

**ASSOCIATIONS BETWEEN MATERNAL EXECUTIVE
FUNCTIONS AND PARENTING BEHAVIOR:
ARE THEY MODERATED BY PARENTAL CHILDREARING
ATTITUDES?**

by

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Abstract

Increasing evidence suggests that mothers' executive functioning abilities promote self-regulation of their parenting behaviors; however, inconsistencies across findings suggest that other variables may also play a role in these associations. This dissertation sought to clarify links between maternal executive functions (working memory [WM] and inhibitory control [IC]), and parenting behavior (overreactive and positive), and to examine whether attitudes about childrearing moderated these associations. Two-hundred and seven mothers of 3-7 year-old children participated in an online study, and completed task-based and self-report measures of WM and IC, and self-report measures of parenting and childrearing attitudes, as well as potential control variables including personality characteristics, household chaos, and child behavior problems. At the bivariate level, the WM task was correlated with positive parenting, and self-reported executive functioning difficulties were correlated with both overreactive and positive parenting, in the expected directions. However, these associations were not maintained in partial correlations including relevant covariates. Next, the hypothesized moderation of the relation between executive functioning and parenting by childrearing attitudes was tested in six regression models. Progressive childrearing attitudes negatively predicted overreactive parenting. However, WM and IC were not significant predictors, nor did they interact with childrearing attitudes to predict overreactive parenting. Regarding positive parenting, WM, childrearing attitudes, and their interaction were not significant predictors. However, there was an interaction between IC and attitudes in predicting positive parenting. At low levels of progressive attitudes, IC positively predicted positive parenting; however, at high levels of progressive attitudes, IC negatively predicted positive parenting. A similar pattern of findings was obtained using the self-report measure of executive functioning. These results suggest that, when mothers hold

childrearing attitudes that place importance on child independence, better IC and fewer executive functioning problems allow them to inhibit the use of particular positive parenting practices, in favor of an approach that allows greater child autonomy. I discuss discrepancies between findings from this study and past research, highlighting the need to carefully consider the manner in which executive functions and parenting are measured. I conclude with directions for future research and comment on the implications of these results for clinical work with parents.

Lay Summary

This study examined relations between mothers' characteristics (short-term memory, self-control, attitudes toward parenting, personality) and their parenting behaviors. It also examined how characteristics of their children and environments are related to their parenting. Mothers of 3- to 7-year-old boys and girls participated in an online study. They completed computer tasks and answered questions about the above variables. Higher levels of mothers' neuroticism, child behavior problems, and household chaos, and lower levels of support for children's independence, were more strongly related to overreactive parenting, compared to mothers' short-term memory and self-control. Lower levels of child behavior problems and household chaos were related to positive, involved parenting. Furthermore, when mothers valued child obedience, having better self-control allowed them to behave more positively with their children to encourage good behavior. These results show that, to understand parenting behavior, it is important to consider mothers' characteristics, but also characteristics of their children and homes.

Preface

This thesis is an original intellectual product of the author.

The project was approved by the UBC Behavioural Research Ethics Board, certificate number H17-00801.

Table of Contents

Abstract	iii
Lay Summary	v
Preface	vi
Table of Contents	vii
List of Tables	ix
List of Figures	x
Acknowledgements	xi
Dedication	xii
1 Introduction	1
1.1 Self-regulation of parenting behavior	2
1.2 Links between EFs and overreactive parenting	7
1.2.1 Working memory.....	8
1.2.2 Inhibitory control.....	10
1.3 Links between EFs and positive parenting.....	11
1.4 Summary and limitations of previous research and contributions of this study	14
1.5 Parental childrearing attitudes	18
1.6 The current study	21
2 Method	23
2.1 Recruitment	23
2.2 Participants.....	25
2.3 Procedure	27
2.4 Measures	28
2.4.1 Participant demographics.....	28
2.4.2 Executive functioning.....	28
2.4.2.1 Working memory capacity	28
2.4.2.1.1 VDS (forward and backward recall).....	28
2.4.2.1.2 OSpan	30
2.4.2.2 Inhibitory control.....	33
2.4.2.2 Self-reported executive functioning.....	35
2.4.3 Childrearing attitudes.....	36
2.4.4 Parenting questionnaires	37
2.4.4.1 Overreactive parenting.....	37
2.4.4.2 Positive parenting	38
2.4.5 Scenario ratings	39
2.4.6 Potential covariates.....	41
2.4.6.1 General cognitive ability	41
2.4.6.2 Household chaos.....	42
2.4.6.3 Maternal personality characteristics.....	43
2.4.6.4 Behavior problems in the mothers' own children	44
2.4.6.5 Socially-desirable responding.....	44
2.5 Data analytic plan	45
3 Results	47
3.1 Preliminary analyses	47

3.2	Main analyses	54
3.2.1	Relations between EFs and parenting	54
3.2.2	Moderation by childrearing attitudes	54
3.2.2.1	Models predicting overreactive parenting	56
3.2.2.2	Models predicting positive parenting	60
4	Discussion	65
4.1	Aim 1: Direct links between maternal EFs and parenting	65
4.1.1	Validity and reliability of online tasks	68
4.1.2	Value of self-report assessments of EF	70
4.1.3	Potential for indirect effects of EF	72
4.1.4	Measurement of parenting behavior	74
4.1.5	Summary and conclusion of Aim 1	76
4.2	Aim 2: Moderation by childrearing attitudes	76
4.2.1	Overreactive parenting	76
4.2.2	Positive parenting	77
4.2.2	Summary and conclusion of Aim 2	80
4.3	Other maternal and contextual variables	80
4.4	Strengths and contributions of the present study	82
4.5	Limitations and future directions	83
4.6	Conclusion	85
	References	88
	Appendices	106
	Appendix A: Parental Modernity Scale	106
	Appendix B: Parenting Scale	109
	Appendix C: Alabama Parenting Questionnaire	113
	Appendix D: Challenging Child Behavior Scenarios	115
	Appendix E: Positive Child Behavior Scenarios	117
	Appendix F: International Cognitive Ability Resource Sample Test	119
	Appendix G: Chaos, Hubbub, and Order Scale	124
	Appendix H: Big Five Aspect Scales	125
	Appendix I: Strengths and Difficulties Questionnaire	127

List of Tables

Table 2.1	Participant characteristics	26
Table 3.1	Means and standard deviations, and ranges for study variables	48
Table 3.2	Correlations among measures of maternal executive functioning	50
Table 3.2	Correlations among measures of maternal executive functioning	50
Table 3.3	Correlations among measures of overreactive parenting	51
Table 3.4	Correlations among measures of positive parenting	52
Table 3.5	Significant correlations between main study variables and possible covariates	53
Table 3.6	Correlations with childrearing attitudes	55
Table 3.7	Predicting the overreactive parenting composite from the WM composite and childrearing attitudes	57
Table 3.8	Predicting the overreactive parenting composite from IC and childrearing attitudes	58
Table 3.9	Predicting the overreactive parenting composite from the BRIEF and childrearing attitudes	59
Table 3.10	Predicting the positive parenting composite from the WM composite and childrearing attitudes	60
Table 3.11	Predicting the positive parenting composite from IC and childrearing attitudes	61
Table 3.12	Predicting the positive parenting composite from the BRIEF composite and childrearing attitudes	63

List of Figures

Figure 2.1	VDS-forward recall screen	29
Figure 2.2	Sequence of screens presented during OSpan	31
Figure 2.3	Recall and feedback screens during OSpan	31
Figure 2.4	Sequence of screens during the CGNG task	34
Figure 3.1	Simple slopes of the relation between maternal IC and positive parenting, at low and high (+/- 1 SD) levels of progressive childrearing attitudes	62
Figure 3.2	Simple slopes of the relation between maternal self-reported EF and positive parenting, at low and high (+/- 1 SD) levels of progressive childrearing attitudes	64

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To my parents

1 Introduction

Parenting behavior is multiply-determined and has important implications for parent-child relationships and a range of child outcomes, across developmental stages and in clinical and non-clinical populations (e.g., Belsky & de Haan, 2011; Bugental & Grusec, 2006; Deault, 2010; Kawabataa, Alink, Tsenga, van IJzendoorn, & Crick, 2011; Sanders, Burke, Prinz, & Morawska, 2017). The vast literature on parenting shows that particular parenting behaviors are related to child functioning in a number of ways.

Specifically, parental discipline that involves the use of verbally aggressive commands/or and physical punishment is linked to poor child outcomes, including more internalizing and externalizing behavior problems (e.g., Gershoff & Gorgon-Kaylor, 2016; Luke & Banerjee, 2013; McKee et al., 2007; Olson et al., 2011). On the other hand, positive, warm, supportive parenting is negatively linked with these child difficulties (e.g., Clark & Frick, 2016; Odgers et al., 2012), and positively linked with children's prosocial behavior (Danzig, Dyson, Olino, Laptook, & Klein, 2015; Zhou et al., 2002). To further our understanding of family relationships, as well as our efforts to prevent child emotional and behavioral problems and to maximize optimal child adjustment, it is crucial to study the determinants of variations in such parenting behaviors.

Historically, research has examined and demonstrated that parenting is shaped by various elements including genetic influences, parents' developmental histories and psychopathologies, as well as child characteristics and socioeconomic factors (e.g., Belsky & Jaffee, 2006; Jansen et al., 2012; Lovejoy, Graczyk, O'Hare, & Neuman, 2000; Pinderhughes, Dodge, Bates, Pettit, & Zelli, 2000). Furthermore, a new generation of research has emerged that recognizes that individuals enter the experience of parenting equipped with their own cognitive abilities, attitudes, and other characteristics that also influence their parenting decisions and behaviors. In particular, current research on parental executive functioning is growing and evidence is mounting that these higher-order cognitive processes

have the potential to contribute to parenting (e.g., Crandall, Deater-Deckard, & Riley, 2015). Previously, such individual differences in executive functioning have been understudied in the parenting literature, relative to other factors such as parent psychopathology. However, evidence points to executive functions as possible transdiagnostic factors that may impact aspects of parenting behavior that are central to child development. The current study's aims were twofold: (1) to test the links between maternal executive functions and parenting behaviors, and (2) to test the moderating effect of parental childrearing attitudes in the relations between maternal executive functions and parenting behaviors. To provide a background for this research, I first begin with an overview of self-regulation of parenting behavior, and research that suggests executive functions support self-regulation. Next, the existing research on links between maternal executive functions (particularly working memory and inhibitory control) and parenting is reviewed, with a discussion of limitations in the current literature. Finally, a dual-process framework is introduced to illustrate the possible moderation of the links between executive functions and parenting behavior by childrearing attitudes.

1.1 Self-regulation of parenting behavior

Parenting a child can be very rewarding, and the experience has been linked to increased levels of happiness, positive emotions, and meaning in life (Nelson, Kushlev, English, Dunn, & Lyubomirsky, 2013), and long-term gains in general life satisfaction (Baetschmann, Staub, & Studer, 2016).

Nevertheless, parenting is an endeavor that confers unique demands, such as setting limits on child behavior (e.g., establishing household rules), eliciting and encouraging child cooperation in unappealing activities (e.g., getting ready for school), and responding to oppositional child behavior. To meet these demands, parents often must regulate their own behavior in order to respond to their children adaptively and in a manner in line with their socialization goals. Indeed, the ability to self-regulate has been identified by Sanders and Mazzucchelli (2013) as a cornerstone of effective parenting; it involves

processes that “enable an individual to guide his/her goal-directed activities over time and across changing circumstances (contexts)” (Karoly, 1993, p. 25), and “implies modulation of thought, affect, behavior, or attention” (Karoly, 1993, p. 25). Parents use self-regulation in many ways; for example, they may deliberately increase positive attention and praise in response to behaviors they wish to encourage in their children (e.g., compliance with parent requests; prosocial behaviors). Alternately, when faced with problematic child behavior such as noncompliance, parents may aim to refrain from reacting in a manner that is harsh and unhelpful, and instead strive to reflect on the situation and select an appropriate parenting response, such as the use of reasonable consequences.

There is a growing body of literature in support of these theoretical ties between self-regulation and parenting. A recent review by Crandall, Deater-Deckard, and Riley (2015) summarized 35 studies examining links between what was labelled *maternal cognitive and emotional control capacities* and parenting, assessed by a wide range of self-report and observational measures. In line with Sanders and Mazzucchelli’s (2013) model, in the review, cognitive and emotional control capacities were equated with the term self-regulation and encompassed a host of abilities assessed differentially across studies, including various executive functions, selective attention, ability to regulate emotions, and symptoms of attention-deficit/hyperactivity disorder (ADHD). In general, Crandall and colleagues (2015) found that, in parents of children across developmental stages (from early childhood to adolescence), measures reflecting lower maternal self-regulation were related to measures of negative parenting, such as ineffective discipline strategies (i.e., harsh, inconsistent), controlling parenting style, or negative reactions to children’s emotions. In contrast, better maternal self-regulation was related to measures of positive parenting, such as supportive responses to children’s negative emotions, maternal warmth and sensitivity, and more time spent in caregiving activities. Thus, self-regulatory processes in mothers can be related to a wide range of parenting behaviors. There were, however, some inconsistencies in the

studies reported; for example, Hughes and Gullone (2010) found that maternal self-regulation explained very little variance in parenting after controlling for personality characteristics, such as neuroticism and conscientiousness. Furthermore, Chico and colleagues (2014) found that the relations between maternal self-regulation and sensitive parenting behavior changed (and sometimes disappeared) depending on maternal age. Finally, because very nonspecific definitions of maternal cognitive/emotional control (e.g., emotion regulation, ADHD symptoms, adult temperament, executive functions) and parenting (e.g., ineffective discipline, parenting self-efficacy, maternal warmth) were used across the studies Crandall et al. (2015) reviewed, the precise links between particular self-regulatory mechanisms and parenting behaviors remain unclear.

Several authors have suggested that parents' ability to self-regulate relies on their executive functioning abilities (e.g., Gonzalez, 2015), which were examined in only a small subset of the studies included in the above review. Executive functions (EFs), including working memory and inhibitory control, are higher-order cognitive processes that govern other cognitive processes (Diamond, 2013). Working memory (WM) is a two-fold cognitive process referring to an individual's capacity for (1) maintaining information in consciousness, and (2) simultaneously manipulating the information as well as incorporating information from long-term memory to guide behavior (e.g., Baddeley 1998; Daneman & Carpenter, 1980; Dawson & Guare, 2010). This ability to work with information in the short-term is crucial to making sense of events unfolding in real time and is presumed to have evolved in humans to facilitate complex tasks such as learning and reasoning (Baddeley, 2012). Furthermore, inhibitory control (IC) is the ability to control behavior, particularly in the service of overriding an unhelpful automatic response (e.g., Diamond, 2013; Friedman et al., 2008). WM and IC are both related to frontal lobe activity and each of the functions depends, to some extent, on the other, giving rise to questions about whether these two functions are distinguishable. For example, in order to know which behavior is

appropriate and which to inhibit, one must hold a particular goal in mind – a function that is supported by WM. Conversely, in order to maintain goal-relevant information in mind, one must inhibit internal and external distractors, relying on IC (Diamond, 2013). Using confirmatory factor analysis, Miyake, Friedman, Emerson, Witzki, and Howerter (2000) showed that WM and IC, although moderately correlated, were clearly separable and differentially contributed to participants' performance on various cognitive tasks. Thus, although their inter-related nature is acknowledged, these two abilities were considered separately in this study.

As noted, models of parenting have begun to link self-regulation with executive functioning abilities. For example, Sanders and Mazzucchelli (2013) compare self-regulation with executive functioning, in the sense that both involve processes which enable parents to exert control and agency over their own actions and decisions. On the other hand, Barrett and Fleming (2011) highlight EFs, in addition to other neural and psychobiological characteristics, as key individual difference variables that precede and contribute to the self-regulation of parenting behavior. Even further, other authors have related EFs specifically to emotion regulation, a collection of processes that influence which emotions are felt and when, as well as how these emotions are experienced and expressed (Gross, 1998; McCrae, Jacobs, Ray, John, & Gross, 2012). Although various theorists and researchers use different (and sometimes overlapping) definitions of self-regulation and executive functioning, in this study I conceptualize self-regulation of parenting behavior as an outcome of executive functioning. Said differently, EFs are considered to be processes that serve the self-regulation of parenting by, for example, facilitating problem-solving and self-control (Barkley & Murphy, 2011; Deater-Deckard, 2014; Johnston, Mash, Miller, & Ninowski, 2012). When faced with negative child behavior, strong EFs may allow mothers to override a negative automatic reaction (such as yelling) in favor of a more

effective controlled response (such as calmly applying appropriate consequences), as dual-process frameworks of behavior would suggest (e.g., Barrett, Tugade, & Engle, 2004).

That emerging models of parenting (e.g., Sturge-Apple, Jones, & Suor, 2017) are incorporating parental executive functioning as a possible determinant of parenting behavior represents an exciting avenue for parenting research, for two reasons. Firstly, EFs represent transdiagnostic factors that are related to a number of mental health disorders that themselves have been linked to difficulties in parenting. For example, executive functioning deficits have been documented in samples of adults with depression (e.g., Snyder, 2013), ADHD (Barkley & Murphy, 2010), drug addictions (Hester, Lubman, & Yücel, 2010), and schizophrenia (Eisenberg & Berman, 2010). Moreover, symptoms of these disorders have been related to negative aspects of parenting behavior, including harsh reactions to difficult child behavior (e.g., Berg-Nielsen, Vikan, & Dahl, 2002; Johnston et al., 2012; Lovejoy et al., 2000). It is possible that common factors in the underlying executive functioning profiles of these disorders are related to parenting behavior. A transdiagnostic approach would thus enable a more parsimonious understanding of the cognitive processes related to the regulation of parenting, and as a result inform parenting interventions that are broadly applicable to parents with a range of difficulties (Maliken & Katz, 2013). Secondly, given preliminary evidence that EFs are malleable even into adulthood (e.g., Karbach & Verhaegen, 2014; Richmond, Morrison, Chein, & Olson, 2011), understanding the relations between executive functioning and parenting holds potential for informing parenting intervention developments to target difficulties in executive functioning. Alternately, knowing the specific EFs that are related to particular parenting behaviors may lead to parenting programs that are designed to compensate for difficulties in these cognitive processes. However, as a necessary first step in actualizing these potential advantages of including a focus on EFs in parenting programs, it is critical that more

studies closely examine the associations between particular parental EFs and various parenting behaviors.

1.2 Links between EFs and overreactive parenting

As noted above, Crandall and colleagues (2015) in their review concluded that, in mothers, better self-regulation is generally inversely related to a range of negative parenting behaviors, and positively related to a range of positive parenting behaviors. However, this conclusion reflected a summary of studies that amalgamated different measures of self-regulatory mechanisms (which included some measures of different EFs, but also measures of adult temperament, ADHD symptoms, and emotion regulation), and related these to relatively nonspecific measures to parenting. A handful of investigations that have focused more specifically on a combination of three maternal EFs (WM, IC, and set shifting) have shown that executive functioning is negatively related to aspects of caregiving, including displays of negative affect, anger, criticism, and physically intrusive behaviors (Bridgett, Kanya, Rutherford, & Mayes, 2017; Cuevas et al., 2016). On the other hand, Deater-Deckard, Wang, Chen, and Bell (2012) did not find a direct association between maternal EFs (measured with a composite of WM, IC, and other attention tasks) and harsh parenting; however, they did find that child conduct problems predicted harsh parenting, but only among mothers with weaker executive functioning. Presumably, better executive functioning allowed for mothers' harsh reactions to child conduct problems to be overridden in favor of more adaptive parenting responses.

Together, these findings provide general support for the idea that better executive functioning can facilitate self-regulation of parenting and serve as a buffer against potentially harsh reactions elicited in the face of challenging child behavior. Nevertheless, the specific roles of particular EFs and the strengths of their links to parenting behavior are not clear from the studies just described. Below, I review the few recent investigations that have isolated links of parenting with maternal WM and IC, as

these relations are the focus of the current study. I first consider links between these EFs and harsh (used interchangeably with overreactive) parenting.

1.2.1 Working memory

Four studies have examined maternal WM in relation to overreactive parenting, with mixed results. The first was conducted by Deater-Deckard, Sewell, Petrill, and Thompson (2010), who measured maternal verbal WM via a digit span task in a community sample of 216 mothers of same-sex twin pairs (average child age was 6.12 years). Mothers were observed interacting with each twin, and a composite measure of maternal negativity was obtained by coding mothers' expressions of anger, frustration, or annoyance, and criticism with each child. Furthermore, each child's level of challenging behavior was coded (i.e., noncompliance, anger, frustration, annoyance, and off-task behavior). A differential maternal negativity score was calculated by subtracting the maternal negativity score from her interaction with one twin from the maternal negativity score from the interaction with the other twin. Similarly, a sibling behavior difference score was calculated by subtracting one twin's challenging behavior score from that of the other twin. Although the direct association between maternal WM and observed negative parenting was not reported, the authors found that maternal WM moderated the association between difficult child behavior and differential maternal negativity – that is, changes in sibling behavior were related to changes in maternal reactivity, but only among mothers with lower WM. Presumably, mothers with better WM had more capacity to reflect on the children's behavior and regulate their own responding, so that negative child behavior was not the primary driving force behind their parenting. Furthermore, maternal verbal and spatial abilities did not show this same moderating effect, supporting the unique role of WM relative to measures of general intelligence. These results suggest that WM provides the space a mother needs to reflect and appropriately regulate her behavior in challenging interactions with her child.

Building off this work, Sturge-Apple, Suor, and Skibo (2014) examined how maternal WM operates in the context of dysfunctional maternal attributions for child misbehavior and their links to overreactive parenting in a socioeconomically diverse community sample. One-hundred and 85 mothers of 3.5 year-old children completed a digit span task to assess WM, and questionnaires to assess their attributions and harsh discipline practices. In addition, maternal harsh discipline and criticism of the child were coded during a mother-child clean-up task. At the bivariate level, maternal WM was negatively related to harsh parenting ($r = -.23$), but not negative attributions for child behavior. Furthermore, WM moderated the association between attributions and harsh parenting, such that negative attributions were related to harsh parenting, but only among mothers with lower WM capacity. The authors conclude that when WM is strong, parenting behavior appears to be less influenced by more negative cognitions.

The above findings have been challenged, however, in two recent investigations. In the first, Monn, Narayan, Kalstabakken, Schubert, and Masten (2017) examined WM in a high-risk sample of homeless mothers and children living in emergency shelters. WM was measured via a digit span task in 94 mothers of 4-6 year old children. Furthermore, mothers were observed interacting with their children in problem-solving and collaborative teaching tasks, and maternal harsh discipline was coded from hostile or rejecting behaviors. Contrary to hypotheses, maternal WM was unrelated to harsh parenting both at the bivariate level and in a regression model with other control variables, including mother age, education level, and verbal ability. It is noteworthy that the average WM score in this sample was within one standard deviation of the general population average, and scores covered the full normative range, making it unlikely that the lack of an effect was due to restriction of range in this study. A final study assessed WM via self-report rather than a performance-based measure (Crouch et al., 2018). One hundred and thirty-three community parents, primarily mothers, completed the WM subscale of the

Behavior Rating Inventory of Executive Function – Adult version to assess problems with WM reflected in everyday life (e.g., difficulty retaining information during tasks such as housework), as well as a self-report measure of child abuse potential. Despite self-reports of maternal WM being significantly associated with risk for child physical abuse in a bivariate correlation ($r = .45$), WM was not directly independently associated with abuse risk in a path analysis model that included maternal education level and another performance-based measure of maternal EF (a combination of inhibition and task-switching).

In sum, emerging research in the parenting literature has examined links between WM and parenting behavior that is harsh or overreactive. Early evidence suggests that better WM capacity can mitigate against harsh parenting reactions. However, findings from two later studies highlight the importance of adequately statistically controlling for other variables that may explain the links between WM and parenting (Crouch et al., 2018; Monn et al., 2017). Furthermore, the Monn et al. (2017) results from a socially disadvantaged sample suggest that relations between WM and parenting may differ across socioeconomic contexts, and also that there may be other moderators of the relations between maternal EFs and parenting, such as differences in overall approaches to parenting.

1.2.2 Inhibitory control

In contrast to the above noted studies of maternal WM, even fewer studies examine maternal IC in relation to overreactive parenting behavior, despite it being an EF that is distinct from WM and that intuitively would seem to share an obvious role in restraining overreactive parenting behaviors.

Although not directly focused on IC, research in samples of mothers with varying levels of impulsivity, as captured by measures of ADHD symptoms (e.g., being intrusive or interrupting conversations), points to possible links between IC and parenting. Studies in this area generally show that impulsive symptoms (alone or combined with hyperactive symptoms) are positively related to overreactive parenting (Chen

& Johnston, 2007; Harvey, Danforth, Eberhardt McKee, Ulaszek, & Friedman, 2003; Johnston, Scoular, & Ohan, 2004; Park, Hudec, & Johnston, 2017). Furthermore, using a color-word interference test (similar to a Stroop test), Crouch et al. (2018; described above) created a composite maternal EF variable comprised of inhibition and task-switching measures. Again, although inhibition/switching was significantly associated with child abuse potential at the bivariate level ($r = .19$), it was not a direct predictor of abuse potential in a larger model including maternal education level and WM.

Thus, although these studies suggest potential links between IC and overreactive parenting, results are somewhat inconsistent and difficult to interpret given that IC is directly measured in only one study of negative parenting. Monn et al. (2017), described above, found that IC was not significantly related to harsh parenting in a sample of mothers of young children living in emergency homeless shelters. Nevertheless, this result is preliminary and based on one study with a highly specialized sample. More research is needed examining IC in relation to overreactive parenting in a broad sample of mothers; a gap the current study seeks to address. I now briefly review research that has examined links between WM and IC and more positive parenting behaviors.

1.3 Links between EFs and positive parenting

Another goal of this study was to examine the relations between specific maternal EFs and positive parenting behaviors. It is important to understand associations between EF and positive parenting, as the latter is negatively linked with child internalizing and externalizing problems (e.g., Boeldt et al., 2012; Clark & Frick, 2016), and positively linked with children's prosocial behavior (e.g., Danzig et al., 2015). Furthermore, research also shows that measures of positive parenting are uniquely predictive of children's wellbeing, independent from measures of negative parenting (e.g., Lansford, et al., 2014; McKee, Colletti, Rakow, Jones, & Forehand, 2008). In contrast to the studies relating EFs to overreactive parenting behavior which have typically only considered WM, studies in the area of

positive parenting have more often included measures of both WM and IC. Thus, to facilitate interpretation of the individual studies, results for WM and IC are presented together below.

Four studies have examined links between the specific maternal EFs considered in this study and positive parenting. Shaffer and Obradović (2017) measured parental IC of attention using a flanker paradigm, and observed parents interacting with their 4-6 year-old children in a series of tasks. The authors coded parental behaviors associated with sensitivity/responsiveness, including the degree to which parents provided effective instruction, were available for assistance, and displayed positive affect. They found that parental IC was positively but modestly related to these observed sensitive parenting behaviors, independent from parental education level, financial stress, and emotion regulation difficulties ($\beta = .16$).

Nevertheless, results from other studies have not been conclusive. Sturge-Apple et al. (2017) assessed WM (via a digit span task) and IC (via a stop-signal task requiring inhibition of a motor response) in a socioeconomically diverse sample of mothers and their children. Mothers were also observed in free-play interactions with their children as well as interactions in which they had to elicit child compliance; these were coded for sensitive/responsive parenting behaviors, conceptualized as behaviors reflecting an awareness of the child's needs, moods, and capabilities (e.g., letting the child work on a puzzle without interfering, if the child was working successfully). The measures of EF and parenting were collected at two time points, child ages 3.5 and 5 years. In terms of bivariate associations, neither WM nor IC was related to maternal sensitivity at the first time point. At the second time point, WM was positively associated with maternal sensitivity in the free-play interactions ($r = .38$), but not in the clean-up interaction. Furthermore, contrary to predictions, IC was negatively associated with maternal sensitivity in the free-play interaction ($r = -.18$), but positively associated with maternal sensitivity in the clean-up interaction ($r = .27$). In a path analysis which also included a

measure of socioeconomic risk, IC was found to be associated with changes in maternal sensitivity across the two parent-child interactions at the second time point. This study shows that, although there may be links between maternal EFs and positive parenting, these are not consistent across child developmental levels or parent-child interaction contexts.

Further complicating the picture is another study in which 84 mothers of children with and without ADHD completed multiple measures of EF, including digit span to assess WM and a questionnaire assessing general executive dysfunction (Mazursky-Horowitz et al., 2018). Mothers were also observed interacting with their children in a clean-up task and a homework task; their behaviors were coded for the degree to which mothers provided effective scaffolding (including their use of praise and instructions, positive affect, and responsiveness to the child's questions). In bivariate relations, maternal WM, but not self-reported general difficulties with EF, was positively related to scaffolding behavior ($r = .29$). Furthermore, in a regression analysis, WM continued to predict scaffolding above and beyond maternal education level, child age, and child ADHD symptoms; however, this was not the case for self-reported executive dysfunction.

One recent study (Monn et al., 2017) investigated the association between maternal EFs and another measure of positive parenting behavior – observational ratings of mothers' involvement (positive affect and support), collaboration with, and use of positive reinforcement with their children, collapsed across various interactions involving both problem-solving and teaching tasks. In this sample of homeless mothers and their children, WM was correlated at the bivariate level with observed positive parenting ($r = .21$), however, the relation became non-significant after controlling for maternal education level and verbal ability. Furthermore, IC was not related to positive parenting, and neither of the EFs predicted positive parenting in a regression model that also included measures of stress.

Taken together, results from these studies suggest that maternal EFs could play a role in regulating parenting behaviors outside the realm of overreactivity and harshness, specifically more positive aspects of parenting. However, inconsistent findings emerge from studies depending on the method of measurement of EFs and on whether EFs were considered in the context of relevant control variables. Furthermore, the Sturge-Apple et al. (2017) and Monn et al. (2017) studies suggest that IC and WM may be differentially linked to positive parenting, and that these relations may vary across different interaction contexts (e.g., structured v. free-play) and child developmental levels.

1.4 Summary and limitations of previous research and contributions of this study

There is some evidence to suggest that maternal EFs are related to overreactive parenting behavior. In particular, WM capacity appears to mitigate parenting that is harsh or overreactive, and research in ADHD samples suggests similar links to parenting for IC. Nevertheless, these associations are not consistently found, are few in number, and have been questioned in research with high-risk samples, as well as other studies that control for important covariates such as maternal education. WM and IC also have been related to positive parenting behaviors, but again findings are few and have been inconsistent across investigations, highlighting the need for replication of studies in this area.

A noteworthy limitation of the extant literature is that the majority of the studies reviewed here employed exclusively observational methods to assess parenting behavior. Although typically a strength in studies of parenting, observational methods provide only a snapshot of parental behavior on one given day, and are likely influenced by a range of circumstantial factors, such as the parent or child feeling ill or reacting to the observation. In addition, the observational measures employed have varied across studies, and there are few if any widely-accepted and validated observational measures of parenting. Thus, this study strengthens previous work in this area by linking maternal EFs to parenting as assessed by another method, that of well-validated parenting questionnaires that capture overreactive and positive

parenting behaviors across a wider scope of time. Although questionnaire methods are not without their own limitations, their use in this study adds to the literature and provides a more comprehensive picture of mothers' parenting behavior. Furthermore, a limitation to both questionnaires and observational methods of assessing parenting is that such methods do not adequately control for child behavior effects. With observations, each mother is observed interacting with her own child, and with questionnaires, each mother provides ratings of her behavior in interactions with her own child. As such, these measures of parenting can be confounded with differences in the child behaviors to which mothers are reacting, potentially clouding the interpretation of associations between EFs and parenting. To address this, the current study included an additional measure of parenting behaviors elicited in response to specific predetermined child behaviors (both positive and negative) that were held constant across mothers.

An additional limitation in the studies linking maternal EFs and positive parenting behavior is the overall focus on one dimension of positive parenting, maternal warmth and sensitivity. However, positive parenting also includes behaviors such as positive involvement in the child's life (e.g., enjoying activities together) as well as the use of positive reinforcement strategies (e.g., praise in response to good child behavior). These parenting skills of involvement and reinforcement are core features of evidence-based parenting programs (e.g., Sanders et al., 2017; Sanders, Kirby, Tellegen, & Day, 2014), which consistently have been shown to reduce child behavior problems and parenting stress, and increase parenting self-efficacy (e.g., Colalillo & Johnston, 2016; Forehand, Jones, & Parent, 2013). To extend our understanding of the contributions of maternal EFs to parenting, in this study I operationalize positive parenting as behaviors that indicate involvement and the use of positive reinforcement parenting strategies.

Another methodological limitation of previous research is the almost exclusive reliance on task-based measures of executive functioning. One criticism of such measures is that they lack in ecological

validity and may not necessarily reflect real-world functioning (Barkley & Murphy, 2011). For instance, past research has shown that, despite average performance on classic executive functioning tasks, individuals with ADHD performed worse than controls on EF tasks designed to more closely approximate real-life cognitive demands (Torralva, Gleichgerricht, Lischinsky, Roca, & Manes, 2013). As such, in addition to expanding the scope of measures of parenting behavior, this study also adds to the literature by measuring maternal EFs via both performance-based and self-report indices of WM and IC.

Furthermore, in their review, Crandall et al. (2015) highlight the inconsistent inclusion of relevant covariates in previous research on maternal EFs as a serious limitation of the literature; as such, in order to ensure that any observed relations between maternal executive functioning and parenting behavior in this study are not due to confounding variables, a number of these were measured and considered as control variables. Firstly, fluid intelligence involves the ability to reason, problem-solve, and draw relations among various concepts (Diamond, 2013). Measures of fluid intelligence have been shown to correlate highly with measures of executive functioning, and WM in particular (e.g., Conway, Kane, & Engle, 2003). Despite this, evidence exists that fluid intelligence and EFs are related but independent constructs (e.g., Friedman et al., 2006), and research in the parenting literature shows relations with parenting behavior specific to executive functioning and not measures of general intelligence (e.g., Deater-Deckard et al., 2010). Nevertheless, mothers' general intelligence was measured in the current study, and used as a control variable if it was related to the EF and parenting constructs of interest.

In addition, EFs are impaired under conditions of stress (Liston, McEwen, & Casey, 2009). In particular, household chaos and socioeconomic disadvantage are related to poor executive functioning in mothers, and the association is likely bi-directional (Deater-Deckard, Chen, Wang, & Bell, 2012;

Sturge-Apple et al., 2014; 2017). For this reason, the roles of family income and overall household chaos were also considered in the current study. Equally important to consider is the role of maternal personality characteristics. Specifically, the trait of conscientiousness has been related to behaviors reflecting constraint, similar to self-regulation. Furthermore, neuroticism has been linked with behaviors reflecting impulsivity, a potential consequence of poor IC (e.g., Carver, 2005). As such, mothers in this study completed a measure of personality to offer possible control for these aspects of functioning in assessment of the relations between EFs and parenting. Finally, as parenting and child behaviors are highly and reciprocally related (e.g., Pardini, 2008), behavior problems in the mothers' own children were measured and controlled where relevant.

In sum, although theory and some early empirical findings suggest that maternal WM and IC are related to their parenting, this research is still in its infancy. Regarding overreactive parenting, findings examining WM are inconsistent and no studies examine IC. In terms of positive parenting, findings also are inconsistent, and most often implicate only one aspect of positive parenting (maternal warmth and sensitivity). Moreover, across studies, EFs have been almost exclusively measured via task-based methods, and parenting almost exclusively by observation. To address these gaps in the literature, this study examined the direct associations between maternal WM and IC, assessed by tasks and self-report, and parenting, both overreactive and positive (conceptualized as parental involvement and positive reinforcement). Multiple measures of parenting (questionnaire and scenario-based methods) were included, as well as potential covariates. Based on theory and some empirical evidence from the studies just reviewed, maternal EFs were hypothesized to be negatively related to overreactive parenting. As well, maternal EFs were expected to be positively related to positive parenting.

1.5 Parental childrearing attitudes

As noted above, there are inconsistencies in the extant literature on maternal WM and IC and parenting. These inconsistencies point to the possibility that moderators of these associations exist, one of which may be attitudes parents hold about childrearing. Research has demonstrated that there are individual differences in parents' approaches to or attitudes about parenting (Lansford et al., 2011). Specifically, progressive childrearing attitudes place value on children's independence, freedom to make their own decisions, and relative equality in the parent-child relationship. Conversely, traditional or authoritarian childrearing attitudes place high emphasis on respect for and obedience to authority. There is evidence that these differences in childrearing attitudes are linked to differences in parenting behavior. For example, in a series of studies, Hastings and Grusec (1998) found that parents who held childrearing views that placed importance on quickly reducing noncompliant child behavior (more traditional attitudes) were more likely to use coercive parenting strategies (e.g., physical force and threats) and were less likely to show acceptance or use praise with their children. Similarly, other research (Coplan, Hastings, Lagacé-Séguin, & Moulton, 2002) has shown that authoritarian mothers who endorse more traditional attitudes are less concerned with addressing child needs (e.g., ensuring their child's happiness) and fostering a positive relationship with their child, compared to authoritative mothers who endorse more progressive attitudes. Thus, general attitudes about childrearing (i.e., traditional v. progressive) are conceptualized as stable, internal views parents hold that influence their self-regulation of parenting (Johnston, Park, & Miller, in press; Schaefer & Edgerton, 1985), and I suggest that these attitudes may modulate the relations between maternal EFs and parenting. I now briefly review theoretical and empirical evidence regarding dual-process models to provide a framework for understanding this moderation.

As the term suggests, dual-process models propose two modes of information processing that

operate together to produce behavior (see Hofmann, Friese, & Strack, 2009; Strack & Deutsch, 2004; for reviews). Stimuli in the environment capture attention, and initiate automatic processing; pre-existing knowledge structures (i.e., schemas, scripts) are activated, giving rise to relatively quick and spontaneous thoughts, feelings, or behavioral tendencies (Hofmann et al., 2009). Although automatic processing is simple and efficient, inevitably, there are cases when the automatic response is not appropriate to the situation or is counter to one's values or longer-term goals. In these cases, another processing system is engaged to mediate response selection, referred to as controlled processing (Barrett et al., 2004). Controlled processes determine the extent to which automatic processing influences an individual's thoughts, feelings, and behaviors. As such, controlled processing serves as a "flexible correction tool" (Hofmann, Gschwendner, Friese, Wiers, & Schmitt, 2008, p. 963) that allows for the exertion of agency over one's decisions and actions. EFs (WM and IC in particular) have been proposed as individual difference factors that represent the skills needed for controlled processing to outweigh automatic processing (Barrett et al., 2004; Hofmann, Schmeichel, & Baddeley, 2012). Nevertheless, whether or not these EFs are engaged to regulate parenting behavior will depend on whether mothers are indeed motivated by their childrearing attitudes to override their automatic reaction.

Consider a mother who is frustrated with her noncompliant child. She may feel an automatic impulse to yell at the child, but should she also hold a progressive attitude that children should be autonomous and that yelling would impede this, she will be motivated to override her automatic response, and controlled processing (relying on EFs) will be initiated. However, the scenario might not unfold in the same way should the mother not hold such childrearing attitudes. If the mother does not prioritize supporting the child's autonomy and personal development, and instead holds attitudes focused on ensuring child obedience to authority, a dual-process model would suggest that, regardless of her executive functioning capacities, the mother may proceed with her automatic reaction to yell, as

there is no conflict between the automatic reaction and the internal childrearing attitude.

Although theory suggests that childrearing attitudes may moderate the relations between maternal EFs and parenting behavior, to date, no research has tested this hypothesis. Thus, another major goal of the current study was to address this gap in the literature. Specifically, the degree to which mothers endorsed childrearing attitudes related to fostering child autonomy and encouraging children to develop and express their own ideas (i.e., progressive attitudes) versus attitudes related to undisputed obedience to authority (i.e. traditional attitudes) was expected to moderate the association between maternal EFs and parenting behavior. That is, better executive functioning was expected to predict less overreactive parenting, but only when mothers endorse progressive attitudes, because these attitudes are presumed to motivate mothers to engage in the controlled processing that may override more automatic negative responses.

The picture may not be as straightforward with regards to positive parenting. On the one hand, it may be that childrearing attitudes have less or no moderating influence on the association between maternal executive functioning and positive parenting because even at low levels of progressive attitudes, one might assume little motivation for the parent to over-ride a (presumably positive) automatic response. On the other hand, it is possible that better executive functioning skills will be stronger predictors of more positive parenting among mothers who endorse progressive attitudes, due to the enhanced consistency of the automatic positive reaction to positive child behaviors and higher endorsement of attitudes supporting child autonomy. As the expected moderation effect is not clear with respect to positive parenting, investigation of the moderating role of parental childrearing attitudes was exploratory.

1.6 The current study

Parenting requires self-regulation of behavior, which itself has been shown to rely on EFs. As such, maternal EFs are being incorporated into emerging models of parenting. Research in this area suggests that better WM capacity enables a process of reflection and mitigates overreactive parenting. Although empirical support for a similar process implicating maternal IC is less available, theory supports a role for IC in preventing harsh or overreactive parenting reactions. Furthermore, evidence has implicated these EFs in the regulation of positive parenting behavior. Nevertheless, previous research is subject to numerous methodological limitations, and no work has examined the arguably critical moderating role of mothers' childrearing attitudes in the associations between maternal EFs and parenting behavior. As such, the goals of the current study were twofold:

1. To test the relations between maternal EFs and parenting behavior. WM and IC were examined in relation to overreactive and positive parenting, as measured by both questionnaires and parenting responses to vignettes of challenging and prosocial child behaviors. WM and IC were assessed via traditional task-based measures of EF, as well as by maternal self-report. In addition, demographic variables, and other parent characteristics (intelligence and personality) and contextual factors (household chaos and behavior of the mother's own child) were included in models when appropriate in order to test the unique contributions of maternal EFs to parenting behavior.
2. To test the moderating effect of mothers' childrearing attitudes in the relations between maternal EFs and parenting behavior.

To address these goals, based on previous theory and research, I hypothesized that:

1. Maternal EFs would be related to parenting behavior.
 - a. WM and IC would be negatively related to measures of overreactive, harsh parenting.

- b. WM and IC would be positively related to measures of positive parenting.
- 2. Maternal childrearing attitudes would moderate the relations between maternal EFs and overreactive parenting behavior.
 - a. The relations between EFs and harsh, overreactive parenting would be stronger among mothers who endorse more progressive attitudes.
 - b. No specific hypothesis was proposed, but the potential moderating role of childrearing attitudes in the relations between EFs and positive parenting was explored.

2 Method

2.1 Recruitment

Mothers were recruited via Amazon's Mechanical Turk (MTurk), and completed the study online using Qualtrics. MTurk is a crowdsourcing internet marketplace where requesters (in this case, researchers) can post Human Intelligence Tasks (HITs) that workers (in this case, participants) can browse and complete for monetary compensation if they meet inclusion criteria. HITs can be virtually any task that can be completed with a computer (e.g., surveys, cognitive tasks) and, as such, MTurk has greatly expanded the range of participants that can be accessed quickly and relatively inexpensively for social, behavioral, and clinical science research. The MTurk participant pool has been shown to be more demographically diverse than standard internet samples or college samples (e.g., Buhrmester, Kwang, & Gosling, 2011; Casler, Bickel, & Hackett, 2013). Furthermore, studies show that the reliability of data collected via this platform is comparable to, if not better than, data collected via more traditional means (e.g., Casler et al., 2013; Saunders, Bex, & Woods, 2013), and results from studies conducted via MTurk are similar to those conducted using other online platforms or in-lab data collection (e.g., Bartneck, Duesner, Moltchanova, & Zawieska, 2015). This is true even for research examining mental health and well-being in families. For example, Schleider and Weisz (2015) used MTurk to obtain parent reports of family functioning, parental psychopathology symptoms, parental stress, and child emotional and behavioral problems. They found that this method was more cost-effective than traditional means, equivalent to these in terms of participant attrition rates, and comparable to previous research in terms of correlations among constructs. Furthermore, parents recruited via MTurk passed consistency checks and their responses to measures showed good psychometrics across several time points (Schleider & Weiss, 2015).

To safeguard validity in data collection, researchers using MTurk typically include attention check questions (ACQs) to screen out potentially inattentive responders. Research shows that the inclusion of ACQs increases the quality of the data collected (e.g., Aust, Diedenhofen, Ullrich, & Musch, 2013; Buhrmester et al., 2011), and also that MTurk participants do better on these checks than participants from other subject pools (Hauser & Schwartz, 2016). In addition, MTurk provides researchers with information about participants' performance in previous tasks in the form of approval ratings. Each task that a participant completes is either accepted or rejected by the requestor. Subsequent researchers can then limit the participants that may view and complete their task by making it available only to those participants who have an approval rating (the proportion of their completed hits that are accepted) above a certain cut-off. Peer and colleagues (2014) have shown that participants with high reputations (i.e., approval ratings of 95% or above) produce the highest quality data and consistently correctly answer ACQs. Based on these findings, the participant pool of mothers in this study was limited to those with approval ratings of 95% or above. To ensure that mothers were paying sufficient attention during this study, several ACQs were placed throughout the online protocol, requiring mothers to paraphrase an item from the previous page. As an additional precaution, mothers were asked to enter their child's date of birth multiple times throughout task administration. Presumably, if they were the mother of a 3-7 year-old child, they would have no trouble remembering the child's date of birth. Conversely, if participants lied about being a parent and fabricated a date of birth in order to qualify for the study, they would be less likely to correctly remember this date throughout the study. Finally, several CAPTCHA (Completely Automated Public Turing Test to Tell Computers and Humans Apart) items were embedded between tasks to ensure that responses were not being automatically generated by a computer system. CAPTCHA items are brief problems that are simple for humans to solve (e.g.,

identifying a set of distorted letters), but almost impossible for a computer to solve. Mothers were required to correctly answer CAPTCHA items before moving on to subsequent portions of the study.

2.2 Participants

Two hundred and forty mothers of 3- to 7-year-old children were recruited. All mothers passed all CAPTCHA items, attention questions, and child date of birth entries. Two mothers were excluded from analyses: one who reported that her child had autism spectrum disorder, and another who reported that her child was 8 years old. Following initial data screening procedures, 207 mothers (86.3%) were retained for the final sample (see Preliminary Analyses for more detail on these screening procedures). All subsequent analyses were conducted on this sample of 207. Demographic characteristics of the sample are presented in Table 2.1.

Table 2.1. Participant characteristics. N = 207

	Mean	SD	Frequency (%)
Mother age (years)	33.91	6.72	
Child age (years)	5.01	1.31	
Child gender			male 52.7
Mother ethnicity			Caucasian 82.1
			Asian-American 6.3
			Hispanic-American 5.3
			African-American 4.8
			other 1.5
Mother-child relationship			biological 98.1
			adoptive 1.9
Marital status			married or common law 78.3
			divorced or separated 5.8
			single 13.5
Mother education			high school graduate 13.0
			partial college/university 37.2
			standard college/university graduate 40.1
			graduate or professional training 9.7
Mother employed			yes 73.9
Household income			< \$5000 .5
			\$5000 - \$19 999 7.2
			\$20 000 - \$34 000 12.1
			\$35 000 - \$49 000 20.8
			\$50 000 - \$74 000 28.5
			\$75 000 - \$99 000 16.4
			\$100 000 - \$149 999 10.6
			\$150 000 - 199 999 2.9
			≥ \$200 000 1.0
Mother lifetime diagnosis of any disorder			none 74.8
Child lifetime diagnosis of any disorder			none 99.5

On average, mothers in this study were approximately 34 years old and had a child of approximately 5 years of age. Mothers' level of education and household income were normally distributed, with modal responses reflecting a college or university degree and household income between 50 000 and 74 999 USD. The majority of mothers were the biological parent to their child, married, currently employed, and had never received a mental health diagnosis. Of the 52 mothers who reported that they had received a diagnosis in their lifetime, 50 reported a mood or anxiety disorder, one had post-traumatic stress disorder, and one had a personality disorder. Furthermore, the vast majority of

children had never received a mental health diagnosis, with only one child having been diagnosed with ADHD.

2.3 Procedure

Ethical approval for this project was obtained from The University of British Columbia Behavioral Research Ethics Board. The project was advertised on MTurk as a study about parenting and how this is related to mothers' thought processes. Mothers were able to complete the study at any computer with a working internet connection, in a place where they anticipated being uninterrupted for approximately 2 hours. Interested mothers clicked on a link in the MTurk advertisement that redirected them to a survey hosted on the Qualtrics platform. There, they responded to three screening questions to determine their eligibility to participate: (1) they were the mother of a boy or girl in the 3-7 age range, (2) they had lived with their child in the past year, and (3) they were willing to temporarily download the computer software required to run the study protocol (Inquisit). Mothers who met the criteria provided informed consent and subsequently began the study protocol. They first completed a demographic questionnaire, followed by three EF computer tasks presented in counterbalanced order across mothers. A link in the Qualtrics survey directed mothers to the Inquisit web program, where they completed the EF tasks and then returned to the Qualtrics website. They then completed a self-report questionnaire of EF as well as the parenting measures, in counterbalanced order across mothers. Finally, mothers completed measures assessing all potential covariates, again in counterbalanced order.

At the conclusion of the study, mothers were thanked for their participation. They received a code from Qualtrics that they entered into MTurk in order to receive compensation. Available guidelines ("Guidelines for Academic Requesters", 2014) suggest 0.10\$ per minute as the minimum compensation for MTurk participants, therefore each participant received 15.00\$ in U.S. funds following completion

of the study. Mothers who completed the screener items but failed to qualify or provide consent received 0.10\$.

2.4 Measures

2.4.1 Participant demographics

Mothers completed a Child and Family Information questionnaire (CFI) to gather basic demographic information, including the age, gender, and ethnicity of family members. Mothers reported on mental health problems in themselves and their own children as well as their marital status, and provided occupational and educational information for themselves and their partners (if appropriate), as well as family income.

2.4.2 Executive functioning

2.4.2.1 Working memory capacity

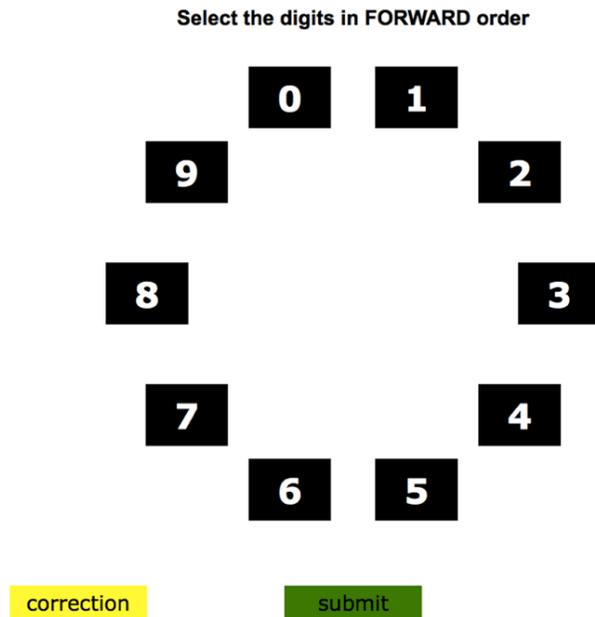
Mothers' WM capacity was assessed using computerized versions of two span tasks, visual digit span (VDS; both forward and backward recall) and operation span (OSpan). This was done in order to capture different aspects of WM (i.e., holding and manipulating conceptual information in mind, as well as doing so within the context of a distractor task). All tasks were available online through the Millisecond Test Library (<http://www.millisecond.com/download/library/>) and were run on Inquisit 4 software.

2.4.2.1.1 VDS (forward and backward recall)

Computerized versions of VDS-forward and backward (Woods et al., 2011) were used in the study. These tasks were adapted from the digit span tasks from the Wechsler IQ batteries (e.g., WAIS-IV; Wechsler, 2008), one of the most widely-used and psychometrically sound assessments of WM. In VDS-forward, mothers viewed strings of random digits (1-9) in black against a white background, presented at a rate of one digit per second. Strings in VDS-forward began at three digits (Level 3).

Following presentation of each string, mothers viewed a recall screen with boxes labelled 1 through 9. See Figure 2.1:

Figure 2.1 VDS-forward recall screen



Their task was to identify the digits they had just seen, in the correct order, by clicking on the appropriate boxes. If the response was correct (i.e., the right digits in the right order), they moved up to the next level (i.e., Level 4) and viewed a string of four digits. If the response was incorrect, the same level was presented a second time. If the mother made a consecutive error, she moved down a level and started again. Furthermore, mothers received feedback after each recall portion of the task (e.g., *You recalled 2 out of 3 digits correctly*). The VDS-forward task did not end after two consecutive incorrect responses, as in traditional digit span tasks; rather, each participant completed a total of 14 trials. The mother's score was the maximal length of digits correctly recalled over the course of 14 trials, with higher scores representing better WM capacity. Although calculation of internal consistency is not recommended for a test of this nature, this score has been shown to have superior psychometrics (improved test–retest reliability; higher correlations with the results of other neuropsychological test

scores; Woods et al., 2011), compared to the traditional digit span metric (i.e., the last correctly recalled number of digits before two consecutive errors). The VDS-backward task was conducted and scored in a similar fashion, however, mothers identified the digits in the reverse order in which they were presented. Furthermore, the task began at Level 2, (i.e., a string of two digits).

Computerized versions of VDS tasks have been shown to produce similar distributions of scores compared to person-administered versions collected in lab-based studies, and the computerized versions differentiate between adults with high and low reading ability as well as the traditional digit span does (Tractenberg & Freas, 2007). Further supporting the validity of WM measured in this way, Bui, Meyerson, and Hale (2015) replicated previous findings showing age-related declines in WM capacity, as well as associations between WM capacity and processing speed, using an online-administered computerized letter-number sequencing task comparable to the VDS tasks used in this study. Evidence of the validity of these tasks as used in this study is included in the results.

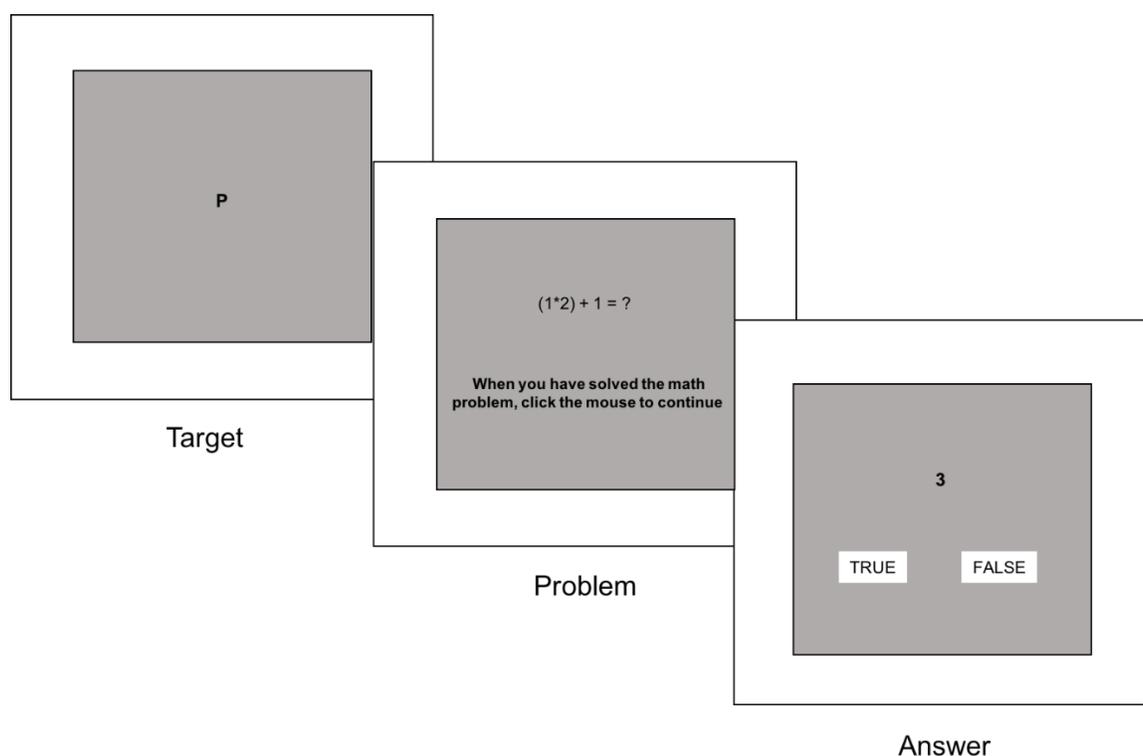
2.4.2.1.2 OSpan

Mothers also completed a computerized version of OSpan (Unsworth, Heitz, Schrock, & Engle, 2005; Unsworth, Redick, Heitz, Broadway, & Engle, 2009) as another measure of WM capacity. During OSpan, mothers were given a sequence of to-be-remembered target items (letters), presented one at a time. However, between target presentations, they completed a distractor task (simple math problems). At the end of a sequence of target-distractor presentations, mothers had to identify all of the target items that were presented, in the correct order. Furthermore, mothers also completed an instruction phase before the task, during which they practiced the storage task alone (recalling target letters), the processing task alone (solving simple math problems), and then the combined storage-processing task. During the instruction phase, mothers were timed while they practiced the distractor task. Subsequently, when mothers completed the actual OSpan task, they were required to respond to each distractor item in

a time within 2.5 standard deviations of their average response time recorded during the instruction phase (i.e., the average amount of time elapsed before they indicated having solved the distractor task). If they did not respond within 2.5 standard deviations of their baseline time, the trial was counted as incorrect and the program moved on to the next item. Maintaining this standard was meant to reduce the likelihood of trials where mothers were able to rehearse the target item during the distractor task.

Mothers completed three blocks of OSpan. Each block was comprised of five sequences that contained between three and seven target items (letters) and corresponding distractor items (simple math problems), referred to as target-distractor pairs. See Figure 2.2:

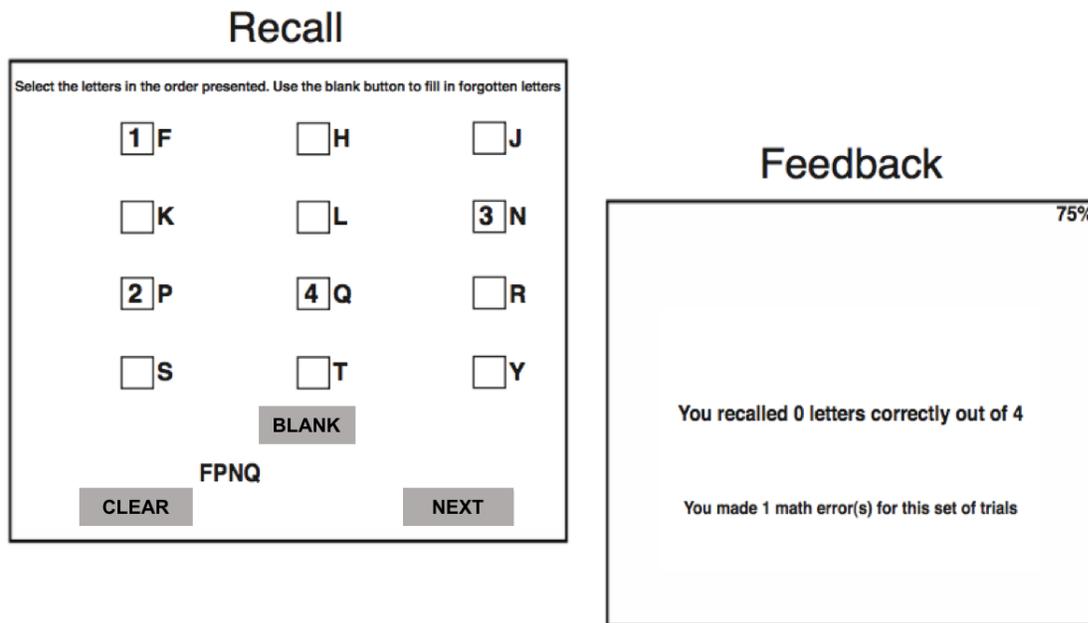
Figure 2.2 Sequence of screens presented during OSpan



Mothers were shown a target letter on the screen, presented for 800 msec. The screen then changed to the distractor math problem, and mothers were instructed to solve it as quickly as possible. Once they mentally solved the problem, they clicked the mouse to advance the screen and were then shown another screen depicting a numerical value. Mothers had to decide whether the value represented

the correct answer to the previous math problem by clicking on boxes labelled *True* or *False*. Once they responded, they were shown the next target letter. Following each sequence of target-distractor pairs, mothers saw screen with 4 x 3 matrix of letters (e.g., F, H, J, K, L, N, P, Q, R, S, T, and Y). In the recall phase, mothers clicked the box beside the target letters in the matrix, representing the correct order of presentation. The recall phase was not timed. Once mothers responded, they were presented a feedback screen for 1200 msec. See Figure 2.3:

Figure 2.3 Recall and feedback screens during OSpan



Scores were calculated by summing the number of letters correctly recalled, in the correct order (Turner & Engle, 1989), and higher scores reflected better WM capacity. This computerized version of OSpan correlates strongly with the traditional person-administered version (Unsworth et al., 2005). Furthermore, it has demonstrated good test-retest reliability ($r = .83$; Unsworth et al., 2005) and predictive validity, correlating expectedly in terms of magnitude and direction with measures of fluid intelligence (e.g., Broadway & Engle, 2010; Foster et al., 2015). In addition, research in social and personality psychology has linked performance on OSpan tasks with successful emotion regulation and

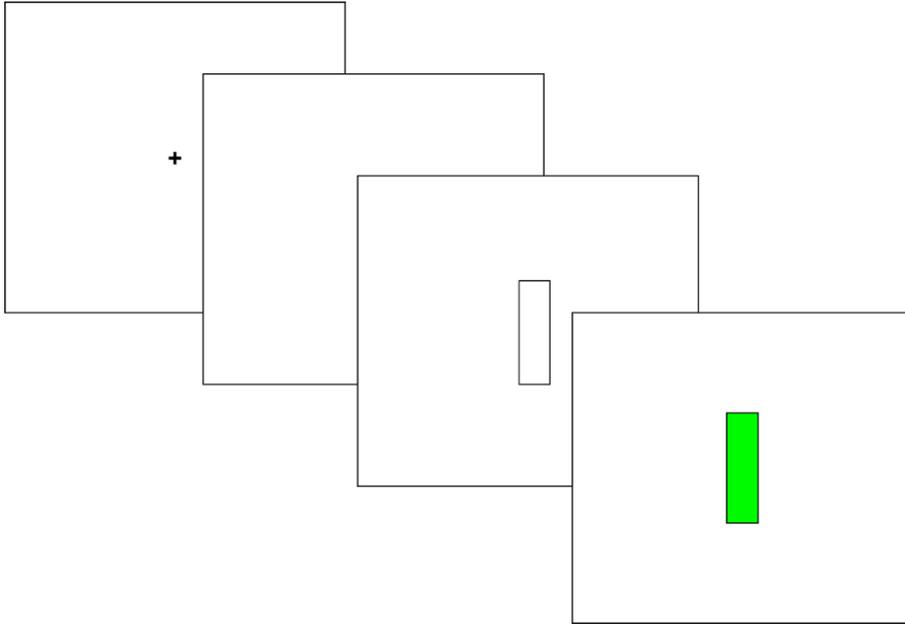
responses to stressful situations (e.g., Hofmann et al., 2012). As with the digit span tests, evidence of validity is presented in the results section.

2.4.2.2 Inhibitory control

Mothers' IC was measured using a Cued Go No-Go task (CGNG; Fillmore, 2003). Traditional Go No-Go tasks involve different stimuli presented one at a time on a screen in a continuous fashion. On each trial, the participant must either make a motor response (Go) in response to what is designated as the Go stimulus, or withhold the response (No-Go) in response to the other stimulus designated as No-Go. In the CGNG, cues provide preliminary information about the type of stimulus that is likely to follow on the next trial, and these cues have a high probability of signaling the correct Go or No-Go stimulus. Participants come to rely on the cues and these elicit processes that prepare the individual to either execute or inhibit a behavior. For some trials, the cue indicates Go, but the actual stimulus that occurs is No Go. Responses on these trials are a good index of IC because the participant must overcome the prepotent urge to make the motor response (Fillmore, 2003).

Each trial of the CGNG task began with the presentation of a fixation point (+) for 800 ms; followed by a blank white screen for 500 ms; a cue displayed for either 100, 200, 300, 400, or 500 ms (presented at random); and a Go or No-Go stimulus displayed until the participant responded or until 1000 ms elapsed. Figure 2.4 depicts a cued Go Trial:

Figure 2.4 Sequence of screens during the CGNG task



The cues were a black outline of a rectangle (7.5 cm x 2.5 cm) presented in the center of a screen in either a horizontal or vertical orientation. The Go stimulus was a green color that subsequently appeared to fill the interior of the rectangle cue, and the No-Go stimulus was a blue color that filled the interior of the rectangle cue. Mothers were instructed to press the spacebar key on the keyboard as soon as a green (Go) stimulus appeared, and to suppress the response when a blue (No-Go) stimulus was presented. The orientation of the rectangle cues provided indications as to whether a Go or No-Go stimulus would be presented next. Vertical cues preceded the Go stimuli on 80% of the Go trials and preceded the No-Go stimulus on 20% of the No-Go trials. Horizontal cues preceded the No-Go stimuli on 80% of the No-Go trials and preceded the Go stimulus on 20% of the Go trials. There were 250 trials (125 Go and 125 No-Go), with 700 ms between each trial.

The measure of interest was the proportion of No-Go targets in which the mother failed to inhibit a response following a Go cue (commission error rate). The inverse of this value was calculated and used in analyses such that higher scores represent better IC. Previous research has shown that the

increase in Go probability during a CGNG task is related to shorter reaction times and well as activity in the anterior cingulate cortex, a brain region associated with impulse control (Bekker, Kenemans, & Verbaten, 2005). Furthermore, response times are slower when participants are required to change a planned response (i.e., on a No-Go trial following a Go cue; Randal & Smith, 2011), supporting the validity of this task as an index of the ability to override a prepotent response. The CGNG also has been shown to discriminate between typically developing samples of adults and those with ADHD (Weafer, Fillmore, & Milich, 2009) as well as substance abuse (Fillmore & Rush, 2006). Although reliability information is limited for the cued task, studies of the traditional Go No-Go task report stability of the commission error score over time ($r = .65 - .84$; Weafer, Baggott, & de Wit, 2013; Wöstmann et al., 2013). Given the similarity of cued and traditional Go No-Go tasks (with the key difference being the cue prompting the prepotent response in the former case, and simply more Go trials than No-Go trials prompting the prepotent response in the latter case), it is reasonable to assume that the CGNG is also a reliable index of IC. Evidence of validity in this sample is presented in the results.

2.4.2.2 Self-reported executive functioning

Mothers also completed the Working Memory and Inhibit subscales of the Behavior Rating Inventory of Executive Function-Adult Version (BRIEF-A; Roth, Isquith, & Gioia, 2005). Each subscale is comprised of eight items tapping mothers' views of their executive functioning and self-regulation in their everyday environment. Sample items include *I forget instructions easily* (Working Memory) and *I say things without thinking* (Inhibit). Mothers rated the frequency with which each behavior has been a problem for them using a 3-point scale (1 = *Never*; 2 = *Sometimes*; 3 = *Often*). Norms for the BRIEF-A are available and based on a large standardization sample representative of the US (Roth, Isquith, & Gioia, 2014). The scale scores have demonstrated good internal consistency and test-retest reliability in both clinic and non-clinic samples (Roth et al., 2005; 2014). In addition, scores on the BRIEF-A

correlate with other questionnaire-based measures of EF including the Dysexecutive Questionnaire and the Frontal Systems Behavior Scale (Roth et al., 2014), and have been shown to have small to moderate associations with task-based measures of EF, such as the Tasks of Executive Control (Isquith, Roth, & Gioia, 2010; McAuley, Chen, Goos, Schachar, & Crosbie, 2010). Raw scores were calculated by summing the ratings for items within each subscale and were then converted to T-scores. Higher scores represent more problems with (i.e., worse) EF. In this study, Cronbach alphas were .91 for the WM and .82 for the Inhibit subscales, and validity evidence is reviewed in the results.

2.4.3 Childrearing attitudes

Childrearing attitudes were assessed with the Parental Modernity Scale (PMS; Schaefer & Edgerton, 1985; see Appendix A). The PMS is a 30-item self-report questionnaire assessing general attitudes toward childrearing, and contains two subscales measuring progressive-democratic and traditional-authoritarian attitudes. These subscales are then combined to produce a total score. The Progressive subscale contains eight items reflecting attitudes that emphasize child autonomy, and beliefs that children should be able to develop their own ideas, challenge authority, and be included in decision making (e.g., *Children have a right to their own point of view and should be allowed to express it; It's alright for a child to disagree with his/her parents*). Mothers indicated the extent to which they agreed with each statement on a 5-point Likert scale (1 = *Strongly disagree*; 5 = *Strongly agree*). Furthermore, the Traditional subscale contains 22 items reflecting attitudes that emphasize obedience to authority and discourage autonomous expression (e.g., *The most important thing to teach children is absolute obedience to whoever is in authority; Children should not question the authority of their parents*). However, the Traditional subscale also contains several items related to education that are irrelevant to the current research question (e.g., *Teachers should discipline all children the same*). Therefore, only the 13 Traditional items (reverse scored) that referred to parenting specifically were combined with the eight

Progressive items (in other words, the nine items related to teaching and education were excluded) to generate the total score. Cronbach's alpha for this aggregated 21-item score was .87 in the current sample, with higher scores reflecting more progressive and lower scores reflecting more traditional childrearing attitudes.

Scores on the PMS have demonstrated acceptable internal consistency ($\alpha = .69 - .87$; Leve & Fagot, 1997; Schaefer & Edgerton, 1985) and test-retest reliability ($r = .84$; Schaefer & Edgerton, 1985). Concurrent validity also has been established, and PMS scores are positively related to other measures of parental values (Burchinal, Peisner-Feinberg, Pianta, & Howes, 2002; Campbell, Goldstein, Schaefer, & Ramey, 1991), as well as children's school readiness and social competence, and negatively related to child behavior problems (NICHD Early Child Care Research Network, 1998).

2.4.4 Parenting questionnaires

2.4.4.1 Overreactive parenting

Overreactive parenting was assessed using the Overreactivity subscale of the Parenting Scale (PS; Arnold, O'Leary, Wolff, & Acker, 1993; see Appendix B). The PS is a 30-item self-report questionnaire assessing parenting strategies in discipline situations for preschool aged children, but also has been validated for use with older child samples, up to 11 years (e.g., Prinzie, Onghena, & Hellinckx, 2007; Rhoades & O'Leary, 2007). The Overreactivity subscale consists of 10 items reflecting displays of anger, meanness, and emotionality in discipline situations. Mothers responded to items using a 7-point Likert scale with anchors on either end (e.g., *When my child misbehaves, ... 1 = I raise my voice or yell, to 7 = I speak to my child calmly; After there's been a problem with my child, ... 1 = I often hold a grudge, to 7 = Things get back to normal quickly*). Although abbreviated versions of the Overreactivity subscale have been developed and validated (e.g., Reitman et al., 2001; Rhoades & O'Leary, 2007), recent research using item response theory suggests that the original 10-item subscale is more reliable

than these alternative versions (Lorber, Xu, Smith Slep, Bulling, & O’Leary, 2014). Thus, the current study used the initial set of items. The Overreactivity subscale has demonstrated good internal consistency ($\alpha = .82 - .83$) and stability over time ($r_s = .78 - .82$; Arnold et al., 1993; Lorber et al., 2014). Furthermore, ample evidence supports its validity. Studies have found that the Overreactivity subscale is related to marital discord, parenting stress, parental depressive symptoms, and child externalizing behaviors (Arnold et al., 1993; Lorber et al., 2014; Reitman et al., 2001), and correlated with observed overreactivity in parent-child interactions (Arnold et al., 1993). Cronbach’s alpha for the Overreactivity scale was .86 in the current study. Higher scores reflect more overreactive parenting.

2.4.4.2 Positive parenting

Positive parenting was assessed using the Positive Parenting and Involvement subscales of the Alabama Parenting Questionnaire (APQ; Shelton, Frick, & Wootton, 1996; see Appendix C). The APQ is a 32-item self-report questionnaire assessing positive and negative parenting practices in parents of children ages 6-13, however, it also has been validated for use with younger children, down to 3 years (e.g., Clerkin, Marks, Policaro, & Halperin, 2007; Dadds, Meaujean, & Fraser, 2003; de la Osa, Granero, Penelo, Domènech, & Ezpeleta, 2014). The Positive Parenting subscale consists of six items assessing parents’ use of positive reinforcement (e.g., *You compliment your child when he/she does something well; You reward or give something extra to your child for obeying you or behaving well*). The original Involvement subscale consists of 10 items assessing parents’ interest and engagement in their child’s life (e.g., *You play games or do other fun things with your child; You talk to your child about his/her friends*), however, Clerkin et al. (2007) suggested eliminating four items that did not adequately load onto the Involvement factor in a sample of younger children 3-6 years. Thus, the proposed study used the original six items from the Positive Parenting, and the retained six items from the Involvement, subscales. Mothers rated the frequency with which they engage in each of the listed behaviors on a 5-

point Likert scale (0 = *Never*; 1 = *Almost never*; 2 = *Sometimes*; 3 = *Often*; 4 = *Always*). Both the Positive Parenting and Involvement subscales have demonstrated good internal consistency in community and clinic samples ($as = .79 - .85$; Clerkin et al., 2007; Shelton et al., 1996), as well as stability over time ($rs = .85 - .87$; Dadds et al., 2003). Supporting the validity of the instrument, mothers' responses do not appear to be strongly related to measures of socially desirable responding (Shelton et al., 1996), but are negatively related to child conduct problems (Dadds et al., 2003) and to the presence of child disruptive behavior disorders (de la Osa et al., 2014). High correlations between the Positive Parenting and Involvement subscales have emerged in previous research (Clerkin et al., 2007; Dadds et al., 2003; Shelton et al., 1996). In line with these authors' recommendations, the two subscales were collapsed to form one overall measure of positive parenting. Cronbach's alpha for this scale was .88 in the current study. Higher scores reflect more positive parenting.

2.4.5 Scenario ratings

An additional measure of parenting in response to scenarios depicting parent-child interactions was developed for the proposed study, to address the limitations of questionnaires in terms of controlling for variations in behavior of the mothers' own children. This scenario method has been used widely in previous research (e.g., Coplan et al., 2002; Rudy & Grusec, 2001) and in our own Parenting Lab in particular (e.g., Colalillo, Williamson, & Johnston, 2014; Park, Johnston, Colalillo, & Williamson, in press). I generated two sets of scenarios, one depicting challenging child behaviors (child noncompliance that produces some inconvenience for the mother), and another set depicting prosocial child behaviors (spontaneously helpful behaviors that have a benefit for the mother). Twelve scenarios of each kind were generated.

All of the scenarios were piloted along three dimensions using a convenience sample of 17 participants who had experience interacting with young children. Participants rated, on 7-point Likert

scales, the extent to which each scenario seemed indicative of a boy or a girl (1 = *boy*, 4 = *neutral*, 7 = *girl*), their impression of the age of the child performing the behavior in question (1 = *0-1 years*, 4 = *6 years*, 7 = *11-12 years*), and the extent to which the behavior in question seemed to have an impact on the parent (1 = *no impact on the parent*, 7 = *substantial impact on the parent*). The strongest six scenarios depicting challenging child behavior and prosocial child behavior, respectively, were selected for inclusion in this study (see Appendices D and E). Based on the initial piloting, the children depicted in the six negative childrearing scenarios were perceived to be gender-neutral ($M = 3.7$), approximately 6 years of age, and behaving in a way that had a moderate impact on the parent ($M = 4.98$). Furthermore, the children depicted in the six positive childrearing scenarios were perceived to be gender-neutral ($M = 4.24$), approximately 7 years of age, and behaving in a way that had a comparable impact on the parent ($M = 4.58$). Examples of the final negative and positive childrearing scenarios are: *You are at home one afternoon with your family when you receive an important phone call. You tell your child, who is playing loudly, to quiet down for a few moments so you can take the call. Your child continues to play loudly so you have to postpone the call;* and *You have a cold and, when you come home from work, you are tired and not feeling well. You lay down on the sofa and your child comes in and says sorry that you aren't feeling well. He/she gives you a hug and hands you his/her stuffed toy to hold for comfort.*

Mothers in the current study read each scenario and rated, on 7-point Likert scales, four items assessing their emotional and behavioral responses to the child behaviors. Items following challenging child behaviors were *How angry would you be?* (1 = *Not at all angry*; 7 = *Very angry*); *How likely would you be to yell at your child?* (1 = *Not at all likely*; 7 = *Very likely*); *How likely would you be to correct/reprimand your child?* (1 = *Not at all likely*; 7 = *Very likely*); and *How likely would you be to do nothing?* (1 = *Not at all likely*; 7 = *Very likely*). Responses for each specific item were averaged across the six negative scenarios such that higher scores represent more overreactivity (i.e., yielding an overall

Upset score across the six scenarios, as well as an overall Yell score, etc.). The parallel items following the prosocial child behavior scenarios were *How happy would you be?* (1 = *Not at all happy*; 7 = *Very happy*); *How likely would you be to praise your child?* (1 = *Not at all likely*; 7 = *Very likely*); *How likely would you be to offer your child a reward?* (1 = *Not at all likely*; 7 = *Very likely*); and *How likely would you be to do nothing?* (1 = *Not at all likely*; 7 = *Very likely*). Responses for each specific item were averaged across the six positive scenarios such that higher scores represent more positive responses (i.e., yielding an overall Happy score across the six scenarios, as well as an overall Praise score, etc.).

Following each negative and positive scenario, mothers also rated the extent to which the behavior depicted was typical for their child. On average, mothers reported that the positive child behaviors were more typical of their children than the negative behaviors ($M_s = 5.14$ and 3.13 , respectively).

Previous work has supported the psychometrics of instruments of this type, reporting internal consistencies in the .80 to .84 range (e.g., Park et al., in press), as well as relations with other measures of parenting (e.g., Rudy & Grusec, 2001). Cronbach's alphas for the items used in this study ranged from .80 – .87 and .87 – .95 for the negative and positive scenarios, respectively.

2.4.6 Potential covariates

2.4.6.1 General cognitive ability

Mothers completed the 16-item sample test from the International Cognitive Ability Resource (ICAR; Condon & Revelle, 2014; see Appendix F). The ICAR is a public-domain measure of cognitive ability for basic intelligence research. The ICAR sample test is comprised of four item types: four Letter and Number Series items, four Matrix Reasoning items, four Verbal Reasoning items, and four Three-Dimensional Rotation items. Letter and Number Series items required that mothers viewed short digit or letter sequences, and then selected the number or letter that comes next in the sequence from among six choices. Matrix Reasoning items were similar to the Raven's Progressive Matrices. Each item consisted

of a 3 x 3 matrix of shapes with one of the nine shapes missing. Mothers selected the missing shape from among six choices. The Verbal Reasoning items involved logic, vocabulary and general knowledge questions. Finally, the Three-Dimensional Rotation items presented mothers with three-dimensional cubes and asked them to select a response that represented a rotation of the target stimulus. None of the items was timed. Condon and Revelle (2014) have shown that the ICAR items produce scores with sufficient variance and that the 16-item sample test has adequate internal consistency ($\alpha = .81$). Furthermore, construct validity of the sample test has been demonstrated; scores from this measure correlate positively with Graduate Record Examinations scores, achievement test scores, and also discriminate between university majors. Finally, correlations between the ICAR sample test and another validated measure of general cognitive ability (Shipley-2) were comparable to those between the Shipley-2 and other measures of cognitive ability. In the current sample, internal consistency was lower than previously reported for the 16-item sample test ($\alpha = .68$).

2.4.6.2 Household chaos

Mothers completed the Chaos, Hubbub, and Order Scale (CHAOS; Matheny, Wachs, Ludwig, & Phillips, 1995; see Appendix G) to measure the household chaos. The CHAOS is comprised of 15 items assessing the degree of noise, confusion, clutter, frenetic activities, and disorganization/lack of routines within the home. Sample items include *We almost always seem to be rushed* and *You can't hear yourself think in our home*, rated by mothers on a 4-point Likert scale (1 = *Very much like your own home*; 4 = *Not at all like your own home*). Items were scored such that higher scores reflect higher levels of household chaos. The scale has been shown to have acceptable internal consistency ($\alpha = .79$) and test-retest reliability ($r = .74$ after 12 months), as well as concurrent validity, correlating negatively with measures of maternal education and SES, and positively with direct observations of the level of environmental confusion in the home coded by objective raters (Deater-Deckard et al., 2012; Matheny et

al., 1995). Furthermore, higher CHAOS scores are associated with various observations of parenting behavior (e.g., ignoring the child's bids for attention; Matheny et al., 1995). Cronbach's alpha was strong in the current sample ($\alpha = .92$).

2.4.6.3 Maternal personality characteristics

Maternal personality characteristics were evaluated with items from the International Personality Item Pool (IPIP; Goldberg, 1999; Goldberg et al., 2006). The IPIP is a freely-available database of over 3000 items assessing well-studied personality constructs. The IPIP pool contains several scales that can serve as proxies for the NEO Personality Inventory – Revised (Costa & McCrae, 1992) and offers advantages over the former as it is free of costs, and is in an ongoing process of refinement as personality researchers are encouraged to regularly contribute to its development (Goldberg, 1999). The Conscientiousness and Neuroticism scales of the Big Five Aspect Scales (BFAS; DeYoung, Quilty, & Peterson, 2007; see Appendix H) were used to measure personality traits in the mothers in the current study. The Conscientiousness scale is comprised of 20 items measuring two facets of the construct labelled *Industriousness* (e.g., *I carry out my plans*) and *Orderliness* (e.g., *I keep things tidy*). Items from both facets are combined to form a Total Conscientiousness score. The Neuroticism scale similarly is comprised of 20 items measuring two facets of the construct labelled *Volatility* (e.g., *I get easily agitated*) and *Withdrawal* (e.g., *I become overwhelmed by events*), which are combined to form a Total Neuroticism score. Mothers rated the extent to which they agreed with each statement on a 5-point Likert scale (1 = *Strongly disagree* and 5 = *Strongly agree*). Higher scores reflect higher levels of the personality trait in question. Both scales have demonstrated strong internal consistency ($\alpha = .81 - .89$) and test-retest reliability (mean $r = .81$; DeYoung et al., 2007). The BFAS scales are also highly correlated with other Big Five personality scales, including the Big Five Inventory (John & Srivastava,

1999). In the current sample, Cronbach's alphas were .95 for Neuroticism and .92 for Conscientiousness.

2.4.6.4 Behavior problems in the mothers' own children

Mothers completed the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997; see Appendix I) to assess behavior problems in their own children. The SDQ is a 24-item parent-reported questionnaire assessing child behavior along five dimensions: emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems, and prosocial behavior. Mothers indicated how true each of a series of behaviors is for their child (*Not true*, *Somewhat true*, *Certainly true*). The Total Problems score was used in the proposed study and was generated by averaging responses to items comprising the first four dimensions, and higher scores reflect more child behavior problems. The SDQ has been validated for use with 4 to 16 year-old children (Goodman, 1997). Although a slightly modified version in which three items are reworded has been created for use in younger populations (age 3), other studies have employed the original version as a screener for behavioral problems in samples down to 3 years (e.g., Hughes, White, Sharpen, & Dunn, 2010), and thus for simplicity only the original measure will be used in this study. The Total Difficulties score has consistently shown good internal consistency (mean α across 26 studies = .80) and test-retest reliability (mean r across 6 studies = .76; Stone, Otten, Engels, Vermulst, & Janssens, 2010). Extensive support also is available for the scale's validity. The Total Difficulties score correlates highly with other measures of child behavior problems and symptoms of psychopathology (e.g., DuPaul, Power, Anastopoulos, & Reid, 1998; Goodman, 1997; Muris, Meesters, & van den Berg, 2003), and the SDQ predicts future psychopathology in children at 3-year follow-up (Goodman & Goodman, 2009). In the current sample, Cronbach's alpha for the Total Difficulties score was .85.

2.4.6.5 Socially-desirable responding

Mothers completed the Impression Management subscale of the Balanced Inventory of Desirable Responding, Version 7 (BIDR-7; Paulhus, 1998). This subscale contains 20 items assessing deliberate enhanced self-presentation. Mothers rated the degree to which they perform various desirable, but uncommon, behaviors on a 5-point Likert scale ranging from *Not True* to *Very True*. Sample items include *I have never dropped litter on the street* and *I never swear*. Total scores were calculated and converted to T scores. The Impression Management subscale has demonstrated good internal consistency (α 's = .79 – .86), and test-retest reliability over a 5-week period is acceptable ($r = .65$; Paulhus, 1991; Paulhus, 1998). In addition, scores on the subscale are highly correlated with lie scales from the Eysenck Personality Questionnaire and the Minnesota Multiphasic Personality Inventory (Paulhus, 1998), and have been shown to be more sensitive to self-presentation than any of the Big Five personality scales (Paulhus, Bruce, & Trapnell, 1995). Cronbach's alpha in this sample was acceptable ($\alpha = .79$).

2.5 Data analytic plan

Prior to analyses, descriptive statistics were examined for each variable to detect any potential inaccuracies. All data were then checked for missingness (see Preliminary analyses). Next, aggregate scores for the primary variables (i.e., EF, overreactive parenting, positive parenting) were generated when appropriate, based on correlations between the constituent variables. A positive association of at least medium strength (i.e., $r \geq .30$) was considered as the minimum threshold for combination. Next, bivariate associations among all study variables were examined; if covariates emerged that were related to both a predictor (EF or childrearing attitudes) and a criterion (parenting) variable, they were included in the main analyses.

The main analyses were run using R statistical software (R Core Team, 2013). Correlations (or partial correlations using covariates, depending on the outcome of the data screening process) were

calculated between the EF measures (task-based and self-report) and parenting variables (questionnaire and scenario-based) to test the hypothesized relations between maternal executive functioning and overreactive as well as positive parenting. The hypothesized moderation was then tested using regression. Regression models were constructed predicting parenting from maternal EF (task-based and self-report) and childrearing attitudes, and their interaction. If there was no significant interaction between maternal executive functioning and childrearing attitudes, main effects were interpreted. If a significant interaction did emerge, simple slopes between executive functioning and parenting were examined at different levels of the childrearing attitudes moderator (± 1 standard deviation) and tested for significance.

Assumptions and diagnostics of regression analyses were checked and potentially influential outliers were identified using Cook's distance and a cut-off of $4/(n-k-1)$ (Belsley, Kuh, & Welsch, 2005). The identified cases were then removed and the models in question were retested but the patterns of results were largely unchanged, therefore I have decided to include all observations in the reported analyses. Furthermore, the original models predicting positive parenting failed to meet the assumption of homoscedasticity. In these cases, the regressions were conducted using a heteroscedastic-consistent standard error (HC0) and covariance matrix estimator (Hayes & Kai, 2007) with the PROCESS v3 macro for SPSS (IBM Corp., 2016; Hayes, 2017). In addition, the normal Q-Q plots for these models identified three observations that disturbed the normal distribution of residuals. Removing these three observations did not change the results, therefore they were retained in the analyses below.

I elected not to apply a correction to the Type I error rate to these analyses in order to decrease the likelihood of failing to detect potential true effects. However, if and when statistically significant effects emerged, these are interpreted alongside careful consideration of the corresponding beta values (effect sizes).

3 Results

3.1 Preliminary analyses

All data from all eligible participants were initially examined for missingness. Of the original 238 participants, one mother did not complete the VDS forward and backward tasks, and was excluded from analysis. The remaining 237 mothers had complete data for all measures of executive functioning, childrearing attitudes, and potential covariates. Some data were missing from items on the Overreactive subscale of the PS and the scenario-based measures of parenting, however this occurred in very few instances (less than .003% of items) and did not appear to follow a systematic pattern. Thus, in cases where a mother failed to respond to an item from a scale, its value was replaced with the mean of that scale.

Descriptive statistics were next examined for each of the variables used in the analyses to detect possible inaccuracies. Inspection of the distributions for the VDS-forward and backward tasks revealed that some mothers had unusually low or high scores on these measures (e.g., remembering 0 digits or remembering 16 digits). This suggested that these mothers may not have paid sufficient attention during the task, or that they may have used an external method to facilitate recall of the number strings (e.g., writing down the digits). Both of these possibilities compromise the validity of the VDS scores, and as such, unusually low or high scorers were excluded from the sample. To determine appropriate cut-off scores for the VDS tasks in the current study, I considered the distribution of scores reported in previous studies using these tasks. Woods et al. (2011) reported a mean maximum forward span of 7.87 with a standard deviation of .97, and a mean maximum backward span of 6.48 with a standard deviation of 1.36. Furthermore, Yang (2017) reported a mean maximum forward span of 8.30 with a standard deviation of 1.38, and a mean maximum backward span of 7.52 with a standard deviation of 1.19. Based on these distributions, I decided that a reasonable range of scores for these computerized VDS tasks was

3-12, inclusive. Participants who scored outside this range on either the forward or backward tasks were excluded from analyses, reducing the current sample from 237 to 207 mothers. All subsequent analyses were based on this final sample of 207 mothers.¹

Descriptive statistics for every variable used in the study are presented in Table 3.1.

Table 3.1. Means, standard deviations, and ranges for study variables

	Mean	SD	Range	Possible range
Working memory				
VDS forward	7.95	1.62	3-12	3-12
VDS backward	7.02	1.89	3-12	3-12
OSPAN	57.56	17.05	0-75	0-75
BRIEF ^a	54.33	13.83	39-97	39-97
Inhibitory control				
CGNG	.96	.12	.04-1	0-1
BRIEF ^a	49.15	10.59	36-88	36-93
Childrearing attitudes (PMS)				
	73.93	11.99	43-102	21-105
Parenting				
Overreactive parenting (PS)	25.74	9.34	10-60	10-70
Negative child behavior scenarios				
Upset	4.30	1.07	1-6.67	1-7
Yell	2.86	1.28	1-6.33	1-7
Correct/Reprimand	4.75	1.22	1-7	1-7
Do nothing	2.20	.99	1-5.83	1-7
Positive parenting (APQ)	50.10	6.57	30-60	12-60
Positive child behavior scenarios				
Happy	6.44	.76	2-7	1-7
Praise	6.25	.96	1-7	1-7
Reward	3.47	1.85	1.83-7	1-7
Do nothing	1.63	.97	1-6.33	1-7
Conscientiousness (BFAS)	77.58	13.16	32-100	20-100
Neuroticism (BFAS)	49.02	17.60	20-95	20-100
General intelligence (ICAR)	7.06	2.88	0-13	0-16
Household chaos (CHAOS)	28.64	9.46	15-57	15-60
Child behavior problems (SDQ)	9.25	6.06	0-30	0-40
Impression management (BIDR) ^a	59.37	10.56	34-86	34-86

Note. VDS = Visual Digit Span; OSPAN = Operation Span; BRIEF = Behavior Rating Inventory of Executive Function; CGNG = Cued Go No Go; PMS = Parental Modernity Scale; PS = Parenting Scale; APQ = Alabama Parenting Questionnaire; BFAS = Big Five Aspect Scales; ICAR = International Cognitive Ability Resource 16-item Sample Test; CHAOS = Chaos, Hubbub, and Order

¹ The sample remains the same using 2-12 inclusive, and only two mothers are lost using 4-11 inclusive (N = 205).

Scale; SDQ = Strengths and Difficulties Questionnaire; BIDR = Balanced Inventory of Desirable Responding; ^a = T-score

Means, standard deviations, and ranges for the forward digit span, backward digit span, and OSPAN scores were comparable to those obtained in previous research (Redick et al., 2012; Unsworth et al., 2005; Woods et al., 2011; Yang, 2017). The CGNG inhibition error rate score was positively skewed in the current sample, with 66% of mothers making no inhibition errors and receiving a perfect score of 1. It would not be appropriate in this case to perform square-root or log transformations of this variable due to the high number of mothers with perfect scores; the original score was thus used in analyses. Skewness and kurtosis statistics for all other variables were in the acceptable range ($|\leq 3|$ for skewness and $|\leq 10|$ for kurtosis).

With respect to the measures of parenting, mothers reported low levels of overreactive parenting (PS) and relatively higher levels of positive parenting (APQ) overall, and these were comparable to non-clinic samples in other studies (Arnold et al., 1993; Clerkin et al., 2007; de la Osa et al., 2014; Lorber et al., 2014). Similarly, mothers reported relatively higher levels of positive responses compared to negative responses in the childrearing scenarios, however, there was adequate variability across all measures of parenting behavior. In addition, on average mothers reported moderate to high levels of progressive childrearing attitudes, similar to what has been reported previously (e.g., Burchinal et al., 2002; Schaefer & Edgerton, 1985).

Levels of neuroticism and conscientiousness from the BFAS paralleled those obtained from a previous community sample (DeYoung et al., 2007) and these scales also had wide ranges. However, child behavior problems in this study were slightly higher and more variable than available US norms ($M = 7.4$ and $SD = 5.3$ for American 4-7 year-olds; Youth in Mind Ltd., 2004). Mothers also reported moderate levels of chaos in their homes, similar to what has been reported elsewhere (Atsaba-Poria & Pike, 2008; Coldwell, Pike, & Dunn, 2006). They responded at the upper limit of the average range (i.e.,

just below a T-score of 60) in terms of social desirability based on general population norms (Paulhus, 1998). Finally, scores on the ICAR were roughly comparable to those reported by Condon and Revelle (2014), although mothers in the current study performed worse on the matrix reasoning and three-dimensional rotation items relative to the adults in that sample (aged 15 to 90 years). Nevertheless, supporting the validity of the task-based measures of EFs, ICAR scores were significantly positively correlated with the VDS forward, $r(205) = .27, p < .001$, and backward, $r(205) = .26, p < .001$, the OSPAN score, $r(205) = .16, p = .021$, and the CGNG, $r(205) = .18, p = .009$.

Next, bivariate associations among study variables were examined to determine whether the formation of composite scores was supported empirically. Pearson correlations among measures of maternal EFs, among measures of overreactive parenting, and among measures of positive parenting are presented in Tables 3.2, 3.3, and 3.4, respectively.

Table 3.2. Correlations among measures of maternal executive functioning

	CGNG	VDS forward	VDS backward	OSPAN	BRIEF WM	BRIEF IC
CGNG	1	.18**	.17*	.20**	-.10	-.14 ^t
VDS forward		1	.58***	.38***	.001	-.02
VDS backward			1	.45***	-.20**	-.13 ^t
OSPAN				1	-.08	-.05
BRIEF WM					1	.82***
BRIEF IC						1

Note. * = $p < .05$; ** = $p < .01$; *** = $p < .001$; ^t = $p < .10$; CGNG = Cued Go No Go; VDS = Visual Digit Span; OSPAN = Operation Span; BRIEF WM = Behavior Rating Inventory of Executive Functioning Working Memory

The CGNG correlated significantly and in the expected direction with task-based measures of WM (better IC, better WM). However, due to the modest magnitude of these associations ($r \leq .20$), the CGNG score was kept separate from the other measures of EF in analyses. Associations among the

VDS-forward, VDS-backward, and OSPAN scores were positive and medium ($r > .30$) to large ($r > .50$) in magnitude. Aggregating these variables was therefore justified empirically and conceptually, and the final task-based WM score was the standardized average of these three scores. Finally, the self-report measures of WM and IC were positively and strongly ($r > .50$) correlated with each other, but not with the task-based measures of EF. Therefore, a self-reported EF composite was created from the average of the BRIEF subscale T-scores.

Table 3.3. Correlations among measures of overreactive parenting

	PS				
	Overreactive	Upset	Yell	Correct	Do Nothing
Overreactive	1	.36***	.61***	-.02	.05
Upset		1	.64***	.55***	-.33***
Yell			1	.27***	-.10
Correct				1	-.60***
Do Nothing					1

Note. *** = $p < .001$; PS = Parenting Scale

Table 3.3 shows the Overreactive subscale of the PS and the Upset and Yell items from the negative childrearing scenarios were positively correlated with one another, with effects in the medium ($r > .30$) to large ($r > .50$) range. Thus, despite the rationale for including both questionnaire and scenario-based measures of parenting, the empirical data suggest they capture similar aspects of parenting behavior. Furthermore, the pattern of intercorrelations involving the Correct and Do Nothing items was inconsistent, and difficult to interpret perhaps due to the original wording of the items. The Correct item asked how likely mothers would be to correct *or* reprimand their child in the situation, however, these terms may, in fact, capture different parenting behaviors. As such, I decided to form an

overreactive parenting composite score from the standardized average of the PS and only the Upset and Yell items from the scenario-based parenting measure.

Table 3.4. Correlations among measures of positive parenting

	APQ	Positive child behavior scenarios			
	Positive	Happy	Praise	Reward	Do Nothing
Positive	1	.39***	.32***	.26***	-.20**
Happy		1	.71***	.13 ^t	.46***
Praise			1	.20**	-.60***
Reward				1	-.02
Do Nothing					1

Note. ** = $p < .01$; *** = $p < .001$; ^t = $p < .10$; APQ = Alabama Parenting Questionnaire

Finally, with respect to positive parenting, Table 3.4 shows the Positive Parenting score from the APQ and the Happy and Praise items from the positive childrearing scenarios were positively correlated with one another, with effects in the medium ($r > .30$) to large ($r > .50$) range. Furthermore, as with overreactive parenting, the pattern of intercorrelations involving the Reward and Do Nothing items was inconsistent; therefore, a positive parenting composite score was formed from the standardized average of the APQ and only the Happy and Praise items from the scenario-based parenting measure.

Next, bivariate associations between possible covariates (mother age, education level, general intelligence, neuroticism, and conscientiousness; household income and chaos; child age and behavior problems, impression management) and the EF, childrearing attitudes, and parenting measures were examined to determine which control variables to include in the main analyses. Significant associations ($p < .05$) between covariates that were related to both a measure of EF or childrearing attitudes and a measure of parenting are presented in Table 3.5. The task-based measure of IC (the CGNG) was not significantly related to any covariate and thus does not appear in the table. Independent samples *t*-tests

were used to test differences in main study variables depending on mother ethnicity (European/Caucasian vs. other) and child gender, but no significant relations emerged.

Table 3.5. Significant correlations between main study variables and possible covariates

	WM composite	BRIEF composite	Childrearing attitudes	Overreactive parenting composite	Positive parenting composite
Mother age	.16*	--	--	--	.17*
Household chaos	--	.37***	-.16*	.36***	-.25***
Neuroticism	--	.51***	--	.49***	-.18*
Conscientiousness	.16*	--	--	--	.29***
Child behavior problems	--	.43***	-.14*	.42***	-.35***
Impression management	--	-.31***	--	-.29***	.19**

Note. * = $p < .05$; *** = $p < .001$; WM = Working memory; BRIEF = Behavior Rating Inventory of Executive Function

Many of the above associations replicate previous literature showing, for example, links between household chaos and positive and negative aspects of the parent-child relationship (e.g., Coldwell et al., 2006); parent personality characteristics and parenting behavior (e.g., Bornstein, Hahn, & Haynes, 2011; Metsäpelto & Pulkkinen, 2003); and parenting behavior and child behavior problems (e.g., Eisenberg et al., 2005; McKee et al., 2007). Based on these correlations, household chaos and child behavior problems were included as control variables in all models. In addition, mother age and conscientiousness were included in the model predicting positive parenting from the WM composite, and mother neuroticism and impression management were included in the models predicting overreactive and positive parenting from the BRIEF composite. Although maternal education level and general intelligence were related to various measures of EF (supporting the validity of the EF measures), they

were unrelated to overreactive and positive parenting, and as such were not included as control variables in any analyses.

3.2 Main analyses

3.2.1 Relations between EFs and parenting

The first aim of this study was to examine the relations between specific maternal EFs and parenting behavior. Based on literature suggesting that executive functioning abilities facilitate self-regulation, I expected that maternal EFs would be related to overreactive and positive parenting. However, contrary to my hypotheses, neither the WM composite, $r(205) = -.06, p = .388$, nor IC, $r(205) = -.003, p = .970$, was significantly related to overreactive parenting at the bivariate level. Furthermore, although the WM composite was related to positive parenting, $r(205) = .14, p = .040$, this small association became non-significant when mother age and conscientiousness were included as control variables in a partial correlation, $r(203) = .08, p = .268$. IC was not significantly related to positive parenting, $r(205) = .07, p = .289$. Finally, although the BRIEF composite (mothers' self-reported difficulties with EF) was related to both overreactive, $r(205) = .29, p < .001$, and positive, $r(205) = -.23, p = .001$, parenting at the bivariate level, these associations became non-significant when household chaos, neuroticism, child behavior problems, and impression management were included as control variables in partial correlations, $r(201) = -.07, p = .323$, and $r(201) = -.05, p = .495$, for overreactive and positive parenting, respectively. In sum, despite evidence of the validity of the EF and parenting measures, the predicted bivariate relations between maternal EFs and overreactive and positive parenting did not emerge in this study, particularly when controlling for relevant covariates.

3.2.2 Moderation by childrearing attitudes

The second aim of this study was to examine whether mothers' childrearing attitudes moderated the associations between maternal EFs and parenting behavior. Prior to testing this moderation, bivariate

correlations between childrearing attitudes and other variables of interest were examined and are presented in Table 3.6.

Table 3.6. Correlations with childrearing attitudes

	Childrearing attitudes
CGNG	.09
WM composite	.23** ²
BRIEF composite	-.05
Overreactive parenting	-.32*** ³
Positive parenting	.12 [†]
General intelligence	.35*** ⁴
Household chaos	-.16* ⁵
Neuroticism	-.04
Conscientiousness	-.06
Child behavior problems	-.14* ⁶
Impression management	.08

Note. * = $p < .05$; ** = $p < .01$; *** = $p < .001$; [†] = $p < .10$;
 WM = Working memory; BRIEF = Behavior Rating Inventory of Executive Function

The WM composite was significantly related to childrearing attitudes, such that as WM increased, so did progressive attitudes about childrearing. There was a similar association between

² Becomes non-significant in a partial correlation controlling for general intelligence, $r(204) = .11, p = .133$.

³ Remains significant in a partial correlation controlling for child behavior problems, $r(203) = -.27, p < .001$.

⁴ Remains significant in a partial correlation controlling for the WM composite, $r(204) = .30, p < .001$.

⁵ Becomes non-significant in a partial correlation controlling for overreactive parenting and child behavior problems, $r(203) = -.05, p = .518$.

⁶ Becomes non-significant in a partial correlation controlling for overreactive parenting and household chaos, $r(203) = .01, p = .985$.

childrearing attitudes and general intelligence, not surprisingly given the known associations between WM capacity and general cognitive ability (e.g., Conway et al., 2003; Engle, Tuholski, Laughlin, & Conway, 1999). Conversely, childrearing attitudes were not significantly related to IC (CGNG), self-reported EF (BRIEF composite), or maternal personality characteristics. They were, however, related to familial variables; mothers with more progressive attitudes reported less overreactive parenting as well as less disorganization in the home, and also reported more positive parenting (trend level). Similar to previous research, progressive childrearing attitudes were negatively related to child behavior problems (NICHD Early Child Care Research Network, 1998).

Next, six regression models (three predicting overreactive parenting, and three predicting positive parenting) were run to examine whether childrearing attitudes moderated the relations between the three measures of EF and parenting behavior. All variables were standardized (z-transformed) in order to facilitate interpretation of the regression coefficients and model intercepts.

3.2.2.1 Models predicting overreactive parenting

Rooted in a dual-process framework, I hypothesized that the relations between EFs and overreactive parenting would be stronger among mothers who endorse more progressive childrearing attitudes, due to the conflict between mothers' progressive attitudes and the more automatic overreactive parenting reaction elicited by negative child behavior. Results from the models predicting overreactive parenting from the task-based measures of EF (WM composite and IC) are presented in Tables 3.7⁷ and 3.8.⁸

⁷ When potentially influential data points were identified and removed, the overall model remained largely unchanged, and the effect of WM at Step 2 approached significance, $\beta(4, 202) = .10, p = .085$. The pattern of results presented in the table remained similar when the covariates were excluded from the model, as well as when the individual task-based measures of WM (VDS forward, backward, and OSPAN) were tested in separate models instead of the WM composite score.

Table 3.7. Predicting the overreactive parenting composite from the WM composite and childrearing attitudes

	β	t	adj. R^2	R^2 change
Step 1				
Intercept	.00	.00	.21	.22***
Household chaos	.24**	3.22		
Child behavior problems	.33***	4.84		
Step 2				
Intercept	0.00	0.00	.27	.06***
Household chaos	.21**	3.19		
Child behavior problems	.30***	4.60		
WM composite	.05	.77		
Childrearing attitudes	-.25***	-4.08		
Step 3				
Intercept	-.01	-.11	.26	.001
Household chaos	.21**	3.19		
Child behavior problems	.30***	4.60		
WM composite	.05	.86		
Childrearing attitudes	-.25***	-4.03		
WM composite x Childrearing attitudes	.03	.49		

Note. ** = $p < .01$; *** = $p < .001$

⁸ When potentially influential data points were identified and removed, the overall model remained unchanged. The pattern of results presented in the table remained similar when the covariates were excluded from the model, as well as in logistic regression model using IC re-coded as a dummy variable (i.e., perfect score v. all other scores).

Table 3.8. Predicting the overreactive parenting composite from IC and childrearing attitudes

	β	t	adj. R^2	R^2 change
Step 1				
Intercept	.00	.00	.21	.22***
Household chaos	.24**	3.51		
Child behavior problems	.33***	4.84		
Step 2				
Intercept	.00	.00	.27	.06***
Household chaos	.21**	3.20		
Child behavior problems	.30***	4.63		
IC	.05	.78		
Childrearing attitudes	-.25***	-4.06		
Step 3				
Intercept	-.01	-.07	.26	.00
Household chaos	.21**	3.20		
Child behavior problems	.30***	4.61		
IC	.07	.76		
Childrearing attitudes	-.25***	-4.00		
IC x Childrearing attitudes	.05	.33		

Note. ** = $p < .01$; *** = $p < .001$

Tables 3.7 and 3.8 show that household chaos, child behavior problems, and childrearing attitudes were all significantly related to overreactive parenting. However, contrary to my predictions, the WM composite and IC were not independently related to overreactive parenting, and did not interact with childrearing attitudes to predict overreactive parenting.

Table 3.9⁹ presents the model predicting overreactive parenting from the self-report measure of EF (BRIEF composite). As a reminder, the BRIEF is scored opposite to the task-based measures of EF, such that higher scores represent more problems with (i.e., worse) EF.

⁹ When potentially influential data points were identified and removed, the overall model remained largely unchanged, and the effect of household chaos at Step 2 became significant, $\beta(6, 200) = .15$, $p = .009$. The pattern of results presented in the table remained similar when covariates were left out of the model, as well as when the individual BRIEF WM and IC subscales were analyzed in separate models, rather than the BRIEF composite.

Table 3.9. Predicting the overreactive parenting composite from the BRIEF and childrearing attitudes

	β	t	adj. R^2	R^2 change
Step 1				
Intercept	.00	.00	.31	.32***
Household chaos	.11	1.63		
Child behavior problems	.21**	3.15		
Mother neuroticism	.32***	4.89		
Impression management	-.14*	-2.24		
Step 2				
Intercept	.00	.00	.37	.07***
Household chaos	.08	1.27		
Child behavior problems	.19**	2.96		
Mother neuroticism	.36***	5.83		
Impression management	-.14*	-2.35		
BRIEF composite	-.06	-.93		
Childrearing attitudes	-.26***	-4.58		
Step 3				
Intercept	-.01	-.09	.38	.01
Household chaos	.08	1.25		
Child behavior problems	.19**	2.93		
Mother neuroticism	.39***	5.61		
Impression management	.38***	5.63		
BRIEF composite	-.11	-1.51		
Childrearing attitudes	-.25***	-4.53		
BRIEF composite x Childrearing attitudes	-.10	-1.78		

Note. * = $p < .05$; ** = $p < .01$; *** = $p < .001$

Child behavior problems, mother neuroticism, impression management, and childrearing attitudes were all significantly related to overreactive parenting. However, again contrary to my predictions, the BRIEF composite and the interaction between the BRIEF composite and childrearing attitudes was not significant. In sum, the current study findings show that neither the task-based nor the self-report measures of EF add incrementally to predict overreactive parenting above and beyond other important factors such as household chaos and maternal personality characteristics. Moreover, the degree to which mothers endorse traditional v. progressive childrearing attitudes did not moderate the relation of EFs with overreactive parenting.

3.2.2.2 Models predicting positive parenting

Next, three regression models were constructed predicting the positive parenting composite. As noted above, these models were tested using heteroscedastic-consistent standard error and covariance matrix estimates using the PROCESS v3 macro for SPSS (Hayes, 2017) which precludes step-wise entry of the predictors, therefore only the overall models are reported here. I did not make specific hypotheses regarding the possible moderating role of childrearing attitudes in predicting positive parenting. On the one hand, it is possible that better EFs would be more strongly associated with positive parenting when mothers endorse progressive childrearing attitudes, due to the consistency between mothers' progressive attitudes and the positive parenting response. However, it is also possible that there would be no moderating effect, because even at low levels of progressive attitudes, there may be no motivation for mothers to override a (presumably positive) automatic response.

Results from the model predicting positive parenting from the WM composite and childrearing attitudes are presented in Table 3.10.¹⁰

Table 3.10. Predicting the positive parenting composite from the WM composite and childrearing attitudes

	β	t	R^2
Intercept	.02	.24	.19****
Household chaos	-.10	-1.38	
Child behavior problems	-.22**	-2.60	
Mother age	.12*	2.08	
Mother conscientiousness	.15	1.90	
WM composite	.04	.58	
Childrearing attitudes	.05	.75	
WM composite x Childrearing attitudes	-.07	-.94	

Note. * = $p < .05$; ** = $p < .01$; *** = $p < .001$

¹⁰ When potentially influential data points were identified and removed, the model remained largely unchanged but the effect of mother age was lost, $\beta(7, 199) = .09, p = .107$. Similar results also were obtained when the covariates were left out of the model.

Child behavior problems and mother age were both significantly related to positive parenting, in the expected direction. However, neither the WM composite nor childrearing attitudes, or their interaction, independently predicted positive parenting, paralleling the results for overreactive parenting.

The model predicting positive parenting from IC and childrearing attitudes is presented in Table 3.11.¹¹

Table 3.11. Predicting the positive parenting composite from IC and childrearing attitudes

	β	t	R^2
Intercept	.04	.56	.17***
Household chaos	-.13*	-2.12	
Child behavior problems	-.29***	-3.78	
IC	-.14*	-2.41	
Childrearing attitudes	.09	1.49	
IC x Childrearing attitudes	-.38**	-3.78	

Note. * = $p < .05$; ** = $p < .01$; *** = $p < .001$

Child behavior problems and household chaos were significantly related to positive parenting. Furthermore, there was a main effect of IC on positive parenting, but this was qualified by a significant interaction between IC and childrearing attitudes. To probe this interaction, I examined the simple slopes

¹¹ When potentially influential data points were identified and removed, the model remained largely unchanged and the interaction between IC and childrearing attitudes became stronger, $\beta(5, 201) = -.49, p = .005$. When the covariates were left out of the model, the main effect of IC was lost, $\beta(5, 201) = -.12, p = .129$, and the main effect of childrearing attitudes became significant, $\beta(5, 201) = .15, p = .041$, but their interaction nevertheless remained, $\beta(5, 201) = -.38, p = .031$, and the simple slope analysis paralleled the results below. Similar results as those presented in the table also were obtained from a logistic regression model using IC recoded as a dummy variable (i.e., perfect score v. all other scores).

Furthermore, to explore whether the interaction results presented in Table 11 remained consistent across the various measures of WM, the model was re-run using the VDS forward, VDS backward, and OSPAN scores in the place of the WM composite (three new models). When the VDS backward was used instead of the WM composite, the interaction between the VDS backward and childrearing attitudes was significant, $\beta(7, 199) = -.14, p = .049$, and this interaction was similar the interaction between IC and positive parenting presented in Table 12 and the simple slopes presented in Figure 5. At low levels of progressive attitudes (i.e., when mothers report traditional attitudes), the VDS backward predicted positive parenting, $\beta(7, 199) = .23, p = .038$. However, the VDS backward was unrelated to positive parenting at high levels of progressive attitudes, $\beta(7, 199) = -.05, p = .531$.

of IC at different levels of childrearing attitudes (± 1 SD). At low levels of progressive attitudes (i.e., more traditional attitudes), IC positively predicted positive parenting, $\beta(5, 201) = .24, p = .041$. However, there was a negative association between IC and positive parenting at high levels of progressive attitudes, $\beta(5, 201) = -.52, p = .004$. In addition, the Johnson-Neyman technique was employed to determine the childrearing attitudes values at which the simple slopes of the relationship between IC and positive parenting differ significantly ($p < .05$) from zero (the region of significance). Simple slopes were significant when childrearing attitudes (z-values) were $-.93$ and below, as well as $.11$ and above. Thus, it appears that when mothers hold more traditional attitudes about childrearing, better IC supports their positive parenting. However, when they hold more progressive attitudes, better IC is related to less engagement in positive parenting practices. These simple slopes are represented in Figure 3.1:

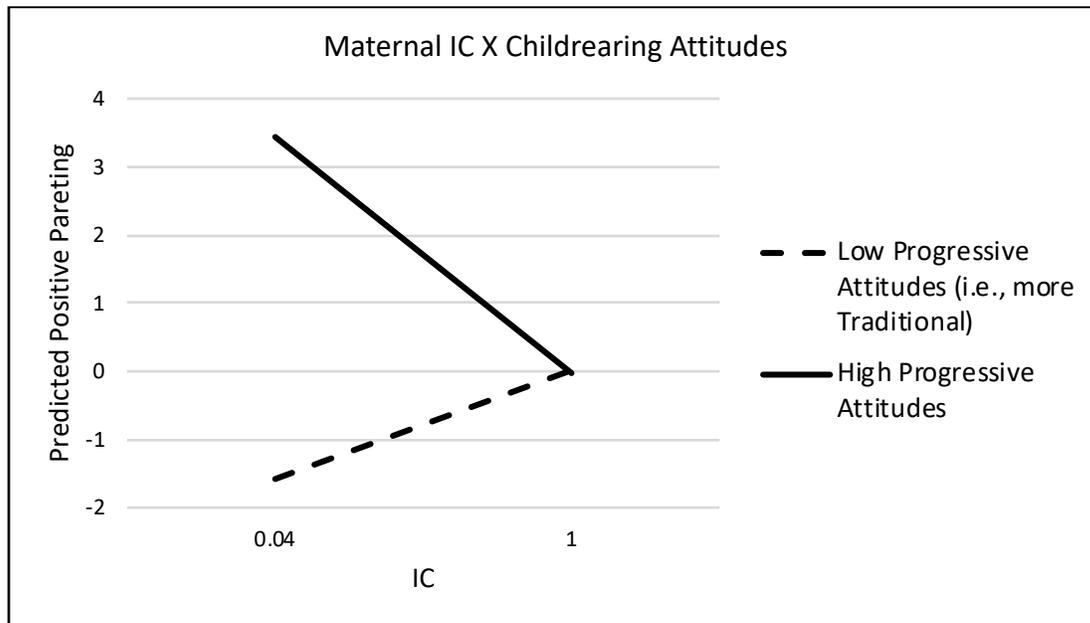


Figure 3.1. Simple slopes of the relation between maternal IC and positive parenting, at low and high (± 1 SD) levels of progressive childrearing attitudes.

The model predicting positive parenting from self-reported EF (BRIEF composite) and childrearing attitudes is presented in Table 3.12.¹² As a reminder, the BRIEF is scored opposite to the task-based measures of EF, such that higher scores represent more problems with (i.e., worse) EF.

Table 3.12. Predicting the positive parenting composite from the BRIEF composite and childrearing attitudes

	β	t	R^2
Intercept	.01	.14	.18***
Household chaos	-.10	-1.39	
Child behavior problems	-.27***	-3.43	
Mother neuroticism	-.01	-.14	
Impression management	.09	1.16	
BRIEF composite	.03	.36	
Childrearing attitudes	.05	.75	
BRIEF composite x Childrearing attitudes	.17**	3.19	

Note. ** = $p < .01$; *** = $p < .001$. BRIEF = Behavior Rating Inventory of Executive Function

Child behavior problems was significantly negatively related to positive parenting. Although neither the BRIEF composite nor childrearing attitudes was independently related to positive parenting, their interaction was significant, and so the simple slopes between the BRIEF composite and positive parenting were examined at different levels of childrearing attitudes (± 1 SD). The BRIEF composite was not significantly related to positive parenting at low levels of progressive attitudes, $\beta(7, 199) = -.14$, $p = .166$. However, at high levels of progressive attitudes, the BRIEF composite was significantly and positively related to positive parenting, $\beta(7, 199) = .21$, $p = .041$ (i.e., more problems with EF, more positive parenting). As before, the Johnson-Neyman technique was employed to determine the region of significance for the simple slopes of the relationship between the BRIEF composite and positive

¹² When potentially influential data points were identified and removed, the overall model remained largely unchanged, but the effect of child behavior problems slipped to not significant, $\beta(7, 199) = -.13$, $p = .052$, and the interaction between the BRIEF composite and childrearing attitudes became stronger, $\beta(7, 199) = .23$, $p < .001$. Similar results as those presented in the table also were obtained when covariates were left out of the model, and when the individual BRIEF WM and IC subscales were analyzed in separate models instead of the BRIEF composite.

parenting. Simple slopes were significant when childrearing attitudes (z-values) fell at -1.58 and below, as well as .93 and above. Thus, unexpectedly but consistent with the model predicting positive parenting from task-based IC (and the VDS backward), it appears that when mothers hold more progressive attitudes about childrearing, better EF is related to less engagement in positive parenting practices. These simple slopes are represented in Figure 3.2:

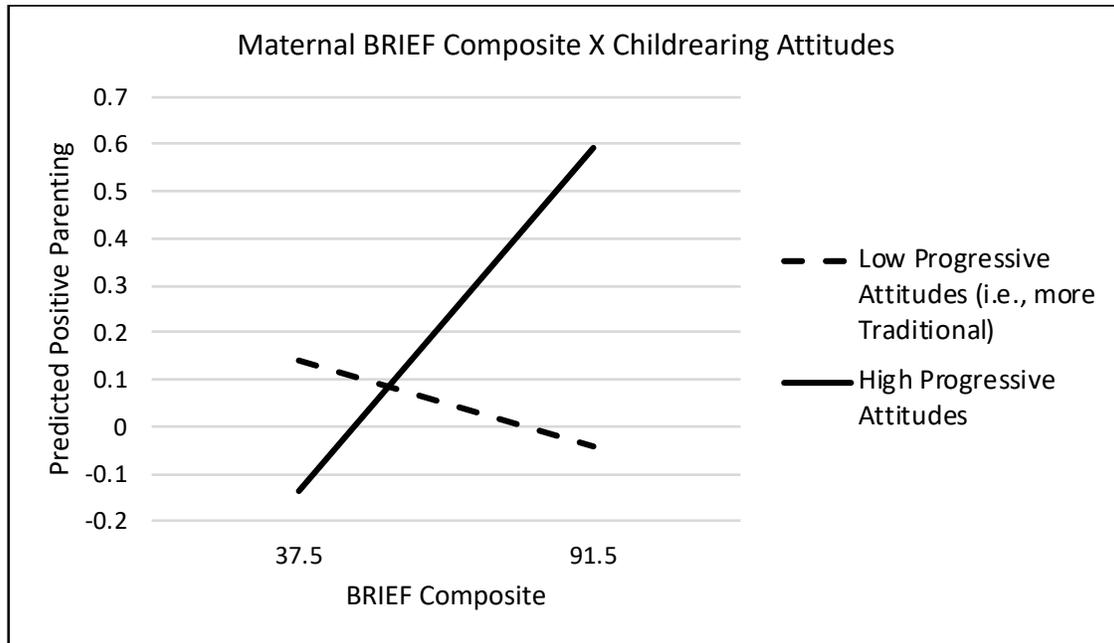


Figure 3.2. Simple slopes of the relation between maternal self-reported EF and positive parenting, at low and high (+/- 1 SD) levels of progressive childrearing attitudes.

4 Discussion

This study sought to achieve two major aims: first, to better understand factors that underlie self-regulation of parenting by testing the links between maternal EFs, in particular WM and IC, and parenting behavior. Secondly, whether these relations are moderated by parental childrearing attitudes was a question of interest. Mothers of 3 to 7 year-old children participated and completed three task-based and one self-report measure of executive functioning, as well as measures to assess overreactive and positive parenting, childrearing attitudes, and possible covariates. As predicted, maternal task-based WM was associated with positive parenting, and maternal self-reported EF was associated with both overreactive and positive parenting; however, these relations became non-significant when relevant variables were controlled in analyses. Furthermore, maternal childrearing attitudes did not moderate the associations between EFs and overreactive parenting, but did moderate the associations between EFs and positive parenting (defined as involvement and use of positive reinforcement), for both the task-based measure of IC and the self-report measure of EF. In both cases, better maternal executive functioning predicted less positive parenting at high levels of progressive childrearing attitudes. In contrast, at low levels of progressive childrearing attitudes (i.e., more traditional attitudes), maternal IC positively predicted positive parenting. These results are discussed in light of previous research, and study limitations, directions for future research, and implications of the findings are considered.

4.1 Aim 1: Direct links between maternal EFs and parenting

Based on theory and previous research suggesting that EFs facilitate self-regulation of parenting behavior (e.g., Crandall et al., 2015; Sanders & Mazzucchelli, 2013), I predicted that maternal WM and IC would be negatively associated with overreactive parenting and positively associated with positive parenting. Contrary to my hypotheses, neither WM nor IC were correlated with overreactive parenting, and in fact these relations were near-zero ($r_s = -.06$ and $-.003$, respectively). At the bivariate level,

although self-reported EF difficulties had a positive and moderate-size association with overreactive parenting, this became non-significant in a partial correlation controlling for relevant covariates. Furthermore, as predicted, maternal WM and self-reported EF difficulties showed significant but relatively small correlations with positive parenting, but again these associations were not upheld in partial correlations with relevant covariates. Maternal IC was not significantly related to positive parenting even at the bivariate level, again a near-zero relation ($r = .07$).

Although contrary to some current theoretical models of parenting and to my hypotheses, the lack of significant associations between the task-based EF measures and overreactive parenting, particularly once covariates are accounted for, is not entirely inconsistent with previous research. Specifically with respect to WM, although Sturge-Apple et al. (2014) reported a moderate association with harsh parenting, they did not control for possible covariates, and other studies, in both high-risk and community samples, failed to find direct links between WM and overreactive parenting (Deater-Deckard et al., 2012; Monn et al., 2017). Furthermore, the only previous study to have included a measure of IC in relation to overreactive parenting also failed to find a significant association (Monn et al., 2017). In the current study, only self-reported difficulties with EF emerged as significantly related to overreactive parenting at the bivariate level, but not above and beyond maternal neuroticism, child behavior problems, and household chaos. This parallels the results by Crouch et al. (2018), who found a bivariate link between self-reported WM and child abuse risk, but not above and beyond other factors such as maternal education level. In general, both my findings and previous results suggest that a direct, robust link between maternal WM and IC and overreactive parenting may not exist.

With respect to positive parenting, in this study the small positive association between task-based WM and positive parenting was not upheld after controlling for maternal age and conscientiousness. Similarly, self-reported EF difficulties were no longer significantly correlated with positive parenting

after controlling for maternal neuroticism, child behavior problems, and household chaos. In comparison, although previous studies have linked maternal task-based WM with positive and responsive caregiving (Gonzalez, Jenkins, Steiner, & Fleming, 2012; Mazursky-Horowitz et al., 2018; Shaffer & Obradović, 2017), these studies did not account for other maternal characteristics such as age or personality, and further when Monn et al. (2017) controlled for maternal education and intelligence, the relation between WM and positive parenting was no longer significant. Moreover, the current study failed to find a bivariate association between maternal IC and positive parenting, but this is perhaps not surprising given that previous findings regarding maternal IC have been contradictory and inconclusive. For example, depending on the time point and childrearing context considered, Sturge-Apple et al. (2017) reported significant positive, null, or negative links between IC and positive parenting, whereas Monn et al. (2017) fail to find any significant relations. The moderation findings in this study (discussed in a later section) may clarify some of these past inconsistencies in the relation between IC and parenting behavior in positive contexts.

In sum, despite a solid theoretical framework for why maternal EFs would be associated with their parenting behavior (e.g., Deater-Deckard, 2014), empirical results from the current study and the larger body of literature are tentative and suggest only that maternal EFs *potentially* may be related to overreactive and positive parenting. Importantly, significant links commonly do not persist after controlling for other parent, child, and contextual factors. Despite expanding the assessment of EFs in this study to include IC in relation to overreactive parenting, and to include self-report measures in relation to both overreactive and positive parenting, direct links between maternal EFs and parenting did not emerge, particularly when maternal personality, child behavior problems, and household chaos were considered as covariates. In the sections that follow, I consider various explanations for the results of the first study goal, which was to test the direct links between maternal EFs and parenting behavior.

4.1.1 Validity and reliability of online tasks

One possibility for the lack of relations between the task-based measures of EF and parenting is that the measurement of WM and IC in this study may have been jeopardized due to mothers completing the tasks online from their own homes, which introduces the possibility of more distractions or inconsistencies in responding relative to data collected in controlled laboratory settings. However, I consider this an unlikely explanation. First, mothers were reminded several times throughout the task instructions that the study should be completed in a quiet place where they could focus and be free from distractions for at least two hours. They were also told to expect that the tasks might at times feel long, boring, challenging, or frustrating, and asked to please continue honestly with their full attention; literature suggests that encouraging honesty in this manner can protect the quality of data collected via MTurk (Buhrmester, Talafar, & Gosling, 2018; Lowry, D'Arcy, Hammer, & Moody, 2016). Second, through my e-mail communications with many participating mothers, they consistently demonstrated that they were diligent and invested in completing the study properly (e.g., checking to ensure that all of their data had been received; commenting that they had put their best effort towards the tasks). Third, the means, standard deviations, and interquartile ranges for the VDS and OSpan tasks in this study were similar to those reported elsewhere (e.g., Redick et al., 2012; Woods et al., 2011), and the inhibition error rate (and the omission error rate, though not used in analyses) for the CGNG task in this study was lower than previously reported (Fillmore, Rush, & Marczinski, 2003), suggesting that mothers were paying ample attention to the tasks. Fourth, established findings in the literature were replicated in the present data: the WM and IC tasks were positively correlated with each other and with general intelligence, and WM was negatively correlated with mother age. Together, this evidence supports the valid task-based measurement of EFs in the current study.

Nevertheless, and as noted in the results section, the possibility that a portion of participating mothers may have used external methods to facilitate recall of digits during the VDS tasks is acknowledged. Efforts were undertaken to identify these mothers and exclude them from analyses, and furthermore, the distribution of scores on the EF tasks for the retained mothers was consistent with previous research. Although it is impossible to know whether every participating mother completed the tasks faithfully, this is a concern that exists for data collected in laboratory settings as well, and the considerable evidence reviewed above suggests that most, if not all, of the mothers in the final sample participated according to instructions.

Assuming that mothers completed the tasks properly, the question of why – despite adequate statistical power to detect medium-size bivariate associations – there was but one significant modest link between the WM composite and positive parenting remains. Hedge, Powell, and Summer (2017) articulate one potential answer to this question, resting in the limited utility of cognitive tasks in correlational research. The authors explain that many of these tasks were originally developed to demonstrate experimental effects or group differences, and as such are designed to minimize individual differences in the constructs of interest. As a consequence, the correlations that can be observed between these tasks and other measures (e.g., measures of parenting behavior) are reduced. Therefore, although it seems the computerized EF measures in this study's online platform were collected properly, the tasks themselves may be limited in their sensitivity to detect individual differences in the constructs of interest, and thus to relate meaningfully to differences in parenting. Future investigations should be mindful of this potential drawback to measuring executive functioning exclusively using certain task-based methods.

4.1.2 Value of self-report assessments of EF

In line with my hypotheses, the EF self-report rating scale was significantly correlated with both overreactive and positive parenting at the bivariate level, and these effect sizes were larger in magnitude than the near-zero to small correlations involving the performance measures of EF. These differences in results between the task-based and self-report measures of EFs have two main implications. Firstly, they illustrate that the manner in which EFs are measured in research is important to the conclusions drawn. Performance-based measures of executive functioning have been criticized in the past for their lack of ecological validity – as Salthouse, Atkinson, and Berish (2003) argue, much of the structure and organization within task-based measures of EF is provided by the researcher, limiting the role of the participant's own executive functioning precisely because he or she does not have to figure out the demands of the task. As a consequence, and in addition to the limitations outlined in the previous section, EFs measured via performance on such tasks may not fully capture the intended constructs.

Moreover, a review of 20 studies concluded that rating- and performance-based measures of EF are only minimally correlated (i.e., only 24% of the correlations reported were significant) and assess different aspects of cognition and behavior that are independently related to functioning (Toplak, West, & Stanovich, 2013). These authors suggest that task-based EF measures capture the efficiency of the processes that a person may engage to regulate their behavior (under optimal, controlled conditions), whereas rating scale measures capture the actual behaviors that individuals perform in their everyday lives – a distinction labelled optimal versus typical performance. In line with this reasoning, Barkley and Murphy (2011) found that self-ratings of EF better predicted 11 indicators of occupational impairment compared to traditional performance-based measures of EF. Similarly, the results of the current study suggest that the everyday, “typical” ratings of executive functioning difficulties mothers report for themselves provide more useful information than do performance-based EF measures in terms of

understanding parenting behaviors, at least at the bivariate level. The more mothers report that they struggle with WM and IC in the real world (e.g., having difficulty with multi-tasking, making impulsive decisions), the more they report engaging in overreactive parenting, and the less they report engaging in positive parenting practices including involvement and positive reinforcement. Indeed, it makes sense that “optimal” cognitive functioning would be less predictive than “typical” executive functioning of parenting behavior, which most often occurs under less-than-optimal conditions (e.g., rushing through morning routines; preparing dinner after a stressful work day).

Nevertheless, despite their seemingly more meaningful contribution to understanding parenting behavior, the measurement of executive functioning via self-report is not without its own limitations. Firstly, the current data show that mothers’ responses on the BRIEF (but not their performance on the VDS, OSpan, or CGNG tasks), were subject to social desirability influences, as per their relation to the measure of impression management. Thus, it is possible that self-ratings of EFs capture a skewed representation of these constructs, suggesting that future research using such ratings should control for the degree to which they are influenced by social desirability factors, something that previous studies fail to do. Furthermore, using self-report measures of both EFs and parenting also introduces a problem of common rater/method variance, and offers another possible explanation for the relatively stronger associations between the BRIEF and parenting measures, compared to the tasks. In sum, both performance-based and self-report EF assessments have their own unique strengths and weaknesses. Future research should continue to employ multiple methods in the measurement of executive functioning in order to account for these. Moreover, forthcoming studies also may benefit from the inclusion of collateral informants in EF ratings, to minimize potential effects of social desirability.

Finally, it is important to remember that the bivariate associations between self-reported EF and parenting behavior were not maintained when household chaos, child behavior problems, maternal

neuroticism, and impression management were included in analyses as covariates. This echoes the results from one past study (Crouch et al., 2018) which showed that self-reported problems with WM were related to risk for child abuse, but not independently from maternal education in a larger model and illustrates a second implication: that maternal EFs may not contribute to parenting above and beyond other demographic and contextual variables, a point I return to later in the discussion. In the next sections, I reflect on two additional explanations for the lack of direct associations between EFs and parenting behavior; the first involves an alternate pathway from EFs to parenting, and the second involves the manner in which parenting was measured in this study.

4.1.3 Potential for indirect effects of EF

That three of the six correlations between EFs (either task-based or self-report) and parenting in this study were small and not significant (and six of six were not significant after controls) suggests that perhaps EFs contribute negligibly to the regulation of parenting behavior. An alternate possibility is that EFs exert their impact on parenting indirectly, via other self-regulatory mechanisms. For example, Crouch et al. (2018), although not finding direct associations between WM or IC and risk for child abuse, did report indirect links between both of these EFs and risk for child abuse through maternal emotion regulation difficulties. That is, difficulties both WM and IC were positively related to emotion regulation difficulties, which in turn were related to child abuse potential. Consistent with this, both within and outside the parenting literature, WM has been linked with numerous aspects of emotion regulation, including cognitive reappraisal and expressive suppression strategies (e.g., Hendricks & Buchanan, 2016; Rutherford, Booth, Crowley, & Mayes, 2016), and other research has found that these emotional control/regulation capacities are related to overreactive discipline (Lorber, 2012; Skowron, Kozlowski, & Pincus, 2010). In addition, there is some suggestion that emotion regulation may mediate the link between EFs and parenting in the current data: controlling for maternal neuroticism (i.e., a

mother's tendency to experience negative affect in reaction to events) eliminated the significant link between self-reported EF and overreactive parenting. In comparison, a post-hoc analysis revealed that the link between maternal neuroticism and overreactive parenting persisted even after controlling for EF. In addition to this potential mediation, it also is possible that EFs and emotion regulation interact; said differently, WM and IC may moderate the link between emotion regulation and parenting. For example, feelings of anger and frustration may be triggered in a mother when, at the end of a long work day, her child does not comply with a request to come to the dinner table. However, if she has relatively strong WM, she may have an easier time considering multiple possible reasons for why her child has not complied (e.g., he didn't hear the request), reappraising the situation as such, and thus reducing her experience of negative emotions as well as the likelihood of yelling at her child. On the other hand, a mother with worse WM may not have the capacity to engage in reappraisal in order to regulate her frustrations, producing a parenting response that is overreactive. Forthcoming studies should attempt to further disentangle the links between executive functioning, emotion regulation, and parenting behavior by measuring all three of these aspects of regulation and testing alternate models of the manner in which they may relate (e.g., is the relation between EFs and behavior mediated by emotion regulation? Do EFs moderate the relation between emotion regulation and parenting behavior?).

Nevertheless, it is important to note that the studies above linking the various EFs to emotion regulation have differed somewhat in their findings – for example, some find significant associations for WM but not IC (Hendricks & Buchanan, 2016), others find significant associations for both WM and IC (Crouch et al., 2018), and others still find significant links for visual-spatial WM but not verbal WM (Rutherford et al., 2016). Thus, these differences in results offer an important caveat within the existing literature, suggesting that methodological or sample differences may lead to the varying conclusions pertaining to the links between specific EFs and emotion regulation, and behavior regulation by

extension. A critical synthesis of the existing studies linking EFs with emotion regulation, with special consideration of potential differential effects, across types of EFs and assessment methods and samples, may be warranted to guide future research in this area.

4.1.4 Measurement of parenting behavior

Beyond the issues discussed concerning EFs and their measurement, it also may be the case that the parenting behavior measures in the current study did not capture the essence of “self-regulation”, which implies a two-step process (i.e., a starting point, followed by an adjustment), and where maternal EFs may play a more substantial role. Rather than assessing overreactive parenting as the frequency with which a mother uses physical force, or foul language, when disciplining her child (as I do in this study), perhaps a more appropriate proxy of parenting self-regulation would be one that captures both the start and endpoints of the regulation process in the moment. To illustrate, past studies examining the associations between parents’ emotions, cognitions, and harsh parenting behaviors (e.g., Lorber & O’Leary, 2005; Smith & O’Leary, 1995) have employed a clever paradigm whereby mothers watch videotaped segments of their interactions with their children, while they simultaneously and continuously rate the valence of the emotions they experienced during the interaction using a dial apparatus that allows ratings to range from *Very Positive* to *Neutral* to *Very Negative*. Researchers interested in parenting self-regulation might employ a similar paradigm, and identify a reactivity threshold (i.e., close to the *Very Negative* anchor) at which point in the interaction self-regulation would be needed. Each time a mother reaches that threshold could be considered the start point of the regulation process, and the point at which she returns to a *Neutral* state as the end point; in this way, the amount of time it takes for the mother to down-regulate from a heightened emotional state to a calm state is one potential indicator of regulation. Alternately, independent raters could code maternal harsh parenting behaviors during the interaction, and these ratings could be compared against the level of

negative emotions the mother reports having been triggered during the interaction. A mother who indicates that she is angry/frustrated but who is observed responding effectively (e.g., refraining from raising her voice in response to child non-compliance, but rather calmly restating her instruction), would be considered to be appropriately down-regulating her behavior. On the other hand, a mother who indicates she is upset and who also is observed criticizing her child would be considered as poorly regulating. Maternal EFs may be more strongly related to parenting self-regulation measured in these types of naturalistic and dynamic ways, compared to self-reported frequency of past parenting behaviors.

In addition to the possibility that the measure of overreactive parenting in this study did not accurately represent self-regulation, it is possible that the measure of positive parenting was limited in a similar way. As noted in the introduction, most previous research in this area (with the exception of Monn et al., 2017) has characterized positive parenting as sensitive/responsive caregiving in observed parent-child interactions. In these studies, maternal sensitivity involves a mother being attuned to the needs of her child and then appropriately responsive to him/her; such a conceptualization of positive parenting may indeed better capture the “regulation” of parenting because the appropriateness of the parenting response depends largely on the child’s behavior. For example, the same behavior in a mother (letting her child complete a puzzle alone) may be coded as sensitive (if the child is completing the task successfully) or not (if the child is clearly struggling with the task or becoming upset). Coded by observers in this way, sensitivity represents an index of the degree to which mothers adjust (i.e., regulate) their behavior in response to cues from the child. On the other hand, self-reports of the frequency with which mothers engage in their child’s lives or use positive reinforcement strategies may not be as sensitive in detecting the matching of parent behavior to child behavior, indicative of self-regulation, and this may explain the lack of strong independent direct associations between WM and IC

and positive parenting in this study. Moreover, research has shown that conceptualizations of positive parenting derived from attachment theory (i.e., sensitivity and responsiveness) and those derived from social learning theory (i.e., attentiveness and positive reinforcement) are modestly related but nevertheless distinct, and differentially predict various child outcomes, including attachment security and social functioning (Matias, O'Connor, Futh, & Scott, 2014; O'Connor, Matias, Futh, Tantam, & Scott, 2013). As such, it also may be that these distinct aspects of positive parenting are differentially related to maternal EFs. Future studies are needed to address this premise by comparing the relative contributions of EFs to both sensitive/responsive caregiving and the use of positive reinforcement/involvement.

4.1.5 Summary and conclusion of Aim 1

The first goal of this study was to address the question of whether maternal WM and IC are related to overreactive and positive parenting behavior. The current findings suggest that although these links may exist, they are at best of moderate size and are not robust after controlling for relevant covariates. Improving the measurement of EFs as well as parenting regulation, to better capture the modulation of emotions and behaviors in mothers, offers a promising avenue for future research.

4.2 Aim 2: Moderation by childrearing attitudes

4.2.1 Overreactive parenting

Due to inconsistent results from previous research and rooted in a dual-process framework, I hypothesized that childrearing attitudes would moderate the association between maternal EF (WM, IC, and self-reported EF) and overreactive parenting, such that the association would be stronger for mothers with higher levels of progressive attitudes, compared to lower levels of progressive attitudes (i.e., more traditional). This hypothesis was not supported by the current data. Across all models, neither the task-based measures of WM and IC, nor the self-report measure of EF, interacted with childrearing

attitudes to predict overreactive parenting. This was the case in spite of adequate statistical power to detect interactions in the analyses, and furthermore, effect sizes for the interactions were small, irrespective of significance (β s = .03 – .10).

Dual-process models posit that human behavior results from the interplay between automatic (relatively quicker, occurring largely outside of awareness) and controlled (relatively slower and purposeful) cognitive systems (e.g., Hofmann et al., 2009). In retrospect, a more precise test of a dual-process framework perhaps should have included a measure tapping the *implicit* internal schemas and beliefs believed to guide automatic behavior, rather than exclusively assessing *explicit* childrearing attitudes via a questionnaire. As an example, research outside the parenting context has shown that automatic or implicit attitudes, measured via Implicit Association Tests, have a stronger influence on behavior (e.g., consumption of tempting food and alcohol; responses to provocation) for individuals with lower WM capacity compared to individuals with higher WM capacity (Hofmann et al., 2008). Accordingly, it is possible that implicit traditional childrearing attitudes (rather than explicitly endorsed attitudes) more strongly influence overreactive parenting for mothers who have weaker compared to stronger EF. Nevertheless, this is a question that remains to be addressed in future research. The current findings, however, suggest that it is unlikely that the previous inconsistencies regarding the links between maternal EFs and overreactive parenting behaviors are explained by the moderating role of explicit childrearing attitudes.

4.2.2 Positive parenting

I did not have specific hypotheses about the possible moderating role of childrearing attitudes on the relations between maternal EFs and positive parenting. Although the interaction between the WM composite and childrearing attitudes was not a significant predictor of positive parenting, both IC and self-reported EF (as well as the VDS backwards, in a secondary analysis) interacted with childrearing

attitudes to predict positive parenting. The patterns of these interactions were similar in that, at lower levels of progressive attitudes (i.e., when parents hold traditional views valuing children's obedience to authority), better executive functioning was related to more engagement in positive parenting practices. However, somewhat unexpectedly, at higher levels of progressive attitudes valuing child autonomy, better executive functioning was related to less engagement in positive parenting practices, at least as measured in this study. Similarly, even at mean levels of progressive attitudes, IC negatively predicted positive parenting. While these relations may seem surprising, they are consistent with the negative relation between IC and sensitive caregiving that Sturge-Apple et al. (2017) report at one time point in their study. I now move on to discuss one potential interpretation of the current findings.

In this sample, multiple indicators of executive functioning, assessed via multiple methods, were related to less parenting involvement and less use of positive reinforcement strategies, when attitudes about childrearing are progressive. One potential interpretation that sheds light on this unexpected finding is that, when mothers hold more progressive childrearing attitudes, refraining from engaging in the types of positive parenting practices measured in this study is actually congruent with their attitudes supporting child autonomy. Consider a mother who endorses attitudes such as *Children learn best by doing things themselves rather than listening to others* – she also may adopt a relatively more “hands-off” approach to parenting by being less involved in, for example, her child's homework or choice of friends, and by a similar token she may be less likely to use praise or rewards to shape positive child behavior. To explore this hypothesis, a post-hoc series of regression analyses were run using the *Do Nothing* response item from the positive child behavior scenarios as the outcome. These regressions were run in the same manner as the main moderation analyses; all assumptions were verified and covariates included where necessary. When predicting the likelihood of a mother doing nothing in response to positive child behaviors, childrearing attitudes again interacted significantly with both the

task-based measure of IC and the self-report measure of EF. Simple slope analyses revealed a pattern opposite to what was obtained using positive parenting as the outcome. That is, at higher levels of progressive childrearing attitudes, better IC, as well as fewer difficulties with executive functioning, positively predicted the overall *Do Nothing* response across the six positive childrearing scenarios. However, at lower levels of progressive attitudes (or alternately, higher levels of traditional attitudes) better IC, and fewer difficulties with executive functioning negatively predicted the *Do Nothing* response.

Taken together, this series of findings lends support for the idea that, when mothers hold progressive attitudes, better executive functioning capacities allow them to refrain or hold back from becoming too involved or influential in their child's behavior (opting instead to be more passive) in order to allow their child to be more autonomous as they navigate the world. Conversely, parents who hold more traditional attitudes and highly value obedience to authority may be more inclined to become involved and to use positive reinforcement to encourage good behavior or compliance in their children, consistent with their traditional attitudes valuing child obedience. Obviously, forthcoming studies are needed to replicate this interaction, and such studies would also benefit from a measure of warmth and sensitivity in addition to positive reinforcement. Noted above and important to consider here again is that the current study did not measure maternal warmth or sensitivity as an outcome – perhaps a different pattern of results would have emerged had it done so. That is, although the current findings suggest that progressive mothers with strong EFs adopt a more hands-off approach in positive contexts, it is possible that these mothers are in fact smiling and engaging in eye contact with their children, behaviors consistent with maternal warmth.

4.2.2 Summary and conclusion of Aim 2

The second goal of this study was to clarify previous inconsistencies in the literature by testing the moderating role of childrearing attitudes in the links between maternal EFs and parenting behavior. No evidence for this moderation was found where overreactive parenting is concerned; suggesting that other moderators, such as SES (e.g., Sturge-Apple et al., 2017), may be at play. However, maternal IC and self-reported EF did interact with childrearing attitudes to predict involvement and use of positive reinforcement strategies, in a somewhat unexpected fashion. Future research is needed to replicate these results and continue to examine how general approaches to parenting may influence how EFs operate in mothers.

4.3 Other maternal and contextual variables

An important finding from the current study is that, with only one exception, maternal executive functioning was not significantly predictive of mothers' parenting behavior above and beyond other maternal characteristics (i.e., childrearing attitudes; neuroticism) and contextual factors (i.e., household chaos; child behavior problems). This adds empirical support to Crandall et al. (2015)'s recommendation that research must consider the individual and environmental context in which maternal EFs operate; indeed, these contextual variables may carry more weight than executive functioning in determining a mother's likelihood of engaging in overreactive or positive parenting behaviors.

Across all the regression models predicting overreactive parenting, childrearing attitudes were independently negatively related to overreactive parenting; that is, mothers who hold traditional attitudes valuing child obedience are more likely to engage in parenting that involves displays of anger, criticism, or yelling in the face of child misbehavior. Furthermore, child behavior problems also were consistently positively associated with overreactive parenting, and consistently negatively associated with positive

parenting. This is in line with previous research (e.g., Bradley & Corwin, 2013; Fisher & Fagot, 1993; Hastings & Grusec, 1998; Burke, Pardini, & Loeber, 2008) and is perhaps not surprising given that, in this study, childrearing attitudes and child behavior problems were the predictors most proximal to parenting behavior.

Furthermore, in two of the regression models, the level of household chaos uniquely contributed to the variance in overreactive parenting, also consistent with previous investigations (e.g., Dumas et al., 2005; Valiente, Lemery-Chalfant, & Reiser, 2007). In homes that are noisy, highly disorganized, and where the general atmosphere is frantic, it may not be possible for a mother to pause, reflect on, and regulate her behavior; she may instead default to a reaction that is overly harsh and punitive, perhaps to ensure that her message is received through all the chaos. Conversely, it also was the case in one regression model that household chaos was negatively associated with positive parenting; a disorganized home environment may limit mothers' capacity to pay sufficient attention to child behavior, and to notice and respond to it with praise. Nonetheless, it is difficult to draw causal or directional conclusions given the cross-sectional nature of the data; it is equally possible that mothers who overreact in their parenting or who are less involved in their children's lives also are less likely to create structure, routines, and a calm living environment.

Finally, in the last of the regression models predicting overreactive parenting, maternal self-reported neuroticism, but not self-reported difficulties with executive functioning, independently predicted overreactive parenting. Neuroticism represents a spectrum of individual differences in the tendency to experience negative or distressing affect, and can encompass traits such as fearfulness, irritability, and low self-esteem (Costa & McCrae, 1987). It comes as little surprise, then, that a mother with a dispositional tendency to react negatively to life events would also react negatively to challenging child behavior. However, despite personality being a key factor in shaping people's lives and behaviors (e.g.,

Caspi & Shiner, 2006), and some evidence that neuroticism specifically is linked with both executive functioning (Bridgett, Oddi, Laake, Murdock, & Bachmann, 2013; Murdock, Oddi, & Bridgett, 2013) and negative parenting (Prinz et al., 2005), no studies of the relations between maternal WM and IC and parenting have considered neuroticism as a covariate. Nevertheless, this study provides evidence that maternal personality characteristics, child characteristics, and household characteristics should not be ignored in forthcoming research. As noted in the introduction, compared to maternal psychopathology or SES, for instance, investigations into the links between maternal EFs and parenting behavior are relatively new. While research in this area should certainly continue, in order to advance the literature, maternal EFs should be considered alongside and compared against what is already known about the myriad of factors that contribute to parenting.

4.4 Strengths and contributions of the present study

The current research offers several important contributions to the extant literature, by (a) examining both WM and IC in relation to overreactive parenting, when most studies have focused exclusively on WM; (b) including task-based and self-report assessments of EF; (c) testing the moderating role of childrearing attitudes; (d), examining involvement and positive reinforcement as aspects of positive parenting, when most studies have focused exclusively on maternal sensitivity; and (e) measuring and including where appropriate a number of possible covariates, including contextual factors such as household chaos and child behavior problems, as well as maternal characteristics such as general intelligence, neuroticism, and conscientiousness. Furthermore, mothers' levels of impression management were also measured and controlled in relevant analyses.

With respect to each of these contributions, the current findings reveal that the addition of IC as measured by the CGNG did not offer incremental information to the prediction of overreactive parenting, despite its intuitive value. Furthermore, although the self-ratings of executive functioning

difficulties were more strongly related to parenting than the task-based measures of WM and IC at the bivariate level, none of the EF measures were significantly correlated with parenting above and beyond relevant covariates. The present study attempted to elucidate previous inconsistent findings regarding the links between maternal EFs and parenting by considering attitudes about childrearing as a possible moderator. Where overreactive parenting is concerned, unfortunately the current results do not help to resolve past contradictory results. However, childrearing attitudes did emerge as a significant moderator of the relationship between EFs (IC and self-ratings from the BRIEF) and positive parenting, conceptualized as involvement and the use of positive reinforcement strategies. When mothers hold traditional attitudes valuing obedience to authority, having better executive functioning may allow them to utilize positive parenting practices, perhaps to encourage good behavior and compliance in their children. However, when mothers hold progressive attitudes valuing child autonomy, stronger executive functioning actually predicts less involvement and use of positive reinforcement. Stronger EFs in these mothers may aid them to refrain from engaging and instead allows them to more passively encourage autonomy and self-agency in their children's behaviors. Finally, from this study, we learn that having information about other parent, child, and contextual factors aside from EFs may be particularly useful to our understanding of both overreactive and positive parenting behaviors.

4.5 Limitations and future directions

Despite this study's strengths and contributions outlined above, several limitations must be acknowledged. The current research focused on two specific EFs in mothers: WM and IC. Furthermore, within these overall constructs, only specific aspects of WM (WM for digits information presented visually, both alone and in the context of a distractor) and IC (inhibition of a motor response) were assessed. However, WM is complex and multifaceted, comprised of domain-specific (e.g., visual, spatial, auditory WM) and process-specific (e.g., monitoring, updating, retrieval) elements that can be

measured in a number of ways (Baddeley, 2012; Shura, Hurley, & Taber, 2016). There also is evidence that these different aspects of WM are differentially related to self-regulation in mothers (e.g., Rutherford et al., 2016). Similarly, IC may involve both motor inhibition as well as attentional inhibition (Carr, Nigg, & Henderson, 2006), although most studies in the parenting literature have focused on the former. The impact of specific EFs on parenting regulation is likely nuanced, therefore future research should pay careful attention to the manner in which EFs are assessed and exert caution about generalizing across different aspects of WM or IC functioning.

Furthermore, beyond WM and IC, other EFs also may be implicated in regulating parenting. For example, maternal cognitive flexibility or set shifting has been negatively related to negative intent attributions for child behavior (Azar, McGuier, Miller, Hernandez-Mekonnen, & Johnson, 2017) and positively related to sensitive caregiving (Chico et al., 2014; Gonzalez et al., 2012). Forthcoming studies may try to assess the relative contributions of each of these EFs to parenting. Another fruitful avenue for future research would be to measure EFs using tasks that are more applicable to everyday life, so as to increase the ecological validity of EF measurement as well as clarify the practical implications of the research. For example, Mazursky-Horowitz et al. (2017) used the Hotel Test, where mothers had to complete five tasks needed to run a hotel (e.g., proofreading the hotel brochure, alphabetizing conference name labels, etc.) within a specified period of time. This required mothers to plan the most effective approach and flexibly switch between tasks to meet the overall demands of the assignment. The authors found that this general measure of maternal executive functioning was related to positive parenting behavior in a collaborative parent-child interaction task. Future research might employ the Hotel Test paradigm or others like it, and perhaps even develop a parallel paradigm requiring mothers to perform multiple tasks relevant to parenting (e.g., plan meals for the week, check homework) to more naturalistically address questions about the relations between maternal EFs and parenting self-

regulation. Also, measuring EFs in a heightened emotional context compared to a neutral context may clarify our understanding of how these cognitive processes operate and interact with emotions in predicting parenting (Monn et al., 2017).

Another limitation of this study is the sample comprised exclusively of mothers, a decision made in order to ensure comparability with previous studies. Nevertheless, research has documented gender differences in self-regulation (e.g., D'Ambrosio, Donorfio, Coughlin, Mohyde, & Meyer, 2008; Gross & John, 2003), and there are mother-father differences in parenting roles and behavior (e.g., Cummings, Merrilees, George, & Lamb, 2010; Simons & Conger, 2007). Therefore, samples in future research should be expanded to include both mothers and fathers. In addition, this study focused on mothers of 3-7 year-old children, but there is evidence that links between maternal EFs and parenting behavior may differ depending on both child and parent age (e.g., Gonzalez et al., 2012; Sturge-Apple et al., 2017). Other investigations might seek to clarify the developmental differences in relations between EFs and parenting. Furthermore, mothers in this sample were functioning fairly well, with relatively lower levels of overreactive parenting and higher levels of positive parenting ; studies using clinical or at-risk populations are needed to extend this work and inform parenting interventions. Finally, more research is needed to replicate and substantiate the current findings, particularly with respect to the unexpected negative links between EFs and parent involvement and use of positive reinforcement strategies.

4.6 Conclusion

In his seminal model of the determinants of parenting (Belsky, 1984; Belsky & Jaffee, 2015), Jay Belsky theorizes that parenting behavior is shaped by three major forces: parent characteristics (e.g., personality, general beliefs, psychopathology, executive functioning), child characteristics (e.g., temperament, behavior problems), as well as context (e.g., household chaos, SES). The results from this study highlight again that each of these forces brings distinct information to understanding of the

constellation of variables related to parenting. Beyond this, the current findings also suggest that within each of these forces, certain variables provide relatively more information than others. For example, practically speaking, knowing a mother's level of neuroticism or general approach to parenting appears to be a more important correlate of her likelihood of engaging in overreactive behaviors than knowing about the degree to which she has difficulty remembering multi-step instructions. Thus, while efforts should be made to improve the measurement of EFs and research should continue to consider the potential roles of EFs in regulating parenting, this research should not disregard the meaningful role of the other forces in Belsky's conceptual model.

There is no question that parenting behavior, like any other behavior, is something that parents must regulate and adjust in response to changing personal, social, and environmental circumstances. The current research would suggest that targeting EFs as a means to improve self-regulation may be missing the mark. Indeed, even outside the parenting literature, research on training programs to enhance WM in particular has shown that task-specific improvements may be achievable in the short-term, but generally do not persist into the long-term or transfer onto other untrained tasks (e.g., Melby-Lervåg & Hulme, 2013; Shipstead, Redick, & Engle, 2012). On the other hand, parenting interventions built on a framework of promoting self-regulation more directly by supporting parents in developing goals consistent with their values, recognizing that changes in their behavior may be necessary to attain these goals, learning new and more appropriate parenting strategies, and monitoring key outcomes have long histories of success (e.g., Lundahl, Risser, & Lovejoy, 2006; Sanders, 2008; Sanders, Baker, & Turner, 2012). The current results suggest that, in the context of these interventions, clinicians would do well to pay particular attention to parents' attitudes about childrearing and parenting ideologies, as these might impact the types of positive parenting strategies they choose to implement. Moreover, in keeping with the association between maternal neuroticism and overreactive parenting, development and research into

and programs that target parents' general emotional reactivity also is warranted. For example, a parenting skills program rooted in dialectical behavior therapy, focusing specifically on mothers' emotion regulation and distress tolerance, is showing promise (Gamache Martin, Roos, Zalewski, & Cummins, 2017; Zalewski, Lewis, & Gamache Martin, 2018). Placing a clinical emphasis on parental characteristics such as childrearing attitudes and emotional reactivity may be especially worthwhile, as these characteristics can influence parenting both directly, and indirectly via their impact on child and contextual characteristics (Belsky, 1984).

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*, 137-144. doi:10.1037/1040-3590.5.2.137
- Atsaba-Poria, N. & Pike, A. (2008). Correlates of parental differential treatment: Parental and contextual factors during middle childhood. *Child Development, 79*, 217-232. doi: 10.1111/j.1467-8624.2007.01121.x
- Aust, F., Diedenhofen, B., Ullrich, S., & Musch, J. (2013). Seriousness checks are useful to improve data validity in online research. *Behavior Research Methods, 45*, 527-535. doi: 10.3758/s13428-012-0265-2
- Azar, S.T., McGuier, D.J., Miller, E.A., Hernandez-Mekonnen, R. & Johnson, D.R. (2017). Child neglect and maternal cross-relational social cognitive and neurocognitive disturbances. *Journal of Family Psychology, 31*, 8-18. doi:10.1037/fam0000268
- Baddeley, A. (2012). Working memory: Theories, models, and controversies. *Annual Review of Psychology, 63*, 1-29. doi:10.1146/annurev-psych-120710-100422
- Baddeley, A. (1998). Recent developments in working memory. *Current Opinion in Neurobiology, 234-238*. doi:10.1016/S0959-4388(98)80145-1
- Baetschmann, G., Staub, K.E., & Studer, R. (2016). Does the stork deliver happiness? Parenthood and life satisfaction. *Journal of Economic Behavior & Organization, 130*, 242-260. doi:10.1016/j.jebo.2016.07.021
- Barkley, R.A. & Murphy, K.R. (2010). Impairment in occupational functioning and adult ADHD: The predictive utility of executive function (EF) ratings versus EF tests. *Archives of Clinical Neuropsychology, 25*, 157-173, doi:10.1093/arclin/acq014
- Barkley, R.A. & Murphy, K.R. (2011). The nature of executive function (EF) deficits in daily life activities in adults with ADHD and their relationship to performance on EF tests. *Journal of Psychopathology and Behavioral Assessment, 33*, 137-158. doi:10.1007/s10862-011-9217-x
- Barrett, J. & Fleming, A.S. (2011). Annual research review: All mothers are not created equal: Neural and psychobiological perspectives on mothering and the importance of individual differences. *The Journal of Child Psychology and Psychiatry, 52*, 368-397. doi:10.1111/j.1469-7610.2010.02306.x
- Barrett, L.F., Tugade, M.M., & Engle, R.W. (2004). Individual differences in working memory capacity and dual-process theories of the mind. *Psychological Bulletin, 130*, 553-573. doi:10.1037/0033-2909.130.4.553

- Bartneck, C., Duesner, A., Moltchanova, E., & Zawieska, K. (2015). Comparing the similarity of responses received from studies in Amazon's Mechanical Turk to studies conducted online and with direct recruitment. *PLoS ONE*, *10*. doi:10.1371/journal.pone.0121595
- Bekker, E.M., Kenemans, J.L., & Verbaten, M.N. (2005). Source analysis of the N2 in a cued Go/NoGo task. *Cognitive Brain Research*, *22*, 221–231. doi:10.1016/j.cogbrainres.2004.08.011
- Belsky, J. (1984). The determinants of parenting: A process model. *Child Development*, *55*, 83- 96. doi:10.2307/1129836
- Belsky, J. & de Haan, M. (2011). Annual Research Review: Parenting and children's brain development: The end of the beginning. *The Journal of Child Psychology and Psychiatry*, *52*, 409-428. doi:10.1111/j.1469-7610.2010.02281.x
- Belsky, J. & Jaffee, S.R. (2006). The multiple determinants of parenting. In D. Cicchetti & D.J. Cohen (Eds.), *Developmental psychopathology, Second edition*. (Vol. 3) (pp. 38-85). Hoboken, NJ: John Wiley & Sons, Inc.
- Belsley, D.A., Kuh, E. & Welsch, R.E. (2005). *Regression diagnostics: Identifying influential data and sources of collinearity*. New York, NY: Wiley.
- Berg-Nielsen, T.S., Vikan, A., & Dahl, A.A. (2002). Parenting related to child and parental psychopathology: A descriptive review of the literature. *Clinical Child Psychology and Psychiatry*, *7*, 529-552. doi:10.1177/1359104502007004006
- Boeldt, D.L., Rhee, S.H., DiLalla, L.F., Mullineaux, P.Y., Schulz-Heik, R.J., Corley, R.P., ..., & Hewitt, J.K. (2012). The association between positive parenting and externalizing behaviour. *Infant and Child Development*, *21*, 85-106. doi:10.1002/icd.764
- Bornstein, M.H., Hahn, C.S., & Haynes, O.M. (2011). Maternal personality, parenting cognitions, and parenting practices. *Developmental Psychology*, *47*, 658-675. doi:10.1037/a0023181
- Bradley, R.H. & Corwyn, R. (2013). From parent to child to parent...: Paths in and out of problem behavior. *Journal of Abnormal Child Psychology*, *41*, 515-529. doi:10.1007/s10802-012-9692-x
- Bridgett, D.J., Kanya, M.J., Rutherford, H.J.V., & Mayes, L.C. (2017). Maternal executive functioning as a mechanism in the intergenerational transmission of parenting: Preliminary evidence. *Journal of Family Psychology*, *31*, 19-29. doi:10.1037/fam0000264

- Bridgett, D.J., Oddi, K.B., Laake, L.M., Murdock, K.W., & Bachmann, M.N. (2013). Integrating and differentiating aspects of self-regulation: Effortful control, executive functioning, and links to negative affectivity. *Emotion, 13*, 47-63. doi:10.1037/a0029536
- Broadway, J. M., & Engle, R. W. (2010). Validating running memory span: Measurement of working memory capacity and links with fluid intelligence. *Behavior Research Methods, 42*, 563–570. doi:10.3758/BRM.42.2.563
- Bugental, D. B., & Grusec, J. E. (2006). Socialization theory. In N. Eisenberg (Ed.), *Handbook of child psychology Volume 3*, pp. 366-428.
- Buhrmester, M., Kwang, T., & Gosling, S.D. (2011). Amazon’s Mechanical Turk: A new source of inexpensive, yet high-quality, data? *Perspectives on Psychological Science, 6*, 3-5. doi:10.1177/1745691610393980
- Buhrmester, M.D., Talaifar, S., & Gosling, S.D. (2018). An evaluation of Amazon’s Mechanical Turk, its rapid rise, and its effective use. *Perspectives on Psychological Science, 13*, 149-154. doi:10.1177/17456916177006516
- Bui, D.C., Myerson, J., & Hale, S. (2015). Age-related slowing in online samples. *The Psychological Record, 65*, 649-655. doi:10.1007/s40732-015-0135-2
- Burchinal, M.R., Peisner-Feinberg, E., Pianta, R., & Howes, C. (2002). Development of academic skills from preschool through second grade: Family and classroom predictors of developmental trajectories. *Journal of School Psychology, 40*, 415-436. doi:10.1016/S0022-4405(02)00107-3
- Burke, J.D., Pardini, D.A., & Loeber, R. (2008). Reciprocal relationships between parenting behavior and disruptive psychopathology from childhood through adolescence. *Journal of Abnormal Child Psychology, 36*, 679-692. doi:10.1007/s10802-008-9219-7
- Campbell, F.A., Goldstein, S., Schaefer, E.S., & Ramey, C.T. (1991). Parental beliefs and values related to family risk, educational intervention, and child academic competence. *Early Childhood Research Quarterly, 6*, 167-182. doi:10.1016/0885-2006(91)90005-6
- Carr, L.A., Nigg, J.T., & Henderson, J.M. (2006). Attentional versus motor inhibition in adults with attention-deficit/hyperactivity disorder. *Neuropsychology, 20*, 430-441. doi:10.1037/0894-4105.20.4.430
- Carver, C.S. (2005). Impulse and constraint: Perspectives from personality psychology, convergence with theory in other areas, and potential for integration. *Personality and Social Psychology Review, 9*, 312-333. doi:10.1207/s15327957pspr0904_2
- Casler, K., Bickel, L., & Hacket, E. (2013). Separate but equal? A comparison of participants and data gathered via Amazon’s MTurk, social media, and face-to-face behavioral testing. *Computers in Human Behavior, 29*, 2156-2160. doi:10.1016/j.chb.2013.05.009

- Caspi, A., & Shiner, R. (2006). Personality development. In W. Damon (Series Ed.) and N. Eisenberg (Vol. Ed.), *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (6th ed., pp. 300–365). New York: Wiley
- Chen, M. & Johnston, C. (2007). Maternal inattention and impulsivity and parenting behaviors. *Journal of Clinical Child and Adolescent Psychology*, *36*, 455-468. doi: 10.1080/15374410701448570
- Chico, E., Gonzalez, A., Ali, N., Steiner, M., & Fleming, A.S. (2014). Executive function and mothering: Challenges faced by teenage mothers. *Developmental Psychobiology*, *56*, 1027-1035. doi:10.1002/dev.21185
- Clark, J.E. & Frick, P.J. (2016). Positive parenting and callous-unemotional traits: Their association with school behavior problems in young children. *Journal of Clinical Child & Adolescent Psychology*. doi:10.1080/15374416.2016.1253016
- Clerkin, S.M., Marks, D.J., Policaro, K.L., & Halperin, J.M. (2007). Psychometric properties of the Alabama Parenting Questionnaire–Preschool Revision. *Journal of Clinical Child and Adolescent Psychology*, *36*, 19-28. doi:10.1007/s10826-013-9730-5
- Colalillo, S. & Johnston, C. (2016). Parenting cognition and affective outcomes following parent management training: A systemic review. *Clinical Child and Family Psychology Review*, *19*, 216-235. doi:10.1007/s10567-016-0208-z
- Colalillo, S., Williamson, D., & Johnston, C. (2014). Attributions for parents' behavior by boys with and without attention-deficit/hyperactivity disorder. *Child Psychiatry and Human Development*, *45*, 765-775. doi:10.1007/s10578-014-0445-7
- Coldwell, J., Pike, A., & Dunn, J. (2006). Household chaos – Links with parenting and child behaviour. *The Journal of Child Psychology and Psychiatry*, *47*, 1116-1122. doi:10.1111/j.1469-7610.2006.01655.x
- Condon, D.M. & Revelle, W. (2014). The international cognitive ability resource: Development and initial validation of a public-domain measure. *Intelligence*, *43*, 52-64. doi: 10.1016/j.intell.2014.01.004
- Conway, A.R.A., Kane, M.J., & Engle, R.W. (2003). Working memory capacity and its relation to general intelligence. *Trends in Cognitive Sciences*, *7*, 547-552. doi:10.1016/j.tics.2003.10.005
- Coplan, R.J., Hastings, P.D., Lagacé-Séguin, D.G., & Moulton, C.E. (2002). Authoritative and authoritarian mothers' parenting goals, attributions, and emotions across different childrearing contexts. *Parenting: Science and Practice*, *2*, 1-26. doi:10.1207/S15327922PAR0201_1

- Costa, P.T. & McCrae, R.R. (1987). Neuroticism, somatic complaints, and disease: Is the bark worse than the bite? *Journal of Personality*, 55, 299-316. doi:10.1111/j.1467-6494.1987.tb00438.x
- Costa, P. T., & McCrae, R. R. (1992). *NEO PI-R professional manual*. Odessa, FL: Psychological Assessment Resources.
- Crandall, A., Deater-Deckard, K., & Riley, A.W. (2015). Maternal emotion and cognitive control capacities and parenting: A conceptual framework. *Developmental Review*, 36, 105-126. doi:10.1016/j.dr.2015.01.004
- Crouch, J.L., McKay, E.R., Lelakowska, G., Hiraoka, R., Rutledge, E., Bridgett, D.J., & Milner, J.S. (2018). Do emotion regulation difficulties explain the association between executive functions and child physical abuse risk? *Child Abuse & Neglect*, 80, 99-107. doi: 10.1016/j.chiabu.2018.03.003
- Cuevas, K., Deater-Deckard, K., Kim-Spoon, J., Watson, A.J., Morasch, K.C., & Bell, M.A. (2016). What's mom got to do with it? Contributions of maternal executive function and caregiving to the development of executive function across early childhood. *Developmental Science*, 17, 224-238. doi: 10.1111/desc.12073
- Cummings, E.M., Merrilees, C.E., George, M.W., & Lamb, M.E. (2010). Fathers, marriages, and families: Revisiting and updating the framework for fathering in family context. In M.E. Lamb (Ed.), *The role of the father in child development*. 5th Ed. (pp. 154-176). Hoboken, NJ: Wiley.
- D'Ambrosio, L.A., Donorfio, L.K., Coughlin, J.F., Mohyde, M., & Meyer, J. (2008). Gender differences in self-regulation patterns and attitudes toward driving among older adults. *Journal of Women & Aging*, 20, 265-282. doi:10.1080/08952840801984758
- Dadds, M. R., Maujean, A., & Fraser, J. A. (2003). Parenting and conduct problems in children: Australian data and psychometric properties of the Alabama Parenting Questionnaire. *Australian Psychologist*, 38, 238–241. doi:10.1080/00050060310001707267
- Daneman, M. & Carpenter, P.A. (1980). Individual differences in working memory and reading. *Journal of Verbal Learning and Verbal Behavior*, 19, 450-466. doi:10.1016/S0022-5371(80)90312-6
- Danzig, A.P., Dyson, M.W., Olino, T.M., Lupton, R.S., & Klein, D.N. (2015). Positive parenting interacts with child temperament and negative parenting to predict children's socially appropriate behavior. *Journal of Social and Clinical Psychology*, 34, 411-435. doi:10.1521/jscp.2015.34.5.411
- Dawson, P. & Guare, R. (2010). *Executive skills in children and adolescents: A practical guide to assessment and intervention (2nd Ed.)*. New York, NY: Guilford Press.

- de la Osa, N., Granero, R., Penelo, E., Domènech, J.P., & Ezpeleta, L. (2014). Psychometric properties of the Alabama Parenting Questionnaire-Preschool Revision (APQ-Pr) in 3 year-old Spanish preschoolers. *Journal of Child and Family Studies, 23*, 776-784. doi:10.1007/s10826-013-9730-5
- DeYoung, C.G., Quilty, L.C., & Peterson, J.B. (2007). Between facets and domains: 10 aspects of the Big Five. *Journal of Personality and Social Psychology, 93*, 880-896. doi:10.1037/0022-3514.93.5.880
- Deater-Deckard, K. (2014). Family matters: Intergenerational and interpersonal processes of executive function and attentive behavior. *Current Directions in Psychological Science, 23*, 230-236. doi: 10.1177/0963721414531597
- 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*, 391-399. doi:10.1037/a0028331
- Deater-Deckard, K., Sewell, M.D., Petrill, S.A., & Thompson, L.A. (2010). Maternal working memory and reactive negativity in parenting. *Psychological Science, 21*, 75-79. doi: 10.1177/0956797609354073
- Deater-Deckard, K., Wang, Z., Chen, N., & Bell, M.A. (2012). Maternal executive function, harsh parenting, and child conduct problems. *The Journal of Child Psychology and Psychiatry, 53*, 1084-1091. doi:10.1111/j.1469-7610.2012.02582.x
- Deault, L.C. (2010). A systematic review of parenting in relation to the development of comorbidities and functional impairments in children with attention-deficit/hyperactivity disorder (ADHD). *Child Psychiatry and Human Development, 41*, 168-192. doi: 10.1007/s10578-009-0159-4
- Diamond, A. (2013). Executive functions. *Annual Review of Psychology, 64*, 135-168. doi: 10.1146/annurev-psych-113011-143750
- Dumas, J.E., Nissley, J., Nordstrom, A., Smith, E.P., Prinz, R.J., & Levine, D.W. (2005). Home chaos: Socio-demographic, parenting, interactional, and child correlates. *Journal of Clinical Child and Adolescent Psychology, 34*, 93-104. doi:10.1207/s15374424
- DuPaul, G.J., Power, T.J., Anastopoulos, A.D., & Reid, R. (1998). *ADHD Rating Scale-IV: Checklists, norms, and clinical interpretation*. New York, NY: Guilford Press.
- Eisenberg, D.P. & Berman, K.F. (2010). Executive function, neural circuitry, and genetic mechanisms in schizophrenia. *Neuropsychopharmacology, 35*, 258-277. doi:10.1038/npp.2009.111

- Eisenberg, N., Zhou, Q., Spinrad, T.L., Valiente, C., Fabes, R.A., & Liew, J. (2005). Relations among positive parenting, children's effortful control, and externalizing problems: A three-wave longitudinal study. *Child Development, 76*, 1055–1071. doi:10.1111/j.1467-8624.2005.00897.x
- Engle, R.W., Tuholski, S.W., Laughlin, J.E., & Conway, A.R.A. (1999). Working memory, short-term memory, and general fluid intelligence: A latent-variable approach. *Journal of Experimental Psychology: General, 128*, 309-331. doi:10.1037/0096-3445.128.3.309
- Fillmore, M.T. (2003). Drug abuse as a problem of impaired control: Current approaches and findings. *Behavioral & Cognitive Neuroscience Reviews, 2*, 179-197. doi:10.1177/1534582303257007
- Fillmore, M.T. & Rush, C.R. (2006). Polydrug abusers display impaired discrimination-reversal learning in a model of behavioural control. *Journal of Psychopharmacology, 20*, 24-32. doi:10.1177/0269881105057000
- Fillmore, M.T., Rush, C.R., & Marczinski, C.A. (2003). Effects of d-amphetamine on behavioral control in stimulant abusers: The role of prepotent response tendencies. *Drug and Alcohol Dependence, 71*, 143-152. doi:10.1016/S0376-8716(03)00089-9
- Fisher, P.A. & Fagot, B.I. (1993). Negative discipline in families: A multidimensional risk model. *Journal of Family Psychology, 7*, 250-254. doi:10.1037/0893-3200.7.2.250
- Forehand, R., Jones, D. J., & Parent, J. (2013). Behavioral parenting interventions for child disruptive behavior and anxiety: What's different and what's the same. *Clinical Psychology Review, 33*, 133–145. doi:10.1016/j.cpr.2012.10.010
- Foster, J.L., Shipstead, Z., Harrison, T.L., Hicks, K.L., Redick, T.S., & Engle, R.W. (2015). Shortened complex span tasks can reliably measure working memory capacity. *Memory and Cognition, 43*, 226-236. doi:10.3758/s13421-014-0461-7
- Friedman, N.P., Miyake, A., Corley, R.P., Young, S.E., DeFries, J.C., & Hewitt, J.K. (2006). Not all executive functions are related to intelligence. *Psychological Science, 17*, 172-179. doi:10.1111/j.1467-9280.2006.01681.x
- Friedman, N.P., Miyake, A., Young, S.E., DeFries, J.C., Corley, R.P., & Hewitt, J.K. (2008). Individual differences in executive functions are almost entirely genetic in origin. *Journal of Experimental Psychology: General, 137*, 201-225. doi:10.1037/0096-3445.137.2.201
- Gamache Martin, C., Roos, L.E., Zalewski, M., & Cummins, N. (2017). A dialectical behavior therapy skills group case study on mothers with severe emotion dysregulation. *Cognitive and Behavioral Practice, 24*, 405-415. doi:10.1016/j.cbpra.2016.08.002

- Gershoff, E.T. & Gorgon-Kaylor, A. (2016). Spanking and child outcomes: Old controversies and new meta-analyses. *Journal of Family Psychology, 30*, 453-469. doi: 10.1037/fam0000191
- Goldberg, L.R. (1999). A broad-bandwidth, public domain, personality inventory measuring the lower-level facets of several five-factor models. In I. Mervielde, I. Deary, F. De Fruyt, & F. Ostendorf (Eds.), *Personality Psychology in Europe*, Vol. 7 (pp. 7-28). Tilburg, The Netherlands: Tilburg University Press.
- Goldberg, L.R., Johnson, J.A., Eber, H.W., Hogan, R., Ashton, M.C., Cloninger, C.R., & Gough, H.C. (2006). The International Personality Item Pool and the future of public-domain personality measures. *Journal of Research in Personality, 40*, 84-96. doi:10.1016/j.jrp.2005.08.007
- Gonzalez, A. (2015). The role of maternal executive function. *Canadian Psychology, 56*, 46-53. doi:10.1037/cap0000019
- Gonzalez, A., Jenkins, J.M., Steiner, M., & Fleming, S. (2012). Maternal early life experiences and parenting: The mediating role of cortisol and executive function. *Journal of the American Academy of Child and Adolescent Psychiatry, 51*, 673-682. doi:10.1016/j.jaac.2012.04.003
- Goodman, A. & Goodman, R. (2009). Strengths and Difficulties Questionnaire as a dimensional measure of child mental health. *Journal of the American Academy of Child and Adolescent Psychiatry, 48*, 400-403. doi:10.1097/CHI.0b013e3181985068
- Goodman, R. (1997). The Strengths and Difficulties Questionnaire: A research note. *Journal of Child Psychology and Psychiatry, 38*, 581-586. doi:10.1111/j.1469-7610.1997.tb01545.x
- Gross, J.J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology, 2*, 271-299. doi:10.1037/1089-2680.2.3.271
- Gross, J.J., & John, O.P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology, 85*, 348-362. doi:10.1037/0022-3514.85.2.348
- Guidelines for Academic Requesters – Fair Payment. (2014). Retrieved March 4, 2017 from <https://irb.northwestern.edu/sites/irb/files/documents/guidelinesforacademicrequesters.pdf>
- Harvey, E., Danforth, J.S., Eberhardt McKee, T., Ulaszek, W.R., & Friedman, J.L. (2003). Parenting of children with attention-deficit/hyperactivity disorder (ADHD): The role of parental ADHD symptomatology. *Journal of Attention Disorders, 7*, 31-42. doi:10.1177/108705470300700104
- Hastings, P.D. & Grusec, J.E. (1998). Parenting goals as organizers of responses to parent-child disagreement. *Developmental Psychology, 34*, 465-479. doi:10.1037/0012-1649.34.3.465

- Hauser, D.J. & Schwartz, N. (2016). Attentive turkers: MTurk participants perform better on online attention checks than do subject pool participants. *Behavior Research Methods*, 48, 400-407. doi:10.3758/s13428-015-0578-z
- Hayes, A.F. (2017). *Introduction to mediation, moderation, and conditional process analysis, Second Edition*. New York, NY: Guilford Press.
- Hayes, A.F. & Kai, L. (2007). Using heteroskedasticity-consistent standard error estimators in OLS regression: An introduction and software implementation. *Behavior Research Methods*, 39, 709-722. doi:10.3758/BF03192961
- Hedge, C., Powell, G., & Summer, P. (2017). The reliability paradox: Why robust cognitive tasks do not produce reliable individual differences. *Behavior Research Methods*. doi:10.3758/s13428-017-0935-1
- Hendricks, M.A. & Buchanan, T.W. (2016). Individual differences in cognitive control capacities and their relationship to emotion regulation. *Cognition and Emotion*, 30, 912-924. doi:10.1080/02699931.2015.1032893
- Hester R., Lubman D.I., Yücel M. (2010). The role of executive control in human drug addiction. In: Self, D. & Staley Gottschalk, J. (Eds.) *Behavioral neuroscience of drug addiction. Current topics in behavioral neurosciences, Volume 3*. Springer: Berlin, Heidelberg.
- Hofmann, W., Friese, M., & Strack, F. (2009). Impulse and self-control from a dual-systems perspective. *Perspectives on Psychological Science*, 4, 162-176. doi:10.1111/j.1745-6924.2009.01116.x
- Hofmann, W., Gschwendner, T., Friese, M., Wiers, R.W., & Schmitt, M. (2008). Working memory capacity and self-regulatory behavior. *Personality Processes and Individual Differences*, 962-977. doi:10.1037/a0012705
- Hofmann, W., Schmeichel, B.J., & Baddeley, A.D. (2012). Executive functions and self-regulation. *Trends in Cognitive Sciences*, 16, 174-180. doi:10.1016/j.tics.2012.01.006
- Hughes, E.K. & Gullone, E. (2010). Parent and emotion socialization practices and their associations with personality and emotion regulation. *Personality and Individual Differences*, 49, 694-699. doi:10.1016/j.paid.2010.05.042
- Hughes, C., White, A., Sharpen, J., & Dunn, J. (2010). Antisocial, angry, and unsympathetic: “Hard-to-manage” preschoolers’ peer problems and possible cognitive influences. *Journal of Child Psychology and Psychiatry*, 41, 169-179. doi:10.1017/S0021963099005193
- IBM Corp. Released 2016. IBM SPSS Statistics for Macintosh, Version 24.0. Armonk, NY: IBM Corp.

- Isquith, P.K., Roth, R.M., & Gioia, G.A. (2010). *Tasks of executive control (TEC)*. Lutz, FL: Psychological Assessment Resources.
- Jansen, P.W., Raat, H., Mackenbach, J.P., Hofman, A., Jaddoe, V.W.V., Bakermans-Kranenburg, M.J., ..., & Tiemeier, H. (2012). Early determinants of maternal and paternal harsh discipline: The generation R study. *Family Relations, 61*, 253-270. doi:10.1111/j.1741-3729.2011.00691.x
- John, O.P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (2nd ed., pp. 102–138). New York, NY: Guilford Press.
- Johnston, C., Park, J.L., Miller, N.V. (In press). Parental cognitions: Relations to parenting and child behavior. In M.R. Sanders & A. Morawska (Eds.), *Handbook of parenting and child development across the lifespan*. New York: Springer International Publishing.
- Johnston, C., Mash, E.J., Miller, N., & Ninowski, J.E. (2012). Parenting in adults with attention-deficit/hyperactivity disorder (ADHD). *Clinical Psychology Review, 32*, 215-228. doi:10.1016/j.cpr.2012.01.007
- Johnston, C., Scoular, D.J., & Ohan, J.L. (2004). Mothers' reports of parenting in families of children with symptoms of attention-deficit/hyperactivity disorder: Relations to impression management. *Child & Family Behavior Therapy, 26*, 45-61. doi:10.1300/J019v26n01_04
- Karbach, J. & Verhaegen, P. (2014). Making working memory work: A meta-analysis of executive-control and working memory training in older adults. *Psychological Science, 25*, 2027-2037. doi:10.1177/0956797614548725
- Karoly, P. (1993). Mechanisms of self-regulation: A systems view. *Annual Review of Psychology, 44*, 23–52. doi:10.1146/annurev.ps.44.020193.000323
- Kawabataa, Y., Alink, L.R.A., Tsenga, W., van IJzendoorn, M.H., & Crick, N.R. (2011). Maternal and paternal parenting styles associated with relational aggression in children and adolescents: A conceptual analysis and meta-analytic review. *Developmental Review, 31*, 240-278. doi:10.1016/j.dr.2011.08.001
- Lansford, J.E., Bornstein, M.H., Dodge, K.A., Skinner, A.T., Putnick, D.L., & Deater-Deckard, K. (2011). Attributions and attitudes of mothers and fathers in the United States. *Parenting: Science and Practice, 11*, 199-213. doi:10.1080/15295192.2011.585567
- Lansford, J. E., Sharma, C., Malone, P. S., Woodlief, D., Dodge, K. A., Oburu, P., ... & Di Giunta, L. (2014). Corporal punishment, maternal warmth, and child adjustment: A longitudinal study in eight countries. *Journal of Clinical Child & Adolescent Psychology, 43*, 670–685. doi:10.1080/15374416.2014.893518

- Leve, L.D. & Fagot, B.I. (1997). Gender-role socialization and discipline processes in one- and two-parent families. *Sex Roles*, 36, 1-21. doi:10.1007/BF02766236
- Liston, C., McEwen, B.S., & Casey, B.J. (2009). Psychosocial stress reversibly disrupts prefrontal processing and attentional control. *Proceedings of the National Academy of Sciences of the United States of America*, 106, 912-917. doi:10.1073/pnas.0807041106
- Lorber, M.F. (2012). The role of maternal emotion regulation in overreactive and lax discipline. *Journal of Family Psychology*, 26, 642-647. doi:10.1037/a0029109
- Lorber, M.F. & O’Leary, S.G. (2005). Mediated paths to overreactive discipline: Mothers’ experienced emotion, appraisals, and physiological responses. *Journal of Consulting and Clinical Psychology*, 73, 972-981. doi:10.1037/0022-006X.73.5.972
- Lorber, M.F., Xu, S., Smith Slep, A.M., Bulling, L., & O’Leary, S.G. (2014). A new look at the psychometrics of the Parenting Scale through the lens of item response theory. *Journal of Clinical Child and Adolescent Psychology*, 43, 613-626. doi:10.1080/15374416.2014.900717
- Lovejoy, M.C., Graczyk, P.A., O’Hare, E., & Neuman, G. (2000). Maternal depression and parenting behavior: A meta-analytic review. *Clinical Psychology Review*, 20, 561-592. doi:10.1016/S0272-7358(98)00100-7
- Lowry, P.B., D’Arcy, J., Hammer, B., & Moody, G.D. (2016). “Cargo Cult” science in traditional organization and information systems survey research: A case for using nontraditional methods of data collection, including Mechanical Turk and online panels. *The Journal of Strategic Information Systems*, 25, 232–240. doi:10.1016/j.jsis.2016.06.002
- Luke N. & Banerjee, R. (2013). Differentiated associations between childhood maltreatment experiences and social understanding: A meta-analysis and systematic review. *Developmental Review*, 33, 1-28. doi:10.1016/j.dr.2012.10.001
- Lundahl, B., Risser, H. J., & Lovejoy, M. C. (2006). A meta-analysis of parent training: Moderators and follow-up effects. *Clinical Psychology Review*, 26, 86–104. doi:10.1016/j.cpr.2005.07.004
- Maliken, A.C. & Katz, L.F. (2013). Exploring the impact of parental psychopathology and emotion regulation on evidence-based parenting interventions: A transdiagnostic approach to improving treatment effectiveness. *Clinical Child and Family Psychology Review*, 16, 173-186. doi:10.1007/s10567-013-0132-4
- Matheny, A. P., Wachs, T. D., Ludwig, J. L., & Phillips, K. (1995). Bringing order out of chaos: Psychometric characteristics of the Confusion, Hubbub, and Order Scale. *Journal of Applied Developmental Psychology*, 16, 429–444. doi:10.1016/0193-3973(95)90028-4

- Matias, C., O'Connor, T.G., Futh, A., & Scott, S. (2014). Observational attachment theory-based parenting measures predict children's attachment narratives independently from social learning theory-based measures. *Attachment & Human Development, 16*, 77-92. doi:10.1080/14616734.2013.851333
- Mazursky-Horowitz, H., Thomas, S.R., Woods, K.E., Chrabaszcz, J.S., Deater-Deckard, K., & Chronis-Tuscano, A. (2018). Maternal executive functioning and scaffolding in families of children with and without parent-reported ADHD. *Journal of Abnormal Child Psychology, 46*, 463-475. doi:10.1007/s10802-017-0289-2
- McAuley, T., Chen, S., Goos, L., Schachar, R., & Crosbie, J. (2010). Is the behavior rating inventory of executive function more strongly associated with measures of impairment or executive function? *Journal of the International Neuropsychological Society, 16*, 495-505. doi:10.1017/S1355617710000093
- McCrae, K., Jacobs, S.E., Ray, R.D., John, O.P., & Gross, J.J. (2012). Individual differences in reappraisal ability: Links to reappraisal frequency, well-being, and cognitive control. *Journal of Research in Personality, 46*, 2-7. doi:10.1016/j.jrp.2011.10.003
- McKee, L., Colletti, C., Rakow, A., Jones, D. J., & Forehand, R. (2008). Parenting and child externalizing behaviors: Are the associations specific or diffuse? *Aggression and Violent Behavior, 13*, 201-215. doi:10.1016/j.avb.2008.03.005
- McKee, L., Roland, E., Coffelt, N., Olson, A.L., Forehand, R., Massari, C., ..., & Zens, M.S. (2007). Harsh discipline and child problem behaviors: The roles of positive parenting and gender. *Journal of Family Violence, 22*, 187-196. doi:10.1007/s10896-007-9070-6
- Melby-Lervåg, M. & Hulme, C. (2013). Is working memory training effective? A meta-analytic review. *Developmental Psychology, 49*, 270-291. doi:10.1037/a0028228
- Metsäpelto, R.L. & Pulkkinen, L. (2003). Personality traits and parenting: Neuroticism, extraversion, and openness to experience as discriminative factors. *European Journal of Personality, 17*, 59-78. doi:10.1002/per.468
- Miyake, A., Friedman, N.P., Emerson, M.J., Witzki, A.H., Howerter, A., Wager, T.D. (2000). The unity and diversity of executive functions and their contributions to complex "frontal lobe" tasks: A latent variable analysis. *Cognitive Psychology, 41*, 49-100. doi:10.1006/cogp.1999.0734
- Monn, A.R., Narayan, A.J., Kalstabakken, A.W., Schubert, E.C., & Masten, A.S. (2017). Executive function and parenting in the context of homelessness. *Journal of Family Psychology, 31*, 61-70. doi:10.1037/fam0000275
- NICHD Early Child Care Research Network. (1998). Relations between family predictors and child outcomes: Are they weaker for children in child care? *Developmental Psychology, 34*, 1119-1128. doi:10.1037/0012-1649.34.5.1119

- Murdock, K.W., Oddi, K.B., & Bridgett, D.J. (2013). Cognitive correlates of personality: Links between executive functioning and the Big Five personality traits. *Journal of Individual Differences, 34*, 2013, 97-104. doi:10.1027/1614-0001/a000104
- Muris, P., Meesters, C., & van den Berg, F. (2003). The Strengths and Difficulties Questionnaire (SDQ): Further evidence for its reliability and validity in a community sample of Dutch children and adolescents. *European Child and Adolescent Psychiatry, 12*, 1–8. doi:10.1007/s00787-003-0298-2
- Nelson, S.K., Kushlev, K., English, T., Dunn, E.W., & Lyubomirsky, S. (2013). In defense of parenthood: Children are associated with more joy than misery. *Psychological Science, 24*, 3-10. doi:10.1177/0956797612447798
- O'Connor, T.G., Matias, C., Futh, A., Tantam, C., & Scott, S. (2013). Social learning theory parenting intervention promotes attachment-based caregiving in young children: Randomized clinical trial. *Journal of Clinical Child and Adolescent Psychology, 42*, 358-370. doi:10.1037/t00540-000
- Odgers, C., Caspi, A., Russell, M., Sampson, R., Arseneault, L., & Moffitt, T. (2012). Supportive parenting mediates neighborhood socioeconomic disparities in children's antisocial behavior from ages 5 to 12. *Development and Psychopathology, 24*, 705-721. doi:10.1017/S0954579412000326
- Olson, S.L., Tardiff, T.Z., Miller, A., Felt, B., Grabell, A.S., Kessler, D., ..., & Hirabayashi, H. (2011). Inhibitory control and harsh discipline as predictors of externalizing problems in young children: A comparative study of U.S., Chinese, and Japanese preschoolers. *Journal of Abnormal Child Psychology, 39*, 1163-1175. doi:10.1007/s10802-011-9531-5
- Pardini, D.A. (2008). Novel insights into longstanding theories of bidirectional parent-child influences: Introduction to the special section. *Journal of Abnormal Child Psychology, 36*, 627-631. doi:10.1007/s10802-008-9231-y
- Park, J.L., Hudec, K.L., & Johnston, C. (2017). Parental ADHD symptoms and parenting behaviors: A meta-analytic review. *Clinical Psychology Review, 56*, 25-39. doi:10.1016/j.cpr.2017.05.003
- Park, J.L., Johnston, C., Colalillo, S., & Williamson, D. (in press). Parents' attributions for negative and positive child behavior in relation to parenting and child problems. *Journal of Child & Adolescent Psychology*. doi:10.1080/15374416.2016.1144191
- Paulhus, D.L. (1991). *Measurement and control of response bias*. In J.P. Robinson, P.R. Shaver, & L.S. Wrightsman (Eds.), *Measurement of personality and social psychological attitudes* (pp. 17-59). San Diego, CA: Academic Press.

- Paulhus, D.L. (1998). *Manual for the Balanced Inventory of Desirable Responding: Version 7*. Toronto, ON: Multi-Health Systems.
- Paulhus, D.L., Bruce, M.N., & Trapnell, P.D. (1995). Effects of self-presentation strategies on personality profiles and structure. *Personality and Social Psychology Bulletin*, *21*, 100-108. doi:10.1177/0146167295212001
- Peer, E., Vosgreau, J., & Acquisti, A. (2014). Reputation as a sufficient condition for data quality on Amazon Mechanical Turk. *Behavior Research*, *46*, 1023-1031. doi:10.3758/s13428-013-0434-y
- Pinderhughes, E.E., Dodge, K.A., Bates, J.E., Pettit, G.S., & Zelli, A. (2000). Discipline responses: Influences of parents' socioeconomic status, ethnicity, beliefs about parenting, stress, and cognitive-emotional processes. *Journal of Family Psychology*, *14*, 380-400. doi:10.1037/0893-3200.14.3.380
- Prinz, P., Onghena, P., & Hellinckx, W. (2007). Reexamining the Parenting Scale: Reliability, factor structure, and concurrent validity of a scale for assessing the discipline practices of mothers and fathers of elementary-school-aged children. *European Journal of Psychological Assessment*, *23*, 24-31. doi: 10.1027/1015-5759.23.1.24
- Prinz, P., Onghena, P., & Hellinckx, W., Grietens, H., Ghesquière, P., & Colpin, H. (2005). Direct and indirect relationships between parental personality and externalising behaviour: The role of negative parenting. *Psychologica Belgica*, *45*, 123-145. doi:10.5334/pb-45-2-123
- R Core Team (2013). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0, <http://www.R-project.org/>
- Randal, W.M. & Smith, J.L. (2011). Conflict and inhibition in the cued-Go/NoGo task. *Clinical Neurophysiology*, *122*, 2400–2407. doi:10.1016/j.clinph.2011.05.012
- Redick, T. S., Broadway, J. M., Meier, M. E., Kuriakose, P. S., Unsworth, N., Kane, M. J., & Engle, R. W. (2012). Measuring working memory capacity with automated complex span tasks. *European Journal of Psychological Assessment*, *28*, 164–171. doi:10.1027/15-5759/a000123
- Reitman, D., Currier, R.O., Hupp, S.D.A., Rhode, P.C., Murphy, M.A., & O’Callaghan, P.M. (2001). Psychometric characteristics of the Parenting Scale in a head start population. *Journal of Clinical Child Psychology*, *30*, 514–524. doi:10.1207/S15374424JCCP3004_08
- Rhoades, K.A. & O’Leary, S.G. (2007). Factor structure and validity of the Parenting Scale. *Journal of Clinical Child and Adolescent Psychology*, *36*, 137-146. doi:10.1080/15374410701274157

- Richmond, L. L., Morrison, A. B., Chein, J. M., & Olson, I. R. (2011). Working memory training and transfer in older adults. *Psychology and Aging, 26*, 813-822. doi:10.1037/a0023631
- Roth, R.M., Isquith, P.K., & Gioia, G. (2005). *Behavior Rating Inventory of Executive Function - Adult Version (BRIEF-A)*. Lutz: Psychological Assessment Resources.
- Roth, R.M., Isquith, P.K., & Gioia, G.A. (2014) Assessment of executive functioning using the Behavior Rating Inventory of Executive Function (BRIEF). In: Goldstein, S., Naglieri, J. (Eds.) *Handbook of executive functioning*. New York, NY: Springer.
- Rudy, D. & Grusec, J.E. (2001). Correlates of authoritarian parenting in individualist and collectivist cultures and implications for understanding the transmission of values. *Journal of Cross-Cultural Psychology, 32*, 202-212. doi:10.1177/0022022101032002007
- Rutherford, H.J.V., Booth, C.R., Crowley, M.J., & Mayes, L.C. (2016). Investigating the relationship between working memory and emotion regulation in mothers. *Journal of Cognitive Psychology, 28*, 52-59. doi:10.1080/20445911.2015.1075542
- Salthouse, T.A., Atkinson, T.M., & Berish, D.E. (2003). Executive functioning as a potential mediator of age-related cognitive decline in normal adults. *Journal of Experimental Psychology: General, 132*, 566–594. doi:10.1037/0096-3445.132.4.566
- Sanders, M.R. (2008). Triple-P Positive Parenting Program as a public health approach to strengthening parenting. *Journal of Family Psychology, 50*, 506-517. doi:10.1037/0893-3200.22.3.506
- Sanders, M.R., Baker, S., & Turner, K.M.T. (2012). A randomized controlled trial evaluating the efficacy of Triple P Online with parents of children with early-onset conduct problems. *Behavior Research and Therapy, 50*, 675-685. doi:10.1016/j.brat.2012.07.004
- Sanders, M.R., Burke, K., Prinz, R.J., & Morawska, A. (2017). Achieving population-level change through a system-contextual approach to supporting competent parenting. *Clinical Child and Family Psychology Review, 1-9*. doi:10.1007/s10567-017-0227-4
- Sanders, M.R., Kirby, J.N., Tellegen, C.L., & Day, J.J. (2014). The Triple P-Positive Parenting Program: A systematic review and meta-analysis of a multi-level system of parenting support. *Clinical Psychology Review, 34*, 337-357. doi:10.1016/j.cpr.2014.04.003
- Sanders, M.R. & Mazzucchelli, T.G. (2013). The promotion of self-regulation through parenting interventions. *Clinical Child and Family Psychology Review, 16*, 1-17. doi:10.1007/s10567-013-0129-z
- Saunders, D.R., Bex, P.J., & Woods, R.L. (2013). Crowdsourcing a normative natural language dataset: A comparison of Amazon Mechanical Turk and in-lab data collection. *Journal of Medical Internet Research, 15*, 49-62. doi:10.2196/jmir.2620

- Schleider, J.L. & Weisz, J.R. (2015). Using Mechanical Turk to study family processes and youth mental health: A test of feasibility. *Journal of Child and Family Studies, 24*, 3235-3246. doi:10.1007/s10826-015-0126-6
- Shaffer, A. & Obradović, J. (2017). Unique contributions of emotion regulation and executive functions in predicting the quality of parent–child interaction behaviors. *Journal of Family Psychology, 31*, 150-159. doi:10.1037/fam0000269
- Shura, R.D., Hurley, R.A., & Taber, K.H. (2016). Working memory models: Insights from neuroimaging. *Journal of Neuropsychiatry and Clinical Neuroscience, 28*, 1-5. doi:10.1176/appi.neuropsych.15120402
- Simons, L.G., & Conger, R.D. (2007). Linking mother–father differences in parenting to a typology of family parenting styles and adolescent outcomes. *Journal of Family Issues, 28*, 212-241. doi:10.1177/0192513X06294593
- Smith, A.M. & O’Leary, S.G. (1995). Attributions and arousal as predictors of maternal discipline. *Cognitive Therapy and Research, 19*, 459-471. doi:10.1007/BF02230412
- Snyder, H.R. (2013). Major depressive disorder is associated with broad impairments on neuropsychological measures of executive function: A meta-analysis and review. *Psychological Bulletin, 139*, 81-132. doi:10.1037/a0028727
- Stone, L.L., Otten, R., Engels, R.C.M.E., Vermulst, A.A., & Janssens, J.M.A.M. (2010). Psychometric properties of the parent and teacher versions of the Strengths and Difficulties Questionnaire for 4- to 12-year-olds: A review. *Clinical Child and Family Psychology Review, 13*, 254-274. doi:10.1007/s10567-010-0071-2
- Strack, F., & Deutsch, R. (2004). Reflective and impulsive determinants of social behavior. *Personality and Social Psychology Review, 8*, 220–247. doi:10.1207/s15327957pspr0803_1
- Sturge-Apple, M.L., Jones, H.R., & Suor, J.H. (2017). When stress gets into your head: Socioeconomic risk, executive functions, and maternal sensitivity across childrearing contexts. *Journal of Family Psychology, 31*, 160-169. doi: 10.1037/fam0000265
- Sturge-Apple, M.L., Suor, J.H., & Skibo, M.A. (2014). Maternal child-centered attributions and harsh discipline: The moderating role of maternal working memory across socioeconomic contexts. *Journal of Family Psychology, 28*, 645-654. doi:10.1037/fam0000023
- Schaefer, E. & Edgerton, M.D. (1985). Parent and child correlates of parental modernity. In I. Sigel (Ed.), *Parental belief systems: The psychological consequences for children* (1st ed., pp. 287-318). Hillsdale, NJ: Erlbaum.

- Shelton, K. K., Frick, P. J., & Wootton, J. (1996). Assessment of parenting practices in families of elementary school-age children. *Journal of Clinical Child Psychology, 25*, 317-329. doi:10.1207/s15374424jccp2503_8
- Shipstead, Z., Redick, T.S., & Engle, R.W. (2012). Is working memory training effective? *Psychological Bulletin, 138*, 628-654. doi:10.1037/a0027473
- Skowron, E.A., Kozlowski, J.M., & Pincus, A.L. (2010). Differentiation, self-other representations, and rupture-repair processes: Predicting child-maltreatment risk. *Journal of Counseling Psychology, 57*, 304-316. doi:10.1037/a0020030
- Toplak, M.E., West, R.F., Stanovick, K.E. (2013). Practitioner review: Do performance-based measures and ratings of executive function assess the same construct? *The Journal of Child Psychology and Psychiatry, 54*, 131-143. doi:10.1111/jcpp.12001
- Torralva, T., Gleichgerricht, E., Lischinsky, L., Roca, M., & Manes, F. (2013). “Ecological” and highly demanding executive tasks detect real-life deficits in high-functioning adult ADHD patients. *Journal of Attention Disorders, 17*, 11-19. doi:10.1177/1087054710389988
- Tractenberg, R.E. & Freas, C.E. (2007). Benchmarking a computerized test of immediate verbal memory. *Behavior Research Methods, 39*, 863-869. doi:10.3758/BF03192980
- Turner, M. L., & Engle, R. W. (1989). Is working memory capacity task dependent? *Journal of Memory and Language, 28*, 127–154. doi:10.1016/0749-596X(89)90040-5
- Unsworth, N., Heitz, R.P., Schrock, J.C., & Engle, R.W. (2005). An automated version of the operation span task. *Behavior Research Methods, 37*, 498-505. doi:10.3758/BF03192720
- Unsworth, N., Redick, T. S., Heitz, R. P., Broadway, J. M., & Engle, R. W. (2009). Complex working memory span tasks and higher- order cognition: A latent-variable analysis of the relationship between processing and storage. *Memory, 17*, 635–654. doi:10.1080/09658210902998047
- Valiente, C., Lemery-Chalfant, K., & Reiser, M. (2007). Pathways to problem behaviors: Chaotic homes, parent and child effortful control, and parenting. *Social Development, 16*, 249–267. doi:10.1111/j.1467- 9507.2007.00383.x
- Weafer, J., Baggott, M.J., & de Wit, H. (2013). Test-retest reliability of behavioral measures of impulsive choice, impulsive action, and inattention. *Experimental and Clinical Psychopharmacology, 21*, 475-481. doi:10.1037/a0033659
- Weafer, J., Fillmore, M.T., & Milich, R. (2009). Increased sensitivity to the disinhibiting effects of alcohol in adults with ADHD. *Experimental and Clinical Psychopharmacology, 17*, 113-121. doi:10.1037/a0015418
- Wechsler, D. (2008). WAIS-IV administration and scoring manual. London, UK: Pearson.

- Woods, D.L., Kishiyama, M.M., Yund, E.W., Herron, T.J., Edwards, B., Poliva, O., ..., & Reed, B. (2011). Improving digit span assessment of short-term verbal memory. *Journal of Clinical and Experimental Neuropsychology*, *33*, 101-111. doi:10.1080/13803395.2010.493149
- Wöstmann, N.M., Aichert, D.S., Costa, A., Rubiab, K., Möllera, H., & Ettinger, U. (2013). Reliability and plasticity of response inhibition and interference control. *Brain and Cognition*, *81*, 82-94. doi:10.1016/j.bandc.2012.09.010
- Yang, E. (2017). Bilinguals' working memory (WM) advantage and their dual language practices. *Brain Sciences*, *86*, 1-21. doi:10.3390/brainsci7070086
- Youth in Mind, Ltd. (2004). *Normative SDQ data from the USA*. Retrieved from <http://www.sdqinfo.com/norms/USNorm.html>
- Zalewski, M., Lewis, J.K., & Gamache Martin, C. (2018). Identifying novel applications of dialectical behavior therapy: Considering emotion regulation and parenting. *Current Opinion in Psychology*, *21*, 122-126. doi:10.1016/j.copsyc.2018.02.013
- Zhou, Q., Eisenberg, N., Losoya, S., Fabes, R.A., Reiser, M., Guthrie, I.K., & Shepard, S.A. (2002). The relations of parental warmth and positive expressiveness to children's empathy-related responding and social functioning: A longitudinal study. *Child Development*, *73*, 893-915. doi:10.1111/1467-8624.004

Appendices

Appendix A: Parental Modernity Scale

Here are some statements other parents have made about rearing and educating children. For each one, please circle the number that best indicates how you feel in general, not just about your own child.

Strongly Mildly Not sure Mildly Strongly
disagree disagree agree agree

1. Since parents lack the special training in education, they should not question the teacher's teaching methods.
2. Children should be treated the same regardless of differences among them.
3. Children should always obey the teacher.
4. Preparing for the future is more important for a child than enjoying today.
5. Children will not do the right thing unless they must.
6. Children should be allowed to disagree with their parents if they feel their own ideas are better.
7. Children should be kept busy with work and study at home and at school.
8. The major goal of education is to put basic information into the minds of the children.
9. In order to be fair, a teacher must treat all children alike.
10. The most important thing to teach children is absolute obedience to whoever is in authority.
11. Children learn best by doing things themselves rather than listening to others.
12. Children must be carefully trained early in life or their natural impulses will make them unmanageable.

13. Children have a right to their own point of view and should be allowed to express it.
14. Children's learning results mainly from being presented basic information again and again.
15. Children like to teach other children.
16. The most important thing to teach children is absolute obedience to parents.
17. The school has the main responsibility for a child's education.
18. Children generally do not do what they should unless someone sees it.
19. Parents should teach their children that they should be doing something useful at all times.
20. It's all right for a child to disagree with his/her parents.
21. Children should always obey their parents.
22. Teachers need not be concerned with what goes on in a child's home.
23. Parents should go along with the game when their child is pretending something.
24. Parents should teach their children to have unquestioning loyalty to them.
25. Teachers should discipline all the children the same.
26. Children should not question the authority of their parents.
27. What parents teach their child at home is very important to his/her school success.
28. Children will be bad unless they are taught what is right.
29. A child's ideas should be seriously considered in making family decisions.

30. A teacher has no right to seek information about a child's home background.

Appendix B: Parenting Scale

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, throwing food, forgetting homework, not picking up toys, lying, having a tantrum, refusing to go to bed, 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, circle the number that best describes your style of parenting during the past 2 months with your child.

Sample item

At meal time...

I let my child decide how much to eat	1	2	3	4	5	6	7	I decide how much my child eats
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1. When my child misbehaves...

I do something about it right away	1	2	3	4	5	6	7	I do something about it later
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2. Before I do something about a problem...

I give my child several reminders or warnings	1	2	3	4	5	6	7	I use only one reminder or warning
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3. When I’m upset or under stress...

I am picky and on my child’s back	1	2	3	4	5	6	7	I am no more picky than usual
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4. When I tell my child not to do something...

I say very little	1	2	3	4	5	6	7	I say a lot
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5. When my child pesters me...

I can ignore the pestering	1	2	3	4	5	6	7	I can’t ignore the pestering
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6. When my child misbehaves...

I usually get into a long argument with my child	1	2	3	4	5	6	7	I don’t get into an argument
--	---	---	---	---	---	---	---	------------------------------

7. I threaten to do things that...

I am sure I can carry out	1	2	3	4	5	6	7	I know I won't actually do
---------------------------	---	---	---	---	---	---	---	----------------------------

8. I am the kind of parent that...

Sets limits on what my child is allowed to do	1	2	3	4	5	6	7	Lets my child do whatever he or she wants
---	---	---	---	---	---	---	---	---

9. When my child misbehaves...

I give my child a long lecture	1	2	3	4	5	6	7	I keep my talks short and to the point
--------------------------------	---	---	---	---	---	---	---	--

10. When my child misbehaves...

I raise my voice or yell	1	2	3	4	5	6	7	I speak to my child calmly
--------------------------	---	---	---	---	---	---	---	----------------------------

11. If saying no doesn't work right away...

I take some other kind of action	1	2	3	4	5	6	7	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	1	2	3	4	5	6	7	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	1	2	3	4	5	6	7	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	1	2	3	4	5	6	7	Things get back to normal quickly
-----------------------	---	---	---	---	---	---	---	-----------------------------------

15. When we're not at home...

I handle my child the way I do at home	1	2	3	4	5	6	7	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	1	2	3	4	5	6	7	I often let it go
---	---	---	---	---	---	---	---	-------------------

17. When there's a problem with my child...

Things build up and I do things I don't mean to do	1	2	3	4	5	6	7	Things don't get out of hand
--	---	---	---	---	---	---	---	------------------------------

18. When my child misbehaves, I spank, slap, grab, or hit my child...

Never or rarely	1	2	3	4	5	6	7	Most of the time
-----------------	---	---	---	---	---	---	---	------------------

19. When my child doesn't do what I ask...

I often let it go or end up doing it myself	1	2	3	4	5	6	7	I take some other action
---	---	---	---	---	---	---	---	--------------------------

20. When I give a fair threat or warning...

I often don't carry it out	1	2	3	4	5	6	7	I always do what I said
----------------------------	---	---	---	---	---	---	---	-------------------------

21. if saying "No" doesn't work...

I take some other kind of action	1	2	3	4	5	6	7	I offer my child something nice so he/she will behave
----------------------------------	---	---	---	---	---	---	---	---

22. When my child misbehaves...

I handle it without getting upset	1	2	3	4	5	6	7	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	1	2	3	4	5	6	7	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	1	2	3	4	5	6	7	I let it go that time
---	---	---	---	---	---	---	---	-----------------------

25. When my child misbehaves...

I rarely use bad language or curse	1	2	3	4	5	6	7	I almost always use bad language
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26. When I say my child can't do something...

I let my child do it anyway	1	2	3	4	5	6	7	I stick to what I said
-----------------------------	---	---	---	---	---	---	---	------------------------

27. When I have to handle a problem...

I tell my child I am sorry about it	1	2	3	4	5	6	7	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	1	2	3	4	5	6	7	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	1	2	3	4	5	6	7	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	1	2	3	4	5	6	7	I stick to what I said
-------------------------------------	---	---	---	---	---	---	---	------------------------

Appendix C: Alabama Parenting Questionnaire

The following are a number of statements about your family. Please read each one carefully and decide how often it has occurred in your home in the past 4 weeks. Select the number that represents your choice. It is very important that you refer only to the past **4 weeks**.

	Never	Almost never	Sometimes	Often	Always	N/A
1. You have a friendly talk with your child						
2. You let your child know when s/he is doing a good job						
3. You threaten to punish your child and then do not actually punish him/her						
4. You volunteer to help with special activities your child is involved in (such as sports, boy scouts, church youth groups)						
5. You reward or give something to your child for obeying you or behaving well						
6. Your child fails to leave a note or let you know where he is going						
7. You play games or do other fun things with your child						
8. Your child talks you out of being punished after he has done something wrong						
9. You ask your child about his/her day at school						
10. Your child stays out in the evening past the time he/she is supposed to be home						
11. You help your child with his/her homework						
12. You feel that getting your child to obey is more trouble than it's worth						
13. You compliment your child when s/he does something well						
14. You ask your child what his/her plans are for the coming day						
15. You drive your child to a special activity						

<p>16. You praise your child for behaving well</p> <p>17. Your child is out with friends you do not know</p> <p>18. You hug or kiss your child when s/he has done something well</p> <p>19. Your child goes out without a set time to be home</p> <p>20. You talk to your child about his/her friends</p> <p>21. Your child is out after dark without an adult with him/her</p> <p>22. You let your child out of a punishment early (like lift restrictions earlier than you originally said)</p> <p>23. Your child helps plan family activities</p> <p>24. You get so busy you forget where your child is and what s/he is doing</p> <p>25. Your child is not punished when s/he has done something wrong</p> <p>26. You attend PTA meetings, parent/teacher conferences, or other meetings at your child's school</p> <p>27. You tell your child that you like it when s/he helps out around the house</p> <p>28. You don't check that your child comes home at the time s/he was supposed to</p> <p>29. You don't tell your child where you are going</p> <p>30. Your child comes home from school more than an hour past the time s/he was supposed to</p> <p>31. The punishment you give your child depends on your mood</p> <p>32. Your child is at home without adult supervision</p>						
--	--	--	--	--	--	--

Appendix D: Challenging Child Behavior Scenarios

1. You just bought a kid-friendly alarm clock that your child wanted. You put the clock on the table and tell your child to take it to his/her room. After your child has gone to bed, you see that the clock is still on the table and that it is laying in a puddle of spilled juice.
2. You have to get to work for an important meeting. You prepare the usual breakfast for your child and tell him/her to come to the table to eat it. Your child shakes his/her head and says he/she wants something different.
3. : You are at home one afternoon with your family when you receive an important phone call. You tell your child, who is playing loudly, to quiet down for a few moments so you can take the call. Your child continues to play loudly so you have to postpone the call.
4. Your child is watching the last part of a TV show he/she has already seen. There is a program on another channel that you need to watch. When you ask your child to switch channels, he/she insists that he/she needs to see the ending of his/her program.
5. You and your child are at the grocery store and it's closing soon so you need to rush. You tell your child to stay in sight so you can finish shopping without having to look for him/her. Your child insists you play hide and seek and leaves to hide somewhere in the store.
6. It is a cold and rainy day. You have just picked up your child from school. When you get home, you tell your child to take off his/her muddy boots before going into the kitchen for a snack. However, your child runs in, leaving muddy footprints all over the floor.

After each scenario, mothers answered:

How upset would you be?

1-----2-----3-----4-----5-----6-----7
Not at all upset Very upset

How likely would you be to yell at your child?

1-----2-----3-----4-----5-----6-----7
Not at all likely Very likely

How likely would you be to correct or reprimand your child?

1-----2-----3-----4-----5-----6-----7
Not at all likely Very likely

How likely would you be to do nothing?

1-----2-----3-----4-----5-----6-----7
Not at all likely Very likely

How typical is this type of behavior for your child?

1-----2-----3-----4-----5-----6-----7
Not at all typical Very typical

Appendix E: Positive Child Behavior Scenarios

1. You are sitting in the living room one afternoon. Your child comes in with a large brown envelope with “mom” written on the front, and gives it to you. When you open the envelope, you see that it contains a card that your child has made for you.
2. You and your child are sitting in the living room. You are reading and your child is playing a game on the computer. You mention that the sun is shining in your eyes and your child gets up and pulls the curtain partway closed so the sun isn’t bothering you.
3. Your child has received a game that he/she really wanted as a birthday present. After dinner, you sit down to play the new game for the first time together in the family room. As you get started, your child offers to let you have the first turn.
4. You are in the kitchen unpacking groceries that you just brought home from the store. A can of food falls off the counter and rolls onto the floor under the table where your child is sitting. Your child crawls under the table to retrieve the can and places it back onto the counter.
5. You have a cold and, when you come home from work, you are tired and not feeling well. You lay down on the sofa and when your child comes in and says sorry that you aren’t feeling well. He/she gives you a hug and hands you his/her stuffed toy to hold for comfort.
6. Your child attended a friend’s party and got to take home a bag of candy. After the party, you and your child are walking home together. Your child opens the bag of candy, and before taking one, he/she holds the bag and offers one to you.

After each scenario, mothers answered:

How pleased/happy would you be?

1-----2-----3-----4-----5-----6-----7
Not at all pleased/happy Very pleased/happy

How likely would you be to offer your child a reward?

1-----2-----3-----4-----5-----6-----7
Not at all likely Very likely

How likely would you be to praise/compliment your child?

1-----2-----3-----4-----5-----6-----7
Not at all likely Very likely

How likely would you be to do nothing?

1-----2-----3-----4-----5-----6-----7
Not at all likely Very likely

How typical is this type of behavior for your child?

1-----2-----3-----4-----5-----6-----7
Not at all typical Very typical

Appendix F: International Cognitive Ability Resource Sample Test

Appendix F (ICAR sample test) has been removed due to copyright restrictions. It was a measure of cognitive ability across four domains.

Original source: Condon, D.M. & Revelle, W. (2014). The international cognitive ability resource: Development and initial validation of a public-domain measure. *Intelligence*, 43, 52-64. doi:10.1016/j.intell.2014.01.004

To request access to the ICAR sample test, please visit: <https://icar-project.com/>

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Appendix G: Chaos, Hubbub, and Order Scale

For each statement below, please assign a number between 1 and 4 to indicate how much each statement describes your home environment. Please use the following scale:

- 1 = Not at all like your own home
- 2 = A little bit like your own home
- 3 = Somewhat like your own home
- 4 = Very much like your own home

1. There is very little commotion in our home.
2. We can usually find things when we need them.
3. We almost always seem to be rushed.
4. We are usually able to stay on top of things.
5. No matter how hard we try, we always seem to be running late.
6. It's a real zoo in our home.
7. At home we can talk to each other without being interrupted.
8. There is often a fuss going on at our home.
9. No matter what our family plans, it usually doesn't seem to work out.
10. You can't hear yourself think in our home.
11. I often get drawn into other people's arguments at home.
12. Our home is a good place to relax.
13. The telephone takes up a lot of our time at home.
14. The atmosphere in our home is calm.
15. First thing in the day, we have a regular routine at home.

Appendix H: Big Five Aspect Scales

Here are a number of characteristics that may or may not describe you. For example, do you agree that you seldom feel blue, compared to most other people? Please fill in the number that best indicates the extent to which you agree or disagree with each statement listed below. Be as honest as possible, but rely on your initial feeling and do not think too much about each item.

Use the following scale:

1 ----- 2 ----- 3 ----- 4 ----- 5
Strongly Neither Agree Strongly
Disagree Nor Disagree Agree

Neuroticism

Get angry easily.

Get upset easily.

Change my mood a lot.

Am a person whose moods go up and down easily.

Get easily agitated.

Can be stirred up easily.

Rarely get irritated.

Keep my emotions under control.

Rarely lose my composure.

Am not easily annoyed.

Am filled with doubts about things.

Feel threatened easily.

Worry about things.

Am easily discouraged.

Become overwhelmed by events.

Am afraid of many things.

Seldom feel blue.

Feel comfortable with myself.

Rarely feel depressed.

Am not embarrassed easily.

Conscientiousness

Carry out my plans.

Finish what I start.

Get things done quickly.

Always know what I am doing.

Waste my time.

Find it difficult to get down to work.

Mess things up.

Don't put my mind on the task at hand.

Postpone decisions.

Am easily distracted.

Like order.

Keep things tidy.

Follow a schedule.

Want everything to be "just right."

See that rules are observed.

Want every detail taken care of.

Leave my belongings around.

Am not bothered by messy people.

Am not bothered by disorder.

Dislike routine.

Appendix I: Strengths and Difficulties Questionnaire

For each item, please mark the box for Not True, Somewhat True or Certainly True. It would help us if you answered all items as best you can even if you are not absolutely certain. Please give your answers on the basis of the child's behavior over the last six months or this school year.

	Not / True	Somewhat / True	Often True
Considerate of other people's feelings		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Restless, overactive, cannot stay still for long		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Often complains of headaches, stomach-aches or sickness		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Shares readily with other children, for example toys, treats, pencils		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Often loses temper		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Rather solitary, prefers to play alone		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Generally well behaved, usually does what adults request		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Many worries or often seems worried		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Helpful if someone is hurt, upset or feeling ill		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Constantly fidgeting or squirming		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Has at least one good friend		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Often fights with other children or bullies them		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Often unhappy, depressed or tearful		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Generally liked by other children		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Easily distracted, concentration wanders		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Nervous or clingy in new situations, easily loses confidence		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Kind to younger children		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Often lies or cheats		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Picked on or bullied by other children		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Often offers to help others (parents, teachers, other children)		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Thinks things out before acting		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Steals from home, school or elsewhere		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Gets along better with adults than with other children		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Many fears, easily scared		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Good attention span, sees work through to the end		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	