Spring 5-9-2020

Relations Between Executive Function and Parenting Behavior

Robin Alexandra Riddick
University of Mississippi

RELATIONS BETWEEN EXECUTIVE FUNCTION AND PARENTING BEHAVIOR

by

Alex Riddick

A thesis submitted to the faculty of the University of Mississippi in partial fulfillment of the requirements of the Sally McDonnell Barksdale Honors College.

April 2020

Approved by

_____

Advisor: Dr. Stephanie Miller

_____

Reader: Dr. Carey Dowling

_____

Reader: Dr. John Young

ACKNOWLEDGEMENTS

I would like to thank Dr. Stephanie Miller for all of her help throughout this entire process. She was always patient and encouraging, and I could not have done it without her. I would also like to thank Reagan and Victoria, and my other readers, Dr. Dowling and Dr. Young for the part they played.

ABSTRACT

ALEX RIDDICK: Relations Between Executive Function and Parenting Behavior (Under the direction of Dr. Stephanie Miller)

Past research focused on how harsh parenting related to EF and behavior problems in children when other factors (i.e., maternal stress, household chaos, socioeconomic risk factors) were present. However, the literature was lacking in the examination of the relationship between EF and other parenting styles. This study aimed to examine the relationship between different aspects of executive function and regulation (i.e, inhibition, working memory, cognitive flexibility, problem solving, and impulsivity) and parenting and routines (i.e., laxness, hostility, overreactivity, and sleep and routines). To study this, parents of 18 to 24 month olds were administered a battery of EF tasks and self-report questionnaires on parenting, impulsivity, and sleep and routines in the home. I found some relations between EF and parenting. Lower scores on the working memory task were related to more problems with overreactivity and overall parenting problems. Higher scores on the inhibition task were related to less overall parenting problems. Better sleep and routines were related to fewer problems with laxness and overreactivity. Although the few relations between EF and parenting behavior was surprising, the lack of relations could be due to methodology and cultural differences in parenting.

Table of Contents

List of Tables and Figures

Introduction

Parenting researchers often focus on the discipline strategies implemented by parents, which are important for healthy child development (Arnold, O'Leary, Wolfe & Acker, 1993). Although there are several ways to measure parenting, one frequently used method is based on self-report where parents answer questions about how they might react to common parenting situations (e.g., misbehavior), with a focus on parenting elements like consistency, permissiveness, harshness, emotionality, and hostility in discipline (e.g., Baumrind, 1967; Rhoades & O'Leary, 2007). Although several factors may influence the development of parenting practices (Baumrind, 2013), there are not many studies examining how individual differences in cognition may influence parenting. This may be fruitful to examine, as many elements of cognition include self-regulation (e.g., executive function or EF; a cognitive ability thought to aid in thought and behavior regulation, self-control, and "will-power"). The purpose of this study was to examine if parents' EF is related to parenting behavior.

Parenting Discipline Styles

One of the most well-known studies of parenting focused on the differing parenting styles proposed by Baumrind (1967, 1991, 2013). In her work, Baumrind proposed four main parenting styles that varied on two dimensions: warmth and control. Parental acceptance-responsiveness or warmth referred to how affectionate and responsive parents are to children's needs. For example, some parents are warm and supportive, while other parents are quick to criticize children. Demandingness-control referred to how much

control is exhibited by the parent. For example, some parents enforce strict rules while others allow their children to have more autonomy (Baumrind, 2013). Baumrind (2013) suggested that four main parenting styles emerged based on the level of warmth and control that parents endorsed with their children. First, authoritative (high in both warmth and control) has been suggested to be the most effective parenting style (but see, Grolnick & Pomerantz, 2009; Lansford et al., 2005; Sorkhabi & Mandara, 2013, for discussion on differences in parenting effectiveness) because it encourages a reasonable and democratic approach where parents are flexible and responsive to their children's needs. This parenting style consists of a mutual respect between parents and children where the parents are responsive to the children's needs and the children are responsive to the parents' demands. It is important to note that with this approach parents still enforce rules (i.e., and thus are high in control), but also maintain warmth by explaining the importance of and reasoning behind each one (e.g., instead of yelling a command, parents may state the rule and explain the importance of the rule). The second approach termed Authoritarian/ dictatorial style (low in warmth and high in control) is usually characterized by parents who are high in control and often have many rules and expectations for their children. These parents focus on punishing children when they do not comply and may involve the use of physical punishment to get their children to obey. Notably, this style is also low in warmth because parents often expect strict obedience without explaining to their children why the rules are important and why they should comply with them. Parents with a Permissive style (high in warmth and low in control) provide minimal rules and regulations in order to minimize conflict. The parents may

give in to their children's every whim. This approach has very few rules and little control over children's behavior (i.e., low in control), however the parents encourage their children to express their feelings without consequences (i.e., high in warmth). Finally, parents who have an uninvolved or Neglectful style (low in warmth and low in control) seem to be indifferent about their children's upbringing. Many parents who employ this style of parenting are overwhelmed by their own problems and do not have the time or energy to devote to their children (Maccoby & Martin, 1983). Parents who employ this style of parenting often have few rules (i.e., low in control) and are generally uninvolved in their children's lives and unconcerned about their upbringing (i.e., low in warmth).

There are a few limitations of measuring parenting styles like Baumrind (1971). Baumrind's measure only looked at two dimensions of parenting: acceptance-responsiveness and demandingness-control (Baumrind, 2013) when determining which style was most effective. These two dimensions are good starting points when looking at parenting behavior, but it is also important to look at other factors that may affect parenting behavior as well. Another tool for studying parenting is examining parents' self-report of parenting behaviors. For example, the Parenting Scale (Rhaodes & O'Leary, 2007) is a 30-item self-report scale that was developed to measure and rate discipline practices of parents. The parenting scale self-report questionnaire asks about how often the parents use particular discipline strategies. The scale includes 30 items which measures three potentially problematic parenting strategies: 1) Laxness: consisting of 5 items related to permissive discipline, 2) Overreactivity: consisting of 5 items related

to displays of anger, meanness, and irritability, and 3) Hostility: consisting of 3 items that reflect harsh parenting and the use of physical or verbal force.

Self-report techniques like the parenting scale have many benefits. For example, they are simple and are typically quick to complete. Although it is susceptible to one issue commonly seen in traditional self-report methods -- response bias, some have suggested that response bias is not as problematic in the questionnaire for the Parenting Scale because most parents indicated that were unsure of the "right" answer or how they should respond in the situation described (Arnold, O'Leary, Wolfe & Acker, 1993). Further, although parents' ability to discipline their children effectively is not the only measure of good parenting, it is an important one. The parenting scale has been useful in early interventions relating to child misbehavior at a crucial period in development (Arnold, O'Leary, Wolfe, & Acker, 1993).

Routines and Sleep Management

Another aspect important to parenting—especially with young children—is the management of sleep and routines. Routines are defined as repeated patterned interactions (Koulouglioti, Cole, & Moskow, 2011) and provide an optimal environment for health promotion and cognitive development due to predictability and structure. Structure is essential to promote a positive environment for children to develop (Koulouglioti, Cole, & Moskow, 2011). Many mothers view routines as an integral part of their role as a parent as well as a reflection of a successful parent (Koulouglioti, Cole, & Moskow, 2011). Meal time, bed time, and reading routines are routines that are

normally enforced by parents (Grywacz, Daniel, Tucker, Walls & Leerkes, 2011). Although most mothers see the importance of routines, they can be difficult to establish and maintain because of the children's behavior, time constraints, parents' lack of knowledge, and nonstandard work schedules (e.g., working nights and weekends, Joshi & Bogen, 2007). Children living in low income and single parent homes are also less likely to be on a strict schedule than children living with two parents. A previous study found that maternal nonstandard schedules are associated with negative behavior outcomes for young children and greater parenting stress (Joshi & Bogen, 2007).

Executive Function

Although there is individual variability in parenting behavior, there are certain parenting behaviors that seem to be associated with more positive outcomes for children (e.g., authoritative parenting style often leads to well adjusted children that are self-reliant and socially responsible, Baumrind, 2013, Khaleque & Rohner, 2012). However, studies examining what predicts positive parenting behavior are still developing and there have been few attempts to examine the potential cognitive factors that may play a role in parenting behavior. Cognitive abilities, especially in regulation, planning and control (i.e., executive function or EF) may be especially important to look at in relation to parenting because many elements of cognition include an element of self-regulation. If parents are better able to regulate their own behavior, than this may allow them to regulate their children's behavior with planned positive strategies (i.e., less negative parenting strategies, better enforcement of sleep and routines).

EF is typically defined as the cognitive processes that aid in thought and behavior regulation or self-control and is tied to prefrontal cortex function of the brain. Although there are several ways to study EF—most measures focus on thought and behavior regulation, self-control, and "will-power". For example, Miyake and Friedman (2012) examined three subcomponents of EF related to updating (i.e., the ability to add or delete things to working memory), shifting (i.e., having the mental flexibility to switch between tasks or mental sets), and inhibition (i.e., being able to override dominant responses). This type of work usually focuses on individual differences in EF by examining performance across a number of tasks meant to assess updating, shifting, and inhibition. For example, updating has been measured in a letter memory task where the participants are presented with one consonant letter at a time. The participants must say the last three letters after each new letter in order to continue updating their working memory. At the end of the task the participants will be asked again to recite the last three letters presented. This task provides an example for measuring updating as it requires individuals to memorize and update the last three items in a sequence that increases in size. Shifting has been studied with tasks like the Color Shape Task. In a Color Shape Task, participants are asked to classify each target by color or by shape, and shifting is measured through the ability to switch between rules that conflict (e.g., sorting by color then shape). In a typical inhibition task like the antisaccade task participants are asked to fixate on the center cross on the screen. Next a flash occurs, luring participants to look at the wrong side of the screen while the correct target (i.e., an arrow) is on the opposite side of the screen. To answer correctly, participants were supposed to avoid looking at the

flash and move their eyes to the correct opposite side of the screen to identify the direction of the arrow. Inhibition was measured by the number of correctly reported arrows indicating how many times the participants used restraint or inhibition to overcome their instincts and avoid looking at the flash on the screen.

There are other abilities that may also be related to EF and impact parenting with children. For example, impulsivity, one's tendency to act without thinking, is related to EF abilities and are important to assessing issues in regulation related to ADHD (McCarney & Anderson, 1996). Impulsivity ties into the self-regulation component of EF and may influence parenting because if a parent is more impulsive in regards to their own behavior, then the parent will most likely act impulsively when making decisions on parenting and discipline. Measures of impulsivity tend to focus on the tendency to act without thinking. For example, the Adult Attention Deficit Disorders Evaluation Scale assesses impulsivity with a 20-item impulsivity axis via questionnaire containing items from the DSM-IV criteria for ADHD. In this measure there are a number of items that assess inattention, hyperactivity, and impulsivity (i.e., a Hyperactive-Impulsive sub scale of the ADHD evolution scale, McCarney and Anderson, 1996). This impulsivity axis measures the tendency to act without thinking and each item is rated on a 0-4 scale with higher scores indicating greater problems with impulsivity (e.g., “Has accidents or makes mistakes which are the result of impulsive or careless behavior, like frequent car accidents, traffic tickets, etc.)” with 4 being one to several times per hour (McCarney & Anderson, 1996).

Parenting and EF Relationship

Although there are theoretical reasons for why cognitive abilities related to control may relate to parenting behavior, there is not much work examining this link. One study conducted by Deater-Deckard, Wang, Chen, and Bell (2012) examined maternal harsh parenting- negativity (e.g., sometimes my child's behavior makes me so angry I can barely stand it), child conduct problems, household chaos (i.e., noise, crowding, lack of routines), and maternal EF. Household chaos was measured by an abbreviated Chaos, Hubbub and Order Scale (e.g., 'You can't hear yourself think in our home', 'It's a real zoo in our home', 'The atmosphere in our house is calm', Deater-Deckard, Wang, Chen, & Bell, 2012). Results indicated that maternal EF measuring executive attention, inhibition, and memory was linked with child conduct problems (i.e., noncompliance, anger, impulsivity) among mothers with poorer EF. The effect was weakest in chaotic households. Child behavior and maternal harshness were moderately associated only among mothers with poorer EF. Further, there was a moderate link between maternal EF and harsh parenting.

Another study done by Deater-Deckard, Chen, Wang and Bell (2012) took a similar approach, but added socioeconomic risk as a factor. This study focused on the link between household chaos and maternal cognitive self-regulation of attention and memory. The correlation between chaos and maternal EF was significant for mothers in households with four or five risk factors (i.e., marital status, paternal education, housing, maternal education, parental unemployment, Deater-Deckard, Chen, Wang, & Bell, 2012). Another approach used by Gonzalez et. al. (2012) used a self-report of consistency

of care and childhood maltreatment to examine links to maternal set shifting and spatial working memory to measure EF. Maternal sensitivity was also measured by videotapes of parent-child interactions. Findings supported the notion that parental stress and EF may be important factors associated with parenting in humans. The study found that higher levels of diurnal cortisol (stress) was related to poor spatial working memory and lower sensitivity (Gonzalez et al., 2012). Deater-Deckard and Bell (2017) also took a more physiological approach similar to Gonzalez et al. (2012). They hypothesized that better EF task performance would contribute to lower levels of harsh parenting. The study found that EF was only marginally significant as a main effect on harsh parenting levels (Deater-Deckard & Bell, 2017).

In sum, these results indicated that parents with poor EF experience more behavior problems in their children when other factors (i.e., maternal stress, household chaos, socioeconomic risk factors) were present. They seem to suggest that EF is moderately linked to parenting behavior (e.g., less EF, more harsh parenting). However, it is important to note that EF relations were only examined with regard to harsh parenting, and not other parenting styles.

The Present Study

The purpose of this study was to examine EF links to other types of parenting (i.e., laxness, overreactivity, and hostility) as well as sleep and routines which may also involve cognitive abilities in self regulation and control. As seen in the previous studies (Deater-Deckard & Bell, 2017, Deater-Deckard, Chen, Wang, & Bell, 2012, Deater-

Deckard, Wang, Chen & Bell, 2012, Gonzalez et al., 2012), EF has been studied most often in relation to household chaos and harsh parenting. I aimed to take into account different aspects of EF (i.e., working memory, inhibition, etc.) as well as different aspects of parenting (i.e., laxness, overactivity, hostility, routines). I hypothesized that parents with better EF will exhibit less parenting problems.

Methods

Participants

Seventy-two parents of toddlers (i.e., 18 or 24 months of age) participated in the present study by coming into an UM campus laboratory. Of the 65 parents who reported demographics, approximately 73% indicated maternal education of a bachelor's degree or higher and 80% indicated paternal education of a bachelor's degree or higher. Ninety-one percent of mothers indicated they were married with 42% reporting that their toddler did not have siblings. Approximately 75% of the sample reported their child's race as Caucasian.

Procedure

During the visit parents completed a battery of tasks examining EF and self-report measures assessing parenting, personality, children's language ability, and childhood misbehavior. The children completed a battery of tasks examining their EF, social understanding, and joint attention. After both the children and parents were complete with their separate portions, they came together to do an in-laboratory task related to parenting

and children's control of behavior. The tasks in the scope of the present study were related to parents' performance on EF tasks, self-report on impulsivity, and parents' self-report on a parenting measure and routines.

Parental Executive Function Tasks

Stroop Task (Inhibition, Stroop, 1935). The Stroop color-word task was used to measure inhibition. This task was administered on the computer. Participants were asked to name the color of the ink of the word instead of the word written on the screen (e.g., for the word "blue" printed in the color "red", the correct response was "red"). If the ink color and written word were the same, they were congruent (i.e., the word "red" written in "red" ink). If the ink color and written word were different, they were incongruent (i.e., the word "red" written in "blue" ink). There were three blocks, and each block included 24 trials. The first block consisted of congruent trials (i.e., the word "red" written in "red" ink), followed by a block of control trials (i.e., XXX's printed in the color "yellow"), and last were the incongruent trials (i.e., the word "red" written in "blue" ink). The participants were instructed to answer as quickly and accurately as possible (Deater-Deckard, Wang, Chen, & Bell 2012). Accuracy across 40 trials including all control XXX (n=20), congruent (word red written in red, n=8) and incongruent (word red written in green, n=12) trials was used as a measure of inhibition.

***The Dimensional Change Card Sort (i.e., DCCS, Cognitive Flexibility, Kirkham & Diamond, 2005*).** The DCCS was used to measure cognitive flexibility. In the DCCS, the participants had to switch between multiple sorting rules (e.g., shape or color). This

task was administered on the computer. Two target cards (e.g., a yellow car and a green flower) and testing cards (e.g., green cars and yellow flowers) were presented to participants in a random sequence in three blocks. In the first block (12 trials), the participants had to sort the cards by one dimension (e.g., sort by color). In the second block (12 trials), participants were asked to switch to a new rule and sort the same cards (e.g., sort by shape). Finally, in the third block (24 trials) participants were instructed to sort the cards based on the prompt that switched on the screen (i.e., for some trials it would say sort by "color" and on other trials it would say sort by "shape"). The total number of correctly sorted cards on the third block of switch trials was used as a measure of cognitive flexibility (DCCS, Diamond & Kirkham, 2005).

Backward Digit Span (i.e., working memory, Carlson, Moses, & Breton, 2002). The Backwards digit span was used to assess working memory. Participants were asked to hold digits in mind and then reproduce them in backward order. In the training phase, the participants were instructed to repeat a string of two numbers backward (i.e., "if I say 1, 2, you would say 2, 1"). Participants were then given two similar training trials and corrected if they were wrong. The participants had to correctly respond on two different trials in order to pass training. In the testing phase participants were presented with three two-digit trials and asked to produce the numbers backward. Next, the experimenter increased the digit span to three numbers and the procedure was repeated (i.e., with three 3-digit trials). The experimenter continued to give three trials at each span before increasing the span by one digit. Testing was terminated once participants gave three

incorrect answers in a row. This task was scored by the total trials completed correctly as a measure of working memory (Carlson, Moses, & Breton, 2002).

Tower of Hanoi (i.e., problem solving, Deater-Deckard, Chen, Wang & Bell, 2012). Tower of Hanoi was used to measure general EF problem solving. This task was administered by presenting participants with a block with three pegs on it. The leftmost peg had three disks, with the largest disk on the bottom stacked in descending order. The objective for the task was to move all the disks to the rightmost peg in the fewest moves possible in the same order. The two rules were that only one disk could be moved per turn and larger disks could not be placed on smaller disks. The task was scored based on time of completion (Deater-Deckard, Wang, Chen, & Bell 2012).

Parent Self-Report Measures

Parenting Scale (Rhoades & O'Leary, 2007, see Appendix A). Parents completed the Parenting Scale (Rhoades & O'Leary, 2007) a 30-item self-report battery where parents rated how likely they were to use different discipline strategies that included Laxness (e.g., when my child does something I don't like I often let it go), overreactivity (e.g., when my child misbehaves I raise my voice or yell), and Hostility (e.g., when my child misbehaves I say mean things). The mean for laxness was calculated if the parent answered at least four out of the five questions. Higher scores indicated more issues with laxness. The measure for laxness was reliable ($\alpha = .60$). The mean for overreactivity was calculated if the parent answered at least four out of the five questions. Higher scores indicated more issues with overreactivity. The measure for overreactivity was fairly

reliable with α = .57. The mean for hostility was calculated if the parents answered at least two out of the three questions. Higher scores indicated more issues with hostility and was not reliable reflecting inconsistent endorsement across the three questions, α = -. 140. I created a composite hostility score based on past research, but I also looked at the potential correlations between the individual hostility questions and EF because of the low reliability. For the Parenting Scale Total Score, the mean was calculated if the parents answered at least 28 out of the 30 questions. Higher scores indicated more issues with parenting. The total score averaged the rating of all 30 items and was a reliable measure (α = .736).

Sleep and Routines (Mindell & Owens, 2003, See Appendix B). The parents completed a questionnaire with four questions (e.g., my child eats dinner at the same time every night). The measure was reliable (α = .77) and a mean for the sleep and routines questionnaire was calculated if the parents answered at least 3 out of the 4 questions. Higher scores indicated more issues with routines .

Impulsivity (McCarney & Anderson, 1996). This impulsivity subscale came from the Adult Attention Deficit Disorders Evaluation Scale. The questionnaire contained 20 items to assess impulsivity from the DSM-IV criteria for ADHD. The average for impulsivity was calculated across 20 questions if the parent completed at least 18 out of the 20 questions. Higher scores mean more issues with impulsivity, (e.g., reacts immediately to situations without thinking). This measure was reliable α = .90.

Results

Descriptive Statistics and Missing data. Only a portion of the parents brought into the lab agreed to complete both the toddler and parent portion of the project. Sixty-three parents (88%) agreed to complete the self-report measure. Forty-one parents (57%) participated in the parental measures of executive function, though not all the missing data was due to failure to consent (e.g., laboratory resources were not available for testing all of the parents on that portion of the task). Missing data was handled in a pairwise deletion fashion, as we only considered data for the individuals who completed some portion of the relevant measures.

Descriptive statistics for variables of interest are reported in Table 1. Missing data within the self-report measures of the PS, SRQ, and Impulsivity was due to parents not completing the measures, however we did calculate averages for sub-scale values if parents completed the majority of the questions. Only one parent did not have enough data to complete a parenting total. The data was screened for outliers and there were no significant outliers present in the data.

Relations between parenting measures. See Table 2 for correlations among parenting measures. Better sleep and routines was related to less lax behavior, $r(61) = .36$, $p = .004$ and less overreactive behavior, $r(61) = .26$, $p = .038$. Laxness, Overreactivity, and Hostility were not related, rs $< .21$, ps $> .10$. PSTotal was related to laxness $r(60) = .69$, $p < .001$ and overreactivity $r(60) = .49$, $p < .01$, but not hostility, $r(60) = .11$, $p = 0.38$.

Relations between EF measures. See Table 2 for correlations among EF measures. There were no relations between EF measures, although impulsivity was marginally related to backward digit span $r(33) = .31$, $p > .07$. Thus, I did not create a composite EF measure and examined performance on each measure separately.

Relations between parenting and EF measures. See Table 2 for correlations among EF and parenting measures. Overall there were few relations between parenting and EF. The only measure of EF that did show a relation to parenting was Backwards Digit Span (BDS), where lower scores on BDS indicated more problems with overreactivity $r(38) = -.31$, $p = 0.49$ and more overall parenting problems $r(37) = -.32$, $p = .05$. Parenting was also marginally related to Stroop, parents who scored higher on Stroop had fewer total parenting problems, $r(61) = -.28$, $p = 0.09$.

Examination of Hostility Factor. The hostility measure was unreliable ($\alpha = -.14$) and scores on the questions for this factor were close to floor, with the exception of the spanking, hitting, grabbing question which had more variability, See Table 1. Although I created a composite hostility score based on past research, I also looked at the potential correlations between the individual hostility questions and EF as well, because of the low reliability. None of the EF measures related to hostility (ps > .10)

Discussion

The goal of this study was to examine the relationship between EF and parenting behavior. I looked at multiple aspects of EF and regulation (i.e., working memory, inhibition, flexibility, and impulsivity) and different types of parenting behaviors (i.e.,

laxness, overreactivity, hostility, sleep and routines). Although I hypothesized that parents with better EF would experience less parenting problems, there were few relations between EF and parenting. Higher scores on BDS (i.e., working memory) were related to fewer issues with overreactivity and overall parenting problems, with additional potential links between better Stroop performance (inhibition) and fewer parenting problems. These results suggest the regulatory cognitive components of EF do show some relations to parenting, suggesting regulation may be important to parenting behavior, although this relationship was not necessarily robust across all measures of EF and parenting.

Of the components of EF that were measured, the one that seemed to show the strongest relationship to parenting was working memory. Higher scores on the working memory task related to less problems with overreactivity as well as fewer overall parenting problems. WM may have had the strongest link to parenting because WM is the ability to hold and manipulate information in the mind. A parent with better WM should be able to think and respond to a situation quickly without overreacting because it could help parents consider other reasons the child was misbehaving (e.g., hold in mind misbehavior, but also the fact they had a bad day at school). This result may also align with a study by Gonzalez et al. (2012) which found that maternal stress and lower maternal sensitivity was related to poorer working memory. Poor working memory was also associated with greater reactive negativity in mothers (Gonzalez et al. 2012). Gonzalez found that working memory and cognitive flexibility were obvious in being able to attend to their infants while taking into account other environmental demands.

This is similar to these results that indicate that better working memory is associated with fewer problems with overreactivity and other parenting problems.

There was also a possible relationship between inhibition and total parenting problems. Higher scores on the inhibition task (i.e., the Stroop) showed a marginally significant relation to fewer overall parenting problems. This finding is similar to findings by Deater-Deckard et al., (2012), which showed that poor maternal EF was linked with child conduct problems. These findings are similar because inhibition is one component of EF, and parenting problems and child conduct problems often coincide. I think there is a possible relationship between inhibition and overall parenting problems because if a parent is able to control themselves against an autonomic response then they are able to think about the best way to respond before reacting, leading to fewer parenting problems.

Perhaps most surprising was the fact that there were few links between flexibility and impulsivity to parenting. The lack of relations could be due to methodological factors. For instance, most people performed well on the DCCS. Although the DCCS has been used with adults (Kirkham & Diamond, 2005), it originated in the child development literature. I think in the future it would be helpful to take into account reaction time in addition to accuracy as a measure of performance on the post-switch trials (e.g., accuracy is expected to be high for adults, but RT reflects the difficulty of switching). Further, perhaps another method to test flexibility would be better. Another possible issue with the impulsivity measure could be due to the fact that it was a self-report measure. Some self-report methods introduce the issue of social desirability bias,

which is the tendency for the participants to respond in a way that they think they are supposed to respond. A second measure for impulsivity could be helpful.

Another novel finding for this study was that better sleep and routines—something that is not commonly studied in parenting studies—was associated with less lax behavior and less overreactivity. This could be due to the structure of routines. According to Koulouglioti, Cole, & Moskow (2011), structure is essential to promote a positive environment for children to develop, and many mothers view routines as a reflection of a successful parent. If a parent enforced routines, then they would be more likely to be more structured in other parenting behaviors also.

There were several limitations to the present study. First, we had a small sample size which may be problematic because it may not be representative of the entire population. Small sample size could also make it more difficult to detect relationships between our variables of interest. Another factor to consider is that parenting in the Southern United States (i.e., where this study was conducted) may look different than parenting in other parts of the country. For example, how parents responded to the questions in the hostility subscale of the Parenting Scale (e.g., when my child misbehaves, I spank, slap, grab, or hit my child...) may differ by location depending on culture. Studies regarding cultural differences in parenting show that the effectiveness of parenting approaches can differ depending on the prevalence of the style in the culture (Grolnick & Pomerantz, 2009; Lansford et al., 2005; Sorkhabi & Mandara, 2013). Demographics should also be taken into account to see if there are any notable differences across the sample.

In sum, the purpose of this study was to examine the relationship between the maternal regulatory components of EF and parenting behavior. These results suggest that EF and regulation play a role in parenting behavior, but there is not necessarily a robust relationship present. More work is needed to further study this relationship. In the future, I think that it will be helpful to look at the role socioeconomic factors play in EF and parenting behavior. There are a few studies that examine socioeconomic risk factors in relation to EF (see Deater-Deckard, Chen, Wang and Bell, 2012), but I think it would be beneficial for future studies to see how socioeconomic factors may change or mediate the relationship between EF and parenting behavior.

References

Arnold, D. S., O'Leary, S. G., Wolff, L. S., & Acker, M. M. (1993). The Parenting Scale: A measure of dysfunctional parenting in discipline situations. Psychological Assessment, 5(2), 137–144. https://doi.org/10.1037/1040-3590.5.2.137

Baumrind, D. (1968). Authoritarian vs. authoritative parental control. Adolescence, 3, 255–272.

Baumrind, D. (1991). The influence of parenting style on adolescent competence and substance abuse. Journal of Early Adolescence, 11, 56-95.

Carlson, S. M., Moses, L. J., & Breton, C. (2002). How specific is the relation between executive function and theory of mind? Contributions of inhibitory control and working memory. Infant & Child Development, 11(2), 73–92. https://doi-org.umiss.idm.oclc.org/10.1002/icd.298

Christina Koulouglioti, Robert Cole & Marian Moskow (2011) Single Mothers' Views of Young Children's Everyday Routines: A Focus Group Study, Journal of Community Health Nursing, 28:3, 144-155, DOI: 10.1080/07370016.2011.589236

Deater-Deckard, K., Chen, N., Wang, Z., & Bell, M. A. (2012). Socioeconomic risk moderates the link between household chaos and maternal executive function. Journal of Family Psychology, 26(3), 391–399. https://doi.org/10.1037/a0028331

Deater−Deckard, K., Wang, Z., Chen, N. and Bell, M.A. (2012), Maternal executive function, harsh parenting, and child conduct problems. Journal of Child

Psychology and Psychiatry, 53: 1084-1091. doi:10.1111/j.1469-7610.2012.02582.x

Deater-Deckard, K., & Bell, M. A. (2017). Maternal executive function, heart rate, and EEG alpha reactivity interact in the prediction of harsh parenting. Journal of Family Psychology, 31(1), 41–50. https://doi-org.umiss.idm.oclc.org/10.1037/fam0000286

Diamond, Adele, and Natasha Kirkham. (2005). Not Quite as Grown-up as We like to Think: Parallels between Cognition in Childhood and Adulthood. Psychological Science, 16:4, 291–297. JSTOR, www.jstor.org/stable/40064218.

Gonzalez, A., Jenkins, J.M., Steiner, M., Fleming, A.S. (2012), Maternal Early Life Experiences and Parenting: The Mediating Role of Cortisol and Executive Function. Journal of the American Academy of Child & Adolescent Psychiatry, 51: 673-682. doi: 10.1016/j.jaac.2012.04.003

Grolnick, W.S. and Pomerantz, E.M. (2009), Issues and Challenges in Studying Parental Control: Toward a New Conceptualization. Child Development Perspectives, 3: 165-170. doi:10.1111/j.1750-8606.2009.00099.x

Grzywacz, J.G., Daniel, S.S., Tucker, J., Walls, J. and Leerkes, E. (2011), Nonstandard Work Schedules and Developmentally Generative Parenting Practices: An Application of Propensity Score Techniques. Family Relations, 60: 45-59. doi: 10.1111/j.1741-3729.2010.00632.x

Joshi, P. and Bogen, K. (2007), Nonstandard Schedules and Young Children's Behavioral Outcomes Among Working Low−Income Families. Journal of Marriage and Family, 69: 139-156. doi:10.1111/j.1741-3737.2006.00350.x

Khaleque, A., & Rohner, R. P. (2012). Pancultural Associations Between Perceived Parental Acceptance and Psychological Adjustment of Children and Adults: A Meta-Analytic Review of Worldwide Research. Journal of Cross-Cultural Psychology, 43(5), 784–800. https://doi.org/10.1177/0022022111406120

Kimberly A. Rhoades & Susan G. O'Leary (2007) Factor Structure and Validity of the Parenting Scale, Journal of Clinical Child & Adolescent Psychology, 36:2, 137-146, DOI: 10.1080/15374410701274157

Lansford, J., Dodge, K., Malone, P., Bacchini, D., Zelli, A., Chaudhary, N., . . . Quinn, N. (2005). Physical Discipline and Children's Adjustment: Cultural Normativeness as a Moderator. Child Development, 76(6), 1234-1246. Retrieved April 23, 2020, from www.jstor.org/stable/3696630

Maccoby, E.E., & Martin, J.A. (1983). Socialization in the context of the family: Parent-child interaction. Handbook of Child Psychology, 4.

McCarney, S. B. & Anderson, P. D. (1996). Manual for the Adult Attention Deficit Disorders Evaluation Scale. Columbia, MO: Hawthorne Educational.

Mindell, J.A., Owens, J.A. (2003). Sleep problems in pediatric practice: Clinical issues for the pediatric nurse practitioner, Journal of Pediatric Health Care, 17:6, 324-331, https://doi.org/10.1016/j.pedhc.2003.09.003.

Miyake, A., & Friedman, N. P. (2012). The Nature and Organization of Individual Differences in Executive Functions: Four General Conclusions. Current Directions in Psychological Science, 21(1), 8–14. https://doi.org/10.1177/0963721411429458

Sorkhabi, N., & Mandara, J. (2013). Are the effects of Baumrind's parenting styles culturally specific or culturally equivalent? In R. E. Larzelere, A. S. Morris, & A. W. Harrist (Eds.), Authoritative parenting: Synthesizing nurturance and discipline for optimal child development (p. 113–135). American Psychological Association. https://doi.org/10.1037/13948-006

Stroop, J. R. (1935). Studies of interference in serial verbal reactions. Journal of Experimental Psychology, 18, 643–662

Table 1

Table 1					
Descriptive Statistics of All Measures					
Measure	M	(SD)	Range	N	
Parenting Measures					
Parenting Scale					
Laxness	2.33	(.76)	1-4	63	
Overactivity	2.37	(.72)	1-4	63	
Hostility	1.35	(.49)	1-3	63	
PSTotal	2.48	(.47)	1.37-3.70	62	
Hostility					
Spank, hit, grab	1.84	(1.85)	0-7	63	
Use bad language	1.18	(.46)	1-3	63	
Insults and calls names	1.03	(.18)	1-2	63	
Sleep and Routines					
SRQTotal	2.30	(1.29)	1-6.75	65	
Executive Function/Regulation Measures					
Stroop	36.68	(6.87)	0-40	41	
DCCS	21.80	(3.64)	10-24	38	
Tower of Hanoi	10.00	(4.52)	4-30	40	
Backwards Digit Span	8.24	(2.95)	2-16	41	
Impulsivity	.55	(.43)	.05-2.75	59	

Table 2

Table 2										
Correlations Among Parenting and EF/Regulation Measures										
	1	2	3	4	5	6	7	8	9	10
1. Parenting Scale Laxness Factor	1.00	.21	-.041+	.690**	.356**	-0.096+	-0.22+	0.018+	-0.113+	0.064+
2. Parenting Scale Overreactivity Factor		1.00	.128	.491**	.262*	-.069+	0.01+	.23	-.314*	0.045+
3. Parenting Scale Hostility Factor			1.00	.11	.448**	.165	.23	-0.244+	0.096+	.14
4. Parenting Scale Total Score				1.00	.461**	-0.281+	-0.18+	.18	-0.315+	-0.092+
5. SRQ Total					1.00	-.25	-.12	.22	-.22	0.08+
6. Stroop task (# of correct)						1.00	.174	-.287+	.11	-.25
7. DCCS (# correct on switch trial)							1.00	-.194+	.15	0.067+
8. Tower of Hanoi (# of moves made)								1.00	-.11	-0.042+
9. Backwards Digit Span (Total trials completed correctly									1.00	-.310+
10. Impulsivity scored										1.00
+ p<0.1, *p<.05, **p<.01										

Appendix A

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. Examples include:									
	hitting someone		**whining**		**not picking up toys**				
	throwing food		**lying**		**refusing to go to bed**				
	having a tantrum		**arguing back**		**wanting a cookie before dinner**				
	running into the street								
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 two months with the target child.									
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 do something right away.								**I do something about it later.**
2	**Before I do something about a problem...**								

	I give my child several reminders or warnings.								I use only one reminder or warning .
3	When I'm upset or under stress…								
	I am picky and on my child's back.								I am no more picky than usual.
4	When I tell my child not to do something…								
	I say very little.								I say a lot.
5	When my child pesters me…								
	I can ignore the pestering.								I can't ignore pestering.
6	When my child misbehaves…								
	I usually get into a long argument with my child.								I don't get into an argument.
7	I threaten to do things that…								
	I am sure I can carry it out.								I know I won't actually do.
8	I am the kind of person that…								
	sets limits on what my child is allowed to do.								lets my child do whatever he/she wants.
9	When my child misbehaves…								
	I give my child a long lecture.								I keep my talks shorts and to the point.

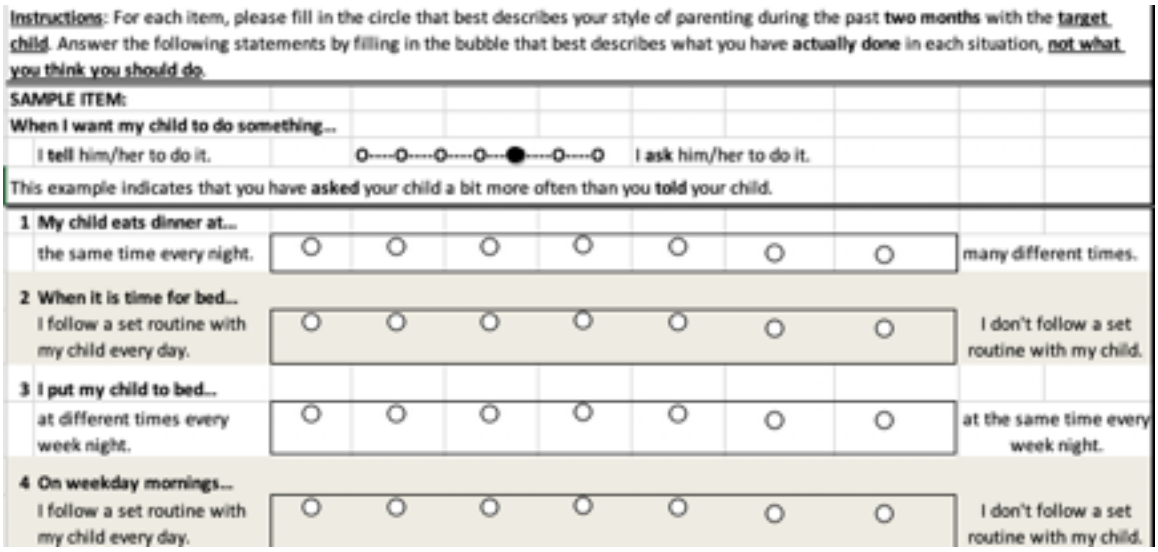
10	When my child misbehaves…								
	I raise my voice or yell.								I speak to my child calmly.
11	If saying "No" doesn't work right away …								
	I take some other kind of action.								I keep talking and try to get through to my child.
12	When I want my child to stop doing something…								
	I firmly tell my child to stop.								I coax or beg my child to stop.
13	When my child is out of my sight…								
	I often don't know what my child is doing.								I always have a good idea of what my child is doing.
14	After there's been a problem with my child...								
	I often hold a grudge.								things get back to normal quickly.
15	When we're not at home…								
	I handle my child the way I do at home.								I let my child get away with a lot more.
16	When my child does something I don't like…								
	I do something about it every time it happens.								I often let it go.

17	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.
18	When my child misbehaves, I spank, slap, grab, or hit my child …								
	never or rarely.								most of the time.
19	When my child doesn't do what I ask…								
	I often let it go or end up doing I myself.								I take some other action.
20	When I give a fair threat or warning…								
	I often don't carry it out.								I always do what I said.
21	If saying "No" doesn't work…								
	I take some other kind of action.								I offer my child something nice so he/she will behave.
22	When my child misbehaves…								
	I handle it without getting upset.								I get so frustrated or angry that my child can see I'm upset.
23	When my child misbehaves…								

	I make my child tell me why he/she did it.								I say "No" or take some other action.
24	If my child misbehaves and then acts sorry…								
	I handle the problem like I usually would.								I let it go that time.
25	When my child misbehaves…								
	I rarely use bad language or curse.								I almost always use bad language.
26	When I say my child can't do something…								
	I let my child do it anyway.								I stick to what I said.
27	When I have to handle a problem…								
	I tell my child I'm sorry about it.								I don’t say I'm sorry.
28	When my child does something I don't like, I insult my child, say mean things, or call my child names...								
	never or rarely.								most of the time.
29	If my child talks back or complains when I handle a problem…								
	I ignore the complaining and stick to what I said.								I give my child a talk about not complaining.

30	If my child gets upset when I say "No"...								
	I back down and give in to my child.								I stick to what I said.
Thank you for completing the PS! Please click the next tab to complete the SRQ.									

Appendix B



Instructions: For each item, please fill in the circle that best describes your style of parenting during the past **two months** with the **target child**. Answer the following statements by filling in the bubble that best describes what you have **actually done** in each situation, **not what you think you should do**.

SAMPLE ITEM:

When I want my child to do something...

I **tell** him/her to do it. O----O----O----O---●----O----O **I ask** him/her to do it.

This example indicates that you have **asked** your child a bit more often than you **told** your child.

1	**My child eats dinner at...**							
	the same time every night.	O	O	O	O	O	O	O	many different times.
2	**When it is time for bed...**							
	I follow a set routine with my child every day.	O	O	O	O	O	O	O	I don't follow a set routine with my child.
3	**I put my child to bed...**							
	at different times every week night.	O	O	O	O	O	O	O	at the same time every week night.
4	**On weekday mornings...**							
	I follow a set routine with my child every day.	O	O	O	O	O	O	O	I don't follow a set routine with my child.