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Exploring the Influence of Parents' Beliefs and Behaviors on Children's Developing Executive Function

Ellen Litkowski

ACCEPTANCE

This dissertation, EXPLORING THE INFLUENCE OF PARENTS' BELIEFS AND BEHAVIORS ON CHILDREN'S DEVELOPING EXECUTIVE FUNCTION, by ELLEN LITKOWSKI, was prepared under the direction of the candidate's Dissertation Advisory Committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree, Doctor of Philosophy, in the College of Education and Human Development, Georgia State University.

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EXPLORING THE INFLUENCE OF PARENTS' BELIEFS AND BEHAVIORS ON CHIDLREN'S DEVELOPING EXECUTIVE FUNCTION

by

ELLEN LITKOWSKI

Under the Direction of Maggie Renken, Ph.D.

ABSTRACT

Executive function (EF) is a multi-component construct responsible for higher-order thinking abilities such as problem solving, goal-setting, and attentional flexibility (Jurado & Rosselli, 2007). Executive functions are associated with the prefrontal cortex, a region of the brain that undergoes substantial growth and modification from birth to age five. For young children, EF supports behavioral and social adjustment and is predictive of future academic achievement (Brock, Rimm-Kaufman, Nathanson & Grimm, 2007). The neurobiological components of EF have been extensively researched, but only recently have socio-environmental influences come to light. This ecological perspective may be of particular importance for children growing up in low-income households, who tend to demonstrate weaker performance on EF-related tasks (Hackman, Gallop, Evans & Farah, 2015). Parents and/or primary caregivers

serve as one vital component of children's early environments. Preliminary research investigating parent behaviors – such as scaffolding, stimulation, sensitivity/responsivity vs. hostility/rejection, and control – (as observed during specific tasks) affect the development of children's EF. The contributions of parents' knowledge about effective parenting and their self-reported behaviors, however, have not been explored. The current study investigated the independent influences of parents' behaviors, parenting knowledge, and involvement on young children's developing EF. A secondary aim of the study was to better understand and characterize parents' knowledge and beliefs. 52 parent-child dyads from three early childcare centers in the metro-Atlanta area participated in the study. Hierarchical regression analyses were used to determine the unique variance in children's EF accounted for by parent variables. Parents' use of non-reasoning, punitive strategies negatively contributed to children's inhibitory control and their good-natured/easygoingness positively contributed to their set-shifting abilities. Parents' knowledge about parenting practices did not significantly contribute to children's EF. Findings from this study inform existing research demonstrating an association between children's EF and parenting practices and provides new knowledge regarding normative and non-normative parenting knowledge and practices for the specific population.

INDEX WORDS: Executive function, Parenting, Hierarchical regression analysis, Pre-K

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1. INCOME-RELATED STRESS AND THE CAREGIVING ENVIRONMENT: RAMIFICATIONS FOR CHILDRENS' EXECUTIVE FUNCTION

The academic 'achievement gap' has plagued the United States' educational system for decades. Nationwide assessments consistently demonstrate that certain groups of students tend to outperform other groups of students. When evaluating these group differences in performance, children are often broadly categorized according to their race, ethnicity, gender, and/or socioeconomic status. While all educational disparities are cause for concern, the current review focuses primarily on differences in academic performance based on family income level. Children growing up in low-income households tend to perform at a lower level on math and literacy assessments than children growing up in higher-income households (Bradley & Corwyn, 2002; Fernald, Marchman & Weisleder, 2013). Although recent evidence indicates that education inequality is lessening (Reardon, Waldfogel & Bassok, 2016), there remains a great deal of progress to be made in supporting positive outcomes for children across the income spectrum.

Existing supports are generally found in the form of educational interventions – programs designed specifically to bolster the success of children in lower-income families. The majority of these interventions focus on domain-specific skills, such as math or reading. These skills are tested in statewide and national assessments, and students' test performance subsequently forms much of the basis for achievement gaps. It is possible, however, that targeting domain-specific skills provides only a superficial support for students most in need. Psychological and cognitive research emphasize that domain-general cognitive skills underlie many of these domain-specific academic skills. And in fact, group differences in performance also arise on cognitive

assessments of working memory, cognitive control, and spatial reasoning, among others (Noble, McCandliss & Farah, 2007; Obradović, Portilla & Boyce, 2012). One construct that has received a great deal of attention among researchers is executive function – a set of higher-order cognitive skills that broadly support goal-directed thought and action (Zelazo et al., 2003). When measured in young children, executive function is found to be predictive of children's later math and literacy abilities, as well as their social and emotional competencies (Blair & Razza, 2007). In line with the achievement gap, children growing up in lower-income households demonstrate lower performance on EF tasks (Fernald, Marchman & Weisleder, 2013; Fitzpatrick, McKinnon, Blair & Willoughby, 2014). In fact, the EF-disparity has been suggested as an underlying mechanism perpetuating the achievement gap (Fitzpatrick, McKinnon, Blair & Willoughby, 2014).

The current review is situated within the early education landscape that calls for more attention to be placed on executive function components. A recent report issued by the National Center for Education Research (NCER) entitled *Executive Function: Implications for Education* makes this call – detailing how parents, teachers, and educators should recognize the importance of supporting EF outcomes (Zelazo, Blair & Willoughby, 2016). While paying greater attention to EF has potential benefits for all students, it is particularly important for children who are growing up in lower-income households and are consequently at greater risk of falling behind in academic performance. It is necessary *but not sufficient* to nod to EF research by including EF components in early childcare frameworks. It is of utmost importance that we understand the mechanisms underlying the income-based gap in EF performance to better support children's long-term academic outcomes. For this reason, this review draws on neurobiology and social developmental science to understand how EF develops, specifically within the context of

poverty, while paying particular attention to the role of income-related stress in children's development. The experience of income-related stress may fundamentally alter the way in which the caregiving environment operates on EF. A greater understanding of the environmental influences on EF and an acknowledgement of its early malleability may provide insight into developing more effective EF interventions for children most in need.

Executive function

In the 1960s and 70s, Walter Mischel performed an experiment known as the Stanford Marshmallow Test. In this study, children ages three to five were asked to perform a simple delay of gratification test. Children were told that if they successfully waited to eat one marshmallow until the experimenter returned to the room they would be rewarded with an extra marshmallow. As expected, younger children were more likely to eat the first marshmallow, while older children were more likely to resist eating until the experimenter reentered the room. Perhaps more interestingly, findings from several follow-up studies showed that *resistors* were deemed "more competent" by their parents, and that children's ability to resist was correlated with higher SAT scores and better mental health outcomes (Mischel, Shoda & Rodriguez, 1989). Delay of gratification tests such as these necessitate the inhibition of a particular, desired behavior (e.g., eating a marshmallow), more generally drawing upon the broader ability to regulate one's own thoughts, behaviors, and actions. Two psychological constructs are often mentioned in discussions of individual's self-regulation – *effortful control* and *executive function*. Effortful control (EC) is associated with the interaction between temperament and behavioral regulation, whereas executive function focuses specifically on goal-directed cognitive processes. While there is certainly overlap between EC and EF (and some have argued for the merging of literature on the two (Liew, 2012; Zhou, Chen & Main, 2011)), this review focuses

specifically on executive function because of its strong association with early academic outcomes.

EF is generally conceptualized as having three primary components – set shifting, working memory, and inhibitory control. These components have similar but distinct definitions. Mental set shifting, also referred to as cognitive flexibility, allows for attention shifting between tasks or mental sets requiring different rules (Anderson, 2002; Jurado & Rosselli, 2007). Working memory is responsible for information manipulation – including the updating of past information and the incorporation and modification of incoming information (Miyake, Friedman, Emerson, Witzki, Howerter & Wager, 2000). Inhibitory control is the ability to suppress some dominant or prepotent response in favor of a particular goal (Zelazo et al., 2004). All three of these cognitive components are utilized when an individual is striving for a particular goal, the hallmark of all executive functions.

EF in general undergoes extensive growth between the ages of three and six, with a second period of sensitivity associated with neuroplasticity during adolescence (Steinberg, 2014). The developmental course of the individual components (set shifting, working memory, and inhibitory control) may vary (Carlson, 2005; Zelazo, 2004). As methods of measuring EF have improved, cross-sectional studies employing multiple confirmatory factor analyses demonstrate that the best fitting models may vary as a function of age (Miyake, Friedman, Emerson, Witzki, Howerter & Wager, 2000). For younger children, EF may be best represented as a unitary set of cognitive skills. According to the differentiation hypothesis, as children age, EF fractures into the discernable, independent components of set shifting, working memory, and inhibitory control (Miyake et al., 2000; Wiebe, Espy & Charak, 2008). Several more recent studies have found that even among preschool-age children a two-factor model of EF is present –

with inhibitory control and working memory functioning as distinct units (Gandolfi et al., 2014; Lerner & Lonigan, 2014). While the independence versus overlap of EF components is important to keep in mind, especially when interpreting results across different tasks and at different developmental stages, all EF-related skills appear to arise from the same general regions of the brain (Garon, Bryson & Smith, 2008).

Before delving into the neurological underpinnings of EF, it is important to situate the discussion within an early education framework. As research examining the impact of EF skills has expanded, early childcare centers have begun to incorporate EF components in their developmental milestones and school readiness frameworks. The Office of Head Start (OHS) defines school ready children as "possessing the skills, knowledge, and attitudes necessary for success in school and for later learning and life" (OHS: ECLKC, 2016). More specifically, in the Head Start Early Learning Outcomes Framework (2015) for preschool age students, executive function is situated within the "Approaches to Learning" domain, which includes emotional and behavioral self-regulation as well as cognitive self-regulation. Despite the inclusion of EF elements in the aforementioned school readiness frameworks, there remains an income-based gap both in academic and EF performance (Fernald, Marchman & Weisleder, 2013; Noble, McCandliss & Farah, 2007). In order to reduce this gap, we call for a shift in the focus of early interventions from domain-specific skills such as math and reading to the domain-general skills associated with executive function. The rationale for this shift draws upon extensive literature demonstrating an association between EF and school readiness – a literature that is briefly explored below.

The contribution of executive function to early school readiness

For many years, children were considered ready for school when they had acquired foundational math and reading skills. This definition has since expanded to acknowledge the influence of broader cognitive abilities on specific academic outcomes. Specifically regarding EF, research investigating math and reading has demonstrated a positive relation between EF and emergent math and literacy (Blair & Razza, 2007; Bull, Espy, Wiebe, Sheffield & Neslon, 2011; Clark, Pritchard & Woodward, 2010; Dilworth-Bart, 2012). Inhibitory control measured in preschool contributed to math ability in kindergarten (Blair & Razza, 2007), and predicted early arithmetic skills even after accounting for demographic variables such as maternal education (Espy, McDiarmid, Cwik, Stalets, Hamby & Senn, 2004). Children with lower inhibitory control often demonstrate poorer math skills. Additionally, working memory span contributed significantly to the variance in math ability even after controlling for variables such as reading ability and IQ (Bull & Scerif, 2001). With regard to early language skills, inhibitory control in kindergarten was found to be a significant predictor of children's phonemic awareness and letter knowledge (Blair and Razza, 2007). Overall, children with higher EF skills tend to benefit more from instruction, and subsequently have higher academic gains (Bierman, Nix, Greenberg, Blair & Domitrovich, 2008).

Changing early education policies and frameworks have emphasized that school readiness is dependent upon more than just academic performance (OHS: ECLKC, 2016; Scott-Little, Kagan & Frelow, 2006). In addition to emergent literacy and math skills, children's ability to regulate their attention, behavior, and their social and emotional understanding contributes to success in the classroom. For instance, children with higher behavioral regulation have been found to perform significantly better on emergent literacy and vocabulary measures (McClelland,

Cameron, Connor, Farris, Jewkes & Morrison, 2007). Greater fall-spring gains in behavioral regulation also predicted greater gains in their early literacy, math, and vocabulary (McClelland et al., 2007). Just as greater EF skills contribute positively to children's literacy and math abilities, EF skills also promote better attention and behavior regulation, as well as social emotional understanding (Riggs, Jahromi, Razza, Dilworth-Bart & Mueller, 2006). Additionally, EF skills contribute to academic achievement via learning-related behaviors, such as greater classroom participation and more involvement in learning-oriented social interactions (Nesbitt, Farran and Fuhs, 2015). Finding such as these indicate that, despite the ever-widening conceptualization of school readiness, EF clearly plays a vital role in all aspects of children's early school success.

Lower SES and minority status have been associated with both lower academic performance and lower EF performance (Hackman & Farah, 2009; Noble, McCandliss & Farah, 2007; Noble, Norman & Farah, 2004). In fact, Nesbitt, Baker-Ward and Willoughby (2013) found that both socioeconomic status and race indirectly influenced children's early math and literacy skills *by negatively impacting* their executive function. Conversely, it is possible that greater EF could protect against the challenges associated with poverty. For instance, young children who exhibit stronger EF skills can surmount some of the academic risks associated with growing up in poverty (Masten et al., 2012; Obradovic, 2010). Shifting the focus of early interventions away from supporting strictly academic skills to instead supporting children's EF might mitigate current academic achievement gaps. The current review argues for just such a shift in focus, as well as a reconceptualization of how EF interventions should be implemented.

There are two primary explanations for the association between SES and EF, stemming from two different literatures – neurobiology and social-developmental psychology. The current

review brings together these two interrelated explanations within the context of physiological stress. I argue that interventions targeting specific components of the caregiving environment might support EF both *directly*, by fostering the development of EF skills, and *indirectly* by lessening the experience of home stress. As such, the review will first provide an overview of how poverty-related physiological stress influences children's EF. I then briefly outline the state of current EF interventions, and provide preliminary recommendations for developing EF interventions that involve parents and caregivers.

Executive function and poverty

Poverty is pervasive across the United States. It affects both adults and children, but has incredible ramifications when children are exposed from a young age – specifically from infancy to the preschool years (Yeung, Linver & Brooks-Gunn, 2002). Approximately 43% of children under the age of 18 live in low-income families, and 21% live in a poor family (Jiang, Granja & Koball, 2017). Although policy makers and government officials have attempted to mitigate the prevalence and effects of poverty, the percentage of children living in low-income households has remained relatively stagnant over the past decade (Jiang, Granja & Koball, 2017; Smeeding, Rainwater & Burtles, 2001). High concentrations of wealth in certain areas have done little to assuage the persistent income disparity across the country. This difference in familial incomes has long been tied to the educational achievement gap. Despite an initial lessening of inequality, concerns regarding the ties between early achievement and family income level remain pervasive throughout the country.

The complexity of poverty stems in part from its many and broad definitions. Economists might specify poverty as purely an income-level dependent construct (Gershoff, Aber & Raver, 2005), but an ecological perspective emphasizes the broader social disadvantage experienced by

those in low-income households (Engle & Black, 2008). One oft-used subjective measure of poverty is the income-to-needs ratio, which refers to the amount of disposable income that is required in order to meet a family's basic needs. More explicit categorizations of poverty stem from the creation of the poverty line – through which families are considered to be living in poverty if their income registers below a specific amount for the number of individuals in the household. Following a more flexible definition, individuals and families can also fall under the category of 'relative poverty' if they have substantially less income than other individuals with similar characteristics (Engle & Black, 2008). Regardless of which definition applies to a particular family, the consequences of poverty are both varied and severe.

Poverty can be experienced in different ways; regional and environmental factors contribute to the way in which poverty affects families' well-being and children's development. Urban poverty is often associated with higher crime, weaker social support systems, and overcrowding. Living in rural poverty has risks as well – particularly in regard to access to appropriate healthcare (Amato & Zuo, 1992). In addition to differences pertaining to geography, poverty also differs in its temporal qualities. The duration (persistent vs. transient) and timing of poverty vary across regions and families, and differentially affect children's development (Wagmiller, Lennon, Kuang, Alberti & Aber, 2006). To capture the multidimensional nature of poverty, researchers rely on a variety of socioeconomic indices. Income, education level, and occupational status are three of the most oft-used of these indices (Conger & Donnellan, 2007) as falling below a threshold level of income, having achieved minimal education, or being unemployed may result in less social and financial capital, increasing the difficulty of day-to-day life.

The role of stress in EF development

Regardless of differences in families' experiences of living in lower-income households, this idea of persistent difficulty leads to a commonality among many impoverished families – a shared experience of individual and familial stress. Stress can accumulate from a number of poverty-related challenges, including reduced access to resources and healthcare, poorer nutrition, and crowded or more chaotic housing environments (Bradley & Corwyn, 2002). Excessive stress has been increasingly tied to negative, poverty-related outcomes. One potential mechanism for understanding the effects of poverty on a child's health and wellbeing is the principle of allostasis, or allostatic load. Allostatic load refers to the physiological consequences that accumulate after enduring periods of extensive stress (Blair, Raver, Granger, Mills-Koonce & Hibel, 2011). Stress responses are associated with the functioning of the hypothalamic-pituitary-adrenal (HPA) axis, which operates by regulating the levels of stress hormones, such as cortisol, circulating in the body (Blair et al., 2011). Cortisol levels, typically measured via quantities present in the saliva, normally fluctuate within a given range throughout the day. Under periods of normal regulation, acute stress can cause an adaptive spike in cortisol levels, enhancing the body's sympathetic nervous system response in an advantageous manner. Chronic stress can lead to elevated baseline levels of cortisol, which fundamentally alter the appropriate fluctuation of hormones circulating in the body (Blair et al., 2011). A significant amount of research has demonstrated that dysregulated stress hormones can contribute to poorer health outcomes, including increased likelihood of contracting diseases and impaired physical and mental health (Juster, McEwen & Lupien, 2010). Refocusing our lens on executive function, dysregulated stress hormone levels provide one explanation for the negative association between SES and EF. Examining the influence of hormones on physiology necessitates looking at

multiple methods of EF analysis. At the most microscopic level, EF can be assessed at the genomic and molecular level (Friedman, Miyake, Young, DeFries, Corley & Hewitt, 2008); our focus widens slightly to examine EF at the neuronal and brain level.

The development of EF proceeds in tandem with the development of the prefrontal cortex (PFC) (Anderson, 2002; Garon, Bryson & Smith, 2008). Localization in the PFC has both advantages and disadvantages that stem from the brain's neuroplasticity, or its ability to grow, prune, and restructure neuronal connections. The PFC remains relatively plastic during the first few years of life, with extensive neural network reorganization occurring during this time. Although this plasticity can be beneficial by allowing new connections to form, neurocognitive research has suggested that the two brain areas most susceptible to environmental influences are the perisylvian regions that support language processing and the prefrontal regions that support executive functioning (Noble, McCandliss & Farah, 2007). While positive experiences may result in advantageous neuronal growth and reorganization, stressful contexts may adversely affect brain development. Additionally, it is important to note that while EF skills are situated in the PFC, this area of the brain interconnects with other brain regions – most importantly subcortical regions such as the amygdala, necessary for the regulation of emotion and fear (Zelazo, Blair & Willoughby, 2016). The neural connections between these two regions have substantial implications for the impact that excessive environmental stress may have on an individual's EF skills. When an individual experiences stress overload even for a short period of time, their PFC may no longer be able to function properly. As a result of interconnectivity between the PFC and subcortical regions, when the functioning of the PFC is compromised an individual must process information with the amygdala instead. Thus, not only does an

individual experience reduced higher-order decision making skills, they may exhibit greater emotional, fearful, and reactive responses to a situation (Arnsten, 2009).

Following the U-shape curve often found in animal and adult studies of arousal and performance (Yerkes & Dodson, 1908), temporary exposure to stressful circumstances is often beneficial for performance, while excessive stress may lead to impairments (Marcovitch, Leigh, Calkins, Leerks & O'Brien, 2010). Specifically regarding EF, under a stressful environment, levels of neurotransmitters such as dopamine and norepinephrine may rise, suppressing the activity of the PFC and lowering the functioning of EF abilities. This impairment of self-regulation skills causes additional stress, which subsequently leads to a reduction in the ability to appropriately manage one's EF skills (Blair, 2010; Evans & Schamberg, 2009). Long-term exposure to a stressful environment may result in higher resting cortisol levels (Blair et al., 2011). Higher baseline levels and/or the lack of a regulated feedback loop may be maladaptive responses to extended periods of stress. Among preschool students, those who exhibited higher resting cortisol levels demonstrated poorer overall executive functioning (Wagner, Cepeda, Krieger, Maggi, D'Angiulli, Weinberg & Grunau, 2016), while children with appropriate up- and down-regulation of cortisol levels in response to stress performed better on EF measures (Blair, Granger & Razza, 2005). Persistent elevated cortisol levels may have lasting, detrimental effects on cognitive development, via a fundamental altering of brain structuring and integration (Blair, 2010).

Sweeping generalizations about the challenges facing those growing up in poverty are common. It is equally as important to recognize that children growing up in lower-income households are not all affected by their experiences in the same way. There is a great deal of variation among children growing up in low-SES households, such that many children achieve

average or above-average performance both academically and cognitively (Ayoub, O'Connor, Rappolt-Schilctmann, Vollotton, Raikes & Chazan-Cohen, 2009). Not only do the environmental components of poverty differ, but individuals' characteristics can alter the way in which their experiences are internalized. For instance, children's temperament and reactivity can alter their responses to stress (van Bakel & Riksen-Walraven, 2004), serving as a potential moderator between the risks associated with poverty and executive function (Raver, Blair & Willoughby, 2013). Prior work showed that, in adverse environments, children who were less biologically reactive tended to fare better – while higher-reactive children experienced greater challenges (Obradović, Bush, Stamperdahl, Adler, & Boyce, 2010; Skowron, Cipriano-Essel, Gatzke-Kopp, Teti & Ammerman, 2014). Accounting for the chronicity of poverty may further illuminate this association. While in environments of *low* chronic economic hardship, children with high temperamental reactivity scored better on measures of EF; under circumstances of *high* chronic economic hardship, children who had low temperamental reactivity scored better on those same EF measures (Raver, Blair & Willoughby, 2013). Additional research indicates that the high-reactivity associated with greater vulnerability to stressful environments may simultaneously be associated with greater adaptability and response when the environment is favorable (Ellis, Essex, & Boyce, 2005). Findings such as these support the idea of biological sensitivity to context; not all individuals experience adversity in the same way, and how susceptible a particular individual is to their environment should be considered when attempting to mitigate unfavorable circumstances (Belsky & Pluess, 2009; Obradović et al., 2010).

In general, however, poverty-related stress has a direct, negative impact on children's EF development. However, parents and caregivers also accrue physiological stress from living in a lower-income household. And in fact, parents who report higher-levels of stress in the home

have children with higher salivary cortisol levels and lower EF (Wagner et al., 2016). It is thus important to acknowledge the broader effects that poverty has on the caregiving environment, and subsequently investigate how poverty might indirectly influence children's EF development through these changes in the home environment.

The role of stress in the caregiving environment

The biological and physiological origins of executive function are well established. More recently, there has been a push to consider neurobiological research in tandem with work investigating the role of social interactions and environmental context on brain development (Carpendale & Lewis, 2006; Diamond, 2002; Fay-Stammbach, Hawes & Meredith, 2014; Miyake & Friedman, 2012). This is an intuitive merging, as experience-dependent brain maturation is critical during the first few years of a child's life, and neural connections develop in part as a reaction to and interaction with their early environment.

Urie Bronfenbrenner's ecological systems theory can be used to understand how the environment influences an individual's development. In Bronfenbrenner's model, represented by concentric circles surrounding the individual, social interactions comprise part of the microsystem – the circle of influence most proximal to the individual that includes peer, family, and school interactions (Bronfenbrenner, 1979). For the young child, perhaps the most important element within the microsystem is his or her parents and/or immediate caregivers. Although it has long been understood that parents shape their children's development, specific ramifications regarding executive function have only recently been explored. To that effect, parents' behaviors such as responsivity, sensitivity, control, and autonomy support have been found to influence children's EF development (Bernier, Carlson, Deschênes & Matte-Gagne, 2012; Bernier, Carlson & Whipple, 2000; Towe-Goodman, Willoughby, Blair, Gustafsson, Mills-Koonce & Cox, 2014).

Research has implicated that poverty might perpetuate chronic stress by influencing the caregiving environment. This idea has been explored in the social causation model, which states that social conditions of living in poverty contribute to changes in social, academic, *and* cognitive functioning (Conger & Donnellan, 2007). Under the umbrella of social causation, there are two primary mechanisms – the family investment model and the family stress model – by which socioeconomic status and the experience of economic hardship can affect a family, and subsequently, a child's development (see my interpretation of these two models with regard to executive function in Figure 1).

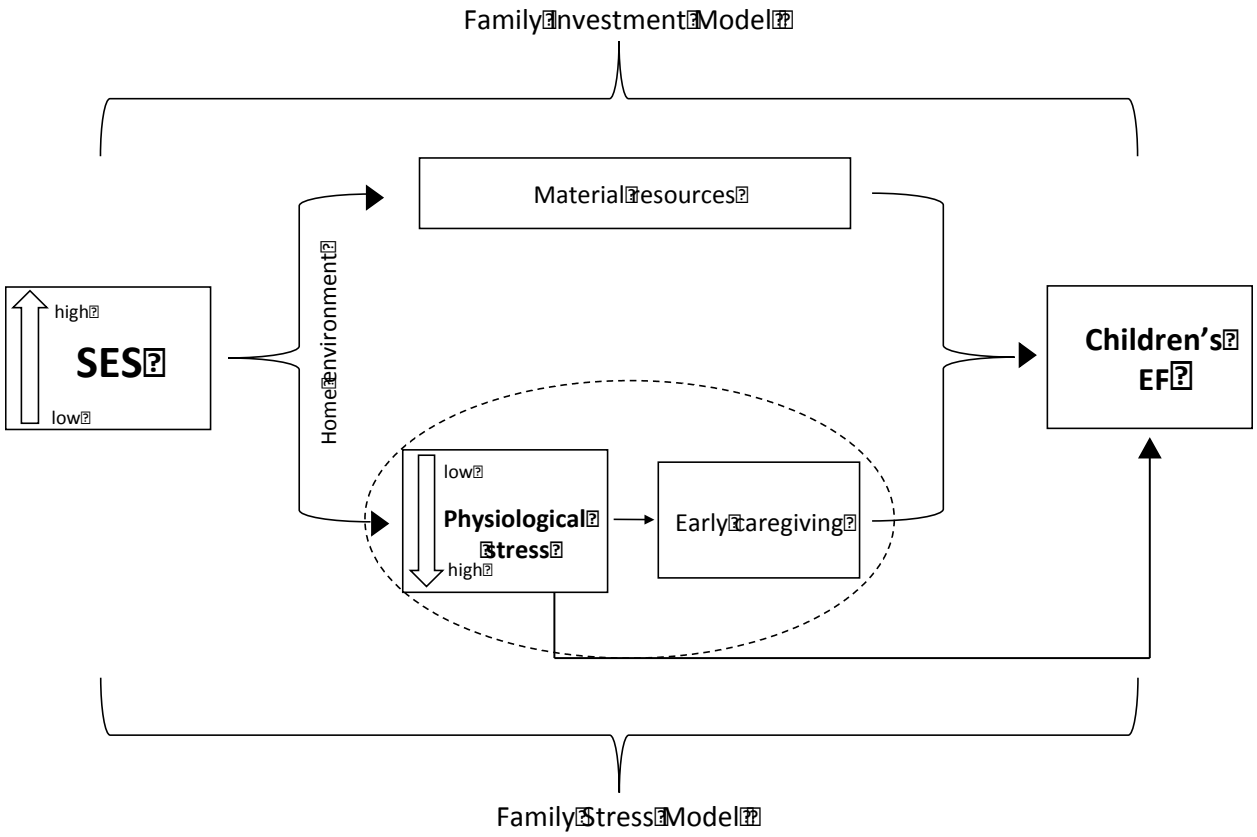

Figure 1. **Contributions of the family investment model and the family stress model to children's EF.**

The family investment model focuses on the material resources provided for a child within the home. When parents have less dispensable income to invest in resources (e.g., books, toys), their children may experience less cognitive stimulation within the home environment (Engle & Black, 2008). In addition to materials within the home, children in lower-SES households may have fewer opportunities for experiential learning through visiting museums or taking trips (Bradley & Corwyn, 2002). The family stress model argues that parents who have to cope with possessing fewer financial resources have greater stress levels than those who do not face the same monetary demands (Yeung, Linver & Brooks-Gunn, 2002). These heightened stress levels can impact parents' emotional well-being and subsequently alter interactions with their child. For instance, parents' responsivity and sensitivity to children's needs may be lower and they may use harsh and controlling parenting strategies rather than promoting their child's autonomy (Engle & Black, 2008). In one study examining the impact of cumulative risk on parenting, a greater number of risk factors (regarding marital status, highest education degree, the number of children in the household, annual household income, and maternal age at child birth) in a parent's environment negatively impacted the quality of parenting. In this case, parenting under excessive cumulative risk involved higher levels of negative-intrusiveness and lower levels of sensitivity (Holochwost et al., 2016). Moreover, fewer prototypical instances of supportive parenting (e.g., sensitivity, positive regard, animation, and stimulation) may occur in households with incomes below the poverty line (Blair et al., 2011). When stress levels have been assessed in parents, levels of cortisol have been found to be inversely related to positive parenting behaviors (Blair et al., 2011).

The two sociological models illustrate the idea that the caregiving environment is made up of two primary components – the tangible material resources that are present within the home

as well as the psychosocial climate (Sarsour, Sheridan, Jutte, Nuru-Jeter, Hinshaw & Boyce, 2011). Both of these models are supported by empirical evidence (Hackman, Gallop, Evans & Farah, 2015; Sarsour et al., 2011), and an interactionist model incorporating both perspectives has been proposed (Conger & Donnellan, 2007). When considering the development of scalable interventions, however, targeting the family stress model may provide a more feasible, cost-effective, and lasting way to support families in need than supplementing material resources. Intervening at the component-level of the family stress model provides an opportunity for targeting and promoting parents' positive caregiving behaviors in order to bolster their children's developing EF.

Further exploring the family stress model and its implications for children's EF, recent research has proposed that the early caregiving environment may serve as a mediating mechanism through which poverty-related stress operates on executive function (Blair et al., 2011). This mediational model was supported when examining families with multiple risk factor profiles; parenting behaviors were found to partially mediate the association between socioeconomic risk and EF skills (Rhoades, Greenberg, Lanza & Blair, 2011). Additional work in the same vein found that parental warmth and responsiveness measured in the preschool years mediated the relation between risk assessed in infancy and prekindergarten levels of academic performance (Mistry, Benner, Biesanz, Clark & Howes, 2010), and that maternal sensitivity mediated SES disparities in children's attention, planning, and working memory (Hackman & Farah, 2009). With recent research focusing on the specific influences of caregiving behaviors on children's EF (Bernier, Carlson, Deschênes & Matte-Gagne, 2012; Cuevas et al., 2014; Roskam, Stievenart, Meunier & Noel, 2014), we call for that same focus and rationale to be acknowledged by and incorporated into EF intervention work.

Where are parents in current executive function interventions?

Executive function interventions have been implemented in a variety of settings and at a variety of ages, but primarily without the assistance of the child's parent or caregiver. EF interventions are often referred to as "trainings," requiring repeated exposure to the same or similar tasks. Theory supports this rationale – that in addition to EF being biologically and neurologically dependent, it is also experience dependent (Zelazo & Carlson, 2012). Just as children's daily environment shapes EF development, so might their encounters with particular activities. Children's successive experiences with a particular EF task might thus improve their task performance. Training tasks typically adjust in difficulty based on the child's prior success or failure, thus scaffolding their learning. Although positive effects from EF interventions are highly desirable, results from a variety of studies have not been consistent. Some research findings purport successful change (Diamond & Lee, 2011; Holmes, Gathercole & Dunning, 2009), others do not (Rueda, Posner & Rothbart, 2005). Challenges facing EF interventions include the lasting effect of any potential benefits, as well as the transferability of particular gains. For instance, training may improve one executive function skill, but not others (Kloo & Perner, 2003; Thorell, Lindqvist, Bergman Nutley, Bohlin & Klinbergh, 2009).

Although computerized programs and games are particularly popular mechanisms for training, most studies using computer games to improve components of EF – specifically inhibitory control – have been relatively unsuccessful (Diamond & Lee, 2011; Rueda et al., 2005; Thorell, Lindqvist, Bergman Nutley, Bohlin & Klingberg, 2009). While computerized trainings seem to provide little to no improvement in children's inhibitory control, experimenter-child and classroom-based research has proven different. In some non-computerized training tasks and educational curricula, the experimenter or teacher gave explicit feedback to the child

about his or her performance (Barnett et al., 2008; Dowsett & Livesey, 2000). In such studies, results indicated that practice and training enhanced children's inhibitory control. If such brief social interactions and tasks could improve EF performance (where computerized programs did not), parents' interactions, which are both more familiar and abundant than experimenter-child interactions, have great potential for impacting their children's EF.

Despite this potential, there is a relative lack of parent involvement in EF interventions. Computerized training games entirely lack a social component. Although some interventions have taken place in the classroom (Domitrovich, Cortes & Greenberg, 2007), with targeted instructions for teachers' interactions with students, parents are seldom required to participate in the intervention itself. This is in spite of the recent literature implicating specific parent behaviors as critical for fostering children's EF. For instance, parents' scaffolding, their offering verbal or non-verbal support, questions or strategies during a particular task, has been found to support children's EF development (Hughes & Ensor, 2009). As parents scaffold, they provide their child with specific language skills necessary for the promotion of self-regulation and problem solving. Studies investigating the impact of parent scaffolding on children's EF have focused on promoting this verbal input, specifically during problem-solving tasks (Hammond, Müller, Carpendale, Bibok & Liebermann-Finestone, 2012; Landry, Miller-Loncar, Smith & Swank, 2002). Despite findings suggesting the role of parents' behaviors in supporting children's EF, there are no established interventions that aim to support children's EF by supporting these positive parenting behaviors. Additionally, no EF interventions have been developed with the explicit purpose of mitigating the income-based achievement gap.

Conclusion and future directions

As this review has iterated, supporting children's EF might have particularly strong ramifications for children growing up in low-income households – supporting their cognitive development, and subsequently their academic outcomes. Although components of EF have been incorporated into school readiness frameworks and early assessments, few effective interventions have yet been developed that promote children's EF. I believe that the family stress model of poverty should be better acknowledged as new interventions are developed. More specifically, parents and caregivers should be incorporated as primary agents of implementation. Interventions that target the caregiving environment might benefit children's EF in a twofold fashion. Programs that encourage parents' positive behaviors (specifically targeting responsivity, sensitivity, control, and autonomy support) might directly bolster children's EF skills and indirectly enhance EF through a reduction of parents' perceived stress (see Figure 2).

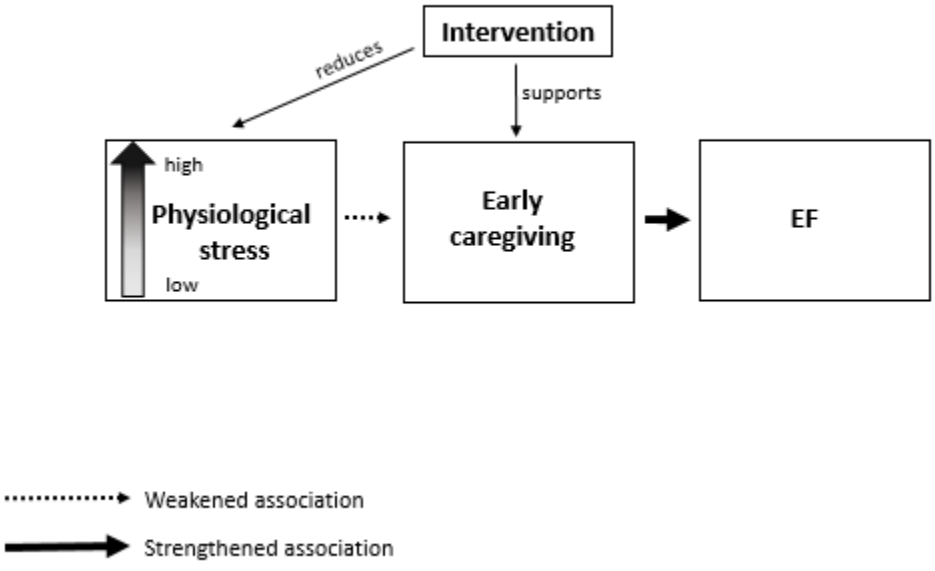

Figure 2. **Possible dual benefits of an intervention targeting parents' caregiving behaviors.**

Parents in low-income households often report lower self-efficacy and confidence regarding their parenting techniques and a substantial portion of the variance in parenting stress can be attributed to parents' self-efficacy and overall family risk (Raikes & Thompson, 2005). Interventions that provide support for positive parent-child interactions may have a subsidiary benefit of lessening parents' stress regarding caregiving itself. With such possible benefits for children's developing EF, we might ultimately make great strides in further reducing the achievement gap and supporting positive outcomes for children across the country.

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2. EXPLORING THE INFLUENCE OF PARENTS' BELIEFS AND BEHAVIORS ON CHILDREN'S DEVELOPING EXECUTIVE FUNCTION

Executive function (EF) is a multi-component construct responsible for higher-order thinking abilities such as problem solving, goal-setting, and attentional flexibility (Anderson, 2002; Jurado & Rosselli, 2007). For young children, EF supports academic outcomes, including math and literacy performance, behavioral and social adjustment, and is generally predictive of future academic achievement (Brock, Rimm-Kaufman, Nathanson & Grimm, 2009). EF abilities are located in the prefrontal cortex of the brain, which undergoes relatively protracted maturation during the first few years of life. The neurobiological components of EF are well understood, but only recently have socio-environmental influences come to light. Taking this ecological perspective may be of particular importance for children growing up in low-income households, who tend to demonstrate weaker performance on EF-related tasks (Hackman, Gallop, Evans & Farah, 2015). EF's biological origins support the notion of environmental vulnerability. Greater neuroplasticity, the formation and pruning of new and old connections in the brain, during the first few years of a child life's, means that young children's brains are particularly susceptible to environmental factors.

A child's parents and/or primary caregivers are a critical component of the early environment. Research on parenting has a lengthy history, in which multiple aspects of parenting – including styles and practices, goals, and beliefs – have been investigated. Parenting style and the behaviors used in the home impact children's language, temperament, self-regulation, social-emotional, and cognitive development (Carlson & Harwood, 2003). Parents' goals provide insight into what developmental outcomes they hope to foster in their children, and their beliefs reflect how they view the course of child development and child rearing (Hoff, Laursen &

Tardif, 2002). Parents' characteristics shape the quality of the caregiving environment, which subsequently affects the development of the prefrontal cortex (Lucassen et al., 2015). Although the importance of parenting on children's development has long been recognized, the specific influence of parents on children's developing executive function has only recently been explored. This is in spite of the fact that a primary goal of parents is to move from providing external regulation for their young child to allowing them to self-regulate – a goal shared by the components of executive function (Bernier, Carlson & Whipple, 2010).

Parents' behaviors and children's EF

Preliminary research indicates that parents' general impact on EF occurs via four primary avenues – scaffolding (or autonomy support), sensitivity/responsiveness, control, and stimulation (Fay-Stammbach, Hawes & Meredith, 2014; Landry & Smith, 2010; O'Connor, 2002). Scaffolding is a common method for providing autonomy support, and has been the most extensively studied contributor to children's EF (Bibok, Carpendale & Muller, 2009; Hughes & Ensor, 2009). Parents can scaffold children's behaviors by offering verbal or non-verbal feedback during a particular activity. Rather than directing the child to perform a particular behavior in the present moment, parents scaffold by promoting future-oriented thinking about a specific problem. In doing so, parents can redirect attention or provide praise and elaboration during a task (Hammond, Müller, Carpendale, Bibok & Liebermann-Finestone, 2012; Hughes & Ensor, 2009; Landry, Miller-Loncar, Smith & Swank, 2002). Research indicates that autonomy support is a strong predictor of children's EF at multiple age-related time points (Meuwissen & Carlson, 2015), even when controlling for cognitive ability and maternal education (Bernier, Carlson & Whipple, 2010).

A parent's sensitivity, often dichotomized as harsh or warm parenting, is characterized by his or her ability to respond in an appropriate and timely manner to their child (Wolff & Ijzendoorn, 1997). Parents who demonstrate sensitivity are aware of their children's needs and exhibit emotionally appropriate, contingent responses to their children's actions. Maternal and paternal sensitivity, as measured during free play at 24 months, independently contributed to children's EF at 3 years (Towe-Goodman, Willoughby, Blair, Gustafsson, Mills-Koonce & Cox, 2014), and lower maternal sensitivity was associated with lower scores for children's inhibition and self-control (Lucassen et al., 2015). Parents' responsiveness during parent-child free play sessions was significantly positively related to children's inhibitory control measured three months later (Merz et al., 2015).

Parents' control is often divided into supportive behaviors and negative controlling behaviors. Supportive behaviors include warmth and involvement, while negative controlling behaviors include coercion, inconsistent responses to a child's needs, or excessive punishment. High levels of inconsistency and controlling behaviors negatively affect the development of children's inhibition (Roskam, Stievenart, Meunier & Noel, 2014) and excessive intrusiveness contributes to the variance in children's composite EF scores (Cuevas, Deater-Deckard, Kim-Spoon, Watson, Morasch & Bell. 2014). Fathers' control, as measured by providing too much support on a particular task, significantly negatively predicted children's EF (Meuwissen & Carlson, 2015). When control was quantified by parents' management language, direction language (e.g., "I want you to help me with this, okay?" or "Put the plate on the table.") was negatively associated with children's EF, while suggestion language (e.g., "Do you want to start cleaning up?") was positively related to children's EF at 3 years of age (Bindman, Hindman, Bowles & Morrison, 2013; Merz et al., 2015).

Perhaps the broadest assessed contributor to children's EF is stimulation – a characteristic associated with the overall home environment. Parents who provide a stimulating environment offer their children a home space that fosters exploring and engaging in diverse learning opportunities. Elements of children's home environment, such as enrichment activities, are predictive of components of EF including inhibitory control and working memory (Sarsour, Sherida, Jutte, Nuru-Jeter, Hinshaw & Boyce, 2011). While home-environment quality has been significantly correlated with EF in many studies, results regarding its contribution to individual variance (after accounting for factors like verbal ability and SES) have been mixed (Dilworth-Bart, 2012; Hackman et al., 2015).

Most studies investigating parents' influence on their child's EF involve observations of parent-child dyads and ratings of their behaviors during specific activities (e.g., free play, puzzle solving tasks). Research using observational tasks of parent-child dyads may provide context-dependent results, as short, free-play tasks take place in relatively stress-free environments that may not provide opportunities for all types of interactions (Cuevas, Deater-Deckard, Kim-Spoon, Watson, Morasch & Bell, 2014). Although parent-report measures can be influenced by social desirability bias, such measures may provide a more holistic view of parents' day-to-day attitudes and behaviors. Surveys of parenting styles, such as the Parenting Practices Questionnaire (Robinson, Mandaleco, Olsen & Hart, 1995), have demonstrated associations with behavioral, psychological, and relational characteristics (Olivari, Tagliabue, Confalonieri, 2013). More importantly, understanding parents' perceptions of their own knowledge and behaviors is vital when working with diverse populations. Parents' characteristics (e.g., ethnicity, income level, education, gender) may influence the effect their behaviors have on their child's EF and may impact their views about parenting. For instance, maternal and paternal behaviors have been

found to have different effects on children's EF (Baptista et al., 2016; Meuwissen & Englund, 2016; Roskam, Stievenart, Meunier & Noel, 2014), perhaps stemming from mothers' and fathers' different conceptualizations about their role in the parenting process. Nuances such as these indicate that parents' underlying beliefs and knowledge about child development – not solely their behaviors – may be important to consider when examining children's EF.

Parents' beliefs and knowledge about effective parenting

Parents' conceptions of child development include their principles of childrearing, understanding of developmental norms and milestones, knowledge of children's health and safety, and processes of child development (Benasich & Brooks-Gunn, 1996; Huang, Caughy, Genevro & Miller, 2005). Mothers' beliefs about child development influence how they interact with their children – in terms of both style of play and speech – and impact expectations of their child's growth and behavior. Prior work indicates that parents who score higher on assessments of child development knowledge tend to interact more sensitively with their children and provide a more appropriate learning environment (Huang, Caughy, Genevro & Miller, 2005).

Beliefs about parenting and child development, however, are not universal. One contributing factor to parents' beliefs and knowledge about child development is the family's socioeconomic status. When middle-class developmental standards are held as the norm, parents in lower-SES households tend to demonstrate lower levels of knowledge – perhaps because knowledge of changing developmental theories is more accessible to families of higher-SES. Often closely tied with income, parents' education level may affect their knowledge of child development. Parents with higher educational attainment generally have a better understanding of when children should acquire certain skills or develop certain behaviors (Bornstein, Hahn, &

Haynes, 2011; Williams, Williams, Lopez, & Tayko, 2000). No research yet indicates whether perceived knowledge of effective parenting influences children's cognitive development.

I reference knowledge above as *perceived* because culture and subculture influence parents' beliefs about child development. Cross-cultural studies indicate that parents' attributions and attitudes about caregiving differ across country (Bornstein, Putnick & Lansford, 2011). Even among Western countries, there appear to be noticeable differences regarding maternal knowledge and beliefs about child development, primarily across minority and immigrant populations (Huang et al., 2005; Kolobe, 2004). Among Caucasian, African-American, and Hispanic mothers, maternal ethnicity explains part of the association between parent knowledge and parent behavior. Contrary to expectations, for both Hispanic and African American mothers, higher accuracy in child development knowledge was negatively related to positive maternal behaviors during a teaching task (Huang et al., 2005). Positive maternal behaviors may stem from beliefs in the importance of other factors either not assessed in typical child development inventories or not viewed as correct and/or positive. For example, Latino families often have high parental expectations that lead to greater parental control and discipline – childrearing practices that are not always well regarded within Euro-American traditions, but that are supported by Latino parents' strong family ties and their desire to instill respect and moral values (Halgunseth, Ispa & Rudy, 2006).

Cultural differences in parents' knowledge and beliefs about child development may be particularly important when considering the effect of parents' behaviors on children's EF development. Although many studies neglect to consider ethnicity, one study accounting for its effect demonstrated that while maternal sensitivity predicted higher levels of EF only among European American participants, higher levels of negative intrusiveness predicted lower levels of

EF only among African American participants (Holochwost et al., 2016). Apart from a few studies, much of the research investigating the effect of parents' behaviors on children's EF has focused primarily on middle-class, Caucasian families. Research examining possible risk factors for children's cognitive outcomes has found that some factors, such as maternal employment, do not function in the same manner among different types of families. For instance, while mothers' employment during their child's first year of life negatively impacted children's outcomes for Caucasian families, this association did not hold true for African American or Hispanic families (Berger, Brooks-Gunn, Paxson & Waldfogel, 2008). Another potential risk factor, single parenthood, was negatively associated with children's academic and behavioral outcomes for Caucasian families, but there was no association for African American families (Dunifon, Kowaleski-Jones, 2002). Findings such as these demonstrate that the intricacies of family's interactions are likely culturally specific (Hughes & Ensor, 2009). As work investigating parents' influence on children's EF continues, research investigating the effect of parents' *behaviors* should be expanded to a more diverse population. Additionally, parents' *beliefs and knowledge* should be considered as a possible contributor to children's EF development.

The current study

The current study takes a holistic view of the caregiving environment by considering parents' contributions to their children's cognitive development both in terms of their knowledge and beliefs about child development *and* their parenting behaviors and practices. The primary study aim was to understand whether parents' knowledge and beliefs (specifically regarding child rearing and child development) and parenting practices influence their children's developing EF as assessed during children's pre-Kindergarten year in school. The study expands prior research investigating parents' influence on EF by accounting for these two parenting

components specifically within a predominantly African American sample. The expectation was that both parents' knowledge and practices would uniquely contribute to children's developing EF. More specifically, and based on prior research findings, I hypothesize that greater knowledge of effective parenting would positively contribute to EF, whereas lower knowledge of effective parenting and child development and parents' behaviors associated with negative intrusiveness and control would negatively contribute to EF. In this study, self-report questionnaires were used to assess parents' knowledge and beliefs. As a secondary study aim, I hoped to examine culturally specific parenting beliefs and practices through general trends in survey responses.

Methods

Participants

Participants were 54 parent-child dyads. Two parents reported that they were not the child's primary caregiver and were removed from further analyses (n = 52 dyads). All children and parents were recruited from pre-K classrooms in three early childcare centers in a large urban area in the Southeast. The early childcare centers are part of a larger, nonprofit childhood education program that serves over 3,600 children, ranging from infancy through pre-K, across thirteen sites. According to parents' self-reported ethnicities, 85% were African American, 6% were Caucasian, 2% were Latino, 4% were Multi-racial, and 4% preferred not to answer. 50 parent participants were female, one parent participant was male, and one parent participant chose not to report gender. Parents' education level was varied – 6% reported having a 12th grade or lower education, 6% graduated high school or equivalent, 38% completed some college but earned no degree, 13% earned an Associate degree, 17% earned a Bachelor's degree, and 17% completed a post-graduate degree. Additional parent demographics are reported in Table 1.

Table 1

Demographic characteristics of parents

	n	*%*
Gender		
Female	51	96.2%
Male	1	1.9%
Ethnicity		
Black/African American	44	83.0%
Caucasian	3	5.7%
Hispanic	1	1.9%
Other/Multi-Racial	2	3.8%
Prefer not to answer	2	3.8%
Marital status		
Single, never married	26	49.1%
Married or domestic partnership	19	35.8%
Widowed	1	1.9%
Divorced	4	7.5%
Separated	2	3.8%
Parent education level		
12th grade or less	3	5.7%
Graduated high school or equivalent	3	5.7%
Some college, no degree	20	37.7%
Associate degree	7	13.2%
Bachelor's degree	9	17.0%
Post-graduate degree	9	17.0%
Annual household income		
$0 – 14,999	9	15.1%
$15,000 - 34,999	16	30.2%
$35,000 - 49,999	12	22.6%
$50,000 – 64,999	6	11.3%
$65,000 - 74,999	1	1.9%
$75,000 - $99,999	3	5.7%
$100,000 or more	3	5.7%
Total # of people in the household		
2	8	15.1%
3	6	11.3%
4	14	26.4%
5	11	20.8%
6	8	15.1%
7 or more	5	9.4%

Although all children were recruited from pre-K classrooms, children's age ranged from 3 to 6 years (M = 4.43, SD = .61). 59% of the child participants were female.

Procedure

IRB approval was obtained from Georgia State University prior to recruitment or data collection. All procedures adhered to the standards of the IRB. Two centers had five pre-K classrooms, and one center had two pre-K classrooms. Recruitment took place in all possible pre-K classrooms. In the first wave of recruitment, consent forms and informational handouts were sent home with children to be signed by the parent and returned to their classroom teacher. Recruitment materials indicated that in order to participate, parents had to be willing both for their child to complete assessments administered by a researcher *and* to complete several surveys about their own views and practices. After parents returned a signed consent form, the survey materials were placed in their child's mailbox to be completed at home and returned to the child's teacher. As initial recruitment numbers were low, the researcher began to recruit participants during children's morning drop-off time. If recruited in this manner, participants returned the signed consent form to the researcher, and were immediately given the survey packet to take home and complete.

Children completed three measures, each targeting one of the primary domains of emergent executive function, including (1) inhibitory control (the Day/Night Stroop task), (2) working memory (the Digit Span task), and (3) set shifting (the Dimensional Change Cart Sort task). For the assessment, children were escorted from their classroom to a quiet, public location. Prior to their participation, children were informed about the study procedure and asked to verbally give their assent to take part in the research project. Children were told that they could stop participating at any time. Due to the brevity of each measure, all measures were administered at

one time point. Task ordering was randomized across all participants. For example, one child might receive (1) Digit Span task, (2) Day-Night Stroop task, (3) Dimensional Change Card Sort task, while another student might receive (1) Day-Night Stroop task, (2) Dimensional Change Card Sort task, (3) Digit Span task. Presenting tasks to children in a randomized fashion prevented an ordering effect biasing the results. Participation lasted approximately ten to fifteen minutes.

Survey materials for the parents included three questionnaires regarding their (1) knowledge about effective parenting (the Knowledge of Effective Parenting Scale (KEPS), (2) parenting behaviors (the Parenting Practices Questionnaire (PPQ), and (3) demographics and parent involvement. Order of survey administration within each packet was randomized across participants, with the demographics and involvement survey always included last. Both the KEPS and the PPQ were administered in two forms in which presentation of the items was reversed. Completion of the survey materials took approximately 25 minutes.

Measures

Working memory task

Working memory was assessed using a digit span task. Digit span tasks are a commonly used method of measuring working memory, with prior test-retest reliability of .68 among 4 and 5 year olds (Gathercole, 1995). Children listened to a series of numbers and were asked to repeat the numbers in the same order. Prior to the first trial, children were given the opportunity to practice with a two-number series. If the child incorrectly repeated the numbers, they were corrected and asked to repeat them again. After completing this practice trial, children were not given feedback for the remainder of the task. The first set of trials consisted of a series of only 2 numbers. Four trials were given at each series length. If the child correctly repeated 3 trials out

of the 4, the series length was increased by one. No trial exceeded seven digits (Rasmussen & Bisanz, 2005). Score on the digit span task consisted of the number of trials correctly recalled. Task protocol is included in Appendix A.

Inhibitory control task

Inhibitory control was assessed using the Day-Night Stroop task (Gerstadt, Hong & Diamond, 1994). Children were shown a set of cards with two different designs – a black card with a picture of the moon and stars, and a white card with a picture of the sun. For 'moon' cards, children were told that they should respond by saying 'day', and for 'sun' cards, children were told that they should respond by saying 'night'. Following these instructions, children were given two practice trials – one of each card type. If children gave an inaccurate response, the researcher corrected the child. Following these initial practice trials, no feedback was given for the remainder of the task. Children were shown sixteen cards, and received zero points for an incorrect response and one point for a correct response (McClelland, Cameron, Connor, Farris, Jewkes & Morrison, 2007). Task protocol is included in Appendix B.

Set shifting task

The Standard Dimensional Change Card Sort (DCCS) task was used to assess set shifting ability (Zelazo et al., 2003). This task evaluates children's ability to flexibly shift attention and inhibit other responses. The task requires students to hold two rules in mind and to switch between them by inhibiting one or the other. Students were given two boxes (one affixed with a blue rabbit and one with a red boat) and a set of task cards (blue boats and red rabbits). Students were asked to play the "color game," in which they sorted the cards into the boxes according to their colors (the preswitch phase). If children successfully completed at least 5 out of the 6 preswitch trials, they were asked to play a second game with incompatible rules to the first (the

postswitch phase). The "shape game" requires sorting the cards based on their shape, and disregarding the previously attended to color. Students completed six postswitch trials. If students were able to correctly sort at least 5 cards on the postswitch phase, they moved on to the next trial phase. In this final round, children were given some cards with black borders and some without. They were told that if the card has a border, they should sort according to its color, and if the card does not have a border, they should sort according to shape (Thompson, Lengua, Zalewski & Moran, 2013). This rule was repeated between each card distribution. There were 12 total trials for the border phase. The task was administered according to Zelazo's protocol, which includes both verbatim instructions and appropriate responses to potential child questions (Zelazo, 2006). Score on the DCCS was the number of cards correctly sorted out of the 24 possible total trials.

Knowledge of effective parenting

The Knowledge of Effective Parenting Scale (KEPS) was used to measure parents' knowledge of parenting principles across four dimensions: (1) promotion of development, (2) principles of effective parenting, (3) use of assertive discipline, and (4) causes of behavior problems. The KEPS has been used in several public health related studies of the Triple P-Positive Parenting Program – and has shown test-retest reliability (r = .70) and internal consistency (α = .73) (Winter, Morawska & Sanders, 2012). The KEPS includes 28 multiple-choice questions. Due to incidental error, only 27 items were included in the measure for the current study. The question stem for the missing item (Item 21) was "A father wants his children to come to the dinner table. What should he say?". Each question has four answer choices, one of which is considered correct. Correct responses receive one point, while incorrect or missing responses receive zero points. Appendix C lists the items in the KEPS.

Assessment of parent behaviors

The Parenting Practices Questionnaire (PPQ) was used to assess parents' behaviors by examining the style of their reaction to specific interactions with their child (Robinson, Mandleco, Frost, Olson & Hart, 1995). The PPQ contains 62 questions that fall into three groups aligned with parenting style (authoritative, authoritarian, and permissive). Each parenting style is further broken down into component factors, such that the PPQ aligns with eleven specific parenting behaviors. Parents rated their own behaviors on a 5-point Likert scale, according to how often they would use a certain strategy. For example, "I give comfort and understanding when my child is upset." with responses ranging from 1 – *never* to 5 – *always* (Winter, Morawska & Sanders, 2012). Variations of the PPQ have been used in many studies, and it has satisfactory internal consistency ($\alpha = .71$) (Olivari, Tagliabue & Confalonieri, 2013; Winter, Morawska & Sanders, 2012). Appendix D lists the items contained in the PPQ.

Background and parent involvement.

In addition to basic demographic information collected from parents, regarding their (1) household income, (2) highest level of education attained, (3) ethnicity, (4) number of people in the household, parents also responded to a series of questions quantifying involvement with their children on a daily basis (Cabrera, Fagan & Farrie, 2008; Meuwissen & Carlson, 2015). Demographic and involvement questions are listed in Appendix E.

Results

I report study results in a series of four stages. I present preliminary, descriptive analyses specific to child variables first, followed by similar analyses specific to parent variables. Within each of these sections, bivariate correlations between the child or parent variables and possible covariates are reported. Next, I examine bivariate correlations between parent and child variables

to identify any significant associations. In the main analysis, hierarchical regression analyses are used to determine the unique variance in children's EF accounted for by parent variables, after controlling for any potential demographic covariates. A secondary aim of the current study was to investigate parents' normative behaviors and parenting knowledge. Results pertaining to this second aim are presented in the final section.

Child EF outcomes

Descriptive statistics for the three EF measures are reported in Table 2. Although the score distributions appeared slightly non-normal, values for kurtosis and skew are within the appropriate range for normal data, and Q-Q plots are satisfactory. One child refused to complete the Sun-Moon task (n = 51), but all other children (n = 52) completed the DCCS and the Digit Span task. Although two practice trials with researcher feedback were given prior to the start of both the Digit Span task and the Sun-Moon Stroop task, a substantial number of children answered zero questions correctly on the Digit Span task (n = 12) and the Sun-Moon Stroop task (n = 7). As children's performance may reflect a lack of task understanding, rather than an accurate measure of their ability, these children were selectively eliminated from each regression analysis (that is, a child receiving a zero on the Digit Span, but not on the Sun-Moon Stroop, would have been included in the analysis predicting inhibitory control but not working memory).

Table 2

Descriptive statistics for child EF measures

Measure	Mean	SD	Range
Digit Span	7.90	5.43	0 - 18
Day-Night Stroop	8.45	5.68	0 - 16
DCCS	10.56	5.39	4 - 18

Note. DCCS = Dimensional Change Card Sort

None of the EF measures were significantly correlated (see Table 3), thus the three task performance scores were maintained separately rather than creating a unitary EF construct. There were no significant mean differences in EF task performance across gender or childcare center. Only three children were neither four nor five years of age. To determine mean differences in EF task performance across age these children were included in the nearest four or five year age group. There were no significant mean differences in EF task performance across age. To determine possible covariates, correlations between child EF measures and parent demographics were calculated. No child EF measures were significantly correlated with any parent demographic measure.

Table 3

Pearson's correlations between child EF measures

Measure	1	2	3
1. Digit Span	—	.26	.03
2. Day-Night Stroop	.26	—	.21
3. Dimensional Change Card Sort	.03	.21	—

Parent data.

Table 4 presents descriptive statistics for the KEPS, the PPQ, and involvement survey. Both the KEPS ($\alpha = .70$) and the PPQ ($\alpha = .72$) demonstrated adequate survey reliability. Performance on the KEPS ($M = 16.92$, SD = 4.06) was particularly low given that there were only 27 questions. While score on the KEPS was not associated with parents' income level or involvement, the score was significantly correlated with education level ($r = .52$, $p < .01$). There were no significant differences across childcare center in parents' knowledge score. There was one significant difference across center on the PPQ score for warmth/involvement (Factor 2) ($F(2,44) = 3.65$, $p = .034$).

The PPQ groups items into three parenting styles (authoritative, authoritarian, and permissive) as well as eleven factors (see Table 4). Mean score on the parenting styles was greater for authoritative (M = 4.10, SD = .41) than for authoritarian (M = 1.90, SD = .37) and permissive (M = 1.85, SD = .35), indicating that parents reported a higher overall likelihood of 'always' exhibiting a behavior associated with the authoritative parenting style than the other two parenting styles. Regarding associations between parents' demographics and PPQ scores, parents' involvement was significantly correlated with parents' authoritative style (r = .33, p < .05), significantly correlated with being good natured/easy going (PPQ Factor 4, r = .36, p < .01), and significantly negatively correlated with verbal hostility (PPQ Factor 5, r = - .44, p < .01) and corporal punishment (PPQ Factor 6, r = -.28, p < .05). Contrary to expectations, parents' education level was significantly negatively correlated with being good natured/easy going (PPQ Factor 4, r = -.39, p < .01), and parents' income level was significantly negatively correlated with warmth and involvement (PPQ Factor 1, r = -.30, p < .05).

In examining correlations between parents' knowledge and behaviors, score on the KEPS was negatively correlated with reasoning/induction (PPQ Factor 2, r = -.33, p <.05), corporal punishment (PPQ Factor 6, r = -.40, p < .05), ignoring misbehavior (PPQ Factor 10, r = -.33, p < .05), self-confidence (PPQ Factor 11, r = -.35, p < .05) and authoritarian parenting style (r = -.35, p < .05). Note that this negative correlation means that higher knowledge scores were surprisingly associated with less use of reasoning/induction but were also associated with less use of corporal punishment, less ignoring of behavior, less lack of self-confidence (as items on the self-confidence factor belong to the permissive style), and less adherence to an authoritarian parenting style.

Table 4

Descriptive statistics for the KEPS and PPQ

Variable	Mean	SD	Range
KEPS	16.92	4.06	7 – 24
PPQ authoritative	4.10	.41	3.26 – 4.89
1. Warmth and involvement	4.44	.41	3.45 – 5.00
2. Reasoning/Induction	4.14	.55	2.86 – 5.00
3. Democratic participation	3.25	.84	1.60 – 5.00
4. Good natured/Easy going	4.12	.51	3.00 – 5.00
PPQ authoritarian	1.90	.37	1.25 – 3.05
5. Verbal hostility	1.88	.40	1.25 – 3.25
6. Corporal punishment	1.68	.45	1.00 – 2.67
7. Non-reasoning, punitive strategies	1.69	.49	1.00 – 3.00
8. Directiveness	2.57	.77	1.00 – 4.50
PPQ permissive	1.85	.35	1.13 – 2.73
9. Lack of follow through	2.14	.55	1.17 – 3.67
10. Ignoring misbehavior	1.65	.47	1.00 – 3.00
11. Self confidence	1.70	.50	1.00 – 3.00
Involvement Survey	3.21	.42	2.11 – 4.00

Parent survey data was assessed for missingness. Both the KEPS and the PPQ had missing data. Participants may have skipped items that they felt uncomfortable answering, or, due to the length of the survey materials, they may have skipped items. Therefore, some data is likely missing at random while other data may not be missing at random. Options for dealing with missing data, however, are similar across the two scenarios. No individual items on the KEPS had greater than 5% missing data and no individual items on the PPQ had greater than 8% missing data. To avoid further reducing the sample size by eliminating any participants who failed to answer any items, missing items on the PPQ were replaced with the item mean. Mean-substitution has previously been used with parent-report surveys (Schroeder & Kelley, 2010) and would underestimate, rather than over-inflate, any findings due to a reduction in item variance.

Bivariate correlations between child and parent variables.

Prior to the regression analyses, correlations were run to uncover any associations between parents' knowledge of effective parenting and their parenting practices and their child's executive function. As seen in Table 5, regarding scores on the PPQ, being good natured/easy going (Factor 4) was significantly associated with children's score on the DCCS ($r = .30$, $p < .05$) and non-reasoning, punitive strategies (Factor 7) was significantly negatively associated with children's score on the Sun-Moon Stroop task ($r = -.39$, $p < .001$). Total score on the KEPS was not significantly associated with any of the child EF outcomes.

Table 5

Pearson's correlations between child EF measures and parent variables

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Digit Span	—														
2. Day-Night Stroop	.26	—													
3. DCCS	.03	.21	—												
4. KEPS	.18	.10	-.15	—											
5. Factor 1	.15	-.04	-.04	.15	—										
6. Factor 2	-.06	.06	.01	-.33*	.43**	—									
7. Factor 3	.06	.12	.24	-.09	.37**	.46**	—								
8. Factor 4	.06	.16	.30*	-.13	.57**	.56**	.47**	—							
9. Factor 5	.14	.14	.04	.11	-.18	-.16	-.06	-.37**	—						
10. Factor 6	.08	-.13	-.10	-.40*	-.27	-.02	-.17	-.41**	.35*	—					
11. Factor 7	-.04	-.39**	-.08	-.33*	-.22	-.09	-.24	-.18	.10	.31*	—				
12. Factor 8	.20	-.10	-.08	-.20	.02	.15	-.04	-.10	.45**	.48**	.44**	—			
13. Factor 9	.10	-.10	-.06	-.08	-.10	-.07	-.07	.11	.13	-.12	.37**	.07	—		
14. Factor 10	.16	.04	.11	.27	.18	.03	.34*	.08	.16	-.23	-.03	-.06	.11	—	
15. Factor 11	-.05	.02	.19	.17	-.26	-.24	.02	-.07	.16	-.18	-.09	-.31*	.39**	.15	—

Note. DCCS = Dimensional Change Card Sort; KEPS = Knowledge of Effective Parenting Scale; Factors all belong to the PPQ = Parenting Practices Questionnaire; * $p < .05$; ** $p < .01$

Main analyses

All assumptions of regression were met. Hierarchical regression analyses were conducted with the three EF variables as separate variables to determine the contribution of parents' practices to their children's EF. Although parents' income level was not significantly correlated with children's EF outcomes, prior empirical findings have demonstrated a strong association between two (Hackman & Farah, 2009). For this reason, income level was retained as a covariate in all prediction models. Analyses were only conducted for parent variables that had initially demonstrated a correlation with the respective child EF variable. Table 6 summarizes the results of the hierarchical regression analysis predicting children's inhibitory control. In the first step, parents' income level was entered into the regression equation. In the second step, parents' non-reasoning, punitive strategies (PPQ Factor 7) were added into the model. The overall model accounted for 18.4% of the variance in children's inhibitory control ($F(2, 41) = 4.40$, $p = .02$). While income level did not significantly contribute to children's inhibitory control (accounting for only 1.8% of the variance in the first model) parents' non-reasoning, punitive strategies accounted for an additional 16.6% of the variance. Squared semipartial correlations, which represent the amount of variance associated with each individual variable, are also reported. The regression coefficient ($\beta = -.41$) indicates that parents' non-reasoning, punitive strategies negatively contribute to children's inhibitory control.

Table 6

Summary of regression analysis of parent characteristics on children's inhibitory control

Block	β	*t*	sr^2	R^2	ΔR^2	ΔF
Step 1				.02	.02	.74
Income level	.22	.86	.02			
Step 2				.18	.17	7.94**
Income level	.07	.46	.004			
Factor 7	-.41	-2.82**	.17			

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

Table 7 presents the results for the model predicting children's set shifting ability. Again, in the first step, parents' income level was entered into the regression equation. In the second step, parents' practice of being good natured/easygoing (PPQ Factor 4) was included in the model. The model accounted for 14.7% of the variance in children's set shifting ability ($F(2, 48) = 3.97$, $p = .03$). Again, parents' income level did not contribute significantly to the model, accounting for only 4.4% of the variance. Including parents' practice of being good natured/easy going in the second step of the model accounted for an additional 10% of the variance. The regression coefficient ($\beta = .32$) indicates that parents' good-natured/easygoingness positively contributes to children's set shifting ability.

Table 7

Summary of regression analysis of parent characteristics on children's set shifting

Block	β	*t*	sr^2	R^2	ΔR^2	ΔF
Step 1				.04	.04	2.18
Income level	.21	1.48	.045			
Step 2				.15	.10	5.55*
Income level	.25	1.81	.06			
PPQ Factor 4	.32	2.36*	.10			

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

Trends in parental knowledge and practices

A secondary study aim was to examine the parenting practices and parenting knowledge present within our specific sample. A more in-depth analysis of both the PPQ and the KEPS is thus included below.

As previously mentioned, items on the PPQ are grouped into style (authoritative, authoritarian, and permissive) and further subdivided into factors (1-11). To determine parents' normative practices, frequencies of endorsement of individual items were calculated. Using the categorization technique of Calzada & Eyberg (2002), parenting practices were determined to be normative based on >80% of the sample rating them as a behavior they do *always or very often* (Likert-score of 4 or 5) or *never or once in a while* (Likert-score of 1 or 2). Normative parenting practices are reported in Table 8. All but one of the normative practices endorsed *always or very often* were authoritative practices. The lone authoritarian practice was Question 17 – "I scold and criticize to make my child improve." All normative practices that were reported to occur either *never or once in a while* were authoritarian or permissive practices.

Table 8

Normative parenting practices based on results from the PPQ

PPQ Items Reported to Occur *Always* or *Very Often* by >80% of the Sample		**PPQ Items Reported to Occur *Never* or *Once in a While* by >80% of the Sample**	
Item	Description	Item	Description
1	I encourage my child to talk about the child's troubles. (†, F1)	10	I punish by taking privileges away from my child with little if any explanation. (‡, F7)
5	I give praise when my child is good. (†, F1)	15	I allow my child to annoy someone else. (P, F11)
9	I show sympathy when my child is hurt or frustrated. (†, F1)	19	I grab my child when being disobedient. (‡, F6)
12	I give comfort and understanding when my child is upset. (†, F1)	24	I appear confident about parenting abilities. (P, F11)
16	I tell my child my expectations regarding behavior before the child engages in an activity. (†, F2)	26	I appear to be more concerned with my own feelings than with my child's feelings. (‡, F7)
17	I scold and criticize to make my child improve. (‡, F8)	28	I punish by putting my child off somewhere alone with little explanation. (‡, F7)
18	I show patience with my child. (†, F4)	30	I am afraid that disciplining my child for misbehavior will cause the child to not like his/her parents. (P, F11)
21	I am responsive to my child's feelings or needs. (†, F1)	32	I explode in anger towards my child. (‡, F5)
22	I allow my child to give input into family rules. (†, F3)	36	I ignore my child's misbehavior. (P, F10)
27	I tell my child that we appreciate when the child tries or accomplishes. (†, F1)	37	I use physical punishment as a way of disciplining my child. (‡, F5)
29	I help my child to understand the impact of behavior by encouraging my child to talk about the consequences of own actions. (†, F2)	41	I give into my child when the child causes a commotion about something. (P, F9)
33	I am aware of problems or concerns about my child in school. (†, F1)	43	I slap my child when the child misbehaves. (‡, F6)
35	I express affection by hugging, kissing, and holding my child. (†, F1)	45	I allow my child to interrupt others. (P, F10)
46	I have warm and intimate times together with my child. (†, F1)	47	When two children are fighting, I discipline the children first and ask questions later. (‡, F7)
51	I show respect for my child's opinions by encouraging my child to express	49	I bribe my child with rewards to bring about compliance. (P, F9)

	them. (†, F4)		
53	I explain to my child how I feel about the child's good and bad behavior. (†, F2)	54	I use threats as punishment with little or no justification. (‡, F7)
62	I emphasize the reasons for rules. (†, F2)	57	I appear unsure on how to solve my child's misbehavior. (P, F11)
		61	I shove my child when the child is disobedient. (‡, F6)
		24	I appear confident about parenting abilities. (P, F11)

Note. † = Authoritative, ‡ = Authoritarian, P = Permissive, F= Factor

With a mean score of 16.92 out of 27 possible items (62.7% accuracy), the KEPS appeared to be a fairly challenging assessment for parents. Closer examination indicated that on nine items, an alternative, incorrect answer choice was chosen by >25% of parents. Among these nine items, four items had a greater number of parents choose an incorrect response than the correct response (see Figure 4). Table 9 lists items, possible answer choices, and their respective frequencies. On the Knowledge of Effective Parenting Scale, while the instructions on parents' questionnaires indicated that they should only select one answer choice for each survey item, six parents (11.5%) selected two answer choices on at least one question. Additionally, seven parents (13.5%) annotated their survey materials, either adding an additional answer choice or providing caveats to their selection.

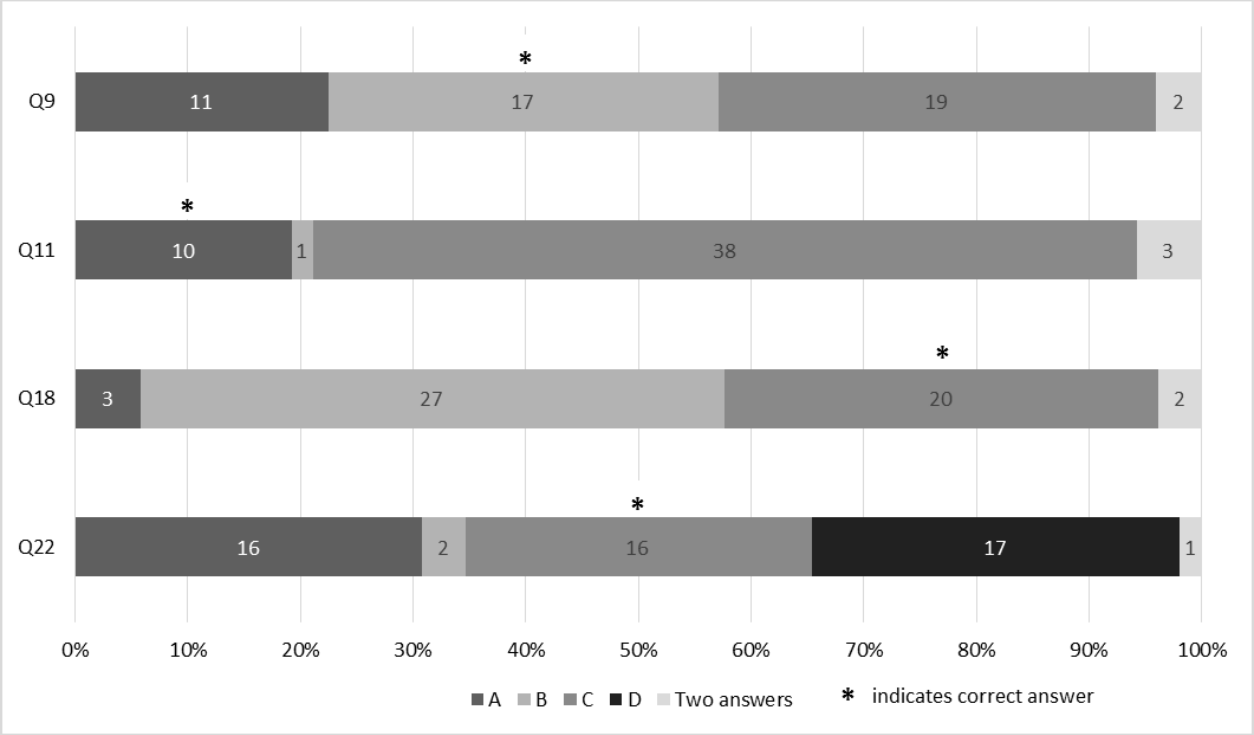

Figure 3. **Frequency of selected answers on KEPS questions with a predominantly inaccurate answer choice.**

Table 9

KEPS items and answer choices for items with a predominantly incorrect answer choice

Item	Answer	Frequency (%)
9. A father asks his child to turn off the TV and get ready for a bath. She loudly refuses saying "No. These are my favorite ads." He asks her again with a raised voice. She puts her hands over her ears. The father then gets annoyed, shouts loudly at her, and threatens to ban her from watching TV for the rest of the week. She then does as she is told but with a sour face. What lesson is the father likely to learn here?		
	A. TV inevitably creates conflict with children.	11 (21.2%)
	B. It is necessary to yell at and threaten children before they cooperate.	17 (32.7%)
	C. When children don't do as they're told, they are just asserting their independence.	19 (36.5%)
	D. Don't create a scene, just let them continue watching TV.	0 (0%)
11. A child is jumping on the couch. Her mother wants her to stop. Which approach would be most effective?		
	A. Telling her to stop jumping on the couch and to jump outside if she would like to jump.	10 (19.2%)
	B. Saying "Sarah, don't be so silly."	1 (1.9%)
	C. Explaining to her again, why jumping on the couch is dangerous.	38 (73.1%)
	D. Asking her to explain why she wants to wreck the couch.	0 (0%)
18. A 10-year-old has been struggling with following		

the rules and doing as the coach asks at football training. His father has discussed this with him and come up with a plan to deal with the problem. At the next training session the father notices his son is doing a good job of following the rules and sticking to the plan they agreed upon. What is the best way for the father to show he is pleased?		
	A. Buy his son a new toy for being so good.	3 (5.8%)
	B. Let his son know what a great job he's doing, and how proud he is of him, in front of the other children.	27 (51.9%)
	C. Give him a smile and thumbs up when his son looks in his direction.	20 (38.5%)
	D. Tell the parent sitting next to him how great his son's behavior is.	0 (0%)
22. A mother is busy making dinner after getting home from work and picking up her 4-year-old from preschool. While playing, the child makes silly noises. What would be the most effective approach for the mother to take?		
	A. Make the same noise to show her daughter how silly she sounds.	16 (30.8%)
	B. Send her daughter to her room until dinner is ready.	2 (3.8%)
	C. Ignore the noises and praise her when she is playing appropriately.	16 (30.8%)
	D. While continuing to make dinner, explain to her child that it is rude to make noises, and that she would like her to play quietly.	17 (32.7%)

Note. Correct answers are indicated by boldface type.

Discussion

The primary purpose of this study was to determine the independent contributions of parents' knowledge of effective parenting and their parenting practices and behaviors to their children's executive function. I hypothesized that both parents' knowledge and their parenting practices would influence developing EF. More specifically, it was expected that greater knowledge of effective parenting and child development would positively contribute to EF, whereas lower knowledge of effective parenting and child development and parents' behaviors associated with negative intrusiveness and control would negatively contribute to EF. The results of this study partially supported these hypotheses. On the one hand, knowledge of effective parenting did not contribute to any EF outcomes. On the other hand, two specific subscales of parents' behaviors, namely parents' non-reasoning, punitive strategies and being good natured/easy going, contributed significantly to children's inhibitory control and set-shifting abilities, respectively. A secondary purpose of the study was to broadly categorize parents' knowledge, beliefs, and practices regarding parenting. Results from parents' surveys indicate that, while data from this specific sample regarding parenting *behaviors* aligned with empirical results from other groups of parents, *knowledge* may not be accurately represented by the survey used here.

Parents' knowledge and child EF

Retaining EF as three separate components – working memory, set shifting, and inhibitory control – allowed for a more precise look at how parents' behaviors impact EF development. Despite the ongoing debate about when EF components separate, many studies have continued to create composite variables for EF due to correlated task performance (Hughes & Ensor, 2009). Creating this aggregate variable may reduce the ability to parse out differences

in EF development. While for three year olds, EF may be best represented as a unitary construct (Wiebe, Sheffield, Nelson, Clark, Chevalier & Espy, 2011), by the age of four, individual components appear to separate. Recent research among a diverse sample of four and five year olds indicated that a two-factor model (working memory and inhibitory control) best fit the data, and that the correlation between these constructs decreased with age (Lerner & Lonigan, 2014). Research addressing the influence of parents' behaviors on EF has shown that certain behaviors may have a significant effect only on specific components of EF (for review, Fay-Stammbach, Hawes & Meredith, 2014). In the current study, none of the EF components were significantly correlated. As the mean age of our population was between four and five years of age, it is possible that for the subsample of urban, African American pre-K students, EF had already fractionated into individual components. More importantly, the effect of parents' behaviors was different for all three factors. No specific parenting behaviors significant contributed to children's working memory. For set shifting ability, higher levels of a positive parenting behavior significantly contributed to higher task performance. Finally, for inhibitory control, higher levels of a negative parenting behavior significantly contributed to lower task performance. Parenting knowledge was not associated with any of the EF components. Differential effects of parenting behaviors found in our study (and mirrored in some prior work) indicates that as EF research in the pre-K years continues, aggregate variables should not be created – allowing for analyses that more accurately account for the developmental trajectory of EF.

Parenting knowledge was measured using the Knowledge of Effective Parenting Scale (KEPS), which was designed to assess parenting knowledge as part of evaluations of the Triple-P Parenting Program (Winter, Morawska & Sanders, 2012). Items align with four areas of

knowledge including (1) promotion of development, (2) principles of effective parenting, (3) use of assertive discipline, and (4) causes of behavior problems. These four knowledge areas are further broken down into subcomponents specifically addressed in the survey items and answers. It is important to note that recent studies using the KEPS have had predominantly Caucasian participants living in higher-income households. With our sample of predominantly African American participants, with a relatively lower mean income, the survey demonstrated adequate reliability, but mean score on the KEPS (16.92) was much lower than those reported in other studies (with means ranging from 21.55 to 23.91) (Winter, Morawska & Sanders, 2012). Additionally, a significant number of participants selected more than one answer choice, or annotated their survey responses. These behaviors indicate that our subsample of parents might hold conflicting knowledge structures regarding parenting, perhaps functioning and responding both within the majority and minority culture. Moreover, on four items (9, 11, 18, and 22) participants selected an incorrect answer more often than a correct answer. These four items align with 'promotion of development,' and the subcomponent of 'encouraging desirable behavior.' Correct answer choices reflect the idea of using positive reinforcement to obtain the desired behavioral outcome. Parents' lower scores on this measure may reflect a broader cultural shift away from certain methods of effective discipline, specifically those that stem from a behaviorist perspective and emphasize a cause-effect relation between parents' action and the child's behavior.

Prior work assessing parents' knowledge using the KIDI (Knowledge of Infant Development Inventory) found significant differences in percent correct scores among African-American, Caucasian, and Hispanic mothers – even after accounting for demographic variables (Keels, 2009). Additionally, race/ethnicity moderated the relation between maternal knowledge

and parents' behaviors, and higher knowledge scores among African American mothers were related to less optimal parent-child interactions (Huang et al., 2005). Correlational findings from the current study reveal a similar counterintuitive relation between parents' behavior and parents' knowledge – parents' knowledge score was negatively correlated with parents' use of reasoning/induction. Surprising findings such as these indicate that knowledge of *effective* parenting may be conceptualized different among different ethnic groups, or that, for diverse groups, a different mechanism may operate between parents' knowledge and their behaviors.

If 'good' parenting is different for diverse populations, it is possible that multiple-choice scenario-type items may not be able to capture the unique qualities of parents' knowledge of caregiving. In such a measure, parents are constrained both by item type, in regards to the specificity of the scenario provided, and by instructions to choose only one 'correct' answer. Findings regarding the Knowledge of Effective Parenting Scale indicate that this measure may not effectively capture the parenting knowledge of our particular sample. Lower scores, *combined with* parents' selection of multiple answer choices, and/or writing in additional responses and caveats indicate that the measure might not provide culturally relevant scenarios (the items themselves) or possible resolutions to those scenarios (the answer choices). Prior work has suggested that parenting measures may not be culturally valid due to differences in what characterizes effective parenting (Hammer, Rodriguez, Lawrence & Miccio, 2007; Huang et al., 2005). If an unrepresentative measurement method is responsible for the lack of association between parents' knowledge and children's EF, then a more open-ended measure of parents' knowledge might better demonstrate how the two constructs are related.

An alternative to measure inadequacy is that parents' knowledge of child development may not contribute to their child's EF in the way this study conceptualized – as a unique

contributor to the variance in EF. Integrated behavior models, often used in health education and health interventions, link peoples' *normative beliefs* to their *intentions* to their *behaviors* (Lac, Alvaro, Crano & Siegel, 2008). Similar to this model, we could conceptualize a model linking parents' *knowledge/beliefs* to their *behaviors* to their *child's EF outcomes*. Such a mediational model would seem like an appropriate mechanism, however, children's EF outcomes were not significantly correlated with parents' knowledge, precluding the possibility of mediation. Parents' knowledge of effective parenting may simply be too distal of an antecedent to measure its contribution to children's cognitive development. However, in the aforementioned study by Huang et al. (2005), the path from knowledge to behaviors for African American mothers did not function as expected. Such findings, considered in tandem with those reported here, indicate that another unassessed mediator or moderator may be operating in the knowledge – behaviors – outcomes model.

Parents' behaviors and child EF

The majority of prior work investigating parental influence on children's EF has measured parent behaviors using observational coding during free play or puzzle solving tasks. Parents' behaviors during a laboratory session may not be representative of their day-to-day interactions, or allow opportunities for all types of behaviors to take place. For example, the impact of scaffolding behaviors has been studied relatively often – perhaps because many puzzle-solving tasks provide an intuitive opportunity for scaffolding to take place. In the current study, self-report measures were used to assess parenting practices. Using such a questionnaire allowed for a greater variety of parenting practices to be assessed in relation to children's EF. Results from our study partially confirm prior work investigating the role of caregiving to children's EF, demonstrating that higher levels of parents' non-reasoning, punitive strategies

negatively predicted children's inhibitory control. Additionally, and contrary to the hypothesis that parents' sensitivity would not predict children's EF for our sample of predominantly African American families, higher levels of parents' easy-going/good-naturedness were positively related to set-shifting ability.

Work by Holochwost et al. (2016) demonstrated that, among their African American participants, higher levels of negative-intrusiveness predicted lower levels of child EF. In their study, negative-intrusiveness was measured by the degree to which parents attempted to direct and control the free play scenario – a conceptualization that likely best aligns with *directiveness* (Factor 8) on the PPQ. Although the current study did not find any significant associations between directiveness and children's EF, directiveness was significantly correlated with non-reasoning, punitive strategies (Factor 7), which did have an effect on children's inhibitory control. Higher levels of parents' easy-going/good-naturedness – a component of the authoritative parenting style – were positively related to children's set-shifting ability.

It is interesting that specific behaviors contributed to inhibitory control and set-shifting ability but not to working memory. Both inhibitory control and set-shifting rely heavily on attentional control, and inhibitory control in particular is often considered to have strong social and behavioral components (Carlson & Wang, 2007). It is possible that parents' behaviors have a greater influence on elements of children's EF that are tied more closely with behavioral correlates. In contrast, working memory ability is a strictly cognitive task – which in this case, overlapped somewhat with numeracy ability. This distinction between cognitive and behavioral demands from EF is made when referring to hot or cool EF. Prior findings investigating differences in parental influence on hot and cool EF have been mixed – with some studies reporting no relationships between parent practices and child EF for hot EF (Kamza, Putko &

Zlotogorska, 2016) and others finding an association (Matte-Gagne & Bernier, 2011). Results of our study indicate that future research should simultaneously investigate parental influence on behaviorally and cognitively demanding EF tasks.

Culturally relevant practices

Although measures of parenting generally align with the three parenting styles, the cross-cultural validity of authoritative, authoritarian, and permissive parenting remains unclear. First, research has been divided regarding whether all three parenting styles are present across different ethnic subsamples. Historically, the bulk of parenting research took place among middle-class, European American families. This majority population formed the basis for norming other cultures' parenting practices, and researchers deemed authoritative parenting to be the 'ideal' parenting style. African American families emphasized greater respect for authority figures, higher accountability, and a stronger work ethic – components associated more with an authoritarian parenting style (Jambunathan, Burts & Pierce, 2000). Among Latino families, studies have produced mixed findings, with use of all three parenting styles (Hammer, Rodriguez, Lawrence & Miccio, 2007; Julian, McKenry & McKelvey, 1994). Later research, however, has found high correlations between authoritative and permissive styles in both Latino and African American samples, indicating that these two styles may in fact converge into one (Calzada & Eyberg, 2002; Querido, Warner & Eyberg, 2002).

Findings from the current study indicate that our sample of African American parents did more strongly endorse the authoritative parenting style than the other two styles. Additionally, no correlations were found between endorsements of any of the three styles. While there were no associations between any of the broader parenting styles and children's EF outcomes, a factor of authoritative parenting was positively related to children's set-shifting ability and a factor of

authoritarian parenting was negatively related to children's inhibitory control. In other work, stronger endorsement of authoritative parenting has predicted more positive behavioral outcomes for African American preschool children (Hall & Bracken, 1996; Querido, Warner & Eyberg, 2002), and parental sensitivity has been positively associated with child outcomes (Mesman, Ijzendoorn, Bakermans-Kranenburg, 2011). Thus, while findings from this study regarding parenting knowledge indicate the possibility of cultural differences, parenting styles from the present sample are consistent with prior research with European-American participants (Querido, Warner & Eyberg, 2010).

Limitations and future directions

One limitation specific to recruitment and participation was the low survey return rate from those parents who initially consented to participate in the study. The survey return rate was roughly fifty percent. This low return rate was in spite of the fact that parents who consented were encouraged and reminded to return their surveys both via interactions with a researcher at the data collection sites and reminders placed in children's mailboxes. It is possible that parents who volunteered represent a different sample than those who did not. A monetary incentive was provided to parents when they returned their survey in an attempt to mitigate this sample bias. However, future studies should perhaps attempt alternate recruitment methods in order to reach a wider sample or to promote participation once consent is given. Another possible limitation regarding recruitment and return rate was that the researcher responsible for recruiting participants and collecting data was a majority group member. Knowing this might have deterred parents from returning their survey materials, or unknowingly influenced parents to report different behaviors or knowledge.

An additional limitation to the current research was that parents were surveyed at roughly the same time point as their children participated in the EF measures. Longitudinal work that accounts for change over time in children's EF likely provides a more accurate picture of how EF develops (Cuevas et al., 2014; Roskam, Stievenart, Meunier, and Noel, 2014). Additionally, the appropriateness of particular parenting behaviors and styles may fluctuate, with responses to particular situations changing based on the age of the child. Surveys of behaviors at one time point may thus not reflect the behaviors that parent exhibited during the child's earlier, formative years. Other researchers have posited that the influence of parents' behaviors on their child's EF is bidirectional. Not only might parents' behaviors influence children's EF, but children who have higher EF might elicit more positive caregiving behaviors from their parents (Bernier et al., 2010). The current analysis did not account for the possibility of such a feedback loop.

The findings presented here provide confirmatory evidence that specific parenting behaviors influence children's EF development. Future research should continue to investigate these parenting behaviors, both by survey method and by observation, as they relate to specific components of EF. By incorporating both hot and cool EF tasks, and by corroborating parents' behaviors across two methods of assessment, we may uncover a more accurate conception of the intricacies of EF development. Study findings provide support for the idea that interventions targeting specific parenting behaviors might influence children's EF development. Additionally, different ways of assessing parents' knowledge of effective parenting and child development should be developed in order to capture the nuances in parents' knowledge and beliefs. Measuring parenting knowledge in a different way might shed light on new mechanisms for how parents' knowledge and beliefs influence children's EF.

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APPENDICES

Appendix A

Digit span task

Digits range from 1 to 9, presented 1 per second

[Researcher]: "Now we're going to play a number game. Here's how we play. I'm going to say some numbers to you, and then you'll say them back to me in the same order. Don't start saying the numbers until I'm done saying mine.

Let's do a practice. If I say "5 … 3" what would you say?

[*Child says "5…3"*] – Good job! Now let's start.

[*Child says something incorrect*] – No, I said "5…3" so you'd need to say "5…3" also. Can you say "5… 3?"

[*Child says "5 ... 3"]*

[Researcher]: Okay let's start playing!

Trial 1: [2 numbers]

e.g., "6 … 2"

[Regardless of whether the child is correct or incorrect] "Okay, let's do another!"

If child correctly repeats 3 out of the 4 trials, move on to the next trial →

[Researcher] "You did so well, we're going to try the game with more numbers now!"

Trial 2: [3 numbers]

e.g., "7 … 1 … 2"

[Regardless of whether the child is correct or incorrect] "Okay, let's do another!"

If child correctly repeats 3 out of the 4 trials, move on to the next trial →

[Researcher] "You did so well, we're going to try the game with more numbers now!"

Trial 3: [4 numbers]

e.g., "4 … 5 … 9"

[Regardless of whether the child is correct or incorrect] "Okay, let's do another!"

If child correctly repeats 3 out of the 4 trials, move on to the next trial →

[Researcher] "You did so well, we're going to try the game with more numbers now!"

Trial 3: [4 numbers]

If child correctly repeats 3 out of the 4 trials, move on to the next trial →

e.g., "7 … 2 … 1 … 8"

[Regardless of whether the child is correct or incorrect] "Okay, let's do another!"

If child correctly repeats 3 out of the 4 trials, move on to the next trial →

[Researcher] "You did so well, we're going to try the game with more numbers now!"

Trial 4: [5 numbers]

e.g., "6 … 5 … 7 … 3 … 2"

[Regardless of whether the child is correct or incorrect] "Okay, let's do another!"

If child correctly repeats 3 out of the 4 trials, move on to the next trial →

[Researcher] "You did so well, we're going to try the game with more numbers now!"

Trial 5: [6 numbers]

e.g., "1 … 5 … 4 … 2 … 8 … 6"

[Regardless of whether the child is correct or incorrect] "Okay, let's do another!"

If child correctly repeats 3 out of the 4 trials, move on to the next trial →

[Researcher] "You did so well, we're going to try the game with more numbers now!"

Trial 6: [7 numbers]

e.g., "4 … 5 … 1 … 7 … 9 … 8 … 2"

[Regardless of whether the child is correct or incorrect] “Okay, let’s do another!”

If child correctly repeats 3 out of the 4 trials, move on to the next trial →

[Researcher] “You did so well, we’re going to try the game with more numbers now!”

Appendix B

Sun-Moon Stroop task

Dimensions of all cards – 13.5 x 10 cm. 2 training cards and 16 testing cards in each set. The front of half of the cards are black with a moon and stars. The front of the other cards are white with a bright yellow sun.

Introduction

[Researcher] Now we're going to play a game with pictures!

[Show the child the black moon card and tell the child] "This card has a moon and stars on it. When you see this card, I want you to say 'day'. Can you say 'day'?

[Child]: Day

[Researcher] Good!

[Show the child the white sun card and tell the child] "This card has a sun on it. Now when you see this card, I want you to say 'night'. Can you say 'night'?

[Child]: Night

[Researcher]: Good! Now we're going to play the game.

2 PRACTICE TRIALS:

[NO instruction should be given after the drawing of the cards. If the child hesitates, prompt the child by saying] "What do you say for this one?"

[Show white sun card]:

Child should say "night"

[Show black moon card]:

Child should say "day"

If the child responds correctly to both of these trials, testing should continue with the 16 trial cards.

If the child does not respond correctly to AT LEAST one of these trials, return to RULES and then complete the 2 practice trials again.

16 TEST TRIALS: (pseudo-random order?)

[Show children the remaining 16 cards, in a random order]
[NO instruction should be given after the drawing of the cards. If the child hesitates, prompt the child by saying, “What do you say for this one?”]

Appendix C

Knowledge of Effective Parenting Scale (KEPS)

Please read each of the following questions carefully and circle the response which you consider would be the most effective action for a parent to take. Please circle only one response for each question.

1. To ensure that a toddler is safe and secure, which of the following would be the least effective strategy for a parent to take:
    a) Make sure they know where their child is and what they are doing at all times.
    b) Install child safety devices, such as power point covers.
    c) Show them exactly what they can and cannot touch.
    d) Put away precious, fragile items out of reach.

2. An environment which facilitates children's independent play is one where:
    a) There are lots of fun and interesting things to do.
    b) The parent sets up a number of structured activities.
    c) Parents spend a lot of time playing with children.
    d) Children are expected to play independently.

3. When disciplining a child it is important that a parent:
    a) Is consistent in their reaction to their child's misbehavior.
    b) Makes sure their child feels a bit of pain or discomfort so they will remember what they have done wrong.
    c) Speaks firmly to their child so they know who is the boss and that they mean business.
    d) Encourages their child to express their negative or angry feelings openly.

4. When a child approaches a busy parent to speak or show them something it is best that a parent:
    a) Says, "Mummy is busy, go and ask daddy."
    b) Tells the child to wait.
    c) Spends at least 30 minutes a day in activities of the child's choice.
    d) Gives the child their full attention, giving them the help they need briefly and encourages them to continue with their interest of the moment.

5. Parenting is less stressful when:
    a) The parent strives to be a better parent than their own parents.
    b) A parent expects that children will sometimes break rules and not do as they are asked.
    c) There are too many rules in life, let children be children.
    d) A parent expects that their child should always do as they are told.

6. To make a success of being a parent a parent should:
    a) Take a stress management or relaxation class.
    b) Spend all of their free time with their children.
    c) Be less reliant or dependent on friends to help out.

d) Take care of their own needs and take an occasional break from children.

7. All children are born with a certain temperament, which is partly inherited from their parents. This means that:

a) There is nothing a parent can do to change their child's behavior – that's just the way the child is.

b) Either parent might be responsible for the problems with their child – if they were the same as a child.

c) If a child has a difficult temperament it makes the parents' job harder, but how their child is raised matters.

d) Temperament doesn't matter, because the environment is the thing that really makes the difference.

8. During a shopping trip in the grocery store Jacob asks his mother to buy him a toy. She says not today. He protests, pleading with her to buy the toy. She says no again and he starts to cry then screams loudly throwing himself on the floor. Jacob is more likely to throw a tantrum in the future when shopping with his mother if she:

a) Buys the toy for him, and says "just this once."

b) Tells him to stop the noise.

c) Ignores the behavior completely.

d) Reminds him of the rules about not buying anything today and refuses to give into his demands.

9. A father asks his child to turn off the TV and get ready for a bath. She loudly refuses saying "No. These are my favorite ads." He asks her again with a raise voice. She puts her hands over her ears. The father then gets annoyed, shouts loudly at her, and threatens to ban her from watching TV for the rest of the week. She then does as she is told but with a sour face. What lesson is the father likely to learn in this situation?

a) TV inevitably creates conflict with children.

b) It is necessary to yell at and threaten children before they cooperate.

c) When children don't do as they're told, they are just asserting their independence.

d) Don't create a scene, just let them continue watching TV.

10. An 11-year old girl tends to yell and shout at her younger sister, in order to get what she wants. She is most likely to have learned this by:

a) Seeing characters from her favorite TV shows yelling at each other.

b) Listening to loud music, which may have affected her hearing.

c) Listening to her parents raise their voices at her, when she does not do her chores or do as she's told.

d) It's probably just part of her nature.

11. A child is jumping on the couch. Her mother wants her to stop. Which approach would be most effective?

a) Telling her to stop jumping on the couch and to jump outside if she would like to jump.

b) Saying "Sarah, don't be so silly."

c) Explaining to her again, why jumping on the couch is dangerous.
d) Asking her to explain why she wants to wreck the couch.

12. A 3-year-old and 2-year-old have made a mess with all of their toys. There are toys everywhere. What would be the most effective approach for their father to take?
a) Tell them to stop playing and pack away all the toys.
b) Send them to time out for making a mess.
c) Set them up in another activity and then he cleans the mess up himself.
d) Help them get started by asking them to pick up one thing each.

13. If parents disagree about something it is better for their children if they:
a) Try to keep the peace and avoid having any form of disagreement in front of them.
b) Keep calm but show them that disagreements are OK and can be resolved.
c) Ask their child what they think about the disagreement.
d) Tell each other exactly what they think even if they are really angry because children have to learn how to cope with conflict.

14. It is Saturday morning and a mother is ironing. Her 4-year-old son comes up to show her something. What is the best way for her to respond:
a) Tell them she is busy and not to interrupt.
b) Ignore his interrupting.
c) Stop what she is doing, give him her attention, and then continue ironing.
d) Tell him that she will look when she has finished the ironing.

15. A father is on his way home after picking up his two children from school. He's previously had the problem of being distracted by the children arguing noisily in the backseat. To prevent this from occurring it would be more effective for him to:
a) Turn the radio/CD up loud to drown out the sound of the children in the backseat.
b) Be prepared to keep telling them to keep the noise down, because he can't concentrate.
c) Tell them something interesting about his day, and ask them to tell him something that happened at school today.
d) Just accept that driving with children can be difficult.

16. When children receive lots of hugs and cuddles from parents they:
a) Become needy and dependent.
b) Feel loved, secure and wanted.
c) Find it harder to separate from their parents.
d) Are more likely to become interested in the opposite sex early.

17. Damian, a 7 year old, has just made a tall building out of wooden blocks, while his mother was on the phone. What would be the best way for her to show her interest and approval to encourage this behavior?
a) Say "That looks interesting. Haven't you done well."
b) Say nothing. Praising children makes them self-centered.
c) Just watch him for a while and wait until he says something about his creation.

d) Say “Thank you for playing by yourself while I was on the telephone. Tell me about what you’ve made.”

18. A 10-year old has been struggling with following the rules and doing as the coach asks at football training. His father has discussed this with him and come up with a play to deal with the problem. At the next training session the father notices his son is doing a good job of following the rules and sticking to the play they agreed upon. What is the best way for the father to show he is pleased?

a) Buy his son a new toy for being so good.
b) Let his son know what a great job he’s doing, and how proud he is of him, in front of the other children.
c) Give him a smile and thumbs up when his son looks in his direction.
d) Tell the parent sitting next to him about how great his son’s behavior is.

19. If a parent uses a reward system such as good behavior or “smiley” faces chart, to encourage desired behavior, it will work best when:

a) The parent combines stickers with praise or some other form of positive attention.
b) Stickers are consistently removed for misbehavior.
c) Stickers are rarely given to start with, then more often once a child learns a new behavior.
d) Stickers are only given when the child asks for them.

20. A mother is about to take her two children Carmel (5 years) and Steven (8 years) round to visit her sister at her home. She wants them to remember some simple rules about going visiting. What should she say to most effectively introduce visiting rules?

a) “Now listen here you kids. You were really naught last time we visit Alice’s place. So today be on your best behavior.
b) “It’s time for dinner. Go and wash your hands please. Then come up to the table.”
c) “Stop playing with your toys. It’s dinner time.”
d) “Why are you going so slowly? I said your dinner’s ready.”

*21. A father wants his child to come to the dinner table. What should he say?

a) “Your dinner’s ready.”
b) “It’s time for dinner. Go and wash your hands please. Then come up to the table.”
c) “Stop playing with your toys. It’s dinner time.”
d) “Why are you going so slowly? I said your dinner’s ready.”

22. A mother is busy making dinner after getting home from work and picking up her 4-year-old from preschool. While playing, the child makes silly noises. What would be the most effective approach for the mother to take?

a) Make the same noise to show her daughter how silly she sounds.
b) Send her daughter to her room until dinner is ready.
c) Ignore the noises and praise her when she is playing appropriately.
d) While continuing to make dinner, explain to the child that is rude to make noises, and that she would like her to play quietly.

23. A 6-year old child has refused to put her toys away when her mother asked her to, and when she repeated the instruction, the child started screaming and throwing the toys around the room. What should the mother do?

a) Give her a smack on the bottom, and let her know that there will be no dessert tonight.
b) Pack the toys away herself, but let her child know that she will not be able to play with them for the rest of the week.
c) Give the child a cuddle to help her settle down and then assist with packing the toys away.
d) Take her child to time out and wait until she (the child) has calmed down before letting her out and restating the instruction to put the toys away.

24. A father has put his child to bed; she's been to the bathroom, had some water and a story, and he has said goodnight. The child later comes down the hall and says, "I'm not sleepy. I want to play with my toys." What would be the most effective approach for the father to take in this situation?

a) Let his child get her toys and stay up a little longer.
b) Remind her of the bedtime rules and take her back to bed.
c) Ignore her and carry on with what he was doing.
d) Go with her back to her bed and stay to soothe and calm her to sleep.

25. It's 30 minutes before dinnertime, and a child ask his mother for a cookie. She says, "Dinner will be ready soon. You need to wait." The child becomes upset and starts to cry. She says "no" again. The crying continues and the child throws himself on the floor screaming. What should the mother do?

a) Get down on her child's eye level, and say "Darling, you must be very upset."
b) Get her child's attention, tell him to stop screaming, and remind him of the ground rule (about no sweets before dinner). Ignore further protests and don't give a cookie.
c) Say "You can have just one, but don't ask for any more." Then give the child a cookie.
d) Use this as an opportunity to talk to her child about eating too much sugar, and the dangers of getting fat, tooth decay, and spoiling his appetite for dinner.

26. A three-year-old pulls the kitten's tail for the third time in the morning. What would be the most effective way for the parent to respond?

a) Threaten to take the kitten back to the store it came from.
b) Ignore the behavior and hope that the kitten will teach the child a lesson.
c) Get their child's attention. Tell them to stop pulling the kitten's tail, and show them how to stroke the kitten gently.
d) Explain to their child why it's important not to hurt animals.

27. A 2-and-a-half-year-old child approaches her father to show him a picture she painted of an animal. In this situation, what can the father say to his child to help her learn new things?

a) "Yes, that's a horse. It's a great horse you've drawn!"
b) "Can you draw another animal for daddy?"
c) "That's just like the horses we saw on the weekend. Can you remember that?"
d) "That's a great horse. What kind of noises do horses make? And what do horses eat?"

28. A 4-year-old son has hit his younger brother while they were playing together. His mother asks him to stop hitting his brother, and when he continues to hit, she takes him to time out. While he is in time out she should:

a) Wait for a pause in his complaints and remind him that he needs to be quiet before he can come out.
b) Wait for 30 seconds then go to him and help him calm down.
c) Allow him to come out and let him know that he won't be allowed to watch TV tonight.
d) Ignore any complaints and wait until he has been quiet for a set time before letting him out.

Note: * indicates missing item

Appendix D

Parenting Practice Questionnaire

Please rate how often you exhibit the following behaviors with your child.

I exhibit this behavior:

(1) Never
(2) Once in Awhile
(3) About Half of the Time
(4) Very Often
(5) Always

1. I encourage my child to talk about the child's troubles.
2. I guide my child by punishment more than reason.
3. I know the names of my child's friends.
4. I find it difficult to discipline my child.
5. I give praise when my child is good.
6. I spank when my child is disobedient.
7. I joke and play with my child.
8. I withhold scolding and/or criticism even when my child acts contrary to my wishes.
9. I show sympathy when my child is hurt or frustrated.
10. I punish by taking privileges away from my child with little if any explanation.
11. I spoil my child.
12. I give comfort and understanding when my child is upset.
13. I yell or shout when my child misbehaves.
14. I am easy going and relaxed with my child.
15. I allow my child to annoy someone else.
16. I tell my child my expectations regarding behavior before the child engages in an activity.
17. I scold and criticize to make my child improve.
18. I show patience with my child.
19. I grab my child when being disobedient.
20. I state punishments for my child and do not actually do them.
21. I am responsive to my child's feelings or needs.
22. I allow my child to give input into family rules.
23. I argue with my child.
24. I appear confident about parenting abilities.
25. I give my child reasons why rules should be obeyed.
26. I appear to be more concerned with my own feelings than with my child's feelings.
27. I tell my child that we appreciate when the child tries or accomplishes.
28. I punish by putting my child off somewhere alone with little explanation.
29. I help my child to understand the impact of behavior by encouraging my child to talk about the consequences of own actions.
30. I am afraid that disciplining my child for misbehavior will cause the child to not like his/her parents.

31. I take my child's desires into account before asking the child to do something.
32. I explode in anger towards my child.
33. I am aware of problems or concerns about my child in school.
34. I threaten my child with punishment more often than actually giving it.
35. I express affection by hugging, kissing, and holding my child.
36. I ignore my child's misbehavior.
37. I use physical punishment as a way of disciplining my child.
38. I carry out discipline after my child misbehaves.
39. I apologize to my child when making a mistake in parenting.
40. I tell my child what to do.
41. I give into my child when the child causes a commotion about something.
42. I talk it over and reason with my child when the child misbehaves.
43. I slap my child when the child misbehaves.
44. I disagree with my child.
45. I allow my child to interrupt others.
46. I have warm and intimate times together with my child.
47. When two children are fighting, I discipline the children first and ask questions later.
48. I encourage my child to freely express himself/herself even when disagreeing with parents.
49. I bribe my child with rewards to bring about compliance.
50. I scold or criticize when my child's behavior doesn't meet my expectations.
51. I show respect for my child's opinions by encouraging my child to express them.
52. I set strict well-established rules for my child.
53. I explain to my child how I feel about the child's good and bad behavior.
54. I use threats as punishment with little or no justification.
55. I take into account my child's preferences in making plans for the family.
56. When my child asks why he/she has to conform, I state: because I said so, or I am your parent and I want you to.
57. I appear unsure on how to solve my child's misbehavior.
58. I explain the consequences of my child's behavior.
59. I demand that my child do things.
60. I channel my child's misbehavior into a more acceptable activity.
61. I shove my child when the child is disobedient.
62. I emphasize the reasons for rules.

Appendix E

Background and Involvement Questionnaire

How many times per week do you typically engage in the following activities?

None 1-3 times 4-6 times More than 6 times

1. Sing songs or nursery rhymes
2. Read books
3. Tell stories
4. Play inside with toys or games
5. Hug or show physical affection
6. Tell child you love him/her
7. Let child help you with household chores
8. Play imaginary games with child
9. Tell child you appreciate what he/she did
10. Other _____

For this section, write your answer in the blank:

How many hours do you spend alone with your child?

1. On a typical weekday?
2. On a typical weekend day?

How many hours do you spend playing with your child?

1. On a typical weekday?
2. On a typical weekend?

How many hours do you spend caregiving for your child?

1. On a typical weekend?
2. On a typical weekend?

Are you the primary caregiver for your child? Y / N

What is your ethnicity?

- Black/African-American
- Hispanic
- Caucasian
- Asian/Pacific Islander
- Native American/Alaska Native
- Other/Multi-Racial/_____ (fill in the blank)
- I prefer not to answer

What is your gender?

- Male
- Female
- I prefer not to answer

What is your marital status?

- Single, never married
- Married or domestic partnership
- Widowed
- Divorced
- Separated

What is your household's average annual income?
(1) $0 – 14,999
(2) $15,000 – $34,999
(3) $35,000 - $49,999
(4) $50,000 - $64,999
(5) $65,000 - $74,999
(6) $75,000 - $99,999
(7) $100,000 or more

How many people (including all adults and children) live in your household?
(1) One
(2) Two
(3) Three
(5) Four
(6) Five
(7) Six
(7) Seven or more

What is the highest level of education you have completed?
(1) 12 grade or less
(2) Graduated high school or equivalent
(3) Some college, no degree
(4) Associate degree
(5) Bachelor's degree
(6) Post-graduate degree