQ), as well as information about the study and the informed consent form (Appendix A). At the laboratory visit, mothers completed a structured clinical interview with a trained lab member along with behavioral tasks and additional questionnaires. Mothers were compensated $50 for the completion of this visit. At 12 months postpartum (± 2 weeks from the 12 month “birthday”), mothers and infants attended a laboratory visit which included participation in the still face paradigm. Infants’ performance in the still face paradigm was later coded for use of emotion regulation behaviors. Mothers were compensated $30 for the completion of this visit. At the 18- (± 4 weeks from the 18 month “birthday”) and 24-month (± 4 weeks from the 24 month “birthday”) visit, mothers and infants attended a laboratory visit and completed a series of behavioral tasks including a stranger approach task (will be coded for toddler emotion regulation) and a teaching task (coded for overcontrolling parenting). Mothers were compensated $40 for the completion of these visits.
Measures

Infant Emotion Regulation

To assess infant emotion regulation behaviors at 12 months of age, mothers and infants participated in the still face paradigm (Tronick et al., 1978), a task designed to allow researchers to examine infants’ use of independent emotion regulation behaviors separate from caregivers’ external regulatory influence. The still face paradigm used in the current study was comprised of four episodes (i.e., play, still face, reunion 1, reunion 2), with episodes 1-3 separated by 15 second “breaks” wherein the caregiver was instructed to turn away from the infant. During episodes 1-3, the infant was seated in a high chair with mothers seated across from their infants at eye level in a swiveling desk chair. During the first episode (approximately 2 minutes in length), mothers were instructed to play with their infants normally, as they would at home. During the second episode (approximately 2 minutes in length), mothers were instructed to hold a “poker face” (e.g., blank face, staring straight at their infant) and remain unresponsive to their infant’s bids for attention. Episodes 3 and 4 represented “reunion” interactions, during which time mothers were instructed to once again interact with their infants naturally. In episode 3 (approximately 2 minutes in length), infants were to remain in the high chairs; in episode 4 (approximately 1 minute in length), mothers were permitted to remove their infants from the high chair. For the purposes of the current investigation, only the second episode (i.e., still face episode) was coded for independent infant emotion regulatory behaviors.
Specific infant emotion regulation behaviors were coded using a coding scheme developed by the author of this project, in collaboration with the principal investigator of the larger longitudinal study, specifically designed for use with the still face paradigm (see Appendix A; Tronick et al., 1978) and in consideration of previously used infant emotion regulation coding schemes (Braungart-Rieker, Garwood, Powers, & Notaro, 1998; Braungart-Rieker, Garwood, Powers, & Wang, 2001; Gunning, Halligan, & Murray, 2013; Tronick & Weinberg, 1990) and the relevant still face paradigm literature. Videos were coded using the Observer (Noldus, 2009) software in second by second intervals for the presence or absence of the following regulatory behaviors, as well as others outside the scope of the current investigation: mother orientation (i.e., looking at mother’s face), self-distraction (e.g., playing with high chair, hands, or shoes with visual attention directed toward object of interest), and self-soothing behaviors (e.g., sucking fingers, rubbing ear lobes, playing with hair). Mother orientation and self-distraction were the only behaviors considered mutually exclusive.

As suggested above, the still face episode is specifically designed to isolate infants’ abilities from the caregiver-assisted emotion regulation, and is an abnormal experience for infants. As such, the still face episode typically produces displays of negative affect (Mesman et al., 2009) which can be aversive for mothers. Given this, mothers were given the option to terminate the still face episode prematurely by removing their infant from the high chair and experimenters were trained to terminate the episode if infants exhibited extreme displays of negative affect (e.g., intense crying for more than 20 seconds). Therefore, slight variations emerged in the total time each mother-infant dyad engaged in the still face episode within the paradigm. To better represent infant emotion regulation abilities, the proportion of time spent
engaging in each regulatory behavior across the episode was calculated to create a single indicator of each behavior (i.e., time spent engaging in behavior divided by total time spent in episode). After the proportions of each behavior were calculated, the inverse of mother orientation was obtained and used as an indicator of gaze aversion.

Notably, mother compliance to task instructions (i.e., hold neutral facial expression, do not interact with infant) was also coded by coders on both a second by second basis and as a global rating. For the second by second coding, any deviation from a neutral expression or any maternal response (e.g., laughter, turning in chair, humming) which was perceived by the infant or which attracted the infants’ attention was coded as the absence of compliance. For the global rating, mothers were assigned a rating of 0 (“completely compliant”), 1 (“mostly compliant”), 2 (“mildly compliant”), or 3 (“not at all compliant”) to indicate overall adherence to task instructions. Coders were instructed to determine global ratings by both the number and intensity of non-complaint behaviors demonstrated by mothers. Five participants were excluded from analyses due to a high degree of non-compliance (i.e., rated as “3” within the global code with no usable segments of compliance lasting 30 seconds or more).

For training purposes, ten training videos were chosen and coded by the primary investigator of the current project and the lead investigator of the larger longitudinal study which represented a wide range of infant regulatory behaviors. Coders were trained via group observation and discussions of four of the training videos. Coders then independently coded all ten training videos until an inter-rater reliability of 70% on all coded variables was achieved across all videos. After completion of training, the author of the current proposal and each coder met individually once a week to code a video together in order to retain reliability and prevent
coder drift. Twenty-seven of the videos at the 12-month time point (i.e., 22.13%) were re-coded by the author of the current proposal to determine reliability. Reliability at 12-months was excellent (based on intra-class correlations); gaze aversion ICC = 0.99, self-soothing ICC = 0.90, and self-distraction ICC = 0.98.

**Toddler Emotion Regulation**

To measure toddler emotion regulation, toddlers’ behavior during the stranger task from the Laboratory Temperament Assessment Battery (Lab-TAB; Goldsmith & Rothbart, 1999) was coded. Prior to beginning the task, mothers were given an index card with the following instructions: “For our next task, a member of our research team, wearing a hat and sunglasses, will enter the room and try to engage your child in conversation for a few minutes. For this task, we’d like you to try to interact with your child as little as possible, so that we may observe how s/he responds to the approach of an unfamiliar person. As always, if at any point during the task you feel it is necessary to intervene, you may do so.” Mothers were given an opportunity to ask questions before experimenter began the task. The experimenter then left the room and, shortly thereafter, the stranger entered the testing room and, using a standardized script, attempted to engage the toddler (see Appendix C for full script). The stranger task was executed in the same manner across 18- and 24-month time points; however, at 18 months, toddlers were presented with a female stranger, while at 24 months the stranger was male.

Similar to infant emotion regulation, toddler emotion regulation behaviors were coded using a coding scheme developed by the author of this project, in collaboration with the principal
investigator of the larger longitudinal study. This coding scheme was specifically designed for use with the version of the stranger approach task used within the larger longitudinal study (see Appendix B) and was created while referencing and consulting previously used toddler emotion regulation coding schemes for similar tasks (Buss et al., 2008; Grolnick et al., 1996, Mangelsdorf et al., 1995). Videos were coded using the Observer (Noldus, 2009) software in second by second intervals for the presence or absence of the following regulatory behaviors, in addition to others outside the scope of the current investigation: gaze aversion (i.e., looking away from stranger), self-distraction (e.g., interacting with chair, shoes, or other objects in room with visual attention directed toward object of interest), and self-soothing behaviors (e.g., sucking fingers, rubbing ear lobes, playing with hair, rocking in seat, feet swinging). Gaze aversion and self-distraction were the only behaviors considered mutually exclusive. These three specific indicators of emotion regulation were chosen to be consistent with those coded during the Still Face Paradigm at 12 months postpartum.

Although lab members acting in the role of “stranger” had a script to follow with standardized time durations to spend engaged in each activity, slight variations in the total time of the task occurred as uncontrollable factors increased or decreased time spent in the task (e.g., stranger counting seconds too slowly or too quickly, toddler interacting with the stranger). Therefore, the proportion of time spent engaging in each regulatory behavior across the task was calculated to create a single indicator of each behavior (i.e., time spent engaging in behavior divided by total time spent in episode). Mother compliance to task instructions (i.e., interact minimally with toddler) was coded as a global rating. For the global rating, mothers were assigned a rating of 0 (“completely compliant”), 1 (“mostly compliant”), 2 (“mildly
compliant”), or 3 (“not at all compliant”) to indicate overall adherence to task instructions. Coders were instructed to determine global ratings by considering the number, intensity, and pattern of occurrence (e.g., self-initiated or in response to toddlers’ bids for comfort) of non-complaint behaviors demonstrated by mothers. Three participants at the 18 month visit and three participants at the 24 month visit were excluded from analyses due to significant mother non-compliance during the stranger task (i.e., global rating of “3”).

For training purposes, ten training videos were chosen and coded by the primary investigator of the current project. Behaviors displayed across the training videos were representative of the wide-range of toddler regulatory behaviors that are displayed during the task. Coders were trained via group observation and discussions of four of the training videos. Coders then independently coded all ten training videos until an inter-rater reliability of 80% on all coded variables is achieved across all videos. After completion of training, the primary investigator of the current project and each coder met individually once a week to code a video together in order to retain reliability prior to the COVID-19 shutdown in March 2020.

At that time only approximately one-third of the videos had been coded. Given the COVID-19 shutdown, restrictions were placed on persons allowed within the laboratory space (i.e., no persons allowed back on campus until June 2020, only graduate students allowed within the laboratory space until August 2020, only one person allowed within a given room at a time, additional precautions for cleanliness). Due to these restrictions, two graduate students were trained as secondary coders by the primary investigator in June 2020 to complete the project. The primary investigator and the two new coders took over the initial coding of remaining videos at 18 and 24 months, making sure that no one coder coded the same family at multiple time points.
Additionally, given the need for reliability coding and the need to ensure the lead investigator was not re-coding their own videos for reliability purposes, re-coding of videos for reliability were split between the three coders. Approximately 20% of the videos from the 18- and 24-month time points were re-coded by the primary investigator and the two new coders (21.05% and 22.12%, respectively) to establish reliability. Reliability at each time point was excellent (based on intra-class correlations); 18-month gaze aversion ICC = 0.91, self-soothing ICC = 0.93, and self-distraction ICC = 0.93, while 24-month gaze aversion ICC = 0.97, self-soothing ICC = 0.97, and self-distraction ICC = 0.98.

**Overcontrolling Parenting Behaviors**

To assess overcontrolling parenting behaviors at 18 and 24 months of age, mothers and their toddlers participated in a challenging teaching task which was video and audio recorded for later behavioral coding. For the task, mothers were asked to “teach” their child how to put together a jigsaw puzzle (18 months) or one of three figures (i.e., ice cream cone, dinosaur, tree) using Duplo Legos using pictographic instructions (24 months). Importantly, the tasks were designed to be slightly beyond the capabilities of a typical 18- or 24-month-old, thus indicating the need for maternal involvement.

Overcontrolling parenting behaviors were defined as inappropriate engagement in the task (e.g., completing the puzzle or figure for the child), overly directive or critical statements (e.g., “Give it to me” or “No! That doesn’t go there!”), or physical involvement that prohibits the child from completing the task independently (e.g., blocking child’s attempts to help), as
prescribed by the overcontrolling parent behavior code from the Coding Manual for Parent-Child Interactions (Ginsburg & Grover, 2014; Appendix D). Behaviors were coded every minute using a five-point Likert-type scale that ranged from 0 (no presence of the behavior within the minute) to 4 (presence of the behavior for most of the minute OR several instances of severe examples of the behavior) using the Observer software noted above (Noldus, 2009). Coders used both frequency and intensity of behaviors to determine accurate ratings. Ratings across one-minute epochs were averaged and used as a single indicator of overcontrolling parenting.

The overcontrolling parenting coding scheme was developed by two graduate students, in consultation with the principal investigator of the larger longitudinal study. Training videos were selected and coded by the graduate students representing a variety of overcontrolling parenting behaviors at each time point. A third member of the coding team (i.e., undergraduate student within the lab) was included and trained via group observation and discussion of training videos. All three coders were required to achieve an 80% reliability on each of the one-minute segments comprising the teaching task across eight chosen training videos. Approximately 20% of the videos from the 18- and 24-month time points were re-coded by the lead graduate student in charge of the coding project (22.12% and 21.36%, respectively) to establish reliability. Reliability at each time point was excellent (based on intra-class correlations); 18-month ICC = 0.98 and 24-month ICC = 0.92.
Covariates

Child Sex

Previous work has shown variability in the influence of sex on emotion regulation abilities in children prior to preschool age. Specifically, while some studies examining infants and/or toddlers’ emotion regulation find sex differences in strategy use (e.g., Braungart-Rieker et al., 1998; Mayes & Carter, 1990; Premo & Kiel, 2014; Toda & Fogel, 1993), other do not (e.g., Haley & Stansbury, 2003; Moore, Cohn, & Campbell, 2001; Roque & Verissimo, 2011; Stifter et al., 1999). Additionally, research suggests parenting differences between male and females, particularly related to emotion socialization (e.g., Premo & Kiel, 2014; Radke-Yarrow & Kochanska, 1990). Specific to the stranger approach task, male and female children appear to exhibit different reactions, with girls utilizing increased levels of comfort-seeking behaviors (e.g., looking toward mother, assuming close physical proximity to mother) compared to boys (Buss et al., 2008; Zimmerman & Stansbury, 2003). Notably, most of these studies examine children’s utilization of emotion regulation strategies in isolation (i.e., only assess one strategy, such as comfort seeking; Buss et al., 2008) or as composites (i.e., combine multiple strategies into one composite, such as “disengagement of attention strategies”; Roque & Verissimo, 2011). Given the variability between studies’ reporting of significant sex differences in emotion regulation prior to age 3 and the overall limited research children’s specific use of gaze aversion, self-distraction, and self-distractions between the proposed time periods, child sex was included as a covariate.
Cumulative Risk Index

Previous research has shown increased sociodemographic risk in early childhood predicts increased use of overcontrolling parenting behaviors in mothers of infants and toddlers (Clincy & Mills-Koonce, 2013; Hyun et al., 2010; Popp, Spinrad, & Smith, 2008; Taylor et al., 2013). Additionally, greater exposure to cumulative risk has been commonly associated with increases in emotion regulation difficulties across the lifespan (Walton & Flouri, 2010). To control for confounding effects of cumulative stress on child emotion regulation and maternal use of overcontrolling parenting, an index was calculated wherein each dyad was assigned one point for the presence of 1) maternal education less than high school; 2) teenage motherhood (aged 17-19 years); 3) living in poverty; 4) single motherhood; and 5) current or past maternal depression. This resulted in a cumulative stress index that ranges from zero to five, where higher scores are indicative of higher levels of stress.

Maternal education attainment, age, relationship status, and potential for poverty status were assessed via information collected from a demographics questionnaire (see Appendix E and F). Mothers’ self-reported relationship status as “single”, “widowed”, or “divorced” were all classified under single motherhood. Poverty status was determined via income-to-needs ratios (i.e., household income divided by 2008 poverty thresholds for reported number of people in household). Income-to-needs ratios of less than or equal to one was considered “living in poverty.”
Mothers’ experience of significant past or current depressive symptoms was indicated via endorsement of symptoms during the administration of the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-IV; First, Spitzer, Gibbon, & Williams, 2002). Within the current study, the SCID-I was administered by graduate students and research assistants after undergoing extensive training in its administration and with direct supervision. For the purposes of the current study, mothers received a point on the index for “maternal depression” if criteria was met for past or present major depressive disorder on the SCID-IV.

**Maternal Emotion Regulation**

Children’s emotion regulation abilities are often found to be associated with parental emotional expression and emotion regulation strategy use (see Bariola, Gullone, & Hughes, 2011 for review). As such, maternal emotion regulation was included as a potential covariate. Maternal emotion regulation was assessed via the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003), given at 4 months postpartum. The ERQ is a brief questionnaire comprised of 10 items which ask respondents how they control their emotional experience (i.e., how they actually feel) and their emotional expression (i.e., how they show their emotions to others) on 7-point Likert scale ranging from 1 (“strongly disagree”) to 7 (“strongly agree”). Once scored, items from the ERQ are computed into one of two scales: cognitive reappraisal and expressive suppression.

The ERQ is one of the most widely utilized self-report measures to evaluate individuals’ tendency to use reappraisal or suppression in the regulation of emotional arousal (e.g., Betts,
Data from the original psychometrics article from Gross and John (2003) found moderate internal consistency ($\alpha = 0.79$ for reappraisal scale and 0.73 for suppression scale), test-retest reliability ($r = 0.69$ for both scales), and convergent and divergent validity. Additionally, the two-factor structure of the ERQ has been replicated by most studies (Balzarotti, John, & Gross, 2010; Cabello, Salgeuro, Fernandez-Berrocal, & Gross, 2012) and there has been support for measurement invariance and factor distinction (Melka, Lancaster, Bryant, & Rodriguez, 2011; Moore, Zoellner, & Mollenholt, 2008). Within the current study, both the reappraisal and suppression scales were utilized as covariates. No broad maternal emotion regulation composite could be formed due to a lack of significant correlation between these scales ($r = .044, p = .578$). The internal consistency for the reappraisal scale was good ($\alpha = .81$) and for the suppression scale was acceptable ($\alpha = .76$).
CHAPTER 3
RESULTS

Missing Data

As is typical in longitudinal studies, attrition occurred across the four time points, resulting in differing sample sizes at 12 (n = 143), 18 (n = 125), and 24 (n = 114) months of age and missing data. The results of Little’s MCAR test (Little, 1988), used to assess for systematic trends between missing and non-missing data, were significant ($\chi^2 = 212.571, p<.001$), suggesting the data was not missing completely at random. A series of independent samples t-tests were conducted to determine whether missingness was associated with any of the covariate variables (Table 1). Missingness among all dependent variables (i.e., infant and toddler emotion regulation behaviors, and toddler experience of overcontrolling parenting) was significantly related to the cumulative risk index, suggesting the data is missing at random (MAR). Specifically, families with higher cumulative risk indices were more likely to miss the 12-, 18-, and 24-month visits. Missingness was not significantly related to child sex or maternal emotion regulation (as measured by the separate ERQ scales). To address the MAR nature of the data,
cumulative risk was included as a covariate within all models. Missing data was accounted for using full information maximum likelihood (FIML) estimation, a technique which analyzes relationships and trends between non-missing values to determine the maximum likely values for missing data points, within the EQS 6.3 software. Simulations have found FIML to be a superior method of estimation, including increased efficiency, accuracy, and precision, compared to listwise deletion, pairwise deletion, and response pattern imputation (Enders & Bandalos, 2001; Enders, 2010).

Table 1. Independent T-Tests with Cumulative Risk

<table>
<thead>
<tr>
<th>Variable</th>
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<tr>
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<tr>
<td>Gaze Aversion Proportion</td>
<td>2.97*</td>
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<tr>
<td>Self-Distraction Proportion</td>
<td>2.97*</td>
</tr>
<tr>
<td>Self-Soothing Proportion</td>
<td>2.97*</td>
</tr>
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<td>18-Month Emotion Regulation Strategies</td>
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<tr>
<td>Gaze Aversion Proportion</td>
<td>4.71**</td>
</tr>
<tr>
<td>Self-Distraction Proportion</td>
<td>4.71**</td>
</tr>
<tr>
<td>Self-Soothing Proportion</td>
<td>4.71**</td>
</tr>
<tr>
<td>24-Month Emotion Regulation Strategies</td>
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<tr>
<td>Gaze Aversion Proportion</td>
<td>4.80**</td>
</tr>
<tr>
<td>Self-Distraction Proportion</td>
<td>4.80**</td>
</tr>
<tr>
<td>Self-Soothing Proportion</td>
<td>4.80**</td>
</tr>
<tr>
<td>Overcontrolling 18 Months</td>
<td>4.44**</td>
</tr>
<tr>
<td>Overcontrolling 24 Months</td>
<td>5.18**</td>
</tr>
</tbody>
</table>

Note. Values based on transformed data (n = 169); *Significant at p < .05; **Significant at p < .01.
Preliminary Analyses

Data Cleaning Methods

Descriptive statistics for all variables, before and after transformations are presented in Table 2. Preliminary analyses were conducted using SPSS 26 (IBM Corporation, 2020). Variables were assessed for evidence of skew and kurtosis. Two were found to have significant skew (i.e., skew divided by the standard error of skew $[z] = +/-2.00$) and were transformed via square-root or logarithmic transformations, per recommendations of Tabachnick and Fidell (2007). All but two infant and toddler emotion regulation behaviors demonstrated significant skew and/or kurtosis. As proposed, traditional transformations recommended for proportion data (i.e., arcsine or logit transformations) were considered. Though skew and kurtosis improved with arcsine transformations, model fit was worse when transformed infant and toddler emotion regulation behaviors were included in all three models. Given the precedence of previous research demonstrating superior results with the use of logistic or linear regression to analyze skewed proportion data compared to transforming proportion variables prior to regression analyses (Dixon, 2008; Von Hippel, 2015; Warton & Hui, 2011; Wilson et al., 2013), the non-transformed proportion data was utilized for all models.

To further account for error, robust estimation methods were employed within modeling software and all variables were standardized prior to analyses (Sokal & Rohlf, 1995; Warton & Hui, 2011; Wilson et al., 2013). Within all three models, outliers were identified, removed, and
Table 2. Descriptive Statistics of Primary Study Variables

<table>
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<tr>
<th>Variable</th>
<th>Mean(^1)</th>
<th>Standard Deviation(^1)</th>
<th>Skew(^1)</th>
<th>Kurtosis(^1)</th>
<th>Skew</th>
<th>Kurtosis</th>
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<td>Infant Sex</td>
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<td>0.50</td>
<td>0.32</td>
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<tr>
<td>Cumulative Risk Index</td>
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<td>0.91</td>
<td>5.58</td>
<td>2.13</td>
<td>1.71(^2)</td>
<td>-3.23(^2)</td>
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<td>Maternal Reappraisal</td>
<td>5.29</td>
<td>1.03</td>
<td>-0.85</td>
<td>-1.00</td>
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<tr>
<td>Maternal Suppression</td>
<td>2.98</td>
<td>1.27</td>
<td>2.79</td>
<td>0.12</td>
<td>0.28(^2)</td>
<td>-1.46(^2)</td>
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<td><strong>12-Month Emotion Regulation Strategies</strong></td>
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<tr>
<td>Gaze Aversion Proportion</td>
<td>0.82</td>
<td>0.11</td>
<td>-2.77</td>
<td>0.47</td>
<td>-0.38(^3)</td>
<td>-0.85(^3)</td>
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<td>Self-Distraction Proportion</td>
<td>0.25</td>
<td>0.18</td>
<td>3.29</td>
<td>0.23</td>
<td>0.34(^3)</td>
<td>-0.48(^3)</td>
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<tr>
<td>Self-Soothing Proportion</td>
<td>0.04</td>
<td>0.10</td>
<td>21.32</td>
<td>69.12</td>
<td>9.50(^3)</td>
<td>15.63(^3)</td>
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<tr>
<td><strong>18-Month Emotion Regulation Strategies</strong></td>
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<tr>
<td>Gaze Aversion Proportion</td>
<td>0.34</td>
<td>0.16</td>
<td>-0.34</td>
<td>-1.69</td>
<td>-2.85(^3)</td>
<td>1.28(^3)</td>
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<tr>
<td>Self-Distraction Proportion</td>
<td>0.02</td>
<td>0.05</td>
<td>14.14</td>
<td>28.60</td>
<td>6.29(^3)</td>
<td>4.09(^3)</td>
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<td>Self-Soothing Proportion</td>
<td>0.20</td>
<td>0.27</td>
<td>5.85</td>
<td>2.02</td>
<td>3.91(^3)</td>
<td>-0.18(^3)</td>
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<td><strong>24-Month Emotion Regulation Strategies</strong></td>
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<tr>
<td>Gaze Aversion Proportion</td>
<td>0.39</td>
<td>0.19</td>
<td>1.31</td>
<td>-0.15</td>
<td>0.06(^3)</td>
<td>0.74(^3)</td>
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<td>Self-Distraction Proportion</td>
<td>0.05</td>
<td>0.11</td>
<td>14.49</td>
<td>28.57</td>
<td>8.06(^3)</td>
<td>8.46(^3)</td>
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<td>Self-Soothing Proportion</td>
<td>0.14</td>
<td>0.24</td>
<td>7.80</td>
<td>5.69</td>
<td>5.54(^3)</td>
<td>2.14(^3)</td>
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<td>Overcontrolling 18 Months</td>
<td>1.67</td>
<td>0.82</td>
<td>1.33</td>
<td>0.50</td>
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<tr>
<td>Overcontrolling 24 Months</td>
<td>1.81</td>
<td>0.82</td>
<td>1.91</td>
<td>0.22</td>
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</tbody>
</table>

Note. \(^1\)Values based on original, pre-transformed data (n = 169); \(^2\)Values based on transformed data; \(^3\)Although presented here, arcsine transformed variables were not included in final models for any of the three child emotion regulation behaviors.
models were re-run. In two of the three models, model fit was improved with the exclusion of outliers. Three outliers were removed from the gaze aversion model and two outliers were removed from the self-soothing model. Within the self-distraction model, exclusion of the three identified outliers did not improve model fit, and as such, the outliers were included in the final model. The literature supports both the exclusion and inclusion of outliers within path analysis (Aguinis, Gottfredson, & Joo, 2013; Bakker & Wicherts, 2014; Osborne & Overbay, 2004), provided a decision is made thoughtfully and is well-documented. Within each model, identified outliers were examined more closely using frequency tables and by examining the case itself. In most cases, the outlier data occurred in only one time-point for one emotion regulation behavior, suggesting it may be “abnormal” even for that child. As such, it was decided these cases would be excluded.

Zero-Order Correlations

Correlations were conducted to examine associations between covariates (i.e., child sex, cumulative risk, maternal emotion regulation), child emotion regulation behaviors, and maternal use of overcontrolling parenting. Given the use of non-transformed child emotion regulation behaviors in primary analyses, only correlations between study variables and non-transformed child emotion regulation behaviors are presented. Additionally, correlations are based upon list-wise deletion. To account for the possibility that study variables may change together, but not at a constant rate (i.e., display non-linear growth), and to account for high degrees of skew and kurtosis within emotion regulation variables, both Pearson and Spearman correlations were
conducted. Differences emerged related to significant correlations between variables using Pearson correlations compared to Spearman correlations. Given previous research has demonstrated higher variability and frequency of Type 1 errors using Pearson correlations with non-normal data (e.g., Bishara & Hittner, 2012), both Pearson correlations and Spearman correlations are presented (see Table 3 and 4, respectively).

Related to primary study variables and covariates, using Pearson correlations, gaze aversion at 12 months was positively correlated with cumulative risk \( (r = .20, p < .05) \) and at 18 months was positively correlated with child sex \( (r = .22, p < .05) \). Self-soothing at 24 months was negatively associated with child sex at a trend level \( (r = -.18, p < .078) \). Also at a trend level, self-distraction at 12 and 18 months were negatively and positively related to cumulative risk, respectively \( (r = -.16, p = .088; r = .18, p = .067) \). Finally, overcontrolling parenting at 24 months was negatively correlated with maternal reappraisal \( (r = -.19, p = .075) \) and positively correlated with cumulative risk \( (r = .18, p = .077) \), both at trend levels. Using Spearman correlations, cumulative risk was negatively correlated with self-distraction at 12 months \( (r_s = -.20, p = .039) \) and positively associated with gaze aversion at 12 months \( (r_s = .23, p = .015) \). At trend levels, it was also positively associated with overcontrolling parenting at 18 and 24 months \( (r_s = .18, p = .076 \text{ and } r_s = .19, p = .067\text{, respectively}) \). Gaze aversion at 18 months was positively correlated with child sex \( (r_s = .21, p = .035) \). Finally, maternal reappraisal was negatively correlated with both self-distraction at 18 months \( (r_s = -.20, p = .043) \) and overcontrolling parenting at 24 months \( (r_s = -.24, p = .023) \).

Related to associations between child emotion regulation behaviors, using Pearson correlations, gaze aversion at 12 months was positively related to self-distraction at 12 months \( (r \)
Table 3. Pearson Correlations Among Study Variables

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Note. 1 = Infant Sex; 2 = Cumulative Risk; 3 = Maternal Reappraisal; 4 = Maternal Suppression; 5 = GA 12mo; 6 = SS 12mo; 7 = SD 12mo; 8 = GA 18mo; 9 = SS 18mo; 10 = SD 18mo; 11 = GA 24mo; 12 = SS 24mo; 13 = SD 24mo; 14 = Overcontrolling (18mo); 15 = Overcontrolling (24mo); +Trending at p < .10; *Significant at p < .05; **Significant at p < .01
Table 4. Spearman Correlations Among Study Variables

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Note. 1 = Infant Sex; 2 = Cumulative Risk; 3 = Maternal Reappraisal; 4 = Maternal Suppression; 5 = GA 12mo; 6 = SS 12mo; 7 = SD 12mo; 8 = GA 18mo; 9 = SS 18mo; 10 = SD 18mo; 11 = GA 24mo; 12 = SS 24mo; 13 = SD 24mo; 14 = Overcontrolling (18mo); 15 = Overcontrolling (24mo); +Trending at \( p < .10 \); *Significant at \( p < .05 \); **Significant at \( p < .01 \)
= .32, \( p < .01 \)) and self-soothing at 18 months \( (r = .22, \ p < .05) \). Gaze aversion at 24 months was negatively correlated with self-soothing at 24 months \( (r = -.25, \ p < .05) \) and, at trend levels, positively associated with self-soothing at 12 months \( (r = .19, \ p = .088) \) and self-distraction at 18 months \( (r = .20, \ p = .073) \). Self-soothing at 12 months was positively correlated with self-distraction at 24 months \( (r = .41, \ p < .01) \) and, at a trend level, negatively correlated with self-soothing at 24 months \( (r = -.21, \ p = .066) \). Self-soothing at 18 months was positively related to self-soothing at 24 months \( (r = .26, \ p < .05) \) and self-distraction at 24 months \( (r = .23, \ p < .05) \). Finally, at a trend level, self-soothing at 24 months was negatively correlated with self-distraction at 24 months \( (r = -.18, \ p = .076) \). Using Spearman correlations, gaze aversion at 12 months was positively associated with self-distraction at 12 months \( (r_s = .29, \ p = .002) \) and gaze aversion at 24 months was negatively correlated with self-soothing at 24 months \( (r_s = .30, \ p = .004) \). At trend levels, self-soothing at 12 months was positively related to self-distraction at 24 months \( (r_s = .21, \ p = .062) \) and self-soothing at 18 months was positively associated with self-distraction at 18 months \( (r_s = .17, \ p = .090) \).

Regarding associations with overcontrolling parenting, using Pearson correlations, self-distraction at 24 months was positively associated with overcontrolling parenting at 24 months at a trend level \( (r = .20, \ p = .058) \). Overcontrolling parenting at 18 and 24 months were positively correlated \( (r = .34, \ p < .01) \). Using Spearman correlations, only overcontrolling parenting at 18 and 24 months were positively associated \( (r_s = .28, \ p = .010) \).
Primary Analyses

To test the current study’s hypotheses, three separate path models (one for each emotion regulation behavior) were run using EQS 6.3 software (Bentler, 2006). As previously proposed, all three hypotheses were examined within the context of larger path models for each emotion regulation behavior. Hypotheses were investigated using path analysis to estimate autoregressive paths (i.e., those that estimate the effect of a construct at one time point on a later time point) and cross-lagged paths (i.e., those that estimate the effect of a construct at one time point on a different construct, while controlling for previous levels of the predicted construct). Model fit indices were evaluated using the chi-square ($\chi^2$) likelihood ratio statistic, the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the standardized root mean squared residual (SRMR). Good model fit was assumed given the following parameters: non-significant chi-square statistic ($p > .05$); CFI value greater than .90; RMSEA value less than 0.08; and SRMR value less than 0.08 (Brown, 2006; Hu & Bentler, 1999).

**Gaze Aversion Model**

The first path model to be conducted focused on gaze aversion as the child emotion regulation behavior of interest. Model fit with the exclusion of the three identified outliers was excellent ($\chi^2 (6) = 5.21, p = .52$, RMSEA = 0.00, SRMR = 0.03, CFI = 1.00). Only results from this final model is presented and can be seen in Figure 2.
Figure 2. Associations between infant gaze aversion at 12 months of age and toddler gaze aversion and overcontrolling parenting at 18 and 24 months of age, including covariates. To improve clarity, associations between overcontrolling parenting and covariates are not depicted. Coefficients for these relationships are presented on the right side of the forward slash (/) at the appropriate time period.

Note: *Trending at p < .10; **Significant at p < .05; ***Significant at p < .01; Standardized beta values depicted in model.
Hypothesis one predicted rank-order stability across developmental periods, such that gaze aversion at 12 months would significantly predict gaze aversion at 18 months and gaze aversion at 18 months would significantly predict gaze aversion at 24 months. Contrary to expectations, gaze aversion at 12 months did not predict gaze aversion at 18 months ($b^* = .04$, $z = .33$, $p = .74$) and gaze aversion at 18 months did not predict gaze aversion at 24 months ($b^* = .02$, $z = .17$, $p = .87$). Additionally, gaze aversion at 12 months did not predict gaze aversion at 24 months ($b^* = -.07$, $z = -.61$, $p = .54$).

Hypothesis two predicted non-significant cross-lagged pathways from gaze aversion at 12 months to overcontrolling parenting at both 18- and 24-months. Consistent with expectations, gaze aversion at 12 months did not significantly predict maternal use of overcontrolling parenting at 18 months ($b^* = .07$, $z = .82$, $p = .41$) or at 24 months ($b^* = .09$, $z = .87$, $p = .38$).

Hypothesis three predicted bidirectional relationships between gaze aversion at 18 months to overcontrolling parenting at 24 months and overcontrolling parenting at 18 months to gaze aversion at 24 months, controlling for autoregressive and concurrent associations. Contrary to expectations, 18-month gaze aversion did not predict 24-month overcontrolling parenting ($b^* = -.13$, $z = -1.23$, $p = .22$) and 18-month overcontrolling parenting did not predict 24-month gaze aversion ($b^* = .05$, $z = .43$, $p = .67$).

Significant relationships between covariates and primary study variables emerged as well. Specifically, cumulative risk at 4 months positively predicted gaze aversion at 12 months ($b^* = .19$, $z = 2.17$, $p = .03$) and overcontrolling parenting at 18 months ($b^* = .18$, $z = 2.09$, $p = .037$), child sex predicted differences in gaze aversion at 18 months ($b^* = .23$, $z = 2.44$, $p = .014$), and maternal reappraisal at 4 months negatively predicted overcontrolling parenting at 24 months.
Additionally, overcontrol parenting at 18 months positively predicted use of overcontrolling parenting at 24 months ($b^* = .27, z = 2.31, p = .021$).

**Self-Soothing Model**

The second path model conducted focused on self-soothing as the child emotion regulation behavior of interest. As with the gaze aversion model, model fit with the exclusion of the two outliers was excellent ($\chi^2 (6) = 5.93, p = .43$, RMSEA = 0.00, SRMR = 0.03, CFI = 1.00). Only the results of this final model are discussed and presented in Figure 3.

Hypothesis one predicted significant autoregressive pathways (i.e., rank-order stability), such that self-soothing at 12 months would predict self-soothing at 18 months and self-soothing at 18 months would predict self-soothing at 24 months. Partially in line with this hypothesis, 12-month self-soothing negatively predicted 18-month self-soothing ($b^* = -.13, z = -1.81, p = .07$) and 18-month self-soothing positively predicted 24-month self-soothing ($b^* = .23, z = 1.70, p = .089$), but only at trend levels. Self-soothing at 12 months negatively predicted self-soothing at 24 months ($b^* = -.15, z = -2.01, p = .04$).

Hypothesis two predicted non-significant cross-lagged pathways between 12 month self-soothing and overcontrolling parenting at 18 and 24 months. This hypothesis was not supported. Twelve-month self-soothing did not significantly predict maternal overcontrolling at 18 months ($b^* = .03, z = .32, p = .75$), but did negatively predict maternal overcontrolling at 24 months ($b^* = -.32, z = -4.24, p < .001$).
Figure 3. Associations between infant self-soothing at 12 months of age and toddler self-soothing and overcontrolling parenting at 18 and 24 months of age, including covariates. To improve clarity, associations between overcontrolling parenting and covariates are not depicted. Coefficients for these relationships are presented on the right side of the forward slash (/) at the appropriate time period.

Note: *Trending at $p < .10$; **Significant at $p < .05$; ***Significant at $p < .01$; Standardized beta values depicted in model
Hypothesis three examined bidirectional influences of self-soothing and overcontrolling parenting at 18 months on overcontrolling parenting and self-soothing at 24 months, respectively, while controlling for autoregressive and concurrent associations. Contrary to expectations, self-soothing at 18 months did not predict maternal overcontrolling at 24 months ($b^* = -.07, z = -.74, p = .46$) and maternal overcontrolling at 18 months did not predict self-soothing at 24 months ($b^* = .04, z = .37, p = .71$).

Similar to gaze aversion, additional relationships emerged between covariates and primary study variables. Cumulative risk positively predicted overcontrolling parenting at 18 months ($b^* = .20, z = 2.34, p = .02$) and 24 months ($b^* = .26, z = 3.16, p = .001$). It also positively predicted self-soothing at 12 months at a trend level ($b^* = .16, z = 1.85, p = .06$). Similarly, at a trend level, child sex predicted differences in self-soothing at 24 months ($b^* = -.17, z = -1.75, p = .08$) and maternal reappraisal negatively predicted maternal overcontrolling at 24 months ($b^* = -.18, z = -1.94, p = .05$). Finally, as in the gaze aversion model, stability between 18-month and 24-month overcontrolling parenting emerged ($b^* = .24, z = 2.53, p = .01$).

**Self-Distraction Model**

The final path model focused on self-distraction as the child emotion regulation behavior of interest. Model fit for the initial model including all cases was excellent ($\chi^2 (6) = 5.65, p = .46$, RMSEA = 0.00, SRMR = 0.03, CFI = 1.00). This initial model was utilized for all results (see Figure 4).
Figure 4. Associations between infant self-distraction at 12 months of age and toddler self-distraction and overcontrolling parenting at 18 and 24 months of age, including covariates. To improve clarity, associations between overcontrolling parenting and covariates are not depicted. Coefficients for these relationships are presented on the right side of the forward slash (/) at the appropriate time period.

Note: +Trending at $p < .10$; *Significant at $p < .05$; **Significant at $p < .01$; Standardized beta values depicted in model
Hypothesis one predicted stability within self-distraction across developmental periods, such that 12-month self-distraction would predict 18-month self-distraction and 18-month self-distraction would predict 24-month self-distraction. Contrary to hypotheses, 12-month self-distraction was not significantly predictive of 18-month self-distraction ($b^* = .12, z = 1.16, p = .25$) or 24-month self-distraction ($b^* = .11, z = 1.50, p = .13$), and 18-month self-distraction was not significantly predictive of 24-month self-distraction ($b^* = .11, z = .83, p = .41$).

Hypothesis two predicted significant cross-lagged pathways between self-distraction at 12 months and overcontrolling parenting at both 18 and 24 months, such that greater use of self-distraction in infancy would lead to lower use of maternal overcontrolling parenting at 18 and 24 months. This hypothesis was not supported. Twelve-month self-distraction did not significantly predict overcontrolling parenting at 18 months ($b^* = -.04, z = -.48, p = .63$) or 24 months ($b^* = .08, z = .86, p = .39$).

Hypothesis three predicted bidirectional relationships, such that self-distraction at 18 months predicts overcontrolling parenting at 24 months and overcontrolling parenting at 18 months predicts self-distraction at 24 months, controlling for autoregressive and concurrent associations. Contrary to predictions, significant bidirectional relationships did not emerge between self-distraction at 18 months and overcontrolling parenting at 24 months ($b^* = .09, z = 1.53, p = .13$) or between overcontrolling parenting at 18 months and self-distraction at 24 months ($b^* = .09, z = .55, p = .58$).

As with the other two models, additional findings related to covariates and primary study variables emerged. At trend levels only, cumulative risk negatively predicted self-distraction at 12 months ($b^* = -1.16, z = -1.70, p = .09$), and positively predicted self-distraction at 18 months.
(b* = .22, z = 1.83, p = .07) and overcontrolling parenting at 18 months (b* = .18, z = 1.91, p = .06). Similar to other models, overcontrolling parenting at 18 months positively predicted overcontrolling parenting at 24 months (b* = .27, z = 2.70, p < .01).
CHAPTER 4
DISCUSSION

The goal of the current study was to investigate stability of individual emotion regulation strategies across infancy and toddlerhood, and the bidirectional influences between early child emotion regulation strategies and overcontrolling parenting. The positive impact of individuals’ adaptive use of emotion regulation strategies on psychosocial, academic, and behavioral functioning has been well documented across the lifespan (Cote et al., 2010; Ivcevic & Brackett, 2014; Lopes et al., 2005; Zeman et al., 2006). Despite knowledge that early emotion regulation strategies influence later development and well-being (e.g., Calkins, 2002; Graziano et al., 2013; Hill et al., 2006; Ursache et al., 2013), the stability of individual strategies across developmental periods has often been neglected within existing studies. Given the importance of effective emotion regulation, there is a need to study children’s use of emotion regulation strategies across developmental periods, particularly early ones, to determine normative developmental patterns, as well as factors which may impact this normative development. Although parenting has been identified as a particularly salient influence on children’s early learning, only a limited number of studies have examined the concurrent and predictive influences of overcontrolling parenting, one aspect of negative parenting behaviors, and emotion regulation abilities in young children.
To address these limitations in previous work, the current study utilized cross-lagged panel path analysis models to examine three primary objectives: 1) the stability of gaze aversion, self-soothing, and self-distraction between 12, 18, and 24 months of age; 2) the influence of gaze aversion, self-soothing, and self-distraction at 12 months of age on maternal use of overcontrolling parenting behaviors at 18 and 24 months of age; and 3) the presence of bidirectional relationships between child emotion regulation (i.e., gaze aversion, self-soothing, and self-distraction) and maternal overcontrolling parenting at 18 and 24 months. Stability of gaze aversion, self-soothing, and self-distraction across time points was not supported, though self-soothing at 12 months significantly related to self-soothing at 24 months. Similarly, infant gaze aversion and self-distraction did not significantly contribute to overcontrolling parenting at either time point; however, self-soothing at 12 months was negatively associated with overcontrolling parenting, but only at 24 months. Finally, no significant bidirectional relationships emerged between primary study variables. These primary study findings, as well as preliminary findings related to inter-relatedness of child emotion regulation strategies and relationships with covariates, are now discussed within the context of previous literature.
Findings from Preliminary Analyses

Child Emotion Regulation Behaviors

Several significant zero-order correlations emerged amongst the different emotion regulation behaviors. First, specific to concurrent associations, gaze aversion and self-distraction at 12 months were positively correlated using both Pearson and Spearman correlations, which is particularly interesting given the mutual exclusivity of the coding of these two behaviors (i.e., could not be coded as “present” in the same one second interval). This suggests that, by 12 months, infants who more readily disengage from distressing stimuli (i.e., still face mother), may be more likely to engage their attention more actively by focusing on a specific stimulus to manipulate. These associations would also suggest that infants less likely to disengage attention from their mothers are also less likely to divert attention to another object or stimulus in the moment. This aligns with previous research by Rothbart and colleagues (1992) who found increases in infants’ use of gaze aversion and more advanced attentional strategies (e.g., self-distraction) between 6.5 and 13.5 months of age.

At 24 months, self-soothing was negatively correlated with both gaze aversion and self-distraction using Pearson correlations and only with gaze aversion using Spearman correlations. Within the current study, mean proportion use of self-distraction and gaze aversion declined over time, while mean proportion use of self-soothing increased over time, which would suggest that self-soothing behaviors were the more normative predominate strategy used as children grew older. This is surprising given previous work has suggested toddlers’ continued use of all three of
these regulatory strategies; however, that work has also focused more on the development of increasingly cognitively and socially sophisticated strategies (i.e., self-talk, talking with stranger and/or mother, physical contact with mother, changing the environment; Atkinson, 2018; Kopp & Neufield, 2003; Mangelsdorf et al., 1995), which were not measured as part of the current study, but may subsume more basic strategies. It may be, given task demands (i.e., sitting at plain table in plain chair with mother across the room), that toddlers in the current study utilized other strategies (e.g., communicating with stranger, thus requiring gaze at stranger, or mother-oriented strategies) or relied on passive sitting in their seat while engaging in physical self-soothing behaviors and watching the stranger carefully (thus, leading to increased rates of self-soothing). Further research is needed to parse out whether this trend in strategy use is specific to this sample, this stranger task, or is more normative.

Second, and specific to cross-time associations, several additional significant and trend level associations emerged using both Pearson and Spearman correlations. Focusing on Pearson correlations, gaze aversion at 12 months positively correlated with self-soothing at 18 months, and self-soothing at 12 months positively correlated with gaze aversion at 24 months (trend level) and self-distraction at 24 months. Self-soothing at 18 months positively correlated with self-distraction at 24 months and negatively correlated with self-soothing at 24 months. Additionally, self-distraction at 18 months positively correlated with gaze aversion at 24 months (trend level). Across Spearman correlations, no cross-time significant associations emerged, though a negative trend level association was demonstrated between self-soothing at 12 months and self-distraction at 24 months. As noted above, differences across Pearson and Spearman correlations may be due to high levels of skew and kurtosis amongst emotion regulation.
variables, leading to higher levels of Type 1 error. Despite this, the findings using Pearson correlations found within the current study are supported within the literature base. Specifically, rather than focus on each of these individual relationships, it is important broadly to note inter-strategy associations using Pearson correlations across time, as they point to infants’ and toddlers’ ability to flexibly utilize all three of these primary strategies across developmental periods given different task demands (Kopp & Neufield, 2003). Additionally, the primarily positive relationships between emotion regulation strategies across time points suggests use of these emotion regulation strategies is inter-related, such that as children’s ability to utilize one strategy adaptively and effectively increases, it also leads to more adaptive and effective use of other strategies. In this way, infants who demonstrate more effective use of emotion regulation strategies may grow up to be toddlers who similarly use more effective emotion regulation strategies.

Covariates

Child Sex

As stated above, the findings related to the relationship between child sex and emotion regulation abilities has been mixed within the literature (e.g., Braungart-Rieker et al., 1998; Haley & Stansbury, 2003; Premo & Kiel, 2014, Toda & Fogel, 1993; Roque & Verissimo, 2011; Stifter et al., 1999). Within the current study, child sex was only significantly positively related to gaze aversion at 18 months. Females utilized higher levels of gaze aversion during the stranger
approach task at this time point than males. Additionally, a trend level negative association between child sex and self-soothing at 24 months suggests males were more likely to utilize self-soothing behaviors during the stranger approach task than females. These findings, paired with the inconsistent literature base, add to the possibility that sex differences in emotion regulation strategy use may not become stable until later in development (e.g., Haley & Stansbury, 2003; Moore et al., 2001; Roque & Verissimo, 2011; Stifter et al., 1999) and, until then, may be highly susceptible to other factors, such as task demands, examination of individual emotion regulation strategy or emotion regulation composite within analyses, and both internal and external factors (e.g., Keenan & Shaw, 1997; Kopp, 1989; Premo & Kiel, 2014). Additional research is needed to further discern the relationship between gender and emotion regulation strategy use, particularly across tasks and developmental periods. Of note, however, a review of the literature upon attempting to find basis for the current findings revealed a trend amongst researchers to not report sex differences, even within zero-order correlation tables, across emotion regulation strategy use. This trend within peer-reviewed articles makes it challenging to know more definitively how to interpret the mixed findings across studies where these associations, both significant and non-significant, have been reported.

Similar to child emotion regulation abilities, previous literature has pointed to limited support for child sex differences in relation to exposure to overcontrolling parenting (see Endendijk, Groeneveld, Bakermans-Kranenburg, & Mesman, 2016 for review). In the current study no relationships were found between exposure to maternal overcontrolling parenting at 18 or 24 months and child sex, similar to previous studies (e.g., Henderson, 2007; Kiel & Buss, 2013). Within a recent meta-analysis conducted by Endendijk and colleagues (2016), the effect
size for the relationship between overcontrolling parenting and sex differences was larger in younger populations (i.e., infants and toddlers) than in older populations, though still small (d = 0.16). Other studies within this age group have demonstrated significant differences in maternal use of overcontrolling parenting for male and female children, but this relationship appears to be moderated by internal factors (e.g., temperament; Barnett & Scaramella, 2017) and external factors (e.g., laboratory versus home setting; Crockenberg & Litman, 1990). As such, while sex differences may be present in mothers’ use of overcontrolling parenting in younger populations, this relationship is most likely dependent on additional factors.

**Cumulative Risk**

Across the three path analysis models, three significant and three trend level associations emerged related to cumulative risk. Higher cumulative risk at 4 months was significantly associated with higher use of gaze aversion in infants at 12 months and, at trend levels, was associated with lower use of self-distraction and higher use of self-soothing in infants at 12 months, and higher use of self-distraction in toddlers at 18 months. As acknowledged, gaze aversion in later infancy is often paired with other, more sophisticated regulatory strategies, which can include self-distraction or self-soothing (Rothbart et al., 1992). Previous research has typically framed self-distraction as being a more adaptive and effective regulatory strategy in infancy and toddlerhood, in part due to its consistent association with lower distress, while self-soothing is framed as a commonly utilized strategy employed in late infancy and into toddlerhood, but that is less effective in modulating distress, particularly during tasks in which
caregivers are unavailable or unresponsive to child bids for attention (Braungart & Stifter, 1991; Ekas et al., 2011; Grolnick et al., 1996; Mangelsdorf et al., 1995). Thus, it may be that children exposed to higher levels of early cumulative risk, are at a disadvantage with regard to emotion regulation capabilities and select those behaviors they are more familiar with (e.g., gaze aversion and self-soothing), even though they may be less effective strategies, to modulate negative affect by late infancy. However, by toddlerhood, they made have “made up the gap” in selecting more effective strategies for regulating distress, such as self-distraction (e.g., Brophy-Herb et al., 2013).

Upon reviewing previous research regarding cumulative risk’s impact on the development of emotion regulation behaviors, few studies have examined the influence of cumulative risk on emotion regulation behaviors in infancy and toddlerhood (e.g., Deater-Deckard, Dodge, Bates, & Pettit, 1998; Evans et al., 2013). Various rationales for this gap in research have included: the effects of cumulative risk on emotion regulation may take several years to produce observable effects (e.g., Burchinal, Roberts, Hooper, & Zeisel, 2000); specific stressors may affect various aspects of functioning differently (e.g., Candelaria, Teti, & Black, 2011; Laucht, Esser, & Schmidt, 2001); differences in early regulatory abilities are more effectively measured physiologically (e.g., Bazhenova, Stroganova, Doussard-Roosevelt, Posikera, & Porges, 2007; Moore & Calkins, 2004); and a tendency to focus on emotion dysregulation (i.e., distress within task) rather than emotion regulation strategy use (e.g., Wolke, Schmid, Scheier, & Meyer, 2009). It may be helpful for future researchers to consider utilizing latent growth modeling techniques to examine growth trajectories of emotion regulation strategies over time, with cumulative risk added as one potential factor that influences growth.
trajectories. This would help researchers pinpoint developmental periods wherein influences become more salient.

Within the current study, higher cumulative risk also significantly contributed to higher exposure to overcontrolling parenting at 18 and 24 months. One might assume parents who have experienced or are continuing to experience high levels of cumulative risk would utilize more overcontrolling parenting techniques due to parental stress decreasing patience or ability to properly scaffold activities for children. Similar patterns of associations have been shown in existing studies, such that increased contextual stress (or one of the variables typically included within the composite) related to more negative or harsh parenting (e.g., punitiveness, psychological aggression; Cohen, Hien, & Batchelder, 2008), more overcontrolling parenting in toddlerhood (Smith, 2010), less maternal sensitivity in toddlerhood (Cabrera, Fagan, Wight, & Schadler, 2011), and more intrusive and withdrawn parenting in middle childhood to adolescence (Vreeland, 2018). Studies utilizing the Family Stress Model as a framework have also found cascading effects from economic hardship to parental psychological distress to increased use of controlling parenting (see Masarik & Conger, 2017 for review). Taken together, it would seem that individual stressors may be salient enough to lead to increased use of overcontrolling or intrusive parenting. Clearly additional research is needed to more adequately understand the influence of cumulative risk, as well as individual stressors, on later parenting behaviors, particularly overcontrolling parenting.
Maternal Emotion Regulation

Both the reappraisal and suppression scales of the Emotion Regulation Questionnaire (ERQ) were used as indicators of maternal emotion regulation for this study. Within the current study, these two scales were not significantly correlated, which is consistent with prior studies (Balzarotti, et al., 2010; Preece, Becerra, Robinson, & Gross, 2020; Preece et al., 2021), and thus were included as separate covariates within the models. Neither maternal suppression nor reappraisal were significantly predictive of infant emotion regulation strategy use across time. Despite consistent findings demonstrating the impact of parental emotion expression and regulation on child emotion, much of this work has been conducted with older children or has focused more on parental socialization of child emotional expression regulation (Bariola et al., 2011). Within the current study, the ERQ was utilized which, while focused on two of the most prominent emotion regulation strategies in adulthood, also focuses on two emotion regulation strategies that are more cognitive in nature. As such, it may be that the lack of observable modeling of emotion regulation behavior to infants and toddlers is not enough to impact young children’s own emotion regulation strategy use at this early point in development. Future studies should attempt to include measures of observed maternal emotion regulation to determine if modeling of emotion regulation strategy impacts early child emotion regulation in ways purely cognitive strategies do not.

Maternal reappraisal, but not suppression, was significantly negatively related to overcontrolling parenting at 24 months. This finding mirrors research linking the ERQ reappraisal scale with more positive outcomes parenting-related outcomes (e.g., Balzarotti, et al.,
2010; Preece et al., 2020; Preece et al., 2021), and suggests that mothers who are more effectively able to regulate their emotions generally may be able to regulate their own negative reactions during a stressful toddler task in order to have more patience, engage in more supportive parenting behaviors, and have space for their children’s own feelings of frustration. To this extent, it has been proposed that parental emotion regulation within the context of parenting is a unique type of emotion regulation, as it requires the individual not only to regulate their own emotions, but that of the child, especially in young children who are still largely dependent on caregiver support (see Rutherford, Wallace, Laurent, & Mayes, 2015 for review).

Within specific studies examining these relationships, research has found mothers’ observed self-regulation to be negatively related to unsupportive parenting of 9-year-old children (Morelen, Shaffer, & Suveg, 2016), poorer maternal emotion coping to be predictive of less supportive parenting (Bynum & Brody, 2005), and maternal use of reappraisal both within a task requiring discipline and globally, to be negatively with overreactive discipline (Lorber, 2012). In sum, the findings in the current study add to the growing understanding of the ways in which maternal emotion regulation affects parenting, even in early childhood.

Primary Study Findings

Stability of Emotion Regulation Behaviors

Gaze aversion and self-distraction demonstrated no significant patterns of stability (i.e., no associations between 12-, 18-, and 24-month behaviors). As acknowledged above, stability
within specific independent regulatory behaviors has been largely ignored within the literature across infancy and toddlerhood. The only two studies known to this author to examine emotion regulation across these two early developmental periods focused on one behavior predicting another (Morales et al., 2005) or utilized composites for self-, mother-, and environmental-reliant strategies (Atkinson, 2018). Of note, even within Atkinson’s (2018) work, only mother-reliant strategies demonstrated rank-order stability, and only between 5.5 and 12 months of age (i.e., no stability into toddlerhood at 18 months). When researchers have examined related cognitive processes, such as attentional focus and distractibility, they have found evidence for rank-order stability (Kannass et al., 2006; Richards, 1989); however, it is also well documented that emotion regulation, while requiring these more basic cognitive processes, also requires additional coordinated activation within the brain and body to adaptively serve individuals. It may be that for the ages of children in the current study, observable attention-reliant emotion regulation behaviors (i.e., gaze aversion and self-distraction) are less reliable and stable due to rapidly developing brain systems. This may contribute to notable individual differences in children’s engagement with strategies task to task, day by day, and context by context, as they continue to test the effectiveness of various emotion regulation strategies.

In line with the possibility of rapid neural development spanning the ages considered in the current study, there exist differential rates of maturational growth and stability in observable behavior consistent with emotion regulation compared to that of underlying neurobiological and physiological processes. For example, previous research has suggested that brain areas associated with emotion regulation (e.g., ACC) remain relatively stable between late infancy and late toddlerhood, with another surge in growth during the preschool years (Bell & Deater-
Deckard, 2007; Posner & Rothbart, 2000; Rothbart et al., 2011). While the early growth in the ACC prior to 10 months of age allows for subsequent behavioral growth in regards to increased independent regulatory functioning, these behaviors are only just coming “online” as the brain systems which control them are stabilizing. Given that these brain systems themselves are just stabilizing, the overt behavior they control and allow for would also require time to stabilize, as infants need time to practice newfound attentional, motor, and social abilities and integrate them into their self-regulatory repertoire. Similarly, measurable changes in physiological indicators of regulation (e.g., vagal tone, HRV, RSA) occur prior to observable changes in behavior (Adrian et al., 2011; Field & Diego, 2008; Fox, 1994; Moore, 2010), and stability of such indicators becomes stronger over the lifetime, similar to emotion regulation strategy use (Holzman & Bridgett, 2017). Given these findings, although stability of underlying physiological processes appears to be documented as early as infancy, behaviorally, we may not be able to expect use of independent emotion strategies to be stable until later in toddlerhood and entering the preschool years, as physiological processes also continue to stabilize (e.g., Bornstein & Suess, 2000; Calkins & Keane, 2004; Fracasso, Porges, Lamb, & Rosenberg, 1994; Kennedy et al., 2004; Porges, Doussard-Roosevelt, Portales, & Suess, 1994). To summarize, there seems to be a trend in the neurobiological and physiological literature for stability of processes required for independent emotion regulation to emerge prior to the stability of observable behaviors themselves. This is most likely due to children’s need to learn, practice, and integrate newfound abilities within different contexts.

Related to self-soothing, promising relationships emerged, though stability was not supported. Specifically, self-soothing at 12 months was significantly and negatively related to
self-soothing at 24 months, with overall use of self-soothing behaviors increasing over time. At trend levels, 12-month self-soothing was negatively associated with self-soothing at 18 months, and 18-month self-soothing was positively associated with self-soothing at 24 months. While surprising, there are several potential reasons for the lack of support of rank-order stability within these behaviors.

Regarding the inverse relationship between infant and toddler self-soothing, differences in task demands between infancy and toddlerhood serves as a particularly salient factor that may influence the findings in the current study. Although both the still-face paradigm and the stranger approach task involve novel social interactions, the still-face paradigm focuses on the infant-mother relationship and removal of “normal” relational reciprocity, whereas the stranger task introduces a novel individual, while also removing mother-initiated support. Additionally, within the still-face task, infants were fastened in a high-chair, unable to escape the distressing social situation involving their mothers (i.e., their primary external regulator). In comparison, during the stranger approach task, toddlers, while initially seated at a table, were permitted to move about the room, including seeking physical comfort from their mother (i.e., touching mother).

Given differences in task demands, it perhaps is not surprising that inverse associations were observed between 12 month self-soothing during the still-face task and 18 and 24 month self-soothing during the stranger approach task. For example, for infants within this still face task, particularly at a time in development when social synchrony and mutual responsivity is increasing (i.e., late infancy; Feldman, 2007), it would be more adaptive to avert gaze and attention away from their mothers. Given engagement in self-soothing allows for continued attentional focus on the distressing stimulus (e.g., sucking on fingers while staring at mother),
this behavior may be less adaptive during the still-face task. However, within the stranger approach task, simply staying in place and modulating attention while a strange individual approaches may be less adaptive, particularly when one’s options for alternative forms of regulation (i.e., maternal physical comfort, physically moving away from stranger within room) are available. Engagement in self-soothing in this context independently (Parritz, 1996) or paired with other, more adaptive strategies (e.g., sucking on fingers while touching mother and staring at stranger; Grolnick et al., 1996), is more likely to lead to overall decreases in arousal/distress. Given differences in significant relationships between self-soothing at 12 months and 18 and 24 months, it may be that toddlers require additional time to adjust to changing demands. At 18 months, they may be flexibly exploring a variety of independent and mother-oriented regulatory strategies, while at 24 months, they may have a more adaptive “plan” for independently regulating emotions within a context such as the stranger approach task. Clearly, additional research is needed examining these behaviors, the contexts under which they are adaptively and flexibly utilized, and how that impacts stability over time. In particular, during this time period of rapid development and change, using latent growth models to examine growth trajectories compared to rank order stability may also prove useful.

Related to the trend level relationship between 18- and 24-month self-soothing, within the current study, between the 18- and 24-month visits, the stranger also changed from a female research assistant to a male research assistant, theoretically increasing perceived threat, and/or novelty. Compared to the still face paradigm, the stranger task is more likely to activate brain areas and elicit behaviors associated with bottom-up reactive self-regulation, specifically behavioral inhibition, and has historically been more readily utilized to study this phenomenon.
than child emotion regulation (Buss & Goldsmith, 2000; Goldsmith & Rothbart, 1999). Studies examining both emotion regulation and behavioral inhibition have commonly found emotion regulation to be negatively impacted by behavioral inhibition, in that individuals utilize fewer and less adaptive strategies when in a situation that triggers “freezing” behavior (i.e., behavioral inhibition); however, these links are only consistently found beginning in later childhood. In early childhood, these associations are mixed, presumably because young children’s engagement in observable behavioral inhibition is also unstable at this time (Eisenberg et al., 2013; Holzman, 2018). Studies that have investigated both in early childhood, find that children with more behavioral inhibition (i.e., shyness, freezing) during tasks involving strangers engage in more self-comforting behaviors (Mangelsdorf et al., 1995; Parritz, 1996), as in the current study. It may be that differences in behavioral inhibition due to task demands at 18 and 24 months led to less stability in toddlers’ use of emotion regulation behaviors.

**Infant Emotion Regulation and Overcontrolling Parenting**

Contrary to hypotheses, self-soothing, not self-distraction, in infancy emerged as a significant predictor of overcontrolling parenting in toddlerhood, wherein self-soothing at 12 months negatively related to overcontrolling parenting at 24 months. It was not a significant predictor of overcontrolling parenting at 18 months. Examining first the perspective that higher levels of self-soothing behaviors in infancy contribute to lower maternal use of overcontrolling parenting in toddlerhood, previous research supports the broad idea that better child emotion regulation abilities lead to more sensitive and less harsh parenting practices (e.g., Feldman,
Eidelman, & Rotenberg, 2004). As reviewed above, although self-soothing appears to become a less effective strategy in toddlerhood for modulating distress (e.g., Ekas et al., 2011; Grolnick et al., 1996), it remains a highly utilized and effective strategy in late infancy (Mangelsdorf et al., 1995). As such, it can be posited that an infant utilizing more self-soothing behaviors would be more adept at regulating their emotions independent of caregivers. This independence may influence parents’ views of their children as being more independent broadly, allowing for less perceived need to hover over them and intrude on their natural exploration of tasks (i.e., overcontrolling parenting). In support of this possibility, it has been shown that infants higher in temperamental surgency (i.e., positive emotionality) utilize more self-soothing (Planalp & Braungart-Rieker, 2015), and that children’s surgency is positively related with maternal affection, while children’s negative affectivity is positively related to overcontrolling parenting (Laukkanen, Ojansuu, Tolvanen, Alatupa, & Aunola, 2014). Taken together, it would seem that child-effects on parenting exist, even within the earliest developmental periods, such that increased effective emotion regulation (leading to more positive affect and less distress) leads parents to be more supportive or sensitive and less controlling, potentially due to a decreased need for external support.

On the other hand, lower use of self-soothing behaviors in infancy may suggest to caregivers that children are ill-equipped to independently regulate themselves, thus leading to increased levels of overcontrolling parenting. This increased level of overcontrolling parenting in turn, could lead to persistent difficulties for children in learning adaptive independent emotion regulation. One such population for which this connection seems particularly relevant is in children of anxious mothers. Previous work has shown infants of anxious mothers use less self-
comforting behaviors (Muller et al., 2016) and that anxious mothers use more harsh, intrusive, and overcontrolling parenting, often attributed to a general lack of awareness or attunement to their children (Beebe et al., 2011; Murray, Cooper, Creswell, Schofield, & Sack, 2007; Stein et al., 2012). It may be that infants demonstrating lower self-regulatory abilities (here, self-soothing) contribute to maternal anxiety, which leads to an “over-correction” in the form of highly structured environments and hypervigilance to even the slightest sign of distress in children. Given the links between both self-comforting behaviors in young children and engagement in overcontrolling parenting, maternal anxiety should be considered within study designs examining the relationship between these factors.

The current study found no relationship between early gaze aversion or self-distraction and overcontrolling parenting at 18 or 24 months. Previous research has utilized a variety of methods to measure emotion regulation (e.g., maternal-report measure, vagal tone, observed behavior) and parenting (e.g., parent-report measure, observed parenting) across different study designs (e.g., path model analysis, latent growth modeling, regression analysis) to examine the impact of child regulatory factors on later parenting (Belsky et al., 2007; Bridgett et al., 2009; Kennedy et al., 2004; Premo & Kiel, 2014). Across these studies, the shortest duration between time points resulting in significant directional influences from child to parent is one year, suggesting that the impact of children’s behavior on parental parenting behaviors may take up to a year to produce observed, perceived, or felt differences. As such, one explanation for the lack of significant predictive relationships between all 12-month emotion regulation behaviors and 18-month overcontrolling parenting is that these effects take longer than 6 months to produce observable differences in parental behavior. Although studies have found significant child
influences on parenting across a one-year time span, no study thus far has examined this link utilizing observed infant emotion regulation abilities and observed overcontrolling parenting in toddlerhood. It may be that the influence of infant emotion regulation strategies on parenting do not fully emerge until later in development. Future studies should consider examining the influence of infant emotion regulation strategy use on parenting behaviors at several time intervals after the infant data point to determine when effects may emerge and if they continue beyond one time interval (i.e., do effects at 1 year “post-exposure” continue).

Overcontrolling parenting was the only parenting dimension measured within the current study. As stated above, to this author’s knowledge, few studies examined the influence of infant observed independent emotion regulation strategies on parenting within toddlerhood. Instead, studies examining the impact of child effects on later overcontrolling parenting have examined maternal reported infant regulatory capacity (i.e., soothability, cuddliness, duration of visual orientation, expressions of low intensity pleasure; Bridgett et al., 2009), toddlers’ use of caregiver-focused strategies (Premo & Kiel, 2014), and toddlers’ vagal tone (Kennedy et al., 2004). Previous work examining other aspects of parenting has shown links between infant emotions regulation (maternal reported and observed) and maternal sensitivity across the first year of life (Feldman et al., 2004) and higher attentional control at 54 months at 6 years of age and exposure to sensitive parenting at 6 years and 8 years of age, respectively (Belsky et al., 2007). It may be that early independent emotion regulation strategies differentially influence aspects of parenting, such that self-distraction and gaze aversion may more heavily impact mothers’ use of sensitive parenting instead of harsh parenting – a possibility not considered in the current investigation.
Bidirectional Effects of Child Emotion Regulation and Overcontrolling Parenting

Despite predictions and theoretical support from previous research, no significant indicators of bidirectionality emerged between child emotion regulation strategy use and maternal use of overcontrolling parenting. In line with this finding, there are some researchers who posit that regulatory abilities, such as emotion regulation, and aspects of parenting (i.e., parent-child reciprocity) are heterotypic in regards to stability, suggesting stability within the larger construct, with variability in what that construct looks like over time (Feldman, 2015). Bidirectionality theoretically expects stability or continuity in primary variables and, as such, the lack of stability in individual emotion regulation strategies over time may account for the lack of significant findings within the current study. That said, even within the inclusion of flexible definitions of emotion regulation based on age-appropriate norms and expectations (e.g., use of differential data collection methods), Feldman (2015) was only able to demonstrate significant bidirectional relations after toddlerhood, not from infancy to toddlerhood.

It may be, as discussed above, that this time period is still a highly tumultuous one, characterized by rapid growth, change, and adaptation by both children and parents in internal processes, as well as behavioral or observable functioning. As such, there may be little stability in individual emotion regulation behaviors, particularly across different situational contexts (i.e., task demands), that is observable within the small windows of time that laboratory visits take place. Instead, other measures (e.g., maternal report of behaviors, physiological/neurobiological indicators, use of composite of behaviors) may be better representations of stability over this developmental period. For example, Holzman (2018) only found stability in maternal reported...
shyness and fear, not in observed behavioral inhibition, when utilizing the same sample within the same toddler task. As such, the field’s understanding of the development of individual emotion regulation behaviors may be represented by examining latent growth models and influences of variables, such as overcontrolling parenting, on growth trajectory.

Despite this acknowledgement, even extending beyond infancy and toddlerhood, research examining the bidirectionality of child emotion regulation and parenting behaviors has generally been mixed, wherein there are specific conditions under which bidirectionality is supported. These mixed findings lead to confusion as to when and how child emotion regulation and parenting may transactionally relate to one another. For example, Norona and Baker (2014) found that in children with developmental disabilities bidirectionality between child emotion regulation and maternal scaffolding was significant, but only between ages 3 and 5 (not beyond) and not in typically developing children. Child emotion regulation and parenting behaviors are important to normative child development and, in theory, should exhibit some interplay. Further investigation is still required utilizing study designs allowing for examining these relationships, not only in early development, but through emerging adulthood.

Limitations

Despite limited support for hypotheses within the current study, there were strengths to the current investigation, including the use of a longitudinal design, observational methodology to measure both child emotion regulation strategy use and overcontrolling parenting, design and implementation of a novel coding scheme grounded in previous research, and use of statistical
modeling techniques for data estimation and analysis. As with all studies, there are nevertheless, aspects that could be improved upon in the future. First, though power analyses suggested the final sample size (n=169) was adequate for the study design, this sample size may not have been able to detect smaller but meaningful effects. Even across the observed significant relationships within the current study, effects were small (.18-.32). This issue may have been further compounded by higher than desirable attrition rates over time (15% at 12 months, 26% at 18 months, 33% at 24 months), leading to the use of robust estimation methods rather than observed data from a small but substantial portion of the sample. Although previous studies have shown missing data estimation methods, particularly FIML, to be effective with missing data rates as high as 40% (e.g., Dong & Peng, 2013; Jakobsen, Gluud, Weterslev, & Winkel, 2017), future studies may wish to replicate the current study design with a larger sample size (~200-250) and with improved participant retention methods to determine whether additional relations of conceptual importance are then detectable.

Second, as noted previously, significant skew and kurtosis were present across the emotion regulation variables, which was not corrected using arcsine transformations. The impact of the non-normal variables can be seen across differences in results between Pearson and Spearman correlations. It is unknown how the non-normal data may have impacted primary analyses, though previous work has suggested increases in Type 1 error rates, inflated rejection of model fit, and underestimating of standard errors (e.g., Cain, Zhang, & Yuan, 2017). Although robust estimation methods were utilized across the cross-lagged models to account for variability and issues within normality, as recommended by previous literature (e.g., Ory & Mokhtarian, 2010; Shi, DiStefano, Zheng, Liu, & Jiang, 2021), skew and kurtosis may have impacted the
results of the current study. Future research should explore to what degree skew and kurtosis may impact even robust estimation methods’ ability to produce reliable and valid results.

Third, given the lack of previous research examining the causal influence of early child emotion regulation on parenting within a year time frame and limited support even within a two-year time interval, it may be that the proposed causal and bidirectional links between study variables are not observable within a year’s time. The addition of a third time point for both toddler emotion regulation and overcontrolling parenting at 30 months (i.e., 1 year after the 18-month time point) or 36 months (i.e., into the preschool years) would allow for further examination of the longitudinal changes which may be present in and across both child emotion regulation and overcontrolling parenting. Fourth, though this study’s goal was to examine only independent child emotion regulation behaviors in relation to overcontrolling parenting, given developmental changes in utilization of child- versus mother-reliant strategies, it would have been interesting to also allow for the examination of mother-reliant emotion regulation strategies within this framework. Findings related to mother-reliant strategies would have allowed for more complete interpretation of the current study findings with regard to comparisons within the literature.

Finally, the current study included only behavioral observation for child emotion regulation and overcontrolling parenting. Given issues raised related to the timing of observable changes in development within an experimental setting (e.g., Adrian et al., 2011; Field & Diego, 2008; Fox, 1994; Moore, 2010), future work would be bolstered by the addition of a multi-method approach to measuring these attributes. Mother-report measures of child regulatory functioning and parenting would allow for a more general overview of the day-to-day
consistency in these behaviors, while the inclusion of physiological measures, such as vagal tone or RSA, would provide a measure of changes in regulatory ability broadly and which predates measurable, behavioral change.

Conclusion

Despite limitations, the current study advances our understanding of the early development of emotion regulation strategy use between infancy and toddlerhood, as well as the interplay between these behaviors and overcontrolling parenting in toddlerhood. It is among the first studies to examine 1) stability of specific independent emotion regulation strategies (i.e., gaze aversion, self-soothing, and self-distraction) between infancy and toddlerhood; 2) the impact of infant emotion regulation strategy use on later overcontrolling parenting; and 3) bidirectionality between independent emotion regulation strategies and overcontrolling parenting. Although significant findings were sparse, findings do suggest significant changes in children’s use of emotion regulation strategies between infancy and toddlerhood within the context of the still face paradigm and stranger approach tasks, respectively. Additionally, self-soothing in infancy demonstrated unique links with both self-soothing and overcontrolling parenting in toddlerhood, suggestive of its continued importance as a regulatory strategy. When paired with the nonsignificant findings of gaze aversion and self-distraction, this emphasizes the need for further exploration of individual emotion regulation strategies across early development in a manner similar to that employed in the current investigation. The lack of significant relationships between child emotion regulation and overcontrolling parenting at shorter time
intervals may suggest a delayed impact of such influences. Future work should continue investigating the development and adaptive use of independent emotion regulation behaviors, while addressing the limitations noted above.
REFERENCES


APPENDIX A

STILL FACE PARADIGM INFANT EMOTION REGULATION CODE
Appendix A

Still Face Paradigm Infant Emotion Regulation Code

Noldus will prompt you every second to report on the presence or absence of each of the behaviors below. You should code what you see when the video pauses, not what occurs in the video during the second. If a behavior is ambiguous, you should maintain the previous code until the behavior is clear (e.g., if it is ambiguous as to when an infant stops sucking on thumb, continue coding behavior until it is clear the thumb is out of his/her mouth).

**Mother Orientation**
Direction of gaze toward from mother (i.e., infant’s gaze focused on mother)

0 = Infant gaze not focused on mother (e.g., infant looking away from mother)
1 = Infant gaze focused on mother

**Physical Self-Soothing Behaviors**
Infant engaging in self-soothing behaviors including sucking on fingers or clothing, rubbing/touching hands or hair, rocking self)

0 = Infant not engaging in any self-soothing behaviors
1 = Infant engaging in at least one of the above self-soothing behaviors

**Self-Distraction Behaviors**
Infant engaging in behaviors aimed at distracting self (e.g., playing with high chair, shoes, etc.). Infant’s gaze must be focused on object being used in distraction.

0 = Infant not engaging in distraction behaviors or is not attending to distracting object
1 = Infant is focused on and utilizing distraction measures

**Mother compliance to task (second by second code)**
Degree to which mother maintains neutral facial expression and resists responding to infant during task. Violations to compliance include mild to extreme occurrences of smiling, laughing, nodding/shaking head, touching child, and vocalizations directed toward child (e.g., humming, talking).

0 = No violation
1 = Violation
Mother compliance to task (global code)
Degree to which mother maintains neutral facial expression and resists responding to infant during task. Violations to compliance include mild to extreme occurrences of smiling, laughing, nodding/shaking head, touching child, and vocalizations directed toward child (e.g., humming, talking).

0 = Mother completely compliant to task instructions
1 = Mother mostly compliant to task instructions, but with instances of mild non-compliance (i.e., breaks from neutral facial expression and responds to infant to a minimal degree [i.e., less than half of the still face episode or with low intensity*])
2 = Mother mildly complaint to task instructions (i.e., breaks from neutral facial expression and responds to infant to a moderate degree [i.e., more than half of the still-face episode or with high intensity**])
3 = Mother not complaint to task instructions (i.e., mother regularly breaks from neutral facial expression and responds to infant and does so with high intensity**)

*Low intensity deviations may include behaviors such as small smiles, muffled laughter, or quiet “shh-ing” of child
**High intensity deviations may include behaviors such as full face smiles, laughter, or speaking words at normal volume to the child
APPENDIX B

STRANGER APPROACH TODDLER EMOTION REGULATION CODE
Appendix B

Stranger Approach Toddler Emotion Regulation Code

Noldus will prompt you every second to report on the presence or absence of each of the behaviors below. You should code what you see when the video pauses, not what occurs in the video during the second. If a behavior is ambiguous, you should maintain the previous code until the behavior is clear (e.g., if it is ambiguous as to when an toddler stops sucking on thumb, continue coding behavior until it is clear the thumb is out of his/her mouth).

Gaze Aversion
Direction of gaze away from stranger (i.e., toddler’s gaze not focused on stranger’s body or face)

0 = Toddler gaze focused on stranger
1 = Toddler gaze not focused on stranger (e.g., toddler looking away from stranger)

Physical Self-Soothing Behaviors
Toddler engaging in self-soothing behaviors including sucking on fingers or clothing, rubbing/touching hands or hair, rocking self

0 = Toddler not engaging in any self-soothing behaviors
1 = Toddler engaging in at least one of the above self-soothing behaviors

Self-Distraction Behaviors
Toddler engaging in behaviors aimed at distracting self (e.g., playing with chair, table, shoes, etc.). Toddler’s gaze must be focused on object being used in distraction.

0 = Toddler not engaging in distraction behaviors or is not attending to distracting object
1 = Toddler is focused on and utilizing distraction measures

Mother compliance to task (global code)
Degree to which mother maintains neutral facial expression and resists responding to toddler during task. Violations to compliance include mild to extreme occurrences of smiling, laughing, nodding/shaking head, touching child, and vocalizations directed toward child (e.g., humming, talking).

0 = Mother completely compliant to task instructions
1 = Mother mostly compliant to task instructions, but with instances of mild non-compliance (i.e., breaks from neutral facial expression and responds to toddler to a minimal degree [i.e., less than half of the stranger approach task or with low intensity*])
2 = Mother mildly complaint to task instructions (i.e., breaks from neutral facial expression and responds to toddler to a moderate degree [i.e., more than half of the stranger approach task or with high intensity**])
3 = Mother not complaint to task instructions (i.e., mother regularly breaks from neutral facial expression and responds to toddler and does so with high intensity**)

*Low intensity deviations may include behaviors such as small smiles, muffled laughter, or quiet “shh-ing” of child
**High intensity deviations may include behaviors such as full face smiles, laughter, or speaking words at normal volume to the child
APPENDIX C

STRANGER APPROACH TASK
Appendix C

Stranger Approach Task

Before the episode begins, the experimenter places a chair near the far wall and instructs child to sit on the chair, facing the camera by saying “You sit here and wait for me while I go look for the next game, okay? You wait here until I come back.” After 10 seconds, the stranger knocks on the door. The stranger enters the room and, remaining by the door, says, (in a friendly tone of voice) “Hi!” After a 2 second pause, the stranger asks, “Have you ever been here before?” followed by a 10 second pause. Then, the stranger walks to the chair, kneels in front the child about 2 feet away and asks, “Are you having a good time here today?” followed by a 10 second pause. The stranger then sits down and asks, “Are you playing with a lot of toys?” followed by a 10 second pause. The stranger then asks, “What was your favorite toy?” and agrees with whatever the says by saying, “I like that too.” If the child says anything else, the stranger replies to every utterance with a friendly, logical one-sentence response that is not a question. After 20 seconds, the stranger says, “Well it was nice seeing/ talking to you today! I hope you have fun with the rest of our toys and games!” and exits the room. After 15 seconds from the sound of the door closing, the experimenter returns and says “Was there a man/woman here?” and waits for the child’s response. After the child’s response, the experimenter says, “What was he/she like?” After the responds, the experimenter says, “Oh that was my friend [stranger’s name]. He/ she is really nice.”
APPENDIX D

PARENT BEHAVIOR RATING FORM
Appendix D

Parent Behavior Rating Form

Use the following rating scale to code PARENT behaviors for each individual minute by writing your numerical rating in the appropriate box. If total task length is under five minutes, finish coding by rounding UP to the nearest minute, and marking all other minutes as “N/A”.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Minute 1</th>
<th>Minute 2</th>
<th>Minute 3</th>
<th>Minute 4</th>
<th>Minute 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-25%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26-50%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51-75%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>76-100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Overcontrol**

Presence of intrusive commands to direct child’s behavior, unsolicited help, over involvement in the task. Remember: giving instructions is not overcontrol.

**Examples of overcontrolling parenting:**

- Completing the task or parts of the task for the child, without the child’s request
- Leaning over the task or over the child
- Obstructing the child’s view of the task
- Using intrusive physical contact to direct the child’s attention or activity
- Delivering commands in a harsh or “bossy” tone of voice (e.g., “Give me that,” or “Put this one here, no not there, over here!”)
- Parent undoes work completed by the child and redoes the work themselves
APPENDIX E

BACKGROUND INFORMATION: PRIMARY CAREGIVER FORM
Appendix E

Background Information – Primary Caregiver

We would like to ask you some questions about yourself. The questions are about your age, marital status, educational background, and current work. Please answer all questions as completely as possible.

Primary Caregiver – spends most time taking care of infant. Example – stay at home mom or stay at home dad.
Secondary Caregiver – spends second most amount of time taking care of infant. Example – working parent (e.g., father) or grandparent.

Please complete this information about the infant’s primary caregiver:

1. What is your partnership status? _____
   1 = Single
   2 = In a relationship
   3 = Living together
   4 = Married
   5 = Divorced
   6 = Separated
   7 = Remarried
   8 = Widowed

2. With which race/ethnicity do you identify most? _____
   1 = Caucasian/European American
   2 = African American/Black
   3 = Asian/Asian American
   4 = Pacific Islander
   5 = Filipino
   6 = Hispanic/Latino
   7 = Native American
   8 = Other: ____________________
3. What is the highest grade of school you’ve completed?

Elementary 1 2 3 4 5 6 7 8
High School 9 10 11 12
Post-High School 1 2 3 4  
(vocational or technical school)
College 1 2 3 4  
Degree earned (if any): __________
Graduate/Professional 5 6 7 8  
Degree earned (if any): __________

4. What is your date of birth? _______/_____/______
   month     day    year

5. What is your age? __________

6. What is your gender?
   Male
   Female

7a. What kind of work are you currently doing (what is your occupation)?
   ________________________________
   (For example: Electrical engineer, farmer, stock clerk, machinist, etc.)

7b. What are your most important activities or duties?
   ________________________________
   (For example: selling cars, filing, finishing concrete, etc.)

7c. What kind of industry is this?
   ________________________________
   (For example: retail shoe store, automobile manufacturing, or state labor department, etc.)

8. What was your approximate family income last year? _________________________

9. What is your religious affiliation?_________________________
10. Please check the boxes below if you have previously been diagnosed with any of the following disorders/difficulties:
   - Depression
   - Anxiety
   - ADHD
   - Substance use/abuse
   - Behavior problems/delinquency
   - Other: __________

11. Please check the boxes below if your biological mother has previously been diagnosed with any of the following disorders/difficulties:
   - Depression
   - Anxiety
   - ADHD
   - Substance use/abuse
   - Behavior problems/delinquency
   - Other: __________

12. Please check the boxes below if your biological father has previously been diagnosed with any of the following disorders/difficulties:
   - Depression
   - Anxiety
   - ADHD
   - Substance use/abuse
   - Behavior problems/delinquency

13. Please check the boxes below if you have previously been diagnosed with any of the following learning or speech difficulties:
   - Reading disability/dyslexia
   - Math disability
   - Writing disability
   - Speech impairment
   - Other: __________

14. Please check the boxes below if your biological mother has previously been diagnosed with any of the following learning or speech difficulties:
   - Reading disability/dyslexia
   - Math disability
   - Writing disability
15. Please check the boxes below if your biological father has previously been diagnosed with any of the following learning or speech difficulties:
   - Reading disability/dyslexia
   - Math disability
   - Writing disability
   - Speech impairment
   - Other: ____________

16. Have you had a history of medical difficulties (for example: heart disease, Alzheimer’s, cancer)?
   - Yes
   - No

16b. If yes, please briefly describe your medical difficulties below:

________________________________________________________________________________________
________________________________________________________________________________________
APPENDIX F

SUPPLEMENTAL DEMOGRAPHIC INFORMATION
Appendix F

Supplemental Demographic Information

We would like to ask you some questions about your income. Please answer the following questions as accurately as possible.

1. How many adults live in your household? ____________
2. How many children live in your household? ______________
3. For each adult in your household, what is his/her monthly income from employment?
   a. Primary caregiver: $____________
   b. Secondary caregiver: $____________
   c. Additional Adult #1: $____________
   d. Additional Adult #2: $____________
4. Are you or your child(ren) receiving help from the Women, Infants, and Children Nutrition program (WIC) or Supplemental Security Income program (SSI)?
   YES  NO
   a. If Yes, how much per month? $__________
5. Do you live in a public housing project – that is, housing owned or operated by a local housing authority or other governmental agency?
   YES  NO
6. Is there any legal arrangement that states the baby’s father must pay some kind of financial support?
   YES  NO
7. Do you have health insurance for yourself?
   YES  NO
   a. If yes, is the insurance through a state or governmental agency (for example, Medicaid, All Kids, FamilyCare, ICHIP, IPXP)?
      YES  NO
8. Do you have health insurance for your child(ren)?
   YES  NO
a. If yes, is the insurance through a state or governmental agency (for example, Medicaid, All Kids, FamilyCare, ICHIP, IPXP)?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
</table>

9. For each of the following that applies, please record the amount of monthly income for each adult in the household:

<table>
<thead>
<tr>
<th>Income Source</th>
<th>Primary Caregiver</th>
<th>Secondary Caregiver</th>
<th>Additional Adult #1</th>
<th>Additional Adult #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployment Insurance payments</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Food Stamps</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Supplemental Security Income or SSI program</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Cash income from welfare program</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Child Support payments (directly from parent or through welfare or child support agency)</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Social security Disability payments</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Worker’s Compensation, Veteran’s disability, or other disability payments</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Social Security retirement or survivor’s payments, or other government pension</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Other pension or retirement income (from company or union)</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Income help from relatives outside the household</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Income help from friends</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Any other form of income, including child support</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
</tbody>
</table>

10. What is the first language of the infant’s mother? ______________________

11. What is the first language of the infant’s father? ______________________

12. What language is spoken in the home most frequently? _____________________