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**EMOTION CONTROL, OVERREACTIVE PARENTING, AND
MOTHERS' EXECUTIVE FUNCTIONS**

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EMOTION CONTROL, OVERREACTIVE PARENTING, AND
MOTHERS' EXECUTIVE FUNCTIONS

A thesis submitted in partial fulfillment
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ABSTRACT

EMOTION CONTROL, OVERREACTIVE PARENTING, AND MOTHERS' EXECUTIVE FUNCTIONS

Serah Jaya Narine

Evidence suggests that mothers' emotion control difficulties are associated with their self-reported and observed overreactive parenting. Specifically, mothers who have difficulties managing their negative emotions and experience more anger, are more likely to discipline harshly. In addition to this emotional process, evidence suggests that poorer cognitive executive function (EF) is also associated with mothers' use of overreactive discipline. However, the association between EF performance and overreactive parenting is inconsistent. The purpose of this study is to assess how different EFs may moderate the association between emotion control and overreactive parenting. I hypothesized that (1) mothers' emotion control would be negatively related to levels of overreactive parenting and (2) this relationship would be moderated by mothers' EF abilities. Specifically, I am predicting that poor executive functioning would exacerbate the impact of poor emotional control on over-reactive parenting. This socio-economically diverse sample included 57 mothers (M = 35.2 years old) of 2- to 5-year-old children. Mothers completed questionnaires and three laboratory assessments of executive function tasks. Consistent with the proposed hypothesis, mothers' emotion control was negatively associated with levels of overreactive parenting. Contrary to our hypothesis, there was no significant moderating effect of mothers' EF performance or their self-report of EF on this relation. However maternal EF was independently associated with overreactive parenting. The

findings from this study add to the growing body of research that concerns the role of EF performance in parenting.

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INTRODUCTION

Overreactive discipline is associated with child misbehavior (Arnold et al., 1993; O’Leary et al., 1999; O’Leary & Vidair, 2005; Taraban et al., 2019), externalizing (Lorber & Egeland, 2009; O’Leary & Vidair, 2005), and internalizing problems (Barber & Harmon, 2002; Brenning et al., 2011) later in life. There is robust evidence that emotion control has an important role in parenting (Barrett & Fleming, 2011; Deater-Deckard et al., 2010; Duncan et al., 2009) and that poor control contributes to overreactive discipline. Emotion control helps parents move away from emotional reactivity to more flexible responses to child behaviors. Parents’ emotion control also models adaptive regulation for children. Finally, effective discipline for misbehavior includes clear and consistent enforcement of rules which requires significant executive control (Lorber, 2012). Therefore, the relation of emotion control to overreactive parenting may be enhanced with higher maternal executive functions.

Research supports the association between mothers’ emotion control and overreactive parenting (Crandall et al., 2015; Lorber, 2012; Shaffer & Obradović, 2017). However, a growing body of research indicates that poorer executive functions (EF) may increase the difficulty parents have with their emotion control and this may in turn predict more reactive negativity to child misbehavior. Additionally, high-performing EF has been associated with fewer instances of harsh parenting (Crandall et al., 2015). Thus, EF may moderate the relationship between parents’ emotion control and their overreactive parenting because these parents have difficulty regulating higher-order cognitive functions. In contrast, for parents with better executive functions, this association would be weaker because parents are more likely to use effective discipline practices, despite the ‘hot’ emotional process that can occur with poor emotion control. Although existing

research supports the association between emotion control and overreactive parenting, it is important to understand the role of EF on the relationship between emotion control and mothers' discipline practices for their children. This present study sought to examine the associations between mothers' emotion control and their overreactive discipline and to consider whether mothers' executive functions have a moderating effect on this relation.

Emotion Control and Parenting

Emotion control is defined as one's ability to regulate emotional responses (Crandall et al., 2015; Roth et al., 2005). In the context of child misbehavior, emotion control is considered parents' ability to regulate emotional arousal that was triggered by their child's misbehavior to reduce harsh, dysregulated responses. Emotion control and emotion regulation are closely related constructs that are often used interchangeably (Thompson, 1994). The overview of the literature includes both constructs, although the term emotion control is employed for consistency. Furthermore, no studies have investigated either determinants or consequences of fathers' emotion control, thus, this overview is limited to research among mothers only.

Contemporary emotion theory emphasizes that emotion control is important for adaptive parenting (Crandall et al., 2015; Shaw & Starr, 2019). This theory suggests that mothers with good emotion control are more equipped to cope with stress and remain calm during toddler misbehavior (Gross, 1999; Thompson, 1994). Conversely, if a child's misbehavior does warrant disciplinary actions, mothers with effective emotion control can adapt better and avoid engaging in harsh discipline that could potentially become chronic and then reinforce further overreactive discipline and escalated child misbehavior (Deater-Deckard et al., 2010; Patterson, 2002).

Several studies support the theory that emotion control helps reduce the emotionally reactive responses that are often found in overreactive parenting. For instance, mothers with higher-performing emotion control are better equipped to manage stress because they are less reactive to stressors (Barrett & Fleming, 2011; Skowron & Friedlander, 1998). Further, persistent negative emotions were associated with children's increased frustration and use of misbehavior instead of competent problem-solving skills (Dix, 1991). Additionally, mothers' poor emotion control indicated more instances of overactivated expressions of emotion that are confusing and disorganizing to the child (Samuelson et al., 2012). This supports that better-performing emotion control is associated with less overreactive discipline use (Crandall et al., 2015; Deater-Deckard et al., 2012; Lorber, 2012).

The Moderating Role of Executive Functions

Deficits in mothers' executive functions (EF) skills are also associated with maladaptive discipline (Azar & Weinzierl, 2005; Crick & Dodge, 1994). More specifically, mothers with poorer executive functions engage in more overreactive discipline than mothers with better-performing EF abilities (Crandall et al., 2015; Deater-Deckard et al., 2012; Taraban et al., 2019). Moreover, better-performing EF is associated with mothers' ability to successfully identify problems, generate and prioritize solutions, and act on misbehaviors (Azar et al., 2017; Azar & Weinzierl, 2005; Deater-Deckard et al., 2012). The direct relation of poor EF to overreactive parenting might be further exacerbated in the presence of lower emotion control; conversely, high EF might reduce the negative impact of low emotion control on overreactive parenting. That is, EF may also moderate the emotional control – overreactive parenting relations

EF has three core components: cognitive flexibility, inhibition, and working memory (Friedman et al., 2008; Karr et al., 2018; Miyake et al., 2000). These three domains also play a significant role in parenting behaviors (Azar & Weinzierl, 2005; Deater-Deckard et al., 2012; Gonzalez, 2015; Luna, 2009; Samuelson et al., 2012; Wilson & Gross, 2018).

These three core components are predominantly measured with two methods: self-report or performance tasks. Interestingly measures based on each method are not highly correlated (ref) so both were used in this study, The self-report measure of EF will provide mothers the opportunity to indicate their perceived EF difficulties in everyday situations. Alternatively, the performance tasks will provide an objective approach to EF by measuring reaction times and successful completion of items. Further, recent characterizations of EF define tasks as ‘cool’ or ‘hot’. Cool tasks consist of affectively neutral components. They do not have any obvious rewards or punishers, so there is little to be gained or lost. Examples of these tasks are Wisconsin Card Sorting, Stroop, and Backwards Digit Span (Poon, 2018; Zelazo & Cunningham, 2007). Hot tasks measure the emotional or motivational components of EF. More specifically, hot EF operates in motivationally and emotionally significant high-stakes situations which will then influence behavior (Zelazo & Müller, 2002).

The BRIEF-A, a self-report inventory of EF has been demonstrated to reflect both hot and cool EF. Hot EF in the BRIEF-A is characterized by the ability to shift maladaptive problem-solving strategies and inhibit inappropriate thoughts and actions (Giancola et al., 2012; Zelazo & Cunningham, 2007). Cool EF in the BRIEF-A includes EF characterized by the ability to organize and manipulate information in working memory (Roth et al., 2005). The BRIEF-A captures both cool and hot aspects EF which

may not be fully addressed if I exclusively used one modality type. Additionally, the BRIEF-A helps measure self-reported us of EF in daily life. The BRIEF-A serves as capturing both ‘cool’ cognitive processes and ‘hot’ emotional events that occur with poor emotion control.

Cognitive flexibility is the ability to adapt one’s behavior and thinking based on the environment (Martin et al., 1998). In intimate partner violence literature, poor cognitive flexibility among perpetrators was associated with reduced verbal and physical conflict (Romero-Martínez et al., 2021). A person’s inability to observe and interpret social cues well enough to understand how to respond is indicative of their poor cognitive flexibility performance (Azar et al., 2017; Martin et al., 1998). While the dyadic interactions between two romantic partners and a parent and child are different, it may explain how cognitive flexibility works in the context of understanding how a parent can take in what is happening with their child in their environment and respond. While high-performing cognitive flexibility was demonstrated to be directly associated with warm, nurturing parenting and inversely related to harsh, reactive parenting practices (Crandall et al., 2015; Deater-Deckard et al., 2010), no existing studies have examined whether cognitive flexibility had a moderating effect on harsh parenting.

Inhibition is the ability to control attention, thoughts, behaviors, and/or emotions to override strong urges, and instead do what is more appropriate or needed (Diamond, 2013; Hoffman et al., 2009). Strong inhibitory control allowed one to selectively attend and focus on what they choose, rather than get distracted by extraneous and unimportant information (Diamond, 2013). Impulsive parents had difficulty inhibiting negative reactions to child misbehavior (Chronis-Tuscano et al., 2011). More specifically, mothers of infants with poor inhibition were more associated with more negative, harsh parenting,

than mothers with higher inhibitory function (Bridgett et al., 2017). There was one study that assessed the moderating role of inhibition, they found that impulsivity significantly moderated the relationship between anger and discrepant harsh discipline (Rhoades et al., 2017). This indicated that higher levels of impulsivity would make it more difficult for mothers to use non-harsh discipline when they were angry.

Working memory is the ability to hold multiple items over a short time for immediate use (Grafman, 1995). Mothers' working memory moderated the degree of their reactivity to their child's misbehaviors (i.e., opposition, distractibility) and mothers' reactive negativity (Deater-Deckard et al., 2010). Additionally, mothers' lower working memory was associated with attributional biases and harsh discipline, which indicated that higher working memory may serve as a protective factor against harsh discipline (Sturge-Apple et al., 2014). Further, challenging behaviors (i.e., noncompliance, frustration/anger) was only significantly associated with mothers' negative discipline behaviors among mothers with poor working memory (Deater-Deckard et al., 2012). A mother's ability to maintain various items of information should implicate better performance in solving problems they face with their child's misbehavior.

Mothers' emotion control performance affects interactions with their children and their engagement in harsh discipline (Crandall et al., 2018). More specifically, poor emotion control is associated with more instances of overreactive parenting (Crandall et al., 2015). EF may moderate parenting outcomes because mothers with high performing EF may be more attuned to their own parenting behaviors which affects their parenting during emotionally elevated states like child misbehavior (Chen & Johnston, 2007; Crandall et al., 2018; Deater-Deckard et al., 2010). However, EF factors and how it impacts parenting outcomes are mixed, therefore, EF's impact should be pursued to better

understand this growing area of study. Mothers' EF may be an important moderator of their discipline choices, such that mothers with high-performing EF abilities, such as cognitive flexibility, inhibition, and working memory are less likely to engage in overreactive parenting even when their emotion control is poor. Their high-performing EF may serve as a protective factor in parenting decisions when their child misbehaves. Conversely, mothers with poor EF may make the relationship between poor emotion control and higher frequency of overreactive parenting stronger because they may not be perceptive to their responses during child misbehavior and engage in impulsive, dysregulated responses. Thus, the relationship between emotion control and overreactive parenting may not be present in mothers with poor EF performance. Based on the small scope of existing research, I theorize that there may be a moderating effect of EF on the relationship between emotion control and overreactive parenting.

Further, previous studies have considered the strengths of using more than one modality of EF (e.g., EF tasks, self-report) and recommend future research use multiple modalities to produce a more reliable measure (Crandall et al., 2018; Deater-Deckard et al., 2012). Different modalities help capture 'hot' and 'cool' characteristics of EF. For instance, 'hot' EF measures motivationally and emotionally significant situations that influence behavior. Whereas, 'cool' EF focuses on more logical processing that are not emotionally driven. Further, the BRIEF-A also does this via self-report to measure daily use of both 'hot' and 'cool' EF. There have been a few studies assessing parenting outcomes that use multiple modalities to measure EF (Chen & Johnston, 2007; Joyner et al., 2009), however, most existing studies only utilize EF performance (Deater-Deckard et al., 2010; Nayak & Milner, 1998; Samuelson et al., 2012; Sturge-Apple et al., 2014). However, to our knowledge, no research to date has examined the moderating role of

mothers' executive functions across various modalities on mothers' emotion control and their overreactive parenting in their toddlers. Further, there is limited research that assesses mothers' emotion control as a predictor in overreactive parenting. Further, I anticipate that by assessing EF with various modalities, the moderating effect of EF on emotion control and overreactive discipline will contribute to this growing body of literature.

Current Study

Overreactive parenting is a common response to child misbehavior that leads to internalizing and externalizing problems later in life. I hypothesized that poor emotion control is associated with more overreactive discipline and higher performance in cognitive flexibility, inhibition, and working memory will strengthen this relationship. Additionally, current research on the moderating effects of EF on overreactive parenting is limited to EF tasks. This study will fill a current gap in parenting research. More specifically, this study will examine the moderating role of mothers' executive functions (i.e., inhibition, cognitive flexibility, and working memory) with multiple modalities: self-report and task-based measures.

Although there are known discrepancies between EF performance tasks and self-reported EF, using both modalities may explain some of the mixed findings that occur in emotion control and parenting literature. The role that cognitions have on emotionally adverse interactions, like overreactive discipline may not be fully captured by a measure that predominantly assesses specific aspects of EF (i.e., cognitive flexibility performance). Given the inconsistencies in the current body of literature, I will assess both modalities.

METHODS

Participants

Participants included 57 mothers of 2- to 5-year-old children. The mean age of the mothers was 35.2 (24 - 55 years). The mean age of the children was 45.5 months (24 - 66 months) and 49% were female. Most mothers identified themselves as African American (40.7%), followed by Caucasian (38.9%), Hispanic (30%), Asian (20.4%), Pacific Islander (5.6%), or American Indian (1.9%). These categories were not exclusive to only one race or ethnicity. For example, mothers could endorse that they were both Asian and Caucasian. The mean household income was \$79,818 (range = \$0-\$262,000). This distribution was positively skewed where the median household income was \$56,000.

Measures

Emotion control

Maternal emotion control was measured using the 10-item Emotion Control subscale of the Behavior Rating Inventory of Executive Function – Adult Version (BRIEF-A) (Roth et al., 2005). The BRIEF-A defines Emotion Control as an individual's ability to modulate or control emotional responses. Within normative levels, an individual can appropriately modulate or regulate emotions overall, without outbursts, sudden and/or frequent mood changes, or excessive periods of emotional upset. Sample items include “I have angry outbursts”, “I overreact emotionally”, and “I overreact to small problems”. Each item was measured on a 3-point Likert scale with response options *never*, *sometimes*, and *often*, respectively. The BRIEF-A items in this sample were highly correlated with themselves ($\alpha = .96$). The emotion control scale had good internal consistency ($\omega = .86$). Higher scores indicate less emotion control.

Executive Function

Executive function tasks were presented via Inquisit 5 computer software program (Millisecond, 2016). The self-report executive functions were measured with the BRIEF-A as well. This study focuses on the unique properties of the scale, rather than the index.

Cognitive Flexibility. The Wisconsin Card Sorting Test (WCST) was used to assess mothers' cognitive flexibility performance. Four stimulus cards incorporating three stimulus parameters (color, form, and number) were presented via a computer screen. Respondents were then required to sort numbered response cards according to the different stimulus parameters and to alter their sorting approach during test administration. After 10 consecutive correct responses and a completed category, the sorting principle changes. A higher score reflects more sets completed in this task and better developed cognitive flexibility abilities.

Self-reported cognitive flexibility was assessed with the BRIEF-A using the 6-item task shifting subscale. The six items are "I have trouble changing from one activity or task to another", "I have trouble thinking of a different way to solve a problem when stuck", "I am bothered by having to deal with changes", "After having a problem, I don't get over it easily", "I have trouble accepting different ways to solve problems with work, friends, or tasks" and, "I get disturbed by unexpected changes in my daily routine" (Roth et al., 2005). Mothers responded on a 3-point Likert response scale: 0=*never*, 1=*sometimes*, and 2=*often*. The cognitive flexibility scale has good internal consistency ($\omega = .76$). Higher scores on cognitive flexibility indicate more difficulty with cognitive flexibility.

Inhibition. The Stroop Color-Word Task was also used to measure inhibition performance, the tendency to contain an automatic response. In the color-word version of

this task, participants were asked to identify the color of the printed color word under the condition of congruent (i.e., the word “blue” being displayed in blue ink) and the incongruent (i.e., the word “blue” being displayed in red ink) conditions. This study assesses levels of interference with Stroop, the difference in the response speed for each condition. Levels of inhibition are interpreted by this interference, meaning the difference in reaction time between an incongruent stimulus and a congruent stimulus. This interference is also known as the “Stroop Effect”, a measure of the inhibitory ability to inhibit a usual or overlearned response in favor of an unusual one. A higher score on this means that there is more interference, and therefore, poorer inhibition skills. Further, mothers with a higher Stroop score take more time to correctly detect if a stimulus is congruent or incongruent.

Self-reported inhibition was assessed with the BRIEF-A using the 8-item inhibition subscale. The eight items are: “ I tap my fingers or bounce my legs”, “I have trouble sitting still”, “I have problems waiting my turn”, “I make inappropriate sexual comments”, “People say that I am easily distracted”, “I rush through things”, “I am impulsive”, and “I make decisions that get me into trouble (legally, financially, socially)”. Mothers responded on a 3-point Likert response scale: 0=*never*, 1=*sometimes*, and 2=*often*. The inhibition subscale has good internal consistency ($\omega = .76$). Higher scores on inhibition indicates more difficulty with inhibition.

Working Memory. Backward digit span task was also used to measure working memory performance. Mothers listened to audio sequencing a series of single-digit numbers (0–9) and she was then instructed to click the numbers she heard from last to first. Following a practice trial, the task began with a four-digit sequence. An additional digit was added in each successive trial. Mothers were given two chances to correctly

recite the numbers in reverse. When the subjects failed to do so after two chances then the task ended, and they were given the score of the last correct trial. A higher Digit Span score was interpreted as better-performing working memory.

Self-reported working memory was assessed with the BRIEF-A using the 8-item working memory subscale. The eight items are: “I have trouble concentrating on tasks (such as chores, reading, or work)”, “I have trouble with jobs or tasks that have more than one step”, “I forget what I am doing in the middle of things”, “I have trouble staying on the same topic when talking”, “I Have a short attention span”, “I forget instructions easily”, “I have trouble remembering things, even for a few minutes (such as directions, phone numbers)”, and “I have trouble doing more than one thing at a time” (Roth et al., 2005). Mothers responded on a 3-point Likert response scale: 0=*never*, 1=*sometimes*, and 2=*often*. The working memory scale has good internal consistency ($\omega = .86$). The higher the scores on this scale indicates more difficulty with working memory.

Overreactive discipline.

All mothers completed an 11-item version of the Parenting Scale (Arnold et al., 1993; M. Lorber et al., 2014), a measure of overreactive and lax discipline practices. The Parenting Scale has been validated against child behavior problems, home observations of parenting, and with item response theory (Arnold et al., 1993; M. Lorber et al., 2014). The 5-item overactivity scale was scored by calculating the mean score among the 5 items. Each overreactive discipline response was paired with an *effective* discipline counterpart to form the anchors for a 7-point scale. For example, the *mistake anchor* of one item is “when my child misbehaviors, I raise my voice or yell”, and its *effective* counterpart is “I speak to my child calmly” (see Appendix B). The Parenting Scale has high positive convergent validity between informant and participant reports, and the

overreactive discipline scale has a good internal consistency ($\omega = .71$). A higher score on this scale indicates a higher likelihood that parents will engage in overreactive parenting.

Overview of Analyses

First, descriptive statistics of the measures and bivariate relationships among the measures were examined. Mothers' age was not significantly correlated with any of the primary variables, so they were not controlled in further analysis. Prior to performing any moderation analyses, bivariate correlations between EF (e.g., cognitive flexibility, inhibition, working memory), overreactive discipline, and emotion control were estimated. All correlations were evaluated with Pearson correlation coefficients because the variables' skewedness and kurtosis were within the acceptable range.

Second, six moderation analyses were performed to test the moderating effect of executive function on emotion control in predicting overreactive discipline. Emotion control and executive function measures were standardized so the estimated parameters could be compared across the analyses and to reduce the likelihood of multicollinearity. To test the hypothesis that 1) poor emotion control is related to overreactive parenting, and 2) that this relation would be moderated by executive functions, I used hierarchical linear regression. In Step 1, emotion control and the EF variable were entered into the model. In Step 2, the product of maternal emotion control by each maternal EF was entered. There was no missing data in this sample, except for one of the inhibition constructs (e.g., Stroop incongruent reaction time) which had a 3.5% rate of missing data. Missing data was handled using Full information maximum likelihood (FIML). Moderation analyses were computed with bias-corrected bootstrapped estimation (10,000 replicates) using Mplus 7.0 (Muthén & Muthén, 1998-2012).

RESULTS

Descriptive statistics and Pearson correlations among study constructs are shown in Table 1. Mothers' self-report of cognitive performance, cognitive performance in executive functions (EF) tasks, self-report of emotion control, and overreactive parenting scores were normally distributed.

As expected, there was some intercorrelation between EF variables. Maternal working memory performance and cognitive flexibility performance were positively associated with each other, $r=.48, p < .001$. However, there was no significant association between each of the EF pairs (e.g., inhibition performance and self-reported inhibition, cognitive flexibility performance and self-reported cognitive flexibility, and working memory performance and self-reported working memory). However, one of the three EF tasks pairs, specifically self-reported inhibition and inhibition performance were directly associated, $r = .69, p < .05$.

Interestingly, emotion control was significantly associated with self-reported EFs: cognitive flexibility, $r = .67, p < .001$, inhibition, $r = .55, p < .001$, and working memory, $r = .52, p < .001$, but not task measures of EF. Also, the association between executive function performance overreactive parenting was mixed. Specifically, significant associations for inhibition performance, $r = -0.27, p < .05$, working memory performance, $r = .27, p < .05$, and self-reported cognitive flexibility, $r = .25, p < .05$ were found, while self-reported inhibition, self-reported working memory, and cognitive flexibility performance were not associated with overreactive parenting.

Emotion control was significantly associated with overreactive parenting, $r=.43, p < .001$. This supports the first hypothesis that emotion control would predict overreactive parenting. To test the second hypothesis, moderation regression analyses were performed

to predict overreactive parenting. Six moderation analyses were conducted to explore the moderating role of various domains of EF (i.e., cognitive flexibility, inhibition, and working memory). All hypothesized interactions between emotion control and maternal EF were not statistically significant. Test statistics and standardized regression coefficients are shown in Table 2.

DISCUSSION

The purpose of this study was to replicate the direct relation between EF and over reactive parenting and consider the moderating effects of mothers' executive functions (EF) on the relationship between their emotion control and overreactive parenting. My first hypothesis was supported, such that poorer emotion control (i.e., emotional outbursts, getting upset easily) was positively associated with higher levels of overreactive parenting. This indicates that mothers' ability to control their emotions is critical in emotionally challenging situations or during child misbehavior. However, my second hypothesis was not supported, as we did not find a moderating effect of EF on this association. However, the hypothesis of a direct relation of EF to overreactive parenting was partially supported, but only for the self-report EF measures

The study's main effect findings align with other findings in previous literature ([Crandall et al., 2015](#)). More specifically, that poor emotion control was associated with more non-supportive, and overreactive parenting ([Hughes & Gullone, 2010](#)). Mothers that experience difficulty with regulating intense and overwhelming emotions during aversive child misbehavior endorsed more instances of overreactive parenting. This effect may be occurring because mothers with poor emotion control have limited coping skills ([Gratz & Roemer, 2004](#)). Limited coping skills impact mothers' ability to support their children constructively and respond in an adaptive way to child misbehavior. Further, limited coping skills are related to poor emotion control because it impacts how mothers process those emotionally heightened states ([Gratz & Roemer, 2004](#)). Further, studies support that mothers with lower emotion control were more critical of their child's dysregulation than mothers with higher levels of emotion control ([Gratz & Roemer, 2004](#); [Morelen et al., 2016](#)). This indicates that mothers who report lower levels of

emotion control have difficulty controlling their anger and frustration. These mothers are more likely to engage in overreactive parenting (e.g., the child can see their mother getting upset, mothers tend to let problems build up and their response is out of proportion) than a mother with higher reports of emotion control. Mothers with higher-performing emotion control can cope with their anger without directing it at their child during disciplinary situations. This theory is strongly supported by the findings in this study. However, this study uniquely adds to the existing literature because it specifically looks at emotion control as a self-reported indicator of frequency of a 'hot' emotional processes occurring that creates angry, negative emotional states. Previous studies have looked primarily at emotion control as a process that is constantly occurring and actively working to diffuse negative emotion (Gratz & Roemer, 2004; Gross, 1999; Morelen et al., 2016). This is a distinctly different emotional process in parenting such that it focuses more on a parent's frustration tolerance and their frequency of their poor emotion control. Further, no previous literature has assessed the moderating effect of EF on emotion control and overreactive parenting.

A number of EF constructs were directly associated with overreactive parenting. This may indicate EF's influence in critical situations where parents are trying to manage child's challenging misbehaviors. Mothers' self-reported cognitive flexibility and cognitive flexibility performance had discrepant relationships with overreactive parenting. Self-reported cognitive flexibility was significantly related to overreactive parenting, but EF performance was not. This effect may have occurred because of what self-reported cognitive flexibility measures. This measure focuses more on the ability to transition and switch between thinking about two different things to solve a current problem (Roth et al., 2005). While the cognitive flexibility performance measure also

focuses more on switching their cognitive strategies to explore two of more aspects of an object, idea, or complex situation, therefore it demands more abstract reasoning (Miles et al., 2021). Since self-reported cognitive flexibility provides more concrete examples of cognitive flexibility (e.g., “I have trouble changing from one activity or task to another”, “I have trouble accepting different ways to solve problems with work, friends, or tasks”), this may be a closer reflection of how cognitive flexibility impacts parenting decisions during child misbehavior.

Mothers’ self-reported EF and EF performance for inhibition and their association with overreactive discipline had different findings. Although inhibition performance was significantly related to overreactive parenting, self-reported inhibition was not. This effect may have occurred because of how self-reported inhibition is measured. This measure focuses more on impulsivity (e.g., “I rush through things”, “I have problems waiting my turn”) and hyperactivity (e.g., “I tap my fingers or bounce my legs”; “I have trouble sitting still”). Conversely, inhibition performance measures one’s ability to inhibit cognitive interference that occurs when processing a specific stimulus while also impeding the simultaneous processing of a second stimulus. This can be compared to a child misbehaving and a parent impeding their response to overreact and alternatively, respond in an emotionally regulated manner. Self-reported inhibition does not completely overlap inhibition performance. However, the self-report inhibition was very close to meeting a significant association with overreactive parenting ($p = .08$). Perhaps with a larger sample, self-report of inhibition may have also been significant. Inhibition may serve as a barrier to negative parenting behaviors because it makes it more difficult to parents to engage in adaptive behavior and as a result will often impulsively engage in overreactive or harsh parenting. However, the mechanism is still unclear.

Mothers' self-reported working memory and working memory performance had differing associations with overreactive parenting, such that working memory performance was significantly associated with overreactive parenting but self-reported working memory was not. This effect may have occurred because of how working memory is measured for each construct. For self-reported working memory, it measures one's ability to maintain attention when completing chores (e.g., "I have trouble concentrating on tasks (such as chores, reading, or work)", "I have trouble with jobs or tasks even when I am willing). This is different from working memory performance, such that this focuses on receiving auditory information, manipulating it, and responding in an accurate and time-sensitive manner. This indicated that mothers that have difficulty manipulating auditory information and then producing a response also use more overreactive parenting. Conversely, self-reported working memory performance may not be very informative if a mother's level of insight into her abilities is poor. This finding aligns with previous research that found that the relationship between a child's misbehavior and a mother's negative response was moderated by poorer working memory (Deater-Deckard et al., 2010). Such that, mothers with poorer working memory are negatively reactive toward their children because they have more difficulty controlling their emotions during child misbehavior (Deater-Deckard et al., 2010). Working memory may be related to parenting because of how it could be supporting and managing frustration and anger in parent-child relationships. Since working memory promotes reflection and consideration of various responses to a challenging situation, higher-performing working memory may aid mothers in responding in a regulated way rather than lashing out (Baddeley et al., 1998; Deater-Deckard et al., 2012).

There was some support for EF's relation to overreactive parenting. Specifically, self-reported cognitive flexibility was found to be significantly associated with overreactive parenting, such that poorer cognitive flexibility was associated with more overreactive parenting. Further, self-reported inhibition was nearly significantly correlated with overreactive parenting ($p = .80$). This is consistent with previous studies that found that poorer EF performance was associated with reactive and hostile parenting (Deater-Deckard et al., 2010; Nayak & Milner, 1998).

Limitations

Several design and measurement limitations should be considered in the interpretation of this study. First, this was a small sample ($N=57$). The small sample size may have impacted the instances of significant moderating findings. The preliminary data indicate that these measures should be pursued with a larger sample. For instance, this study has data that supports that self-report of inhibition is significantly related to overreactive parenting and not the task measure for inhibition. Additional limitations pertain to the study design. This study used a cross-sectional design; this limits conclusions about causality. Longitudinal research with repeated measures of mothers' emotion control, mothers' EF, and disciplinary style would provide valuable information as to the direction of the effects. Experimental interventions targeting parent EF and reduced overreactive discipline would provide the strongest evidence of causal processes.

Maternal EF is critical in minimizing harsh, overreactive discipline (Deater-Deckard et al., 2010). While there are no indications of significant differences among men and women in EF performance (Grissom & Reyes, 2019), mothers' and fathers' parenting styles are often different when disciplining the same child (Winsler et al., 2005). Mothers and fathers appear to have different attributions, or causal explanations to

understanding their child's misbehavior that guide their parenting ([Bornstein et al., 2011](#); [Colalillo et al., 2015](#)). These differences in their reasoning for their child's misbehavior among mothers and fathers are associated with their disciplinary decisions. For instance, primary caretakers endorse more instances of externalizing problems and attribute to the child's fault, and are likely to engage in harsh parenting ([Nelson et al., 2013](#)). Perhaps there will be discrepant disciplinary styles among the primary and secondary caretakers upon child misbehavior that is moderated by EF. Future studies could explore the discrepancies between mothers and fathers and the differences in how their EF and emotion control uniquely impact their child-rearing practices.

Future research should sharpen and deepen its understanding of how maladaptive parenting are associated with EF performance, rather than overreactive. EF performance, specifically deficits in inhibitory control and cognitive flexibility were found as significantly related to neglectful and maladaptive parenting. While a moderating effect was not found in parents that use overreactive parenting frequently, perhaps emotion control and a more harsh and power-assertive form of parenting would be moderated by mothers' EF performance. Therefore, researchers should look for at harsher and more negative parenting. Previous studies have found that poor-performing EF has been associated with harsh, maladaptive parenting ([Azar & Weinzierl, 2005](#)). EF performance is needed for parents to develop their reactions and flexibly change their behaviors in disciplinary situations ([Barrett & Fleming, 2011](#)). Further, EF performance was important in parents' coping and ability to respond effectively when faced with challenging misbehavior ([Barrett & Fleming, 2011](#); [Crandall et al., 2015](#)). Parents that engage in maladaptive schema in parenting roles are more likely to engage in power-assertive punishment that would be more effective in the short-term ([Caselles & Milner, 2000](#)).

Further, physically abusive and neglectful mothers were found to have poor EF, specifically in problem-solving capacities (Azar et al., 1984).

Additionally, this study measures overreactive parenting, which does not capture high levels of aggression and adverse situations may influence this effect. For instance, mothers' executive functions (EF) performance was significantly related to overreactive parenting, however, if there was chaos present in the home, the protective properties of high-performing EF did not have the same effect on their engagement in overreactive parenting (Deater-Deckard et al., 2012). Further, mothers' EF deficits were significantly related to harsh and negative parenting, specifically when physical aggression (Azar et al., 2013; Azar & Weinzierl, 2005), neglect (Azar et al., 2017), or adversity (i.e., homelessness) (Monn et al., 2017) was present. Since this study does not include parenting with high levels of aggression and levels of adversity, this effect would have been difficult to replicate. While I initially expected to see a similar outcome as previous studies have demonstrated, this effect may not have occurred in this study because it does not have the high levels of aggression and adversity that was present in those previous studies. Perhaps the level of acuity in these constructs is a key moderating factor that changes the protective factor high-performing EF has on reducing overreactive parenting.

Strengths

There are several strengths of this study. First, this study contributed to the limited body of literature that assesses mothers' emotion control. Emotion control specifically captures one's ability to refrain or give into angry outbursts. Further, it assesses the frequency of intense emotional outbursts (Roth et al., 2005). While there were no significant moderating effects of EF on emotion control and overreactive parenting, it broadens our understanding of how emotion control is related to overreactive

parenting because of how emotion control is measured. Emotion control in this measure was focused more on the self-reported frequency of angry and negative emotional states, whereas previously emotion control has focused more on the mechanism constantly reducing emotional dysregulation (Gross, 1999; Roth et al., 2005). This unique construct may contribute to the inconsistency in findings between this study and previous research. Specifically, the lack of moderating effects that EF has been shown to have in parenting. However, understanding this facet of emotional processing is important in understanding the mechanisms behind overreactive parenting.

While some studies used a composite variable of EF (Chen & Johnston, 2007; Joyner et al., 2009), this quality in measurement made it difficult to compare to other studies that exclusively use one modality to measure EF (Deater-Deckard et al., 2010, 2012; Nayak & Milner, 1998; Samuelson et al., 2012; Sturge-Apple et al., 2014). This study contributes to the limited literature because it uses two different methods to measure EF: self-reported and performance-based tasks. The incorporation of EF tasks in combination with self-report can provide a larger scope of EF and how it is associated parenting outcomes (Anderson, 2002). However, this study still assesses each EF measure as its own independent moderator of emotion control on overreactive parenting. Mothers' self-report has the potential bias which could explain some of the lack of interrelation between the self-report perception of EF and actual EF performance. Previously, working memory as measured with backwards Digit Span was associated with harsh parenting (Deater-Deckard et al., 2012). This aligns with the findings in my study. Therefore, overreactive parenting and its association with EF processes are clearer and align with previous research.

Another valuable strength of this study is the ethnic and economic diversity of this sample. This sample consists of more ethnic diversity and socioeconomic diversity as compared to other studies that have assessed EF in mothers and their parenting styles (Bridgett et al., 2017; Deater-Deckard et al., 2010).

CONCLUSION

The findings from this study add to the growing body of research that considers emotion control and EF in parenting. Self-reported emotion control use in daily life is associated with self-reported instances of overreactive parenting. Further, both EF performance and self-report showed some significant association to overreactive parenting. This study contributes to the literature that supports the importance of emotion control in its relation to overreactive parenting and provides more support that EF does not reduce the protective properties of good performing emotion control. Therefore, further research needs to be done to understand the mechanisms between emotion control and overreactive parenting. Further, emotion control is a regulatory construct that captures more of the regulatory mechanisms experienced in parenting. Research should focus on targeting emotion control in improving outcomes in parenting interventions.

Table 1.

Descriptive statistics and correlations for variables

Measure	1	2	3	4	5	6	7	8
1. Emotion Control	-							
2. Cog Flex: S	.67***	-						
3. Cog Flex: T	-.15	-.04	-					
4. Inhibition: S	.55***	.57***	-.01	-				
5. Inhibition: T	-.04	-.01	-.23	.01	-			
6. WM: S	.52***	.62***	.10	.69**	-.05	-		
7. WM: T	.23	.22	.48***	.16	-.18	0.20	-	
8. Overreactivity	.43***	.25*	.09	.22	-.27*	.11	.27*	-
<i>M</i>	15.84	9.26	4.21	11.12	391.77	12.61	4.98	2.65
<i>SD</i>	4.55	2.59	1.92	2.84	440.22	3.90	2.07	1.23
<i>Minimum</i>	8.00	5.00	0.00	7.00	-622.80	4.00	-1.00	1.00
<i>Maximum</i>	28.00	17.00	6.00	18.00	2154.38	22.00	8.00	5.40

Note. Cog Flex: S = cognitive flexibility self-reported; Cog Flex: T = cognitive flexibility task; Inhibition: S = inhibition self-reported; Inhibition: T = inhibition task; WM: S = working memory self-reported; WM: T = working memory task

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 2.

Moderated Association of Emotion Control and Overreactive Discipline

Step, Predictor	β	<i>B (SE)</i>	95% CI		<i>R</i> ²
			LL	UL	
1 Emotion Control	0.462	0.566 (0.223)	0.080	0.966	
Cognitive Flexibility: S	-0.056	-0.069 (0.196)	-0.413	0.362	.182
2 Emotion Control	0.511	0.625 (0.224)	0.117	1.024	
Cognitive Flexibility: S	-0.037	-0.045 (0.207)	-0.424	0.387	
Emotion Control x Cognitive Flexibility: S	-0.165	-0.147 (0.163)	-0.473	0.205	.205
1 Emotion Control	0.448	0.548 (0.172)	0.228	0.640	
Cognitive Flexibility: T	0.154	0.188 (0.160)	-0.114	0.412	.203
2 Emotion Control	0.462	0.565 (0.179)	0.246	0.917	
Cognitive Flexibility: T	0.154	0.188 (0.168)	-0.152	0.495	
Emotion Control x Cognitive Flexibility: T	0.113	0.136 (0.216)	-0.353	0.477	.216
1 Emotion Control	0.437	0.535 (0.214)	0.117	0.962	
Inhibition: S	-0.022	-0.027 (0.175)	-0.364	0.328	.181
2 Emotion Control	0.458	0.560 (0.226)	0.100	0.991	
Inhibition: S	-0.009	-0.011 (0.187)	-0.361	0.370	
Emotion Control x Inhibition: S	-0.078	-0.088 (0.166)	-0.414	0.242	.186
1 Emotion Control	0.455	0.560 (0.177)	0.258	0.957	
Inhibition: T	-0.282	-0.347 (0.135)	-0.639	-0.092	.278
2 Emotion Control	0.404	0.495 (0.168)	0.211	0.864	
Inhibition: T	-0.326	-0.398 (0.142)	-0.680	-0.105	
Emotion Control x Inhibition: T	-0.243	-0.358 (0.187)	-0.751	0.004	.319
1 Emotion Control	0.502	0.614 (0.182)	0.215	0.701	
Working Memory: S	-0.150	-0.184 (0.185)	-0.456	0.131	.197
2 Emotion Control	0.571	0.698 (0.191)	0.243	0.799	
Working Memory: S	-0.142	-0.174 (0.188)	-0.474	0.125	
Emotion Control x Working Memory: S	-0.225	-0.218 (0.195)	-0.612	0.149	.242
1 Emotion Control	0.383	0.469 (0.186)	0.122	0.603	
Working Memory: T	0.184	0.225 (0.143)	-0.051	0.395	.212
2 Emotion Control	0.330	0.403 (0.202)	0.053	0.598	
Working Memory: T	0.298	0.364 (0.216)	-0.087	0.621	
Emotion Control x Working Memory: T	0.215	0.278 (0.256)	-0.210	0.524	.245

Note. Significant estimates are bolded (95% CI zero exclusive). S = self-reported; T = task.

Appendix A

Demographics Questionnaire

We would like to ask you some information about you and your family.

About you:

1. Age:
2. Your current relationship status
 - Single, not currently dating
 - Single, dating and not in a relationship
 - Single, in a relationship
 - Cohabiting
 - Married
3. Your current gender identity
 - Female
 - Male
 - Prefer to self-describe: _____
 - Prefer not to answer
4. Your relationship to child
 - Biological parent or adoptive parent
 - Stepparent or parent's partner (living in household)
 - Other adult relative
 - Foster Parent
5. Please check one or more categories below to indicate what race(s) you consider yourself to be.
 - African American or Caribbean American
 - American Indian or Alaska Native
 - Asian (e.g. East Asian, South Asian, Middle Eastern)
 - Caucasian
 - Native Hawaiian or Pacific Islander
6. Are you Spanish, Hispanic, or Latino?
 - Yes
 - No
7. Is English your first language?
 - Yes
 - No
8. Was English the primary language spoken in your home growing up?
 - Yes
 - No

9. Highest grade or year of school you completed
Never attended school or only attended kindergarten
Grades 1 through 8 (elementary)
Grades 9 through 11 (some high school)
Grade 12 or GED (high school graduate)
College 1 year to 3 years (some college or technical school)
College 4 years or more (college graduate)
10. Employment status (please check one):
Part time
Full time
Unemployed
Homemaker
Student
Retired
Unable to work
11. Annual household income (from all sources):
\$ _____

About your child (the 2- to 5-year-old child identified at the beginning of these questionnaires):

12. Age: _____ year(s) and _____ month(s)
13. What is your child's current gender identity?
Female
Male
Prefer to self-describe: _____
Prefer not to answer

Appendix B

Parenting Scale – IRT-derived Short Form

Instructions: At one time or another, all children misbehave or do things that could be harmful, that are “wrong”, or that parents don’t like. Example include:

hitting someone	whining	not picking up toys
forgetting homework	throwing food	refusing to go to bed
having a tantrum	lying	wanting a cookie before
dinner		
running into the street	arguing back	coming home late

Parents have many different ways or styles of dealing with these types of problems. Below are items that describe some styles of parenting.

For each item, fill in the circle that best describes your style of parenting during the **past month** with your target child (*the 2- to 5-year-old child identified at the beginning of these questionnaires*).

SAMPLE ITEM:

At meal time...

I let my child decide how much to eat.

I decide how much my child eats.

1. **When my child misbehaves...**

I usually get into a long argument with my child.

I don’t get into an argument.

2. **I threaten to do things that...**

I am sure I can carry out.

I know I won’t actually do.

3. **When my child misbehaves...**

I raise my voice or yell.

I speak to my child calmly.

4. **When there is a problem with my child...**

things build up and I do things I don’t mean to do.

things don’t get out of hand.

5. **When my child doesn’t do what I ask...**

I often let it go or end up doing it myself.

I take some other action.

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