The Pennsylvania State University

The Graduate School

AGE-RELATED DIFFERENCES IN CHILDREN'S AND MOTHERS' STRATEGIES FOR REGULATING CHILDREN'S BEHAVIOR

A Thesis in

Psychology

by

Gabrielle S. Cardwell

Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Master of Science

August 2021

The thesis of Gabrielle S. Cardwell was reviewed and approved by the following:

Pamela M. Cole
Professor of Psychology & Human Development and Family Studies
Thesis Advisor

Ginger Moore
Associate Professor of Psychology
Director of Clinical Training

Erika Lunkenheimer
Associate Professor of Psychology
Associate Director of Education, Child Maltreatment Solutions Network

Kristin A. Buss
Professor of Psychology & Human Development and Family Studies
Head of the Department of Psychology

Abstract

The leading developmental model posits that infants and toddlers primarily rely on their caregivers as an external source of regulation and, during the transition from toddlerhood to kindergarten, children begin to make use of their own internal cognitive resources to regulate behavior (Kopp, 1982). However, there are few existing studies testing this model directly. Our study aims to address two gaps in the literature: how children's engagement of cognitive resources through strategy behaviors differs as a function of age during early childhood, and how parents continue to intervene to act as a source of external regulation during this period. We investigated age-related differences in children's strategic behaviors and mothers' interventions during a challenging waiting (delayed reward) task. We also examined whether differences in children's effortful control, a dimension of temperament, explains any age-related differences observed. Moreover, we considered temporal features of children's and mothers' behaviors in terms of (a) their frequency, latency, and average duration, and (b) how those indices change as a function of increasing challenge of the task. The participants were 154 mothers and their children (77 boys, 77 girls) between the ages of 30 to 60 months (*M* = 45.15 months, *SD* = 8.23) who participated in a 9-minute task in which mothers told their children to wait to open a gift. In line with a leading developmental model (Kopp, 1982), results of multilevel models reveal maternal and child behavior differ as a function of child age and experimentally induced perturbations, but not as a function of children's temperamental effortful control.

Table of Contents

List of Tables

Acknowledgements

This research was supported by the Eunice Kennedy Shriver National Institute of Child and Human Development under award number R01HD076994. The findings and conclusions of this thesis do not necessarily reflect the view of the funding agency.

I would like to thank Dr. Pamela M. Cole for her continued guidance and support on this project, as well as my committee members, Drs. Ginger Moore and Erika Lunkenheimer.

Introduction

Children's ability to self-regulate is necessary for healthy development. Indeed, the early development of self-regulation has been associated with children's later adjustment (Eisenberg, Spinrad et al., 2010), school readiness (Eisenberg, Valiente, et al., 2010), and long term health outcomes (Blair et al., 2016; Moffitt et al., 2011). Given its significance for children's functioning, it is important to understand how children develop and employ strategies for self-regulation in early childhood. Further, it is also important to examine factors that influence these strategies. Though it is well demonstrated that strategies for self-regulation develop in early childhood (Cole et al., 2009; Eisenberg et al., 2004; Kochanska et al., 2001; Stansbury & Sigman, 2000), the within-person processes involved remain unclear. Understanding within-person differences in the development of strategies for self-regulation will add to our understanding of factors that promote better self-regulation in children.

Recently, self-regulation has been defined as the dynamic interaction between prepotent responses, or highly probable reactions, and executive processes, or the recruitment of cognitive resources in the form of strategies that can modify these reactions (Cole et al., 2017; Cole et al., 2019). Prepotent responses are those natural reactions that a situation evokes. For example, when one is engaged in a difficult task, they are likely to be naturally pulled toward a negative emotional response (e.g., frustration). To avoid being overcome by this frustration, one can engage strategies to help avoid this automatic response. These strategies vary in the extent to which they involve effortful engagement of cognitive processes such as memory, attention, reasoning, and planning. As a result, the nature of these strategies changes as children become better able to engage those cognitive processes in order to cope with frustration. Developmentally, the prevailing view is that during the first years of early childhood, caregivers are a main source of control or regulation, and that from about age 3 years onward cognitive development equips children with internal resources that they can begin to draw on to regulate their own behavior (Kopp, 1982). In other words, initially the main source of strategies for regulating child behavior is the caregiver; during early childhood, as a result of maturation and socialization, there is a transition to greater self-regulation. However, the evidence supporting this view is surprisingly limited.

Previous studies have focused on the specific strategies used by parents (e.g., directing, structuring, assisting) and children (e.g., distraction, cognitive restructuring, etc.) to regulate children's behavior. The assumption that the nature of these strategies changes as a function of children's increasing capacity to draw on their internal cognitive processes has received less attention. Studying children's behaviors as the extent to which they call on children's own internal cognitive processes may provide a better understanding of age-related differences in young children's strategic regulatory behaviors. Additionally, though young children's cognitive resources grow as they age, age is just one marker of the underlying phenomena influencing this growth. One approach of studying differences in these changing capacities focuses on temperament, predispositions to be easily regulated and to regulate one's own behavior drawing on internal resources. The aspect of temperament that should account for how easily children come to regulate their own behavior is effortful control (Rothbart & Rueda, 2005). Children with better effortful control might be expected to better draw on their own cognitive resources to employ strategies for regulation. Thus, examining how factors internal to children (e.g., age and temperament) are associated with the extent to which their strategies call on their own cognitive resources may allow for better examination of children's development of self-regulation.

Similarly, though we know caregivers provide external regulation for their children, it remains unclear how direct external regulation changes and recedes through early childhood. As children age and are thought to draw more on their internal resources to engage in autonomous strategy use, direct parental control should diminish. When parents expect their children to be capable of self-regulation, they can elect not to react and let their children cope independently. Prior to that parental strategy, parents can try to scaffold their children's self-regulation, or they can step in and regulate the situation for their children. Further, just as children with higher effortful control might be expected to better engage cognitive resources that serve to regulate their behavior, caregivers who rate their children as having higher levels of effortful control might be expected to act as an external source of regulation less. Examining the extent to which parents take control to act as the primary source of regulation for their children and how this is associated with factors internal to children (e.g., age and temperament) allows for a better understanding of how parents continue to be involved in children's regulation during early childhood.

An added challenge in examining age-related changes in children's and parents' strategies for regulating children's behavior is measuring these behaviors in a way that is sensitive to the temporal dynamics involved. Typically, research in early childhood self-regulation focuses on the frequency of parents' and children's behaviors. Another approach is to assess temporal features of behaviors. In his germinal writings on emotion regulation, Ross Thompson suggests that temporal variables can index the dynamics of regulation (Thompson, 1990). He posits that regulation is a dynamic, continuous process and suggests that temporal indices, such as latency and duration, can capture aspects of regulatory processes that are not captured by sums and frequencies. Examining behavior in terms of these temporal indices allows for interpretation of the timing and duration of behaviors without taking a measurement approach that is too granular to reveal meaningful results.

Research in early childhood self-regulation also typically assumes that the demands of a situation remain a constant stimulus as time passes. However, it is not clear that this is the case. For example, when mothers tell their children that they must wait to obtain a desired object (e.g., a gift), for how long does this initial restriction endure as a demand throughout the task? If children are reminded that they must wait, do children's and parents' attempts to regulate children's behavior change? It is common for behavior to be perturbated by a situational demand only at the outset of laboratory tasks that study children's self-regulation. Although this task design assumes that initial demands have a continuous effect on children's and parents' behaviors, there is no direct evidence that this is the case. Though studies have investigated how children's and parents' behaviors change around new demands introduced within a task (Guo et al., 2015; Lunkenheimer et al., 2017), there is no direct evidence for how behaviors change when children and parents are reminded of the *initial* demand. One approach, then, is to repeat the demand – the direction that children must wait for what they want – as a way to determine whether children's and parents' strategies for regulating children's behavior change as they are reminded of the initial task demand.

In this study, we focus on the extent to which children's and parents' strategies for regulating children's behavior draw on children's internal cognitive resources, considering temporal features of those behaviors as the demand to wait is repeated during a laboratory procedure. In the following sections, we will explore more fully how children's and parents' strategic behaviors differ in early childhood. We will also consider how best to measure these differences. Understanding these differences will help lead to a fuller explanation of the development of children's regulatory behaviors.

Age Differences in Children's Behaviors

The leading developmental models posit that children begin to develop cognitive resources that can be used to regulate behavior autonomously during the third year of life (Calkins, 2007; Kopp, 1982, 1989; Kopp & Neufeld, 2003; Posner & Rothbart, 2000). As children acquire new linguistic and cognitive skills during the transition from toddlerhood through the preschool years, they can draw on those skills to initiate strategies to regulate their behavior. For example, for effective self-regulation, children can draw on their cognitive resources to monitor their behavior and emotions, remember rules, and plan how best to deal with a situation that requires their restraining their impulses or urges. Self-regulation results from the employment of these cognitive processes as strategies that alter such prepotent responses (Cole et al., 2019). Kopp's (1982) model, therefore, predicts that during the preschool-age years, as children develop increased cognitive skills, they should initiate strategic behaviors that draw on those skills. However, there is a dearth of evidence directly testing this proposition as few studies focus directly on the cognitive processes involved in children's strategic behaviors.

Specific strategies that engage differing levels of cognitive skills have been observed in early childhood. Automatic forms of regulation are observed in infants and include behaviors such as gaze aversion, self-soothing, or looking to caregivers for support (Sheese et al., 2008; Stifter & Braungart, 1995). Although children continue to engage these strategies in early childhood (Stansbury & Sigman, 2000), autonomous, effortful strategic behaviors are reliably observed by age 3 years, as Kopp and others proposed. The earliest observed effortful strategies involve distraction and attention control (Eisenberg et al., 2004; Kochanska et al., 2001; Posner & Rothbart, 2000; Sethi et al., 2000; Stansbury & Sigman, 2000) in which children are able to independently shift attention to better withstand or support task demands. Other aspects of children's cognition thought to be involved in self-regulation in early childhood include the growth of executive function, a set of cognitive processes defined by working memory, inhibitory control, and cognitive flexibility (Anderson, 2002; Willoughby et al., 2012; Zelazo et al., 2003). However, children's executive function abilities comprise a subset of the cognitive processes that can be engaged in the form of strategies. A fuller examination of how children draw on a range of these cognitive processes to engage in strategic behaviors that can regulate their behavior requires behavioral observations that test the hypothesis that children increase in their ability to call on cognitive resources as they age during early childhood.

The extent to which strategies require the engagement of cognitive resources has not been studied in relation to age-related differences in young children's strategy use. A focus on these resources requires considering children's strategy use not in terms of binary categories – they did or did not use a specific strategy from a list of strategies – but scaling the extent to which these strategies engage cognitive processes. This approach does not seek to examine the effectiveness of such strategic behaviors for children's self-regulation, but rather, seeks to better understand one part of the dynamics of self-regulation – how children's ability to call on and employ their own internal cognitive resources differs in early childhood.

Age Differences in Parents' Behaviors

Before children acquire the internal resources to regulate their own behavior, caregivers are the primary source of control of children's behavior (Calkins, 2007; Kopp & Neufeld, 2003;

Kopp, 1982, 1989; Sameroff, 1975; Sroufe, 2000). Even preschool-age children who can engage in autonomous strategies when their self-regulation is taxed still seek or rely on caregivers for support when they are present (Grolnick et al., 1996). The extent to which caregivers provide this support depends to some extent on child factors, such as children's ability to draw on their own cognitive resources, that modify parents' expectations of their child's regulatory abilities and are thought to differ with children's age.

Maternal strategies to aid their children's regulation are observed throughout early childhood. In infancy and toddlerhood, mothers engage in behaviors that provide external regulation such as soothing or distracting children (Bornstein et al., 2017; Spinrad et al., 2004). As children enter the preschool years, parents rely more on verbal explanations and scaffolding that become gradually less structured to allow children to engage in more autonomous self-regulation (Landry et al., 2002; Spruijt et al., 2018). Mothers of 3-year-olds use more instrumental strategies (e.g., behaviors that seek to alter the situation for children by eliminating the challenging stimulus) than parents of 4-year-olds (Stansbury & Sigman, 2000). Some maternal strategies for regulating children's emotions (e.g., redirecting attention or cognitive reframing) appear to be more effective than others (Morris et al., 2011). These studies indicate age-related differences in how parents provide external support for children's self-regulation. Taken together it is reasonable to predict that parent behaviors that serve as an external resource for regulation of children's behavior exist on a continuum from behaviors that are greater in their attempts to control children's behavior or provide some form of scaffolding versus those that involve little or lesser support. However, this continuum of parent behavior has not been examined explicitly. Examining the extent to which parents of preschool-age children *intervene* to provide external regulation and how these interventions differ as a function of child characteristics better accounts for a possible continuum of parent behaviors.

Effortful Control Differences in Children's Behaviors

Children's age marks many developmental phenomena. One that is most closely related to the emergence of more autonomous regulation is the emergence of the temperamental disposition referred to as effortful control. The prevailing model defines temperament in terms of reactivity and regulation, with effortful control reflecting the regulation dimension (Rothbart & Sheese, 2007). Around the third birthday, regulation shifts from soothability and relatively automatic regulatory behaviors such as gaze aversion to more effortful behaviors that reflect the emergence of self-regulation, i.e., effortful control (Rothbart et al., 2003). Effortful control has been explained in terms of the emergence of cognitive processes, such as executive attention networks, that enable planning, error and novelty detection, and working memory (Rothbart & Rueda, 2005). Though effortful control has been linked with children's behaviors such as how they direct and control attention (Rothbart & Rueda, 2005), evidence on how children's effortful control is involved in the engagement of a broader range of cognitive processes through behavior is lacking.

Children's effortful control is thought to reflect their readiness to engage in autonomous regulation of behavior and attention (Rothbart et al., 2011). Previous studies have marked early childhood as a period of substantial growth in children's effortful control (Kochanska et al., 2000; Rothbart et al., 2003), and higher effortful control in children is associated with lower negative emotionality and better self-regulation (Rothbart et al., 2011). Children's development of effortful control is thought to rely on the same set of age-related cognitive processes as children's development of strategies for their self-regulation of emotion (Rothbart & Rueda, 2005). Therefore, increased effortful control in children may serve as a more specific indicator than children's age to account for developmental differences in children's ability to draw on and employ internal cognitive processes for regulatory strategies.

Effortful Control Differences in Parents' Behaviors

Children's temperamental effortful control may also influence the magnitude of caregivers' intervention to provide external regulation for their child. Parents who perceive their child as more capable of effortful control may intervene to act as a source of external regulation differently than parents who do not. Dimensions of parenting have been associated with children's effortful control where positive parenting predicts better effortful control (Cipriano & Stifter, 2010; Lengua et al., 2007; Neppl et al., 2020), but intrusive parenting predicts worse effortful control (Taylor et al., 2013). Further, the reverse—how parents' perceptions of children's effortful control impacts parents' behavior—has been observed (Crockenberg & Leerkes, 2003). Children with higher levels of negative affect are more likely to undermine co-parenting behavior between mothers and fathers (Cook et al., 2009). Findings related more specifically to effortful control have demonstrated mothers' engagement with their infant increased more from 3 to 6 months of age if their infant was initially rated as exhibiting lower effortful control (Kotila et al., 2014). However, another study found fluctuations in preschool-age children's effortful control were not associated with later positive parenting (Neppl et al., 2020). Thus, it remains unclear how children's effortful control influences parents' behavior in early childhood. Though children's effortful control may not predict later parenting, children's effortful control at a specific time could still influence parents' behavior in the moment. Further, as parent intervention to act as an external source of regulation for children is thought to wane as children are better able to call on their own internal cognitive processes, children's effortful control may serve as better indicator of how parental intervention changes with child development.

Behavioral Dynamics

When examining children's behaviors within an observational task, temporal variables provide information that sums of behaviors across a task do not. For example, although children may increase in their use of certain strategies as they age, they may also increase in the speed or duration of their strategies. Temporal variables, such as measuring the number of times a behavior occurred, have been used for the study of individual differences in regulatory behaviors (Calkins & Johnson, 1998; Choudhury & Gorman, 2000; Ruff & Capozzoli, 2003; Stansbury & Sigman, 2000; Thompson, 1994). Thompson (1990) in recognizing the need to better index regulatory processes, recommended the use of *multiple* temporal variables. In this study, we focus on three – frequency, latency, and duration – of both children's and parents' behavioral responses.

The frequency of behaviors indicates how many times a behavior occurs. Measuring the frequency of behaviors informs how levels of behavior vary across the task. For example, higher frequency values for children's behaviors indicate that a greater number of strategies were attempted. However, in the development of self-regulation, the number of separate attempts made is not necessarily the best index. It is equally important to consider how quickly children are able to engage in a strategy and how long children are able to sustain a strategy. The latency of behaviors is calculated by how many seconds it takes from the onset of a stimulus to the onset of a behavior. In the classroom or home, if children are frustrated by not being able to have or to do something they want, the speed with which they can distract themselves from the frustration of waiting is likely to be judged by teachers and parents as better regulation. The duration of behaviors is calculated by the number of contiguous seconds the behavior is sustained. Again, in the context of waiting to have something children want, sustaining a strategy may be more important than engaging it repeatedly for short durations. As older children and children with better effortful control are thought to be better able to draw on cognitive resources to employ strategies, we would predict that these children engage strategies more often, more quickly, and for longer durations.

In contrast, as children age, parents may be slower to intervene and may wait to determine if their children can regulate their own behavior. Thus, as children age, parental latency to intervene at a higher level could be expected to increase and the duration of their interventions may decrease. These temporal variables should also relate to parental perceptions of children's effortful control. If parents rate their children as higher in effortful control, relative to other parents' ratings of their own children, it is likely they perceive that their children can cope with the task and therefore this will affect their own strategies for intervening. Thus, we would predict that parental interventions will be slower to occur and shorter in duration the higher parents rate their children's temperamental effortful control. Each index of behavioral response dynamics allows for a unique measure of how children's and parents' behaviors occur across a task that has the potential to add to our understanding of the development of self-regulation.

Perturbations. In addition to incorporating the temporality of children's and parents' strategic behaviors into the study design, we also consider the issue of whether the evocative stimulus occurs only at the outset of the task or is repeated during the task. In observational studies of children's self-regulation, children are most often confronted with a blocked reward – a toy, a snack, a desired activity – at the outset of the procedure. A tacit assumption is that the challenge remains constant across the procedure. Yet, as we discussed above, situations unfold, and individuals may adjust to them. As a result, it is unclear whether the challenge to children's self-regulation at the outset of the procedure maintains its stimulus value throughout the task. For example, if children are told by their parents that they must wait to open an enticing gift, which reliably evokes frustration in young children, can we assume that children's behavior later in the task is related to that initial goal blockage? Reintroducing the challenge, the demand to wait, is a means of perturbating the situation, and determining whether children's and parents' behavior remains constant across the task or changes over the course of the procedure.

Perturbations are often used to examine the functional dynamics of a system (Hollenstein, 2012). Employing a perturbation disrupts the organization of the observed system, such that a dynamic reorganization process can be observed that may show unknown features of the system beyond those that emerge when the system remains stable (Sravish et al., 2013). Studies have used experimentally induced perturbations as a research tool to observe how parent-child dyads recalibrate after a perturbation and how these perturbations influence subsequent interactions (Guo et al., 2015; Lunkenheimer et al., 2017; Shih et al., 2019). However, we know very little about the extent to which *repeated* perturbations – namely, reminding children that they still must wait – influences children's and parents' strategic behaviors. Older children in the target age range may have adjusted to the situation and maintain their strategies that draw on internal, cognitive resources. Or, despite their age, the repetition may increase frustration and influence the frequency, speed, and/or duration of their strategies. For example, in studies examining young children's task persistence, children persist for 113 – 151 seconds on average (Dennis, 2006; Ramsook et al., 2020). In a longitudinal study, children increased in the duration of their periods of distraction during a frustrating wait between ages 24 and 36 months, but, on average, they only sustained distractions for about 120 seconds (Cole et al., 2011).

An aspect of effective self-regulation that should develop during early childhood is an increase in the speed with which children engage desirable strategies and sustain them even when the task demand – e.g., you have to wait – is reiterated. For example, mothers often must complete tasks (e.g., work related tasks, telephone calls, etc.) that require their full attention such that they are not able to gratify their children's bids for attention. Thus, children must wait. As children become more frustrated or fatigued when they are repeatedly told to wait for something they want, their ability to sustain self-initiated strategies may wane. Once children's stamina to engage their cognitive resources to initiate and sustain strategies wanes, they are then more likely to resort to external sources of regulation, such as caregiver support (Calkins, 2007; Kopp, 1989; Sroufe, 2000). As children's ability to draw on their own cognitive processes declines during a task, parents may be more likely to intervene and provide external regulation. However, there is very little direct evidence of this possibility and how it might differ with age.

Current Study

This study uses coded observational data from a cross-sectional study focusing on a task in which younger and older preschool-aged children (30- to 60-month-olds) were told by their mothers they must wait to open a gift while they completed some work. During a task in which children must engage in self-regulatory strategies to wait while mothers complete work, each individual, the child and the mother, has the potential to engage in behavior that helps children better tolerate the wait. Evidence shows that each partner varies in how they intervene. Mothers may engage in behaviors that encourage children's self-regulation (e.g., why don't you read the posters) but can also simply control the situation (e.g., take the gift away). Children may engage in lower-level strategies such as self-soothing or seeking mother's attention or they may draw on their own cognitive resources to engage in strategies that have the potential to help them tolerate waiting. Theory posits that during the preschool-age years, children increasingly are able to draw on their own internal cognitive resources, which then requires less maternal intervention (Kopp, 1982, 1989; Kopp & Neufeld, 2003). However, direct evidence to support this proposition is lacking. Therefore, the current study tests the hypothesis that:

> (1a.) During early childhood, older preschool-age children engage in higher-level strategies that draw on their own cognitive resources more than younger preschool-age children. Specifically, older preschool-age children will engage in higher-level strategies more often, more quickly, and for longer durations.
> (1b.) In parallel, during early childhood mothers of older preschool-age children engage in less controlling interventions than mothers of younger preschool-age children. Specifically, mothers of older preschool-age children will engage in higher levels of control less often, less quickly, and for shorter durations.

Although children's age should index the extent to which children recruit cognitive resources, age itself represents a range of developmental changes. Effortful control, a dimension of children's temperament, is thought to be closely related to children's ability to self-regulate (Posner & Rothbart, 2000; Rothbart & Rueda, 2005). Thus, children's temperamental propensity to engage in effortful control may be a more proximal index of whether children engage in higher levels of cognitive resources in their strategies. Effortful control, along with the other dimensions of temperament, is commonly measured by parental ratings of children's behavior over the last six months. Parental ratings of effortful control, therefore, capture their perceptions of children's tendency toward self-regulation and are arguably more likely to be related to the extent to which children engage in strategies that recruit cognitive resources in a laboratory wait task than age alone would be. Further, these ratings may better predict whether parents are more or less likely to intervene to provide a source of external regulation. Thus, the current study examines a second set of hypotheses:

> (2a.) During early childhood, preschool-age children rated as higher in effortful control engage in higher-level strategies that draw on their own cognitive resources more than preschool-age children rated lower in effortful control. Specifically, preschool-age children rated as higher in effortful control ratings will engage in higher-level strategies more often, more quickly, and for longer durations.
> (2b.) In parallel, during early childhood, mothers who rate their children higher in effortful control engage in less controlling interventions than mothers who rate their children lower in effortful control. Specifically, mothers who rate their preschool-age children higher in effortful control will engage in higher levels of control less often, less quickly, and for shorter durations.

Further, during a task that elicits frustration from children, it is not clear whether the initial frustrating stimulus (i.e., being told to wait to open a gift) maintains potency throughout the task. The third set of hypotheses address the assumption that the task demands that require self-regulation sustain in their stimulus value for the entire task. The current study used experimentally induced perturbations to remind children of the demand of waiting, allowing us to test whether repeated perturbations alter the pattern of findings for children's and mothers' behaviors. Specifically, the current study tests the following:

> (3a.) During early childhood, repeated reminders of the need to wait is associated with a decrease in preschool-age children's use of higher-level strategies that draw on their own cognitive resources. Specifically, children will engage in higher-level strategies less frequently, less quickly, and for shorter durations after repeated reminders they must wait. Further, this effect will be more pronounced for younger children and children with lower ratings of effortful control.
> (3b.) During early childhood, repeated reminders to wait is associated with an increase in mothers intervening with more control. Specifically, mothers will engage in higher-level strategies more frequently, more quickly, and for longer durations after their children receive repeated reminders they must wait. Further, this effect will be more pronounced for mothers of younger children and mothers who rate their children lower in effortful control.

Method

Participants

Participants were part of a larger cross-sectional study on the development of self-regulation in early childhood (The Dynamics of Self-Regulation Study; Cole, et al., n.d.). For the

current study, analyses included 154 mothers and their 30- to 60-month-old children (77 boys, 77 girls; *M* = 45.15 months, *SD* = 8.23, range = 29.7 – 60.3 months). Families with children age 30 to 60 months were recruited through the Penn State Child Study Center participant pool (FIRSt Families), flyers, events, and various community events (e.g., art and craft festivals, egg hunts, holiday festivals) to take part in a study of children's development of self-regulation.
On average, participants' annual income was $89,541 ($SD_{\text{Income}}$ = $49,983). The children mostly resided in two-parent homes (90.3%) and were described by their parents as White (94.2%), Asian (2.6%), Black (1.3%), and Native American (0.6%). Mothers mostly had at least some college education (91%) and a simple majority described themselves as either working full-time (51.9%), working part-time (20.8%), working and attending school (1.8%), attending school full or part-time (3.1%), or unemployed (22.7%).

Procedures

The Dynamics of Self-Regulation (Dyn-o-SR) research team conducted laboratory visits that ranged from 3 to 4 hours at the Child Study Center at the university. Trained research assistants administered challenging (e.g., lock box, wait task) and non-challenging (e.g., computer game) tasks. A subset of the tasks was administered to mother-child dyads, a subset to father-child dyads, and a subset to children without their parents. At the end of the visit, the parents were debriefed and then reunited with their children. Children received gifts and parents were compensated for their time.

The present study used mother and child behavioral data collected during the frustrating wait task, first introduced by Block and Block (1980) and adapted by Vaughn et al. (1986). A research assistant seated the mother and child at separate tables in the observation room. After the assistant gave the child a boring toy (a toy horse with missing legs) and the mother work to do (questionnaires to complete), the assistant placed a package wrapped in shiny paper on the table near the child and indicated that it was a gift for the child. While the research assistant placed a 3-minute sand timer on the table and left the room, the mother (as previously instructed by the research assistant) told the child to wait until she had finished her work to open the gift. After 3 minutes, the research assistant returned, asked if the mother was finished with her work; mothers said no and the research assistant reset the timer. After another three minutes, the research assistant returned, asked again if the mother was finished and reset the timer when mothers again indicated they were not finished. After the full 3 x 3 = 9 minutes (540 seconds) of waiting, the research assistant returned, and the mother told the child it was time to open the gift. The procedure was video recorded through a one-way mirror for later coding.

Observational Coding

Observational data were coded from the video records. Two independent teams of trained research assistants and undergraduate volunteers coded mothers' and children's behavior, rating the extent to which each was the source of executive control of children's behavior. Specifically, the extent to which children's behavior involved engagement of their own cognitive processes and the extent to which mothers' behavior involved effort to intervene, i.e., act as the source of external regulation, were rated by each team. Raters used a 5-point rating scale on a second-by-second basis using Datavyu (The Datavyu Team, 2014).
For both coding systems, coders were trained to at least 80% accuracy with master coded videos that had been rated by coding team leaders (graduate students and full-time post-baccalaureate research staff). A different research assistant assigned cases to be coded, including double

coding assignments (20% of total 154 of cases) to be used for estimating reliability. Coding teams met weekly to discuss coding issues. Inter-rater reliability estimates were calculated as intra-class correlations (ICCs). Values above 0.70 indicate adequate reliability (Shrout & Fleiss, 1979). The ICC estimate for children's behavior was 0.96, and the ICC estimate for mothers' behavior was 0.89, indicating excellent reliability for both coding systems.

Children's Strategy Behaviors. The extent to which children employed their own cognitive resources was also rated on a 5-point scale. This scale was guided by evidence for the types of strategies children are observed to use and rated on the extent to which they recruited and employed higher levels of cognitive processes through strategic behaviors. These strategies included verbalizing a problem, describing mental states, using memory, planning, reasoning, attentional shifting and control, working memory, cognitive flexibility, and inhibitory control. Ratings ranged from 0 = no attempt to engage in behaviors that engage cognitive resources to 4 = an attempt to engage in behaviors that elaborately recruit cognitive resources (see Table 1 for all 5 points and examples of behaviors that represent each point).

Mothers' Interventions. The extent to which mothers intervened to act as an external source of regulation was rated on the extent to which they took control for their child, including the extent to which they attempted to foster children's self-regulation or provide direct regulation. These ratings ranged from 0 = no attempt to regulate children's behavior to 4 = attempt to regulate children's behavior without any attempt to foster self-regulation (see Table 2 for all 5 points and examples of maternal behaviors for each point).

Calculating Variables

Three metrics (Thompson, 1990) were used to describe the temporal dynamics of both children's and mothers' efforts at regulating children's behavior. Frequency was calculated as the number of seconds in which a behavior occurred during the period between perturbations. Latency was calculated as the number of seconds from the onset of the perturbation to the onset of a behavior. Duration was calculated as the average number of seconds spent engaging in a behavior each time during each perturbation.

Behavior Levels. To differentiate children's strategies that engaged lower and higher levels of cognitive resources, the second-by-second ratings with the 5-point scale were differentiated in two categories: higher-level and lower-level strategies. To differentiate mothers' interventions that exerted lower and higher levels of control, the second-by-second ratings with the 5-point scale were separated into two categories: lower-level and higher-level control. The lower-level categories combined ratings of 1 or 2 from the respective scale, and higher-level combined ratings of 3 or 4. These groupings were based on inference that ratings of 1 and 2 recruit similar levels of cognitive resources or control and ratings of 3 and 4 recruit similar levels, but that these groups differ from each other. Ratings of 0 were excluded as they were given when children and parents were not engaged in behaviors that recruited any degree of cognitive resources or not engaged in behaviors that exerted any control. Thus, children and mothers each received 6 total scores: frequency, latency, and average duration for both lower-level and higher-level strategic behaviors.

Perturbation. Three perturbations occurred every 3 minutes during the 9-minute task. Thus, the three temporal variables were calculated within each of the three perturbations, such that each child and each parent received a frequency, latency, and duration score for each level of behavior within the three perturbations (i.e., a repeated measures design).

Child Age. Children in the study ranged in age from 30 to 60 months. For the analyses, age was treated as a continuous variable. For post-hoc tests, younger children and their parents were compared to older children and their mothers by separating ages into groups one standard deviation above and below the mean.

Child Temperament. Prior to the visit mothers reported on the child's temperament using The Child Behavior Questionnaire Very Short Form (CBQ-VSF; Putnam & Rothbart, 2006). The CBQ-VSF is a 36-item version of the longer Child Behavior Questionnaire (Rothbart, Ahadi, Hershey, & Fisher, 2001). In its development, he CBQ-VSF was assessed for and met criteria for internal consistency and criterion validity (Putnam & Rothbart, 2006). The CBQ-VSF measures three dimensions of temperament including *surgency* (12 items; e.g. "Is sometimes shy even around people s/he has known a long time"), *negative affect* (12 items; e.g. "Gets angry when s/he can't find something s/he wants to play with"), and *effortful control* (12 items; e.g. "Is good at following instructions"). For each of the 36 items, parents indicated how well the statement describes their child's behavior on a 7-point Likert-type scale from 1 (*extremely untrue)* to 7 (*extremely true*); "not applicable" was an option if the situation had not been observed. Effortful control was scored as the average of items related to inhibitory control, attention focusing, low intensity pleasure, and perceptual sensitivity (Cronbach's $\alpha = 0.66$ and 0.72, for mothers and fathers, respectively). Since effortful control is closely related to children's self-regulatory abilities (e.g., the engagement of strategy), we analyzed effortful control as a moderator in our models.

Data Analytic Plan

Developmental differences in the frequency, latency, and average duration of children's and mothers' strategy behaviors were examined using multi-level modeling, with age and effortful control as between-person variables and perturbation and behavior level (lower-level or higher-level) as within-person variables. Analyses were conducted in a series of steps. First, descriptive statistics were examined. Tables 3a and 3b reports means, standard deviations, and ranges for all within-person variables. Table 3c reports the means, standard deviations, and ranges for all moderators. Next, empty models were fit for the frequency, latency, and duration of both children's and mothers' behaviors to calculate the intraclass correlation (ICC) to determine the proportion of variability that could be attributed to stable, person level differences (relative to variation within persons across perturbations). Subsequent analyses examined whether perturbation and behavior level were related to the frequency, latency, and duration of children's and mothers' behaviors separately. Finally, cross-level interactions were included between perturbations and behavior level (level 1) and moderators, child age and maternal effortful control ratings (level 2), in separate models. Equation 1 is an example equation for these models:

Equation 1

Level 1:

$$\textit{Child Frequency}_{ij} = \beta_{0j} + \beta_{1j}\textit{Perturbation}_{ij} + \beta_{2j}\textit{Strategy}_{ij} + e_{ij}$$

Level 2:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}\text{Age}_j + \gamma_{02}\textit{Perturbation}_j + \gamma_{03}\textit{Strategy}_j + U_{0j}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}\textit{Age}_j + U_{1j}$$

In this equation, child *j*'s frequency of strategy behaviors is a function of the task perturbation, the level of strategy (lower-level or higher-level strategy), and their age. The relationship between perturbation and the frequency of children's strategy behaviors and the relationship between strategy level and the frequency of children's strategy behaviors are qualified by an interaction with the child's age. This interaction addresses the question of whether the relationship between the level 1 predictors (perturbation and strategy level) change as a function of age-related differences. Similar models were analyzed for each summary variable (e.g., frequency, latency, and duration) as an outcome variable with child age as a moderator for both children and mothers, and with effortful control as a moderator for both children and mothers. All models included random effects for the intercept and model fit tests were used to determine the appropriateness of random perturbation and strategy level slopes. To aid in interpretation, continuous variables (e.g., child age and maternal ratings of effortful control) were grand mean centered.

Results

Descriptive statistics for key study variables are presented in Tables 3a – 3c. Intraclass correlations indicated 12% variability in frequency of children's strategy behaviors, 4% in their latency, and 0% in their duration. Intraclass correlations indicated 46% variability in frequency of mothers' control behaviors, 27% in their latency, and 11% in their duration. These correlations indicate that variability in mothers' control behaviors was due to stable differences between persons, but this was less the case for children's strategic behaviors.

The results are presented in the following order. First, unpredicted findings that contribute to contextualizing the results of hypotheses are reported. The unpredicted findings indicate main effects of children's and mothers' on frequency, latency, and duration of children's and mother's lower- and higher-level strategies. Second, three sets of analyses that test study hypotheses are reported. The first set of analyses tests hypotheses regarding age-related differences in the frequency, latency, and duration of children's and mothers' efforts to regulate children's behavior. The second set of analyses tests whether effortful control is significantly associated with differences in children's and mothers' behaviors, and, if so, if effortful control is a better index of developmental differences in behaviors than children's age. The third and final set of analyses tests the extent to which there are differences in children's and mothers' behaviors around increased task demands (i.e., experimentally induced perturbations), and how these differences are moderated by children's age or effortful control.

All models test the main effect of the moderator (child age or child effortful control), the interaction of moderators and behavior level (lower or higher-level), the interaction of moderators and perturbation, and a three-way interaction of moderators, behavior level, and perturbation. To examine the direction of omnibus effects, subsequent *t* tests were conducted using a Bonferroni correction to examine the simple effects of each predictor.

Differences in Children's Strategy Levels

Frequency. Strategy levels differ in their frequency, $F(1, 153) = 85.08$, $p < .001$ (Table 4a, Model 1). On average, preschool-age children more frequently engage in lower- ($M = 6.49$) than higher-level strategies ($M = 4.85$), b = 1.64, $SE = .18$, $p < .001$ (Table 4c).

Latency. Strategy levels also differ in latency, $F(1, 153) = 270.52$, $p < .001$ (Table 5a, Model 1). Preschool-age children more quickly engage in lower ($M = 1.55$) than higher-level strategies ($M = 37.10$), b = -35.56, $SE = 2.16$, $p < .001$ (Table 5c).

Duration. Strategy levels also differ in their duration, $F(1, 153) = 79.53$, $p < .001$ (Table 6a, Model1). Preschool-age children spend more time engaging in lower ($M = 14.27$) than higher-level strategies ($M = 8.73$), b = 5.54, $SE = .62$, $p < .001$ (Table 6c).

Though not part of the hypothesized relations, these descriptive results demonstrate that during an age period when children begin to draw on their cognitive resources to cope with frustration, preschool-age children use both lower- and higher-level strategies. They use lower-level strategies more often, much more quickly, and for longer but brief periods. Because the lower-level strategies include seeking maternal attention about the problem of waiting, maternal presence may influence this pattern of findings.

Differences in Mothers' Levels of Control

Frequency. Strategy level was associated with the frequency of mothers' interventions, $F(1, 153) = 25.50$, $p < .001$ (Table 7a, Model 1). On average, mothers more frequently engage lower ($M = 4.80$) than higher-level strategies ($M = 3.91$), b = .89, $SE = .18$, $p < .001$ (Table 7c). Although significant, the differences are relatively slight.

Latency. Although strategy level is associated with the frequency of maternal interventions, the finding for strategy latencies does not quite reach significance, $F(1, 153) = 3.76$, $p = .05$ (Table 8a, Model 1). Mothers differed by about 7 seconds in the latency to higher ($M = 58.01$) versus lower-levels of control ($M = 51.33$), b = -6.68, $SE = 3.45$, $p = .05$ (Table 8c).

Duration. Strategy level is associated with mothers' strategy duration, $F(1, 153) = 21.41$, $p < .001$ (Table 9a, Model 1). Mothers spend slightly more time engaging in higher ($M = 3.12$) than lower levels of control ($M = 2.13$), b = -0.99, $SE = .21$, $p < .001$ (Table 9c).

Overall, the differences in strategy level for mothers' interventions are small. Mothers more frequently use lower levels of control, but by a margin of less than 1. In terms of mothers' higher- level interventions, they are only a second longer and 7 seconds quicker. The nature of higher-level strategies, which often involves reasoning or reiteration of the waiting task rules, may account for the difference in duration. Thus, though statistically significant differences between mothers' use of lower- and higher-level strategies emerge, the differences are slight and perhaps lack real-world significance. Next, findings related to age-differences in children's and mothers' strategy use are presented.

Age Differences in Children's Strategies

Frequency. The prediction that older preschool-age children more frequently engage in strategies that recruit higher levels of cognitive resources than younger preschool-age children is supported, $F(1, 758) = 9.30$, $p = .002$ (Table 4a, Model 2). First, as previously noted for Model 1, Model 2 (see Table 4c) also shows that both younger children, b = 2.18, $SE = .25$, $p < .001$ and older children, b = 1.10, $SE = .25$, $p < .001$ (Table 4c), engage in lower-level strategies more frequently than higher-level strategies. As predicted, however, older children ($M = 5.20$) engage in higher-level strategies more often than younger children ($M = 4.50$), b = 0.04, $SE = 0.02$, $p = .03$, while engaging in lower-level strategies ($M = 6.30$) at about the same rate as younger children ($M = 6.68$), $p = .23$.

Latency. The hypothesis that older children more quickly engage in strategies that recruit higher levels of cognitive resources than younger children is also supported, $F(1, 758) = 14.41$, p

< .001 (Table 5a, Model 2). First, in parallel to the frequency findings, both younger children, b = -43.73, *SE* = 3.04, $p < .001$ (Table 5c), and older children, b = -27.40, SE = 3.04, $p < .001$ (Model 5c), engage in lower-level strategies more quickly than higher-level strategies. In addition, as predicted, older children engage in higher-level strategies (*M* = 28.39) more quickly than younger children (*M* = 45.82), b = -1.06, *SE* = .21, $p <.001$. Thus, older preschool-age children are generally quicker to engage in any strategy; however, the difference is approximately 1 second for lower-level strategies but 18 seconds for higher-level strategies.

Duration. The third hypothesis, that older children engage longer in strategies that recruit higher levels of cognitive resources than younger children is not supported, $p = .56$ (Table 6a, Model 2). Only the previously reported main effect of strategy type emerged, which indicates that lower-level strategies lasted longer than higher-level strategies by about 5 seconds (see Differences in Children's Strategy Use section).

In sum, as predicted, older preschool-age children more often engage in strategies that recruit higher levels of cognitive resources than younger children. They also engage in all strategies more quickly than younger children, including the predicted higher-level strategies. However, contrary to prediction, they do not sustain higher-level strategies longer than younger children.

Age Differences in Mothers' Intervention

Frequency. In general, there is a main effect of children's age on the frequency with which mothers intervene, $F(1, 152) = 18.58$, $p < .001$. However, the prediction that mothers of older preschool-age children, relative to mothers of younger children, intervene less often with higher levels of control is not supported, $p = .20$ (Table 7a, Model 2). On average, mothers of younger children (*Ms* = 4.92, 5.59, respectively) use both lower- and higher-level strategies as often as mothers of older children (*M*s = 2.89, 4.01, respectively). The age differences in mothers' higher- and lower-level interventions are slight and do not support the hypothesis of an interaction between children's age and the frequency at which mothers engage in higher levels of control.

Latency. The prediction that mothers of older preschool-age children intervene less quickly is supported, $F(1, 758) = 4.80$, $p = .03$ (Table 8a, Model 2). Specifically, mothers of older children (*M* = 71.81) intervene less quickly when engaging higher levels of control than mothers of younger children (*M* = 45.61), b = 1.51, *SE* = 0.43, $p < .001$. Further, mothers of older children are quicker to use lower- versus higher-level control strategies, b = -14.23, *SE* = 4.87, $p = .004$ (Table 8c) whereas there is no difference for mothers of younger children, $p =.86$.

Duration. Finally, the prediction that mothers of older preschool-age children engage for shorter durations in higher-level control strategies is also supported, $F(1, 758) = 4.55$, $p = .03$ (Table 9a, Model 2). Mothers of younger children engage in higher level strategies longer than lower-level strategies, b = -1.45, *SE* = .30, $p = < .001$ (Table 9c). Further, mothers of younger children (*M* = 3.77) engage in higher-level control strategies slightly longer than mothers of older children (*M* = 2.46), b = -0.08, *SE* = 0.02, $p < .001$. Mothers of younger children (*M* = 2.33) also engage in lower control strategies longer than mothers of older children (*M* = 1.93). However, the differences for mothers of younger children are not significant, $p = .26$.

In sum, their children's age is associated with the latency and duration of mothers' interventions to regulate their children's behavior during the wait. Specifically, and in line with predictions, mothers of older children use greater control strategies less quickly and use these strategies for slightly shorter durations. However, contrary to prediction, children's age did not influence the frequency at which mothers use higher-level control strategies to regulate their children's behavior.

Effortful Control Related Differences in Children's Strategies

Frequency. The prediction that children rated as higher in effortful control more often use strategies that engage higher levels of cognitive resources is not supported, $p = .84$ (Table 4a, Model 3). Children with lower ($M = 4.93$) versus higher effortful control ($M = 4.77$) do not differ in how often they use those strategies.

Latency. The prediction that children rated higher in effortful control more quickly engage in higher-level strategies is supported, $F(1, 758) = 4.38$, $p = .037$ (Table 5a, Model 3). First, both children with lower ratings, b = -40.07, $SE = 3.05$, $p < .001$ (Table 5d), and higher ratings, b = -31.02, $SE = 3.05$, $p < .001$ (Table 5d), engage more quickly in lower-level than higher-level strategies. However, children rated as higher in effortful control ($M = 32.29$) engage more quickly in higher-level strategies than children with lower ratings ($M = 41.90$), b = -0.37, $SE = 2.34$, $p = .007$.

Duration. Finally, the prediction that children with higher ratings of effortful control engage longer in higher level strategies is not supported, $p = .69$ (Table 6a, Model 3). Children with lower ratings ($M = 8.23$) do not engage in higher level strategies for significantly shorter durations than children with higher ratings ($M = 9.23$).

Thus, the association of children's effortful control with their use of higher-level strategies was largely not found; higher ratings did not account for more frequent or longer use of higher-level strategies. However, as predicted, children with higher ratings of effortful control engage higher levels of cognitive resources more quickly.

Effortful Control Related Differences in Mothers' Intervention

Frequency. We predicted that mothers of children rated higher in effortful control would use higher-level interventions less than mothers rating their children as lower in this aspect of temperament. The results indicate that mothers who rate their children higher in effortful control *more* frequently intervene, $F(1, 758) = 5.69$, $p = .02$ (Table 7a, Model 3), but this difference is slight and is related to lower- and not higher-level interventions averaged across effortful control ratings, b = 1.31, $SE = .25$, $p < .001$ (Table 7d). That is, in terms of the use of lower-level interventions, mothers who rate their children lower in effortful control ($M = 4.39$) intervene at about the same rate as mothers who rate their children higher ($M = 5.21$), $p = .09$. Mothers who rate their children lower ($M = 3.92$) or higher ($M = 3.89$) in effortful control also intervene at similar frequencies in regard to higher-level interventions, $p = .95$.

Latency and Duration. The predictions that mothers of children with higher ratings of effortful control are slower to and spend more time exerting greater control are not supported, all *ps* > .17 (Table 8a, Model 3; Table 9a, Model 3).

In sum, effortful control has a limited relation to the extent to which mothers intervene to regulate their preschool-age children's behavior. Mothers who rate their children higher in effortful control are just as likely to use strategies that exert greater control than mothers who rate their children lower in effortful control. Further, contrary to prediction, they do not do so less quickly or for shorter durations than mothers who rate their children lower in effortful control. Considering this pattern of findings relative to the findings associated with children's age, effortful control seems unlikely to explain the age differences. The next set of analyses turn to predictions that the behavioral patterns reported thus far vary as a function of repeated reminders that the children must continue to wait.

Perturbation Differences in Children's Strategies

Frequency. The prediction that preschool-age children's attempts to use higher-level strategies decrease across repeated perturbations is supported, $F(2, 305) = 4.09$, $p = .02$. Notably, although lower-level strategies do not differ across perturbations, all *p*s > .19 (Table 4e), higher-level strategies occur more frequently in the first ($M = 5.75$) compared to both the second ($M = 4.66$), b = 1.09, $SE = .31$, $p < .001$, and third perturbations ($M = 4.15$), b = 1.59, $SE = .31$, $p < .001$, which do not differ from each other, $p = .10$.

Latency. The prediction that preschool-age children are slower to engage in higher-level strategies across the repeated perturbations is also supported, $F(2, 305) = 7.89$, $p < .001$ (Table 5a, Model 1). Though there are no difference among lower-level strategies, all *p*s > .71 (Table 5e), higher-level strategies occur more quickly in the first perturbation ($M = 25.66$) compared to both the second ($M = 42.25$), b = -16.60, *SE* = .3.74, $p < .001$ and third perturbations ($M = 43.38$), b = -17.74, SE = .3.74, $p < .001$, which do not differ from each other $p = .76$.

Duration. Finally, the prediction that preschool-age children engage longer in higher-level strategies across perturbations is not supported, F(2, 305) = 9.70, p = .02 (Table 6a, Model 1; see Table 6e for contrasts). Higher level strategies do not differ in duration as a function of perturbations, all ps > .27. Rather, lower-level strategies last longer in the second ($M = 14.64$), b = -3.39, $SE = 1.08$, p = .03, and third perturbations ($M = 16.91$), b = -5.66, $SE = 1.02$, p < .001 relative to the first ($M = 11.26$). Lower-level strategies do not differ significantly in the second and third perturbations, $p = .54$.

In sum, children use higher-level strategies more quickly and more often in the first perturbation, but this is not sustained as they are reminded about waiting. Moreover, they use lower-level strategies that engage relatively little of their cognitive resources more often and for longer after repeated reminders to wait to open a gift. In general, children's strategy use does change as a function of reminders of the need to wait to open the gift, with the main differences existing between the first 3 minutes and later minutes.

Perturbation Differences in Mothers' Intervention

Perturbations did not influence any aspect of mothers' efforts to regulate children's behavior. The predictions that mothers intervene more frequently, more quickly, and spend longer intervening with higher levels of control across the repeated perturbations are not supported, all *ps* > .06 (Tables 7a, 8a, & 9a, Model 1). Thus, although children's behavior changes, particularly from the first to later reminders of the need to wait to open the gift, mothers' behavior does not.

Interactions Between Predictors

The predictions that the extent to which children engage in higher- versus lower-level strategies differs as a function of the interaction of child factors (e.g., child age or child effortful control) with perturbations are not supported, all *p*s > .15 (Tables 4a, 5a, & 6a). Similarly, the predictions that the extent to which mothers exert higher- versus lower-levels of control differs as a function of the interaction of child factors (e.g., child age or child effortful control) with perturbations are not supported, all *p*s > .07 (Tables 7a, 8a, & 9a).

Discussion

The purpose of this study was to test hypotheses involving age-related differences in the extent to which children's strategies recruit cognitive resources and the extent to which mothers intervene to act as an external source of regulation during a frustrating wait task with repeated experimentally induced perturbations. Models of developmental changes in children's self-regulation postulate that (a) children gain in cognitive resources for regulating their behavior during the preschool-age period and (b) the extent to which parents act as the source of regulatory control decreases during this period (Kopp, 1982, 1989). However, the specific nature of the age differences during this important period are not fully documented although that knowledge can improve our understanding of the development of self-regulation. The present findings offered empirical support for these age-related differences in preschool-age children's and their mothers' regulatory strategies.

Differences in Children's Strategies

We hypothesized that older preschool-age children would engage in more strategies that recruit higher levels of cognitive resources. In line with our prediction, older children engaged in strategies that recruited higher levels of cognitive resources more often and more quickly than younger children. However, older and younger children did not differ in the duration of their strategies, regardless of the extent to which they recruited cognitive resources. Though not related to age differences, all preschool-age children employed greater cognitive resources more frequently and more quickly, but not for longer earlier in the task than they did after repeated reminders to wait. However, children engaged in more sustained strategies that employed lower levels of cognitive resources after these repeated reminders. These results suggest that children attempt a greater variety of strategies earlier in the task, but may settle in to a type of strategy (e.g., distraction) that employs lower levels of cognitive resources by the end of the task. Perhaps children attempt various strategies earlier in the task before finding one they can sustain.

Thus, it appears older children are more likely to draw on higher levels of cognitive resources than younger children, but that strategies that recruit lower levels of cognitive resources are more sustained for all children, regardless of age, during this period. As children's cognitive processes are not fully developed at age 5, older preschool-age children might attempt to engage more cognitive resources than younger children but are still not able to sustain these strategies for long periods of time. These findings are in line with existing evidence that older children are more likely to engage in more complex strategies that are thought to require a greater level of cognitive skills (Ratcliff et al., in press; Stansbury & Sigman, 2000) and studies that children in this age range sustain strategies for relatively short durations (Cole et al., 2011; Dennis, 2006; Ramsook et al., 2020). In many existing studies, however, it is implied that strategies exist on a continuum where automatic behaviors (e.g., self-soothing) and less autonomous behaviors (e.g., seeking adult help) entail less reliance on cognitive resources than strategies like distraction and remembering the rules of the situation at hand. However, to our knowledge, no study has examined those behaviors on the implied continuum. These findings are among the first to do so in linking children's strategies to the level of cognitive resources employed. Further studies are needed for added support to these age-related findings.

These findings also highlight the advantages of using multiple temporal variables to capture the dynamics of children's behavior. Though many studies of children's regulatory behaviors have measured such behaviors using sums or frequencies, using multiple temporal measures of children's may lead to a fuller picture of how behaviors change across a task (Thompson, 1990). In the current study, utilizing multiple temporal variables (e.g., frequency, latency, and duration), allowed us to examine not only that children use differing levels of cognitive resources when they must wait but also *how* they do so. Specifically, our findings indicate how often, how quickly, and for how long children use differing levels of cognitive resources as well as age-related differences in these differences. The use of these different temporal variables reveal that older children use higher levels of cognitive resources more frequently and more quickly, but not for longer durations. In fact, regardless of age, preschool-age children were able to sustain lower-level strategies longer than higher-level strategies. The difference in all temporal variables, however, came down to a matter of seconds. Thus, children's behaviors change quickly within a task, and the use of multiple temporal variables may allow for researchers to better capture these changes. Future research can use these temporal variables to examine whether how often, how quickly, or how long children engage differing levels of cognitive resources through strategies is related to the effectiveness of these strategies for regulation.

The temporal differences in children's use of higher-level strategies after repeated reminders they must wait may also have differed because their mothers were present. Perhaps children exhaust their own self-regulatory attempts over time and begin to rely more on their mothers for external regulation. However, children's use of cognitive resources could differ in a task in which mothers are not present. Our findings that children's behavior differed most in the first 3 minutes of the task than later in the task, and that children sustained strategies that employed *lower* level cognitive processes longer after repeated reminders of the demand of waiting seem to support this. Though some literature suggests the presence of caregivers or other adults influences the strategies children use for regulation (Grolnick et al., 1996), further research is needed to compare how children employ cognitive resources when they do not have an external source of regulation (e.g., mothers) to rely upon versus when they do. Although other studies illustrate how the extent to which mothers are active, versus passive, in their toddlers' regulatory attempts impacts the effectiveness of children's independent regulatory attempts (Grolnick et al., 1998), more evidence is needed to examine how children's strategy use and the extent to which these strategies employ cognitive resources differs around such interventions in preschool-age children. Though the current study does not examine how mothers' interventions are related to the effectiveness of children's self-regulation, the following findings provide further evidence of the ways in which mothers intervene when their children must wait.

Differences in Mothers' Interventions

We hypothesized mothers of older preschool-age children would intervene with higher levels of control less frequently, less quickly, and for shorter durations. Existing studies found maternal strategies to aid in infants' and toddlers' regulation change as children age and are related to their later regulatory abilities (Casey & Fuller, 1994; Spinrad, Stifter, Donelan-McCall, & Turner, 2004). Our findings support similar trends in mothers of preschool-aged children, and are consistent with models that suggest children begin to rely more on autonomous strategies for regulation as they age (Calkins, 2007; Kopp & Neufeld, 2003; Kopp, 1982, 1989; Sameroff, 1975; Sroufe, 2000). Mothers of older preschool-age children intervened less quickly, and for slightly shorter durations than mothers of younger children, but at about the same frequency. However, these interventions did not significantly differ after repeated reminders of the demand of waiting. Perhaps the nature of the task used in this study in which mothers were not actively engaged with their children is related to the slight age-related differences in mothers behavior and the stability of mothers' interventions even after repeated reminders of the task demands. In this task, mothers were asked to complete paperwork while their children waited to open a gift. Thus, mothers mostly engaged with children only after bids from their children or in response to undesired behaviors.

These results add age-related findings on the extent to which mothers intervene to provide external regulation to existing studies of maternal regulation strategies (Bernier et al., 2010; Grolnick, 2009; Morris et al., 2011; Perry et al., 2018; Spruijt et al., 2018; Stansbury & Sigman, 2000). Further studies are needed to add evidence about the extent of maternal intervention that best promotes children's self-regulation and how this may change as children age. A limitation of the current study is that the task calls for mothers to be relatively passive as they are busy completing paperwork. Though this situation mimics everyday life in which mothers must find ways to pacify their preschool-age children while they complete other tasks, it does not allow for examination of how mothers intervene during a continuous interaction with children. In the current study, though significant differences in children's strategies and mothers interventions emerged, they were differences of seconds. Thus, it may be that because mothers are not actively engaged with their children, they miss changes in children's behavior that occur quickly. Perhaps mothers intervene differently in tasks where they are better able to observe changes in children's behavior. Future studies might investigate the extent to which mothers intervene to provide external regulation when they are engaged in continuous interactions with children. The current analyses also cannot answer questions about how this pattern of parental intervention is related to children's ability to self-regulate as has been studied elsewhere (Bernier et al., 2010; Grolnick et al., 1998; Meuwissen & Carlson, 2019; Perry et al., 2018; Sun & Tang, 2019). Thus, future studies should examine how the extent mothers intervene in their child's regulation is related to children's later regulatory abilities.

Effortful Control is Unrelated to Children's and Mothers' Strategies

Though age-related differences in children's and mothers' were found, these differences are not better explained by maternal ratings of children's effortful control. Effortful control has been cited as a temperamental dimension of children's self-regulatory abilities (Rothbart & Rueda, 2005). Our question about whether mothers' ratings of their children's effortful control is a better indicator than children's age of the extent to which children employ cognitive resources and the extent to which mothers exert control to act as an external source of regulation was not supported by our results. Perhaps the questionnaire used in this study to capture children's effortful control reflects a broader representation of children's ability to self-regulate that does not carry over to individual behaviors within an experimental task. Future studies might examine if ratings of children's effortful control are significantly related to other observed measures of children's and mothers' regulatory behaviors within a task.

If children's effortful control is indeed not related to the extent to which their regulatory strategies draw on cognitive resources, further research is needed to examine other developmental factors that could be driving the developmental differences seen here. As many developmental changes in children's cognitive processes occur during the preschool-age period, any of these processes might underlie age related differences in the extent to which children employ cognitive resources in their strategies. For example, these differences may be related to children's language ability (Clark et al., 2020; Vallotton & Ayoub, 2011) or their ability to understand and remember the rules of the task at hand (Ilkowska & Engle, 2010). Children who are better able to articulate their needs or better able to use language to engage in more cognitive restructuring, for example, may engage higher levels of cognitive resources more often, more quickly, or longer. Future studies should investigate whether the extent to which children's strategy use employs differing levels of cognitive resources is related to the development of cognitive processes (e.g., language, memory, etc.) for a fuller understanding of the factors underlying the age-related differences observed in the current study.

Similarly, mothers' expectations of children's abilities related to the development of their cognitive processes may impact the ways in which they intervene in their children's regulatory attempts. Though maternal ratings of children's effortful control was not related to the extent to which they intervened in the current study, perhaps there is another aspect of children's cognitive development that contributes to the age related differences that were observed. For example, mothers who do not expect their children to remember task rules may be more quick to intervene to remind children they must wait. Future studies, should incorporate additional measures of maternal expectations of children's cognitive abilities and investigate whether such factors are related to the extent to which mothers of preschool-age children intervene to provide external regulation.

Limitations and Future Directions

Despite its strengths, there are weaknesses in the ways in which the current study measured children's and mothers' behaviors. First, as previously mentioned, children's and mothers' behaviors were analyzed separately. Therefore, we are not able to make claims about how one's behavior might influence the other's. Future investigations should consider the bidirectional influences of children's and parents' behaviors, as these analyses may better inform how differences in children's strategy use and mothers' interventions for external regulation is related to the factors that contribute to children's self-regulation.

Second, the data used in this study is cross-sectional. Therefore, we cannot make claims about how children's strategy use and maternal intervention change as children age. While age-related differences are informative for the general development of children's self-regulation, longitudinal data would provide opportunities for richer within-person inferences into how this development changes as children age and allow for models to project later developmental changes. Future investigations with longitudinal observations of children in this age range should consider using the scales and measures used in this study for a better understanding of the extent to which children's strategies recruit cognitive resources and how mothers intervene to provide external regulation. These studies might also employ repeated perturbations within experimental tasks. Repeated perturbations in longitudinal studies would allow multiple time scales to observe developmental changes in children's self-regulation and the extent to which mothers are involved.

Finally, the study sample was not representative of the diversity of the population of preschoolers in the United States. Future studies should consider studying these variables across diverse populations to test the generalizability of the findings. The significance of age-related and perturbation induced differences in children's strategy use and the extent to which mothers' intervene to provide external regulation may vary by cultural context.

Conclusion

In sum, the present study examined age-related, temperament, and within task differences in the extent to which preschool-age children's strategies recruited and employed cognitive

resources and the extent to which mothers' interventions exerted control over children's behavior during a frustrating wait task. Findings about children's behavior indicate that older preschool-age children engaged in strategies that recruited higher levels of cognitive resources more frequently and more quickly than younger children, but not for longer. Rather, all children engaged lower levels of cognitive resources for longer after repeated reminders of the task demand of waiting. Mothers of older children intervened in higher levels of control less quickly and for slightly shorter durations than mothers of younger children, but not less frequently. Mothers' behaviors did not differ significantly after repeated reminders of the demand of waiting. Children's effortful control ratings were not significantly related to differences in children's or mothers' strategies. This study adds to the paucity of research examining age differences in children's strategy use and how mothers intervene, and is the among the first to use experimentally induced perturbations to examine the dynamics of children's and mothers' behaviors within an experimental task.

References

Anderson, P. (2002). Assessment and Development of Executive Function (EF) During Childhood. *Child Neuropsychology*, *8*(2), 71–82. https://doi.org/10.1076/chin.8.2.71.8724

Bernier, A., Carlson, S. M., & Whipple, N. (2010). From External Regulation to Self-Regulation: Early Parenting Precursors of Young Children’s Executive Functioning. *Child Development*, *81*(1), 326–339. https://doi.org/10.1111/j.1467-8624.2009.01397.x

Block, J. H., & Block, J. (1980). The Role of Ego-Control and Ego-Resiliency in the Organization of Behavior. In W. A. Collins (Ed.), *Development of Cognition, Affect, and Social Relations: The Minnesota Symposia on Child Psychology* (Vol. 13, pp. 39–101). Psychology Press.

Bornstein, M. H., Putnick, D. L., Rigo, P., Esposito, G., Swain, J. E., Suwalsky, J. T. D., Su, X., Du, X., Zhang, K., Cote, L. R., Pisapia, N. D., & Venuti, P. (2017). Neurobiology of culturally common maternal responses to infant cry. *Proceedings of the National Academy of Sciences*, *114*(45), E9465–E9473. https://doi.org/10.1073/pnas.1712022114

Calkins, S. D. (2007). The emergence of self-regulation: Biological and behavioral control mechanisms supporting toddler competencies. In *Socioemotional development in the toddler years: Transitions and transformations* (pp. 261–284). The Guilford Press.

Calkins, S. D., & Johnson, M. C. (1998). Toddler regulation of distress to frustrating events: Temperamental and maternal correlates. *Infant Behavior and Development*, *21*(3), 379–395. https://doi.org/10.1016/S0163-6383(98)90015-7

Casey, R. J., & Fuller, L. L. (1994). Maternal regulation of children’s emotions. *Journal of Nonverbal Behavior*, *18*(1), 57–89. https://doi.org/10.1007/BF02169079

Choudhury, N., & Gorman, K. S. (2000). The relationship between sustained attention and cognitive performance in 17–24-month old toddlers. *Infant and Child Development*, *9*(3), 127–146. https://doi.org/10.1002/1522-7219(200009)9:3<127::AID-ICD225>3.0.CO;2-5

Cipriano, E. A., & Stifter, C. A. (2010). Predicting preschool effortful control from toddler temperament and parenting behavior. *Journal of Applied Developmental Psychology*, *31*(3), 221–230. https://doi.org/10.1016/j.appdev.2010.02.004

Clark, R., Menna, R., McAndrew, A. J., & Johnson, E. M. (2020). Language, Aggression, and Self-Regulation in Young Children. *Journal of Emotional and Behavioral Disorders*, 1063426620937691. https://doi.org/10.1177/1063426620937691

Cole, P. M., Bendezú, J. J., Ram, N., & Chow, S.-M. (2017). Dynamical Systems Modeling of Early Childhood Self-Regulation. *Emotion (Washington, D.C.)*, *17*(4), 684–699. https://doi.org/10.1037/emo0000268

Cole, P. M., Dennis, T. A., Smith-Simon, K. E., & Cohen, L. H. (2009). Preschoolers’ Emotion Regulation Strategy Understanding: Relations with Emotion Socialization and Child Self-regulation. *Social Development*, *18*(2), 324–352. https://doi.org/10.1111/j.1467-9507.2008.00503.x

Cole, P. M., Ram, N., & English, M. S. (2019). Toward a Unifying Model of Self-regulation: A Developmental Approach. *Child Development Perspectives*, *13*(2), 91–96. https://doi.org/10.1111/cdep.12316

Cole, P. M., Tan, P. Z., Hall, S. E., Zhang, Y., Crnic, K. A., Blair, C. B., & Li, R. (2011). Developmental changes in anger expression and attention focus: Learning to wait. *Developmental Psychology*, *47*(4), 1078–1089. https://doi.org/10.1037/a0023813

Cook, J. C., Schoppe-Sullivan, S. J., Buckley, C. K., & Davis, E. F. (2009). Are Some Children Harder to Coparent than Others? Children's Negative Emotionality and Coparenting Relationship Quality. *Journal of Family Psychology : JFP : Journal of the Division of Family Psychology of the American Psychological Association (Division 43)*, *23*(4), 606–610. https://doi.org/10.1037/a0015992

Crockenberg, S., & Leerkes, E. (2003). Infant negative Emotionality, Caregiving, and Family Relationships. In A. Crouter & A. Booth (Eds.), *Children's Influence on Family Dynamics: The Neglected Side of Family Relationships* (pp. 57–78). Lawrence Erlbaum Associates.

Dennis, T. (2006). Emotional self-regulation in preschoolers: The interplay of child approach reactivity, parenting, and control capacities. *Developmental Psychology*, *42*(1), 84–97. https://doi.org/10.1037/0012-1649.42.1.84

Diener, M. L., & Mangelsdorf, S. C. (1999). Behavioral strategies for emotion regulation in toddlers: Associations with maternal involvement and emotional expressions. *Infant Behavior and Development*, *22*(4), 569–583. https://doi.org/10.1016/S0163-6383(00)00012-6

Eisenberg, N, Smith, C., Sadovsky, A., Spinrad, T., & Vols, K. (2004). Effortful control: Relations with emotion regulation, adjustment, and socialization in childhood. In R. Baumeister (Ed.), *Handbook of self regulation: Research, theory, and applications* (pp. 259–282). Guilford Press.

Eisenberg, Nancy, Spinrad, T. L., & Eggum, N. D. (2010). Emotion-related self-regulation and its relation to children's maladjustment. *Annual Review of Clinical Psychology*, *6*, 495–525.

Eisenberg, Nancy, Valiente, C., & Eggum, N. D. (2010). Self-Regulation and School Readiness. *Early Education & Development*, *21*(5), 681–698. https://doi.org/10.1080/10409289.2010.497451

Grolnick, W. S. (2009). The role of parents in facilitating autonomous self-regulation for education. *Theory and Research in Education*, *7*(2), 164–173. https://doi.org/10.1177/1477878509104321

Grolnick, W. S., Bridges, L. J., & Connell, J. P. (1996). Emotion Regulation in Two-Year-Olds: Strategies and Emotional Expression in Four Contexts. *Child Development*, *67*(3), 928–941. https://doi.org/10.1111/j.1467-8624.1996.tb01774.x

Grolnick, W. S., Kurowski, C. O., McMenamy, J. M., Rivkin, I., & Bridges, L. J. (1998). Mothers' strategies for regulating their toddlers' distress. *Infant Behavior and Development*, *21*(3), 437–450. https://doi.org/10.1016/S0163-6383(98)90018-2

Guo, Y., Leu, S.-Y., Barnard, K. E., Thompson, E. A., & Spieker, S. J. (2015). An examination of changes in emotion co-regulation among mother and child dyads during the strange situation. *Infant and Child Development*, *24*(3), 256–273. http://dx.doi.org.ezaccess.libraries.psu.edu/10.1002/icd.1917

Ilkowska, M., & Engle, R. W. (2010). Working memory capacity and self-regulation. In *Handbook of personality and self-regulation* (pp. 265–290). Wiley-Blackwell. https://doi.org/10.1002/9781444318111.ch12

Kochanska, G., Coy, K. C., & Murray, K. T. (2001). The Development of Self-Regulation in the First Four Years of Life. *Child Development*, *72*(4), 1091–1111. https://doi.org/10.1111/1467-8624.00336

Kochanska, G., Murray, K. T., & Harlan, E. T. (2000). Effortful control in early childhood: Continuity and change, antecedents, and implications for social development. *Developmental Psychology*, *36*(2), 220–232. https://doi.org/10.1037/0012-1649.36.2.220

Kopp, C. B. (1982). Antecedents of Self-Regulation: A Developmental Perspective. *Developmental Psychology*, *18*(2), 199.

Kopp, C. B. (1989). Regulation of distress and negative emotions: A developmental view. *Developmental Psychology*, *25*(3), 343.

Kopp, C. B., & Neufeld, S. J. (2003). Emotional development during infancy. In *Handbook of affective sciences* (pp. 347–374). Oxford University Press.

Kotila, L. E., Schoppe-Sullivan, S. J., & Kamp Dush, C. M. (2014). Infant characteristics and parental engagement at the transition to parenthood. *Infant Behavior and Development*, *37*(4), 787–799. https://doi.org/10.1016/j.infbeh.2014.09.002

Landry, S. H., Miller-Loncar, C. L., Smith, K. E., & Swank, P. R. (2002). The Role of Early Parenting in Children's Development of Executive Processes. *Developmental Neuropsychology*, *21*(1), 15–41. https://doi.org/10.1207/S15326942DN2101_2

Lengua, L. J., Honorado, E., & Bush, N. R. (2007). Contextual risk and parenting as predictors of effortful control and social competence in preschool children. *Journal of Applied Developmental Psychology*, *28*(1), 40–55. https://doi.org/10.1016/j.appdev.2006.10.001

Lunkenheimer, E., Kemp, C. J., Lucas-Thompson, R. G., Cole, P. M., & Albrecht, E. C. (2017). Assessing biobehavioural self-regulation and coregulation in early childhood: The parent-child challenge task. *Infant and Child Development*, *26*(1), 1–26. http://dx.doi.org.ezaccess.libraries.psu.edu/10.1002/icd.1965

Meuwissen, A. S., & Carlson, S. M. (2019). An experimental study of the effects of autonomy support on preschoolers' self-regulation. *Journal of Applied Developmental Psychology*, *60*, 11–23. http://dx.doi.org.ezaccess.libraries.psu.edu/10.1016/j.appdev.2018.10.001

Moffitt, T. E., Arseneault, L., Belsky, D., Dickson, N., Hancox, R. J., Harrington, H., Houts, R., Poulton, R., Roberts, B. W., Ross, S., Sears, M. R., Thomson, W. M., & Caspi, A. (2011). A gradient of childhood self-control predicts health, wealth, and public safety. *Proceedings of the National Academy of Sciences*, *108*(7), 2693–2698. https://doi.org/10.1073/pnas.1010076108

Morris, A., Silk, J., Morris, M., Steinberg, L., Aucoin, K., & Keyes, A. (2011). The Influence of Mother-Child Emotion Regulation Strategies on Children's Expression of Anger and Sadness. *Developmental Psychology*, *47*, 213–225. https://doi.org/10.1037/a0021021

Neppl, T. K., Jeon, S., Diggs, O., & Donnellan, M. B. (2020). Positive parenting, effortful control, and developmental outcomes across early childhood. *Developmental Psychology*, *56*(3), 444–457. https://doi.org/10.1037/dev0000874

Perry, N. B., Dollar, J. M., Calkins, S. D., Keane, S. P., & Shanahan, L. (2018). Childhood Self-regulation as a Mechanism Through Which Early Overcontrolling Parenting is Associated with Adjustment in Preadolescence. *Developmental Psychology*, *54*(8), 1542–1554. https://doi.org/10.1037/dev0000536

Posner, M. I., & Rothbart, M. K. (2000). Developing mechanisms of self-regulation. *Development and Psychopathology*, *12*(3), 427–441. https://doi.org/10.1017/S0954579400003096

Putnam, S. P., & Rothbart, M. K. (2006). Development of Short and Very Short Forms of the Children's Behavior Questionnaire. *Journal of Personality Assessment*, *87*(1), 102–112. https://doi.org/10.1207/s15327752jpa8701_09

Ramsook, A. K., Benson, L., Ram, N., & Cole, P. M. (2020). Age-related changes in the relation between preschoolers' anger and persistence. *International Journal of Behavioral Development*, *44*(3), 216–225. https://doi.org/10.1177/0165025419866914

Ratcliff, A. K., Vazquez, L. C., Lunkenheimer, E. S., & Cole, P. M. (2020). Longitudinal Changes in Young Children's Strategy Use for Emotion Regulation. *In Preparation*.

Rothbart, M. K., Ahadi, S. A., Hershey, K. L., & Fisher, P. (2001). Investigations of Temperament at Three to Seven Years: The Children's Behavior Questionnaire. *Child Development*, *72*(5), 1394–1408. https://doi.org/10.1111/1467-8624.00355

Rothbart, M. K., Ellis, L. K., Rueda, M. R., & Posner, M. I. (2003). Developing Mechanisms of Temperamental Effortful Control. *Journal of Personality*, *71*(6), 1113–1144. https://doi.org/10.1111/1467-6494.7106009

Rothbart, M. K., & Rueda, M. R. (2005). The Development of Effortful Control. In U. Mayrr, E. Awh, & S. W. Keele (Eds.), *Developing individuality in the human brain: A tribute to Michael I. Posner* (pp. 167–188). American Psychological Association. https://doi.org/10.1037/11108-009

Rothbart, M. K., & Sheese, B. E. (2007). Temperament and emotion regulation. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 331–350). Guilford Press.

Rothbart, M. K., Sheese, B. E., Rueda, M. R., & Posner, M. I. (2011). Developing Mechanisms of Self-Regulation in Early Life. *Emotion Review*, *3*(2), 207–213. https://doi.org/10.1177/1754073910387943

Ruff, H. A., & Capozzoli, M. C. (2003). Development of attention and distractibility in the first 4 years of life. *Developmental Psychology*, *39*(5), 877–890. https://doi.org/10.1037/0012-1649.39.5.877

Sameroff, A. (1975). Transactional models in early social relations. *Human Development*, *18*(1–2), 65–79.

Sethi, A., Mischel, W., Aber, J. L., Shoda, Y., & Rodriguez, M. L. (2000). The role of strategic attention deployment in development of self-regulation: Predicting preschoolers' delay of gratification from mother–toddler interactions. *Developmental Psychology*, *36*(6), 767–777. https://doi.org/10.1037/0012-1649.36.6.767

Sheese, B. E., Rothbart, M. K., Posner, M. I., White, L. K., & Fraundorf, S. H. (2008). Executive attention and self-regulation in infancy. *Infant Behavior and Development*, *31*(3), 501–510. https://doi.org/10.1016/j.infbeh.2008.02.001

Shih, E. W., Quiñones-Camacho, L. E., Karan, A., Davis, E. L., & Link to external site, this link will open in a new window. (2019). Physiological contagion in parent–child dyads during an emotional challenge. *Social Development*. http://dx.doi.org.ezaccess.libraries.psu.edu/10.1111/sode.12359

Shrout, P. E., & Fleiss, J. L. (1979). Intraclass correlations: Uses in assessing rater reliability. *Psychological Bulletin*, *86*(2), 420–428. http://dx.doi.org.ezaccess.libraries.psu.edu/10.1037/0033-2909.86.2.420

Spinrad, T. L., Stifter, C. A., Donelan-McCall, N., & Turner, L. (2004). Mothers' Regulation Strategies in Response to Toddlers' Affect: Links to Later Emotion Self-Regulation. *Social Development*, *13*(1), 40–55. https://doi.org/10.1111/j.1467-9507.2004.00256.x

Spruijt, A. M., Dekker, M. C., Ziermans, T. B., & Swaab, H. (2018). Attentional control and executive functioning in school-aged children: Linking self-regulation and parenting strategies. *Journal of Experimental Child Psychology*, *166*, 340–359. https://doi.org/10.1016/j.jecp.2017.09.004

Sravish, A. V., Tronick, E., Hollenstein, T., & Beeghly, M. (2013). Dyadic Flexibility during the Face-to-Face Still-Face Paradigm: A dynamic systems analysis of its temporal organization. *Infant Behavior and Development*, *36*(3), 432–437. https://doi.org/10.1016/j.infbeh.2013.03.013

Sroufe, L. A. (2000). Early relationships and the development of children. *Infant Mental Health Journal*, *21*(1–2), 67–74. https://doi.org/10.1002/(SICI)1097-0355(200001/04)21:1/2<67::AID-IMHJ8>3.0.CO;2-2

Stansbury, K., & Sigman, M. (2000). Responses of Preschoolers in Two Frustrating Episodes: Emergence of Complex Strategies for Emotion Regulation. *The Journal of Genetic Psychology*, *161*(2), 182–202. https://doi.org/10.1080/00221320009596705

Stifter, C. A., & Braungart, J. M. (1995). The regulation of negative reactivity in infancy: Function and development. *Developmental Psychology, 31*(3), 448–455. https://doi.org/10.1037/0012-1649.31.3.448

Sun, J., & Tang, Y. (2019). Maternal scaffolding strategies and early development of self-regulation in Chinese preschoolers. *Early Child Development and Care*, *189*(9), 1525–1537. https://doi.org/10.1080/03004430.2017.1395874

Taylor, Z. E., Eisenberg, N., Spinrad, T. L., & Widaman, K. F. (2013). Longitudinal Relations of Intrusive Parenting and Effortful Control to Ego-Resiliency During Early Childhood. *Child Development*, *84*(4), 1145–1151. https://doi.org/10.1111/cdev.12054

The Datavyu Team. (2014). *Datavyu: A video coding tool*. Databrary Project.

Thompson, R. (1990). Emotion and Self-Regulation. In *Socioemotional Development. Nebraska symposium on motivation* (Vol. 36, pp. 367–467). University of Nebraska Press.

Thompson, R. (1994). Emotion Regulation: A Theme in Search of Definition. *Monographs of the Society for Research in Child Development*, *59*(2/3), 25–52. https://doi.org/10.2307/1166137

Vallotton, C., & Ayoub, C. (2011). Use your words: The role of language in the development of toddlers' self-regulation. *Early Childhood Research Quarterly*, *26*(2), 169–181. https://doi.org/10.1016/j.ecresq.2010.09.002

Vaughn, B. E., Kopp, C. B., Krakow, J. B., Johnson, K., & Schwartz, S. S. (1986). Process analyses of the behavior of very young children in delay tasks. *Developmental Psychology, 22*(6), 752–759. https://doi.org/10.1037/0012-1649.22.6.752

Willoughby, M. T., Wirth, R. J., & Blair, C. B. (2012). Executive Function in Early Childhood: Longitudinal Measurement Invariance and Developmental Change. *Psychological Assessment*, *24*(2), 418–431. https://doi.org/10.1037/a0025779

Zelazo, P. D., Müller, U., Frye, D., Marcovitch, S., Argitis, G., Boseovski, J., Chiang, J. K., Hongwanishkul, D., Schuster, B. V., Sutherland, A., & Carlson, S. M. (2003). The Development of Executive Function in Early Childhood. *Monographs of the Society for Research in Child Development*, *68*(3), i–151.

Appendix

Tables

Table 1. *Child Strategy Behavior Scale*

Rating	*Extent to Which Cognitive Resources are Engaged*	*Examples*
0	Child makes no attempt to engage in any strategy	- Staring at gift without doing or saying anything
1	Child engages in strategy that does not engage higher level cognitive processes	- Self-soothing; Seeking physical proximity to mother with no verbalization
2	Child engages in strategy that shows some but limited or basic cognitive resources	- Stating facts, seeking information, or expressing needs, feelings, or concerns without emotion labels, planning, or reasoning • "I'm hungry!" or "I want my dad!" - Unfocused distraction
3	Child engages in strategy that clearly involves higher level cognitive resources	- Stating feelings, emotions, or mental states using emotion labels • "I'm frustrated." - Making simple statements or questions about situation • "When will you be done with your work?" - Using alternate strategies that RA did not suggest or show to modify situation - Focused distraction
4	Child engages in strategy that involves more elaborated use of cognitive resources	- Stating intentions, plans, or problem-solving strategies • "When you are done, then I can open my gift" - Reframing or interpreting the situation in a positive manner - "This horse is broken, but I can take it to doctor" - Focused distraction or dialogue involving imaginative play

Table 2. *Parent Intervention Behavior Scale*

Rating	*Extent to which Intervention Exerts Control*	*Examples*
0	No attempt to control child's behavior or to support child in any way	
1	Minor attempt to support child's own strategies, i.e., no direct control, guidance, or scaffolding.	- Responses to child's play; • "Oh?," "Really?!," "That's right," - Answering questions - Repeating what the child says
2	Clear but unelaborated attempt to scaffold child's own strategies	- Redirecting child's attention - Non-specific suggestion • "Maybe pretend," • "Remember, you have to wait,"
3	Specific and/or elaborated (i.e., more involved) attempt to scaffold child's strategies	- Cognitive reframing situation - Asking questions to encourage child to think about situation or emotions • "You can't open it because I have to finish this paperwork first" - Directing child how to distract • "Why don't you make the horse race on the floor?" • "Try the big pieces first"
4	Attempt to control child's behavior that does not aim to encourage child's strategies	- Direct commands • "You need to sit down" - Direct prohibitions • "Don't touch that" - Physical control • Taking desired object away • Holding child without reasoning or explanations

Table 3a.

Descriptive statistics among children's strategy use on average and in each perturbation

	M (*SD*)	*M* Estimate (*SE*)	*M* Estimate (*SE*)	*M* Estimate (*SE*)	*M* Estimate (*SE*)
	Average	Low Age	High Age	Low EC	High EC
Across Perturbations					
Frequency					
Low	6.48 (1.86)	6.68 (0.22)	6.30 (0.22)	6.37 (0.22)	6.61 (0.22)
High	4.86 (2.44)	4.50 (0.22)	5.20 (0.22)	4.77 (0.22)	4.93 (0.22)
Latency					
Low	2.19 (8.65)	2.10 (2.45)	1.00 (2.45)	1.82 (2.49)	1.27 (2.50)
High	25.66 (39.21)	45.82 (2.45)	28.39 (2.45)	41.90 (2.49)	32.29 (2.50)
Duration					
Low	14.27 (8.55)	14.38 (0.62)	14.17 (0.62)	14.02 (0.62)	14.53 (0.62)
High	8.69 (4.44)	8.47 (0.62)	8.99 (0.62)	8.23 (0.62)	9.23 (0.62)
Perturbation 1					
Frequency					
Low	6.74 (2.56)	6.76 (0.33)	6.72 (0.33)	6.74 (0.34)	6.74 (0.34)
High	5.75 (3.25)	5.11 (0.33)	6.39 (0.33)	5.82 (0.34)	5.67 (0.34)
Latency					
Low	2.19 (8.65)	2.63 (3.90)	1.74 (3.90)	1.95 (3.94)	2.43 (3.94)
High	25.66 (39.22)	37.24 (3.90)	14.07 (3.90)	27.04 (3.94)	24.27 (3.94)
Duration					
Low	11.26 (10.40)	12.77 (1.08)	9.74 (1.08)	11.89 (1.08)	10.62 (1.08)
High	9.42 (6.08)	8.87 (1.08)	9.96 (1.08)	9.30 (1.08)	9.54 (1.08)
Perturbation 2					
Frequency					
Low	6.34 (2.86)	6.48 (0.33)	6.20 (0.33)	6.12 (0.34)	6.56 (0.34)
High	4.66 (3.17)	4.43 (0.33)	4.88 (0.33)	4.40 (0.34)	4.91 (0.34)
Latency					
Low	1.64 (7.49)	2.41 (3.90)	0.86 (3.90)	1.27 (3.94)	2.01 (3.94)
High	42.25 (50.45)	49.60 (3.90)	34.91 (3.90)	46.85 (3.94)	37.66 (3.94)
Duration					
Low	14.64 (10.59)	13.86 (1.08)	15.43 (1.08)	14.38 (1.08)	14.91 (1.08)
High	8.23 (6.08)	8.07 (1.08)	8.39 (1.08)	8.13 (1.08)	8.33 (1.08)

	M (*SD*)	*M* Estimate (*SE*)	*M* Estimate (*SE*)	*M* Estimate (*SE*)	*M* Estimate (*SE*)
	Average	Low Age	High Age	Low EC	High EC
Perturbation 3					
Frequency					
Low	6.39 (2.67)	6.79 (0.34)	5.99 (0.33)	6.27 (0.34)	6.51 (0.34)
High	4.15 (3.04)	3.96 (0.34)	4.34 (0.33)	4.10 (0.34)	4.21 (0.34)
Latency					
Low	.81 (3.72)	1.25 (3.90)	0.38 (3.90)	2.26 (3.94)	-0.64 (3.96)
High	43.39 (54.60)	49.60 (3.90)	36.19 (3.90)	51.80 (3.94)	34.94 (3.96)
Duration					
Low	16.91 (13.81)	16.50 (1.08)	17.32 (1.08)	15.79 (1.08)	18.05 (1.08)
High	8.54 (7.04)	8.46 (1.08)	8.62 (1.08)	7.27 (1.08)	9.82 (1.08)

Table 3b.
Descriptive statistics among mothers' strategy use on average and in each perturbation

	M (*SD*)	*M* Estimate (*SE*)	*M* Estimate (*SE*)	*M* Estimate (*SE*)	*M* Estimate (*SE*)
	Average	Low Age	High Age	Low EC	High EC
Across Perturbations					
Frequency					
Low	4.80 (3.30)	5.59 (0.34)	4.01 (0.32)	4.39 (0.34)	5.21 (0.34)
High	3.91 (2.99)	4.92 (0.34)	2.89 (0.32)	3.92 (0.34)	3.89 (0.34)
Latency					
Low	45.20 (53.96)	46.49 (4.95)	56.16 (4.95)	55.23 (5.05)	47.42 (5.05)
High	40.46 (59.77)	45.61 (4.95)	70.39 (4.95)	58.00 (5.05)	58.02 (5.05)
Duration					
Low	2.13 (1.21)	2.33 (0.23)	1.93 (0.25)	1.98 (0.25)	2.27 (0.25)
High	3.12 (3.13)	3.77 (0.23)	2.46 (0.25)	3.26 (0.25)	2.97 (0.25)
Perturbation 1					
Frequency					
Low	6.74 (2.56)	5.06 (0.41)	4.00 (0.41)	4.10 (0.42)	4.96 (0.42)
High	5.75 (3.25)	4.39 (0.41)	2.95 (0.41)	3.87 (0.42)	3.47 (0.42)
Latency					
Low	2.19 (8.65)	46.44 (6.94)	43.95 (6.94)	45.24 (7.02)	45.15 (7.02)
High	25.66 (39.22)	30.04 (6.94)	50.89 (6.94)	37.42 (7.02)	43.50 (7.02)
Duration					
Low	11.26 (10.40)	2.04 (0.39)	1.77 (0.39)	1.83 (0.40)	1.98 (0.40)
High	9.42 (6.08)	3.52 (0.39)	3.03 (0.39)	3.31 (0.40)	3.24 (0.40)
Perturbation 2					
Frequency					
Low	6.34 (2.86)	5.99 (0.41)	4.24 (0.41)	4.67 (0.42)	5.56 (0.42)
High	4.66 (3.17)	5.20 (0.41)	3.03 (0.41)	4.11 (0.42)	4.11 (0.42)
Latency					
Low	1.64 (7.49)	45.48 (6.94)	61.39 (6.94)	61.40 (7.02)	45.47 (7.02)
High	42.25 (50.45)	55.61 (6.94)	79.81 (6.94)	69.99 (7.02)	65.43 (7.02)
Duration					
Low	14.64 (10.59)	2.53 (0.39)	2.05 (0.39)	2.11 (0.40)	2.47 (0.40)
High	8.23 (6.08)	3.26 (0.39)	2.28 (0.39)	2.85 (0.40)	2.69 (0.40)

	M (*SD*)	*M* Estimate (*SE*)	*M* Estimate (*SE*)	*M* Estimate (*SE*)	*M* Estimate (*SE*)
	Average	Low Age	High Age	Low EC	High EC
Perturbation 3					
Frequency					
Low	6.39 (2.67)	5.71 (0.41)	3.79 (0.41)	4.40 (0.42)	5.09 (0.42)
High	4.15 (3.04)	5.19 (0.41)	2.70 (0.41)	3.79 (0.42)	4.10 (0.42)
Latency					
Low	.81 (3.72)	47.55 (6.96)	63.14 (6.94)	59.04 (7.02)	51.65 (7.04)
High	43.39 (54.60)	51.20 (6.96)	80.47 (6.94)	66.57 (7.02)	65.14 (7.04)
Duration					
Low	16.91 (13.81)	2.41 (0.39)	1.96 (0.39)	2.00 (0.40)	2.38 (0.40)
High	8.54 (7.04)	4.54 (0.39)	2.08 (0.39)	3.63 (0.40)	2.98 (0.40)

Table 3c.
Means, standard deviations, and ranges among moderators at the participant level.

	N	Mean	SD	Range
Child Age (in months)	154	45.12	8.22	29.7 – 60.3
Maternal Ratings of Child Effortful Control	154	5.10	0.75	0 – 6.92

Table 4a. *Omnibus Effects for Frequency of Children's Behaviors*

	Model 1		Model 2		Model 3	
	df	*F*	*df*	*F*	*df*	*F*
Perturbation	2, 305	10.98**	2, 305	11.09**	2, 305	10.92**
Strategy Level	1, 153	85.08**	1, 153	86.10**	1, 153	84.72**
Perturbation x Strategy Level	2, 305	4.09*	2, 305	4.15*	2, 305	4.08*
Child Age	--	--	1, 152	0.40	--	--
Child Age x Perturbation	--	--	2, 758	1.92	--	--
Child Age x Strategy Level	--	--	1, 758	9.30**	--	--
Child Age x Perturbation x Strategy Level	--	--	2, 758	0.26	--	--
Child EC	--	--	--	--	1, 152	0.57
Child EC x Perturbation	--	--	--	--	2, 758	0.78
Child EC x Strategy Level	--	--	--	--	1, 758	0.04
Child EC x Perturbation x Strategy Level	--	--	--	--	2, 758	0.04

Note. * $p < .05$; ** $p < .01$

Table 4b. *Fixed and Random Effects for Frequency of Children's Behaviors*

	Model 1 Coefficient (*SE*)	Model 2 Coefficient (*SE*)	Model 3 Coefficient (*SE*)
Fixed Effects			
Intercept	4.15 (0.24)**	4.15 (0.24)**	4.15 (0.24)**
Perturbation			
1 vs. 3	1.59 (0.31)**	1.59 (0.31)**	1.59 (0.31)**
2 vs. 3	0.50 (0.31)	0.50 (0.31)	0.50 (0.31)
Strategy Level (Low vs. High)	2.24 (0.31)**	2.24 (0.31)**	2.24 (0.31)**
Perturbation * Strategy Level (Low vs. High)			
1 vs. 3	-1.24 (0.43)**	-1.24 (0.43)**	-1.24 (0.43)**
2 vs. 3	-0.55 (.43)	-0.55 (.43)	-0.55 (.43)
Child Age	--	0.02 (0.03)	--
Child Age x Perturbation			
1 vs. 3	--	0.05 (0.04)	--
2 vs. 3	--	0.003 (0.04)	--
Child Age x Strategy Level	--	-0.07 (0.04)	--
Child Age x Perturbation x Strategy Level			
1 vs. 3	--	-0.01 (0.05)	--
2 vs. 3	--	0.03 (0.05)	--
Child Effortful Control (EC)	--	--	0.08 (.32)
Child EC x Perturbation			
1 vs. 3	--	--	-0.17 (0.41)
2 vs. 3	--	--	0.26 (0.41)
Child EC x Strategy Level	--	--	0.09 (0.41)
Child EC x Perturbation x Strategy Level			
1 vs. 3	--	--	0.01 (0.58)
2 vs. 3	--	--	-0.13 (0.58)
Random effects			
Intercept	1.35 (0.30)**	1.38 (0.30)**	1.35 (0.30)**
Residual	7.26 (0.37)**	7.18 (0.37)**	7.29 (0.37)**

Note. * $p < .05$; ** $p < .01$

Table 4c. *Least Squared Mean Differences for Age Differences of Frequency of Children's Behaviors*

	Younger Children Coefficient (*SE*)	Older Children Coefficient (*SE*)
Perturbation		
1 vs. 2	0.48 (0.31)	1.02 (0.31)**
1 vs. 3	0.55 (0.31)	1.39 (0.31)**
2 vs. 3	0.08 (0.31)	0.37 (0.31)
Strategy Level (Low vs. High)	2.18 (0.25)**	1.10 (0.25)**
Perturbation * Strategy Level (Low)		
1 vs. 2	0.28 (0.43)	0.53 (0.43)
1 vs. 3	-0.04 (0.43)	0.74 (0.43)
2 vs. 3	-0.32 (0.43)	0.21 (0.43)
Perturbation * Strategy Level (High)		
1 vs. 2	0.67 (0.43)	1.51 (0.43)**
1 vs. 3	1.14 (0.43)	2.04 (0.43)**
2 vs. 3	0.47 (0.43)	0.54 (0.43)

Note. * $p < .05$; ** $p < .01$

Table 4d. *Least Squared Mean Differences for Effortful Control Differences of Frequency of Children's Behaviors*

	Lower Ratings of EC	Higher Ratings of EC
	Coefficient (*SE*)	Coefficient (*SE*)
Perturbation		
1 vs. 2	1.02 (0.31)**	0.47 (0.31)
1 vs. 3	1.10 (0.31)**	0.85 (0.31)*
2 vs. 3	0.08 (0.31)	0.37 (0.31)
Strategy Level (Low vs. High)	1.60 (0.25)**	1.67 (0.25)**
Perturbation * Strategy Level (Low)		
1 vs. 2	0.62 (0.44)	0.18 (0.44)
1 vs. 3	0.47 (0.44)	0.23 (0.44)
2 vs. 3	-0.15 (0.44)	0.05 (0.44)
Perturbation * Strategy Level (High)		
1 vs. 2	1.42 (0.44)**	1.51 (0.44)
1 vs. 3	1.72 (0.44)**	1.46 (0.44)**
2 vs. 3	0.31 (0.44)	0.70 (0.44)

Note. * $p < .05$; ** $p < .01$

Table 4e. *Least Squared Mean Differences for Perturbation Differences of Frequency of Children's Behaviors*

	Coefficient (*SE*)
Perturbation	
1 vs. 2	0.75 (0.22)**
1 vs. 3	0.98 (0.22)**
2 vs. 3	0.23 (0.22)
Strategy Level (Low vs. High)	1.64 (0.18)**
Perturbation * Strategy Level (Low)	
1 vs. 2	0.40 (0.31)
1 vs. 3	0.35 (0.31)
2 vs. 3	-0.05 (0.31)
Perturbation * Strategy Level (High)	
1 vs. 2	1.09 (0.31)**
1 vs. 3	1.59 (0.31)**
2 vs. 3	0.50 (0.31)

Note. * $p < .05$; ** $p < .01$

Table 5a. *Omnibus Effects for Latency of Children's Behaviors*

	Model 1		Model 2		Model 3	
	df	*F*	*df*	*F*	*df*	*F*
Perturbation	2, 305	6.25**	2, 305	6.35**	2, 305	6.27**
Strategy Level	1, 153	270.52**	1, 153	274.58**	1, 153	271.52**
Perturbation x Strategy Level	2, 305	7.89**	2, 305	8.02**	2, 305	7.91**
Child Age	--	--	1, 152	11.59**	--	--
Child Age x Perturbation	--	--	2, 758	0.42	--	--
Child Age x Strategy Level	--	--	1, 758	14.41**	--	--
Child Age x Perturbation x Strategy Level	--	--	2, 758	0.48	--	--
Child EC	--	--	--	--	1, 152	3.31
Child EC x Perturbation	--	--	--	--	2, 758	1.40
Child EC x Strategy Level	--	--	--	--	1, 758	3.48*
Child EC x Perturbation x Strategy Level	--	--	--	--	2, 758	4.38

Note. * $p < .05$; ** $p < .01$

Table 5b. *Fixed and Random Effects for Latency of Children's Behaviors*

	Model 1 Coefficient (*SE*)	Model 2 Coefficient (*SE*)	Model 3 Coefficient (*SE*)
Fixed Effects			
Intercept	43.40 (2.80)**	43.41 (2.76)**	43.37 (2.79)**
Perturbation			
1 vs. 3	-17.74 (3.75)**	-17.76 (3.72)**	-17.71 (3.74)**
2 vs. 3	-1.15 (3.75)	-1.16 (3.72)	-1.12 (3.74)
Strategy Level (Low vs. High)	-42.58 (3.75)**	-42.60 (3.73)**	-42.56 (3.74)**
Perturbation * Strategy Level (Low vs. High)			
1 vs. 3	19.11 (5.30)**	19.13 (5.26)**	19.09 (5.29)**
2 vs. 3	1.97 (5.30)	1.98 (5.26)	1.94 (5.29)
Child Age	--	-0.88 (0.34)**	--
Child Age x Perturbation			
1 vs. 3	--	-0.53 (0.45)	--
2 vs. 3	--	-0.02 (0.45)	--
Child Age x Strategy Level	--	0.83 (0.45)	--
Child Age x Perturbation x Strategy Level			
1 vs. 3	--	0.53 (0.64)	--
2 vs. 3	--	-0.03 (0.64)	--
Child Effortful Control (EC)	--	--	-11.18 (3.71)**
Child EC x Perturbation			
1 vs. 3	--	--	9.35 (4.97)
2 vs. 3	--	--	5.09 (4.97)
Child EC x Strategy Level	--	--	9.26 (4.97)
Child EC x Perturbation x Strategy Level			
1 vs. 3	--	--	-7.11 (7.03)
2 vs. 3	--	--	-2.68 (7.03)
Random effects			
Intercept	123.62 (35.86)**	106.59 (33.77)**	119.85 (35.47)**
Residual	1077.17 (55.13)**	1061.57 (54.51)**	1072.67 (55.09)**

Note. * $p < .05$; ** $p < .01$

Table 5c. *Least Squared Mean Differences for Age Differences of Latency of Children's Behaviors*

	Younger Children Coefficient (*SE*)	Older Children Coefficient (*SE*)
Perturbation		
1 vs. 2	-6.07 (3.72)	-9.98 (3.72)*
1 vs. 3	-6.00 (3.73)	-10.38 (3.72)*
2 vs. 3	0.07 (3.73)	-0.40 (3.72)
Strategy Level (Low vs. High)	-43.73 (3.04)**	-27.40 (3.04)**
Perturbation * Strategy Level (Low)		
1 vs. 2	0.22 (5.26)	0.88 (5.26)
1 vs. 3	1.39 (5.26)	1.37 (5.26)
2 vs. 3	1.16 (5.26)	0.48 (5.26)
Perturbation * Strategy Level (High)		
1 vs. 2	-12.36 (5.27)	-20.83 (5.26)**
1 vs. 3	-13.40 (5.27)	-22.12 (5.26)**
2 vs. 3	-1.03 (5.27)	-1.29 (5.26)

Note. * $p < .05$; ** $p < .01$

Table 5d. *Least Squared Mean Differences for Effortful Control Differences of Latency of Children's Behaviors*

	Lower Ratings of EC Coefficient (*SE*)	Higher Ratings of EC Coefficient (*SE*)
Perturbation		
1 vs. 2	-9.56 (3.74)*	-6.49 (3.74)
1 vs. 3	-12.54 (3.74)**	-3.80 (3.75)
2 vs. 3	-2.98 (3.74)	2.68 (3.75)
Strategy Level (Low vs. High)	-40.07 (3.05)**	-31.02 (3.06)**
Perturbation * Strategy Level (Low)		
1 vs. 2	0.68 (5.29)	0.42 (5.30)
1 vs. 3	-0.31 (5.29)	3.06 (5.30)
2 vs. 3	-1.00 (5.29)	2.64 (5.30)
Perturbation * Strategy Level (High)		
1 vs. 2	-19.80 (5.29)**	-13.39 (5.29)
1 vs. 3	-24.76 (5.29)**	-10.67 (5.29)
2 vs. 3	-4.96 (5.29)	2.72 (5.29)

Note. * $p < .05$; ** $p < .01$

Table 5e. *Least Squared Mean Differences for Perturbation Differences of Latency of Children's Behaviors*

	Coefficient (*SE*)
Perturbation	
1 vs. 2	-8.02 (2.65)**
1 vs. 3	-8.19 (2.65)**
2 vs. 3	-0.16 (2.65)
Strategy Level (Low vs. High)	-35.16 (2.16)**
Perturbation * Strategy Level (Low)	
1 vs. 2	0.55 (3.74)
1 vs. 3	1.37 (3.74)
2 vs. 3	0.82 (3.74)
Perturbation * Strategy Level (High)	
1 vs. 2	-16.60 (3.75)**
1 vs. 3	-17.74 (3.75)**
2 vs. 3	-1.14 (3.75)

Note. * $p < .05$; ** $p < .01$

Table 6a. *Omnibus Effects for Duration of Children's Behaviors*

	Model 1		Model 2		Model 3	
	df	*F*	*df*	*F*	*df*	*F*
Perturbation	2, 305	4.94**	2, 305	4.93**	2, 305	4.95**
Strategy Level	1, 153	79.53**	1, 153	79.51**	1, 153	79.51**
Perturbation x Strategy Level	2, 305	9.70**	2, 305	9.69**	2, 305	9.69**
Child Age	--	--	1, 152	0.06	--	--
Child Age x Perturbation	--	--	2, 758	0.86	--	--
Child Age x Strategy Level	--	--	1, 758	0.34	--	--
Child Age x Perturbation x Strategy Level	--	--	2, 758	1.86	--	--
Child EC	--	--	--	--	1, 152	1.47
Child EC x Perturbation	--	--	--	--	2, 758	1.93
Child EC x Strategy Level	--	--	--	--	1, 758	0.16
Child EC x Perturbation x Strategy Level	--	--	--	--	2, 758	0.19

Note. * $p < .05$; ** $p < .01$

Table 6b. *Fixed and Random Effects for Duration of Children's Behaviors*

	Model 1 Coefficient (*SE*)	Model 2 Coefficient (*SE*)	Model 3 Coefficient (*SE*)
Fixed Effects			
Intercept	8.54 (0.76)**	8.54 (0.76)**	8.54 (0.76)**
Perturbation			
1 vs. 3	0.88 (1.08)	0.88 (1.08)	0.87 (1.08)
2 vs. 3	-0.31 (1.08)	-0.31 (1.08)	-0.32 (1.08)
Strategy Level (Low vs. High)	8.37 (1.08)**	8.37 (1.08)**	8.37 (1.08)**
Perturbation * Strategy Level (Low vs. High)			
1 vs. 3	-6.53 (1.52)**	-6.53 (1.52)**	-6.53 (1.52)**
2 vs. 3	-1.96 (1.52)	-1.96 (1.52)	-1.96 (1.52)
Child Age	--	0.01 (0.09)	--
Child Age x Perturbation			
1 vs. 3	--	0.06 (0.13)	--
2 vs. 3	--	0.01 (0.13)	--
Child Age x Strategy Level	--	0.04 (0.12)	--
Child Age x Perturbation x Strategy Level			
1 vs. 3	--	-0.29 (0.19)	--
2 vs. 3	--	0.04 (0.19)	--
Child Effortful Control (EC)	--	--	1.70 (1.01)
Child EC x Perturbation			
1 vs. 3	--	--	-1.54 (1.43)
2 vs. 3	--	--	-1.56 (1.43)
Child EC x Strategy Level	--	--	-0.19 (1.43)
Child EC x Perturbation x Strategy Level			
1 vs. 3	--	--	-0.80 (2.02)
2 vs. 3	--	--	0.41 (2.02)
Random effects			
Intercept	0	0	0
Residual	89.00 (4.16)**	89.01 (4.17)**	89.01 (4.17)**

Note. * $p < .05$; ** $p < .01$

Table 6c. *Least Squared Mean Differences for Age Differences of Duration of Children's Behaviors*

	Younger Children Coefficient (*SE*)	Older Children Coefficient (*SE*)
Perturbation		
1 vs. 2	-0.14 (1.08)	-2.06 (1.08)
1 vs. 3	-1.66 (1.08)	-3.12 (1.08)*
2 vs. 3	-1.52 (1.08)	-1.06 (1.08)
Strategy Level (Low vs. High)	5.91 (0.88)**	5.18 (0.88)**
Perturbation * Strategy Level (Low)		
1 vs. 2	-1.09 (1.52)	-5.68 (1.52)**
1 vs. 3	-3.73 (1.53)	-7.59 (1.52)**
2 vs. 3	-2.64 (1.53)	-1.89 (1.52)
Perturbation * Strategy Level (High)		
1 vs. 2	0.80 (1.52)	1.57 (1.52)
1 vs. 3	0.41 (1.53)	1.34 (1.53)
2 vs. 3	-0.39 (1.53)	-0.23 (1.53)

Note. * $p < .05$; ** $p < .01$

Table 6d. *Least Squared Mean Differences for Effortful Control Differences of Duration of Children's Behaviors*

	Lower Ratings of EC Coefficient (*SE*)	Higher Ratings of EC Coefficient (*SE*)
Perturbation		
1 vs. 2	-0.66 (1.08)	-1.54 (1.08)
1 vs. 3	-0.93 (1.08)	-3.86 (1.08)**
2 vs. 3	-0.27 (1.08)	-2.32 (1.08)
Strategy Level (Low vs. High)	5.79 (0.88)**	5.30 (0.88)**
Perturbation * Strategy Level (Low)		
1 vs. 2	-2.49 (1.52)	-4.28 (1.52)
1 vs. 3	-3.89 (1.52)	-7.43 (1.52)**
2 vs. 3	-1.41 (1.52)	-3.14 (1.52)
Perturbation * Strategy Level (High)		
1 vs. 2	1.17 (1.52)	1.20 (1.52)
1 vs. 3	2.03 (1.53)	-0.29 (1.53)
2 vs. 3	0.86 (1.53)	-1.49 (1.53)

Note. * p < .05; ** p < .01

Table 6e. *Least Squared Mean Differences for Perturbation Differences of Duration of Children's Behaviors*

	Coefficient (*SE*)
Perturbation	
1 vs. 2	-1.20 (0.76)
1 vs. 3	-2.39 (0.76)**
2 vs. 3	-1.29 (0.76)
Strategy Level (Low vs. High)	5.54 (0.62)**
Perturbation * Strategy Level (Low)	
1 vs. 2	-3.39 (1.08)*
1 vs. 3	-5.66 (1.08)**
2 vs. 3	-2.27 (1.08)
Perturbation * Strategy Level (High)	
1 vs. 2	1.19 (1.08)
1 vs. 3	0.88 (1.08)
2 vs. 3	-0.31 (1.08)

Note. * $p < .05$; ** $p < .01$

Table 7a. *Omnibus Effects for Frequency of Mothers' Behaviors*

	Model 1		Model 2		Model 3	
	df	*F*	*df*	*F*	*df*	*F*
Perturbation	2, 305	2.82	2, 305	2.83	2, 305	1.83
Control Level	1, 153	25.50**	1, 153	25.55**	1, 153	25.58**
Perturbation x Control Level	2, 305	0.12	2, 305	0.12	2, 305	0.12
Child Age	--	--	1, 152	18.58**	--	--
Child Age x Perturbation	--	--	2, 758	2.63	--	--
Child Age x Control Level	--	--	1, 758	1.64	--	--
Child Age x Perturbation x Control Level	--	--	2, 758	0.03	--	--
Child EC	--	--	--	--	1, 152	0.78
Child EC x Perturbation	--	--	--	--	2, 758	0.22
Child EC x Control Level	--	--	--	--	1, 758	5.69*
Child EC x Perturbation x Control Level	--	--	--	--	2, 758	0.53

Note. * $p < .05$; ** $p < .01$

Table 7b. *Fixed and Random Effects for Frequency of Mothers' Behaviors*

	Model 1 Coefficient (*SE*)	Model 2 Coefficient (*SE*)	Model 3 Coefficient (*SE*)
Fixed Effects			
Intercept	3.94 (0.30)**	3.94 (0.30)**	3.94 (0.30)**
Perturbation			
1 vs. 3	-0.27 (0.31)	-0.28 (0.31)	-0.27 (0.31)
2 vs. 3	0.17 (0.31)	0.17 (0.31)	0.17 (0.31)
Control Level (Low vs. High)	0.80 (0.31)**	0.80 (0.31)**	0.80 (0.31)**
Perturbation * Control Level (Low vs. High)			
1 vs. 3	0.06 (0.43)	0.06 (0.43)	0.06 (0.43)
2 vs. 3	0.21 (0.43)	0.20 (0.43)	0.20 (0.43)
Child Age	--	-0.15 (0.04)**	--
Child Age x Perturbation			
1 vs. 3	--	0.06 (0.04)	--
2 vs. 3	--	0.02 (0.04)	--
Child Age x Control Level	--	0.03 (0.04)	--
Child Age x Perturbation x Control Level			
1 vs. 3	--	-0.01 (0.05)	--
2 vs. 3	--	-0.01 (0.05)	--
Child Effortful Control (EC)	--	--	0.21 (0.39)
Child EC x Perturbation			
1 vs. 3	--	--	-0.48 (0.41)
2 vs. 3	--	--	-0.20 (0.41)
Child EC x Control Level	--	--	0.25 (0.41)
Child EC x Perturbation x Control Level			
1 vs. 3	--	--	0.59 (0.57)
2 vs. 3	--	--	0.33 (0.57)
Random effects			
Intercept	6.26 (0.86)**	5.50 (0.80)**	6.28 (0.86)**
Residual	7.18 (0.37)**	7.16 (0.37)**	7.16 (0.37)**

Note. * $p < .05$; ** $p < .01$

Table 7c. *Least Squared Mean Differences for Age Differences of Frequency of Mothers' Behaviors*

	Parents of Younger Children Coefficient (*SE*)	Parents of Older Children Coefficient (*SE*)
Perturbation		
1 vs. 2	-0.87 (0.31)*	-0.16 (0.31)
1 vs. 3	-0.72 (0.31)	0.23 (0.31)
2 vs. 3	0.15 (0.31)	0.39 (0.31)
Control Level (Low vs. High)	0.66 (0.25)**	1.12 (0.25)**
Perturbation * Control Level (Low)		
1 vs. 2	-0.93 (0.43)	-0.24 (0.43)
1 vs. 3	-0.65 (0.43)	0.21 (0.43)
2 vs. 3	0.28 (0.43)	0.45 (0.43)
Perturbation * Control Level (High)		
1 vs. 2	-0.81 (0.43)	-0.07 (0.43)
1 vs. 3	-0.80 (0.43)	0.25 (0.43)
2 vs. 3	0.01 (0.43)	0.32 (0.43)

Note. * $p < .05$; ** $p < .01$

Table 7d. *Least Squared Mean Differences for Effortful Control Differences of Frequency of Mothers' Behaviors*

	Lower Ratings of EC Coefficient (*SE*)	Higher Ratings of EC Coefficient (*SE*)
Perturbation		
1 vs. 2	-0.40 (0.31)	-0.62 (0.31)
1 vs. 3	-0.11 (0.31)	-0.38 (0.31)
2 vs. 3	0.29 (0.31)	0.24 (0.31)
Control Level (Low vs. High)	0.47 (0.25)	1.31 (0.25)
Perturbation * Control Level (Low)		
1 vs. 2	-0.57 (0.43)	-0.60 (0.43)
1 vs. 3	-0.30 (0.43)	-0.13 (0.43)
2 vs. 3	0.27 (0.43)	0.47 (0.43)
Perturbation * Control Level (High)		
1 vs. 2	-0.24 (0.43)	-0.65 (0.43)
1 vs. 3	0.08 (0.43)	-0.63 (0.43)
2 vs. 3	0.32 (0.43)	0.02 (0.43)

Note. * $p < .05$; ** $p < .01$

Table 7e. *Least Squared Mean Differences for Perturbation Differences of Frequency of Mothers' Behaviors*

	Coefficient (*SE*)
Perturbation	
1 vs. 2	-0.51 (0.22)
1 vs. 3	-0.24 (0.22)
2 vs. 3	0.27 (0.22)
Control Level (Low vs. High)	0.89 (0.18)**
Perturbation * Control Level (Low)	
1 vs. 2	-0.58 (0.31)
1 vs. 3	-0.21 (0.31)
2 vs. 3	0.37 (0.31)
Perturbation * Control Level (High)	
1 vs. 2	-0.44 (0.31)
1 vs. 3	-0.27 (0.31)
2 vs. 3	0.17 (0.31)

Note. * $p < .05$; ** $p < .01$

Table 8a. *Omnibus Effects for Latency of Mothers' Behaviors*

	Model 1		Model 2		Model 3	
	df	*F*	*df*	*F*	*df*	*F*
Perturbation	2, 305	11.82**	2, 305	11.86**	2, 305	11.86**
Control Level	1, 153	3.76	1, 153	3.77	1, 153	3.77
Perturbation x Control Level	2, 305	2.85	2, 305	2.86	2, 305	2.86
Child Age	--	--	1, 152	7.95**	--	--
Child Age x Perturbation	--	--	2, 758	1.40	--	--
Child Age x Control Level	--	--	1, 758	4.80*	--	--
Child Age x Perturbation x Control Level	--	--	2, 758	0.41	--	--
Child EC	--	--	--	--	1, 152	0.39
Child EC x Perturbation	--	--	--	--	2, 758	1.23
Child EC x Control Level	--	--	--	--	1, 758	1.28
Child EC x Perturbation x Control Level	--	--	--	--	2, 758	0.07

Note. * $p < .05$; ** $p < .01$

Table 8b. *Fixed and Random Effects for Latency of Mothers' Behaviors*

	Model 1 Coefficient (*SE*)	Model 2 Coefficient (*SE*)	Model 3 Coefficient (*SE*)
Fixed Effects			
Intercept	65.85 (4.96)**	65.83 (4.91)**	65.86 (4.97)**
Perturbation			
1 vs. 3	-25.39 (5.97)**	-25.37 (5.96)**	-25.39 (5.98)**
2 vs. 3	1.85 (5.97)	1.88 (5.96)	1.85 (5.98)
Control Level (Low vs. High)	-10.50 (5.97)	-10.49 (5.97)	-10.51 (5.98)
Perturbation * Control Level (Low vs. High)			
1 vs. 3	15.24 (8.44)	15.22 (8.42)	15.25 (8.45)
2 vs. 3	-3.77 (8.44)	-3.79 (8.42)	-3.76 (8.45)
Child Age	--	1.78 (0.60)**	--
Child Age x Perturbation			
1 vs. 3	--	-0.51 (0.73)	--
2 vs. 3	--	-0.31 (0.73)	--
Child Age x Control Level	--	-0.83 (0.73)	--
Child Age x Perturbation x Control Level			
1 vs. 3	--	-0.59 (1.03)	--
2 vs. 3	--	0.33 (1.03)	--
Child Effortful Control (EC)	--	--	-0.95 (6.60)
Child EC x Perturbation			
1 vs. 3	--	--	4.98 (7.94)
2 vs. 3	--	--	-2.07 (7.94)
Child EC x Control Level	--	--	-3.95 (7.95)
Child EC x Perturbation x Control Level			
1 vs. 3	--	--	-0.14 (11.23)
2 vs. 3	--	--	-3.59 (11.23)
Random effects			
Intercept	1035.99 (172.21)**	973.40 (165.41)**	1041.38 (173.46)**
Residual	2735.44 (140.03)**	2723.15 (139.86)**	2739.46 (140.70)**

Note. * $p < .05$; ** $p < .01$

Table 8c. *Least Squared Mean Differences for Age Differences of Latency of Mothers' Behaviors*

	Parents of Younger Children Coefficient (*SE*)	Parents of Older Children Coefficient (*SE*)
Perturbation		
1 vs. 2	-12.31 (5.96)	-23.17 (5.96)**
1 vs. 3	-11.13 (5.97)	-24.39 (5.96)**
2 vs. 3	1.18 (5.97)	-1.21 (5.96)
Control Level (Low vs. High)	0.87 (4.87)	-14.22 (4.87)**
Perturbation * Control Level (Low)		
1 vs. 2	0.95 (8.42)	-17.43 (8.42)
1 vs. 3	-1.11 (8.44)	-19.19 (8.44)
2 vs. 3	-2.06 (8.44)	-1.76 (8.44)
Perturbation * Control Level (High)		
1 vs. 2	-25.57 (8.42)*	-28.92 (8.42)**
1 vs. 3	-21.16 (8.44)	-29.58 (8.44)**
2 vs. 3	4.41 (8.44)	-0.66 (8.44)

Note. * $p < .05$; ** $p < .01$

Table 8d. *Least Squared Mean Differences for Effortful Control Differences of Latency of Mothers' Behaviors*

	Lower Ratings of EC Coefficient (*SE*)	Higher Ratings of EC Coefficient (*SE*)
Perturbation		
1 vs. 2	-24.36 (5.97)**	-11.12 (5.97)**
1 vs. 3	-21.48 (5.98)**	-14.07 (5.98)**
2 vs. 3	2.89 (5.98)	-2.94 (5.98)
Control Level (Low vs. High)	-2.77 (4.88)	-10.60 (4.88)*
Perturbation * Control Level (Low)		
1 vs. 2	-16.16 (8.45)	-0.32 (8.45)
1 vs. 3	-13.80 (8.45)	-6.50 (8.45)
2 vs. 3	2.36 (8.45)	2.36 (8.45)
Perturbation * Control Level (High)		
1 vs. 2	-32.57 (8.45)**	-21.93 (8.45)
1 vs. 3	-29.15 (8.45)**	-21.64 (8.45)
2 vs. 3	3.41 (8.45)	0.29 (8.45)

Note. * $p < .05$; ** $p < .01$

Table 8e. *Least Squared Mean Differences for Perturbation Differences of Latency of Mothers' Behaviors*

PTEP-Latency Level 1	Model 1 Coefficient (*SE*)
Perturbation	
1 vs. 2	-17.74 (2.21)**
1 vs. 3	-17.77 (2.22)**
2 vs. 3	-0.03 (2.22)
Control Level (Low vs. High)	-6.68 (3.44)
Perturbation * Control Level (Low)	
1 vs. 2	-8.24 (5.96)
1 vs. 3	-10.17 (5.97)
2 vs. 3	-1.92 (5.97)
Perturbation * Control Level (High)	
1 vs. 2	-27.25 (5.96)**
1 vs. 3	-25.39 (5.97)**
2 vs. 3	1.85 (5.97)

Note. * $p < .05$; ** $p < .01$

Table 9a. *Omnibus Effects for Duration of Mothers' Behaviors*

	Model 1		Model 2		Model 3	
	df	*F*	*df*	*F*	*df*	*F*
Perturbation	2, 305	0.37	2, 305	0.38	2, 305	1.83
Control Level	1, 153	21.41**	1, 153	21.65**	1, 153	25.58**
Perturbation x Control Level	2, 305	1.55	2, 305	1.57	2, 305	0.12
Child Age	--	--	1, 152	9.39**	--	--
Child Age x Perturbation	--	--	2, 758	2.21	--	--
Child Age x Control Level	--	--	1, 758	4.55*	--	--
Child Age x Perturbation x Control Level	--	--	2, 758	1.71	--	--
Child EC	--	--	--	--	1, 152	0.00
Child EC x Perturbation	--	--	--	--	2, 758	0.11
Child EC x Control Level	--	--	--	--	1, 758	1.86
Child EC x Perturbation x Control Level	--	--	--	--	2, 758	0.30

Note. * $p < .05$; ** $p < .01$

Table 9b. *Fixed and Random Effects for Duration of Mothers' Behaviors*

	Model 1 Coefficient (*SE*)	Model 2 Coefficient (*SE*)	Model 3 Coefficient (*SE*)
Fixed Effects			
Intercept	3.31 (0.28)**	3.31 (0.28)**	3.31 (0.28)**
Perturbation			
1 vs. 3	-0.03 (0.37)	-0.03 (0.37)	-0.03 (0.37)
2 vs. 3	-0.54 (0.37)	-0.54 (0.37)	-0.54 (0.37)
Control Level (Low vs. High)	-1.12 (0.37)**	-1.12 (0.37)**	-1.12 (0.37)**
Perturbation * Control Level (Low vs. High)			
1 vs. 3	-0.25 (0.52)	-0.25 (0.52)	-0.26 (0.53)
2 vs. 3	0.64 (0.52)	0.64 (0.52)	0.64 (0.53)
Child Age	--	-0.15 (0.03)**	--
Child Age x Perturbation			
1 vs. 3	--	-0.12 (0.05)**	--
2 vs. 3	--	0.09 (0.05)*	--
Child Age x Control Level	--	0.12 (0.05)**	--
Child Age x Perturbation x Control Level			
1 vs. 3	--	-0.11 (0.06)	--
2 vs. 3	--	-0.09 (0.06)	--
Child Effortful Control (EC)	--	--	-0.43 (0.37)
Child EC x Perturbation			
1 vs. 3	--	--	0.38 (0.49)
2 vs. 3	--	--	0.32 (0.49)
Child EC x Control Level	--	--	0.68 (0.49)
Child EC x Perturbation x Control Level			
1 vs. 3	--	--	-0.54 (0.70)
2 vs. 3	--	--	-0.34 (0.70)
Random effects			
Intercept	1.38 (0.37)**	1.23 (0.35)**	1.39 (0.37)**
Residual	10.56 (0.54)**	10.46 (0.54)**	10.59 (0.54)**

Note. * $p < .05$; ** $p < .01$

Table 9c. *Least Squared Mean Differences for Age Differences of Duration of Mothers' Behaviors*

	Parents of Younger Children Coefficient (*SE*)	Parents of Older Children Coefficient (*SE*)
Perturbation		
1 vs. 2	-0.11 (0.37)	0.24 (0.37)
1 vs. 3	-0.70 (0.37)	0.38 (0.37)
2 vs. 3	-0.58 (0.37)	0.14 (0.37)
Control Level (Low vs. High)	-1.45 (0.30)**	-0.54 (0.30)
Perturbation * Control Level (Low)		
1 vs. 2	-0.49 (0.52)	-0.28 (0.52)
1 vs. 3	-0.37 (0.52)	-0.20 (0.52)
2 vs. 3	0.12 (0.52)	0.08 (0.52)
Perturbation * Control Level (High)		
1 vs. 2	0.76 (0.52)	0.26 (0.52)
1 vs. 3	-1.02 (0.52)	0.96 (0.52)
2 vs. 3	-1.28 (0.52)	0.20 (0.52)

Note. * $p < .05$; ** $p < .01$

Table 9d. *Least Squared Mean Differences for Effortful Control Differences of Duration of Mothers' Behaviors*

	Lower Ratings of EC Coefficient (*SE*)	Higher Ratings of EC Coefficient (*SE*)
Perturbation		
1 vs. 2	0.09 (0.37)	0.03 (0.37)
1 vs. 3	-0.24 (0.37)	-0.07 (0.37)
2 vs. 3	-0.34 (0.37)	-0.10 (0.37)
Control Level (Low vs. High)	-1.28 (0.30)**	-0.70 (0.30)*
Perturbation * Control Level (Low)		
1 vs. 2	-0.28 (0.52)	-0.48 (0.53)
1 vs. 3	-0.17 (0.52)	-0.40 (0.53)
2 vs. 3	0.11 (0.52)	0.90 (0.53)
Perturbation * Control Level (High)		
1 vs. 2	0.47 (0.52)	0.55 (0.53)
1 vs. 3	-0.32 (0.53)	0.23 (0.53)
2 vs. 3	-0.78 (0.53)	-0.29 (0.53)

Note. * $p < .05$; ** $p < .01$

Table 9e. *Least Squared Mean Differences for Perturbation Differences of Duration of Mothers' Behaviors*

	Coefficient (*SE*)
Perturbation	
1 vs. 2	0.06 (0.26)
1 vs. 3	-0.16 (0.26)
2 vs. 3	-0.22 (0.26)
Control Level (Low vs. High)	-0.99 (0.21)**
Perturbation * Control Level (Low)	
1 vs. 2	-0.39 (0.37)
1 vs. 3	-0.28 (0.37)
2 vs. 3	0.10 (0.37)
Perturbation * Control Level (High)	
1 vs. 2	0.51 (0.37)
1 vs. 3	-0.03 (0.37)
2 vs. 3	-0.54 (0.37)

Note. * $p < .05$; ** $p < .01$