



Unique effects of socioeconomic and emotional parental challenges on children's executive functions

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ABSTRACT

Socioeconomic disparities undermine the development of children's executive functions (EF), whereas links between parental emotional challenges and EFs have been understudied. In an ethnically-diverse sample of 102 kindergarteners (M age = 5.61 years), linear and quadratic associations emerged between two types of parental challenges and direct assessments of children's EFs. Consistent with previous research, exposure to socioeconomic challenges was associated with lower levels of children's EFs. In contrast, the optimal levels of emotional challenge exposure differed depending on the affective nature of the EFs. Emotional challenges were linked to cool and assessor-rated EFs in a non-linear, inverted U-shaped fashion, whereas hot EFs linearly increased with exposure to emotional challenges. Corroborating the notion of a "steeling effect," mild-to-moderate parental emotional challenges were related to better EFs in a community sample.

1. Introduction

Striking socioeconomic disparities in children's developmental outcomes have been documented before children enter school in the United States (Reardon & Portilla, 2016). Socioeconomic challenges, typically indexed by lower levels of family income, parental education, and social status, affect the quality of children's early environments and their access to resources (Bradley & Corwyn, 2002; Duncan, Magnuson, & Votruba-Drzal, 2014). In addition to the well-established risks of living in or near poverty (Bradley & Corwyn, 2002; Evans & English, 2002; Raver, Blair, & Willoughby, 2013), significant economic disparities in developmental outcomes have been documented between middle- and high-income children (Reardon, 2011). Separately, parental emotional challenges, such as marital conflict, lack of social support, and parental distress have also been shown to impact children's early development by undermining parents' capacities to provide sensitive and responsive care (Choe, Olson, & Sameroff, 2013; Heberle, Krill, Briggs-Gowan, & Carter, 2015) or by exposing children to more chaotic and distressing family dynamics (McCoy, Cummings, & Davies, 2009). Although high levels of financial stress can increase the likelihood of parental emotional challenges, highly educated and affluent adults also experience stress, parental role overload, and mental health challenges (Luthar & Ciciolla, 2015; West, Reed, & Gildengorin, 1998) and can be perceived by their children to be emotionally unavailable (Luthar & Latendresse, 2005). Both socioeconomic and emotional aspects of the early family environment play a

critical role in the development of children's executive functions (EFs), higher-order cognitive skills that support self-regulation of attention and behavior. However, less is known about the unique effects of both socioeconomic and emotional challenges on EFs, especially in community samples with a wide distribution of incomes and educational attainment, where the two types of challenges may not co-occur. Furthermore, extant research has largely focused on identifying linear relations between children's family experiences and EFs, obscuring our understanding of whether exposure to mild to moderate challenges in the early years may be promotive of EF development. The current study uses a community sample to examine how socioeconomic and emotional challenges linearly and non-linearly relate to kindergarteners' EFs.

1.1. Socioeconomic disparities and executive functions

Socioeconomic status, a composite measure of family income, parental education, and sometimes occupational prestige, has been consistently correlated with children's EFs (Hackman & Farah, 2009; Noble, McCandliss, & Farah, 2007). Some studies report independent effects of maternal education and family income on children's EFs (Hackman, Gallop, Evans, & Farah, 2015; Raver et al., 2013), whereas others highlight the importance of family financial resources (Piotrowski, Lapierre, & Linebarger, 2013). Positive linear associations between family socioeconomic status, as indexed by parental income and education, and EFs have been reported in both low- and high-risk samples

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(Choe et al., 2013; Lengua et al., 2015; Obradović, Portilla, & Ballard, 2015; Raver et al., 2013). Significant gaps between low-, middle-, and high-income parents' investments in cognitively-stimulating materials and learning activities in and out of the home (Bassok, Finch, Lee, Reardon, & Waldfogel, 2016; Espinosa, Laffey, Whittaker, & Sheng, 2006; Hackman et al., 2015) may account for socioeconomic disparities in young children's EFs. There are also well-documented socioeconomic differences in access to high-quality and center-based preschool programs, which are known to benefit children's cognitive development (Bassok & Galdo, 2016; Loeb, Bridges, Bassok, Fuller, & Rumberger, 2007; Magnuson & Waldfogel, 2005).

Subjective perceptions of financial stress and social status have been linked to children's socio-emotional and cognitive development, including measures of EFs (Leininger & Kalil, 2014; Ponnet, 2014; Ursache, Noble, & Blair, 2015). These subjective measures have been shown to predict children's EFs over and above objective measures of socioeconomic status in a sample representing a wide distribution of parental income and education (Ursache et al., 2015). Using measures of financial stress and subjective socioeconomic status in conjunction with traditional measures of objective socioeconomic status may also address the fact that indices of parental income and education can be restricted or skewed in community samples. Averaging subjective and objective measures of socioeconomic status creates a more comprehensive measure of the socioeconomic challenges that parents face.

1.2. Emotional challenges and executive functions

Since the quality of parental caregiving is implicated in EF development (Blair & Raver, 2012), it is important to examine how related parental emotional challenges, such as marital conflict, parental burnout, and distress, are related to developing EFs. Most research has focused on how more severe measures of emotional adversity, such as maternal depression, parental maltreatment, and institutional deprivation, relate to EF development using at-risk samples (Colvert et al., 2008; Hughes, Roman, Hart, & Ensor, 2013). There has been a limited amount of research on community samples linking normative experiences of various parental emotional challenges to children's EFs. In middle- to high-income families, Choe et al. (2013) have linked a composite measure of maternal internalizing symptoms, interpersonal sensitivity, and hostility, to children's EFs at age three. Similarly, in a longitudinal community sample, maternal depressive symptoms during the preschool years have been uniquely associated with poorer EFs in early childhood (Hughes et al., 2013). Further, in socio-demographically diverse samples, mothers with higher levels of social support have been shown to report lower levels of depressive and anxiety symptoms (Kingsbury et al., 2015; Skipstein, Janson, Kjeldsen, Nilsen, & Mathiesen, 2012), along with more positive parenting practices (Heberle et al., 2015) and higher cognitive skills in children (Slykerman et al., 2005). Since parents at all socioeconomic levels report experiencing emotional challenges (Choe et al., 2013; Luthar & Cicciolla, 2015), we need more research on how emotional challenges are uniquely related to developing EFs in community samples.

Parental emotional challenges tend to capture proximal and dynamic experiences compared to the more distal measures of income and parent education (Obradović, Shaffer, & Masten, 2012), and as such, they may impact development of children's EF capacities in different ways. For example, witnessing emotional discord at home may directly challenge children's abilities to regulate their emotions and behavior, whereas socioeconomic resources may affect children's access to stimulating experiences. Sektnan, McClelland, Acock, and Morrison (2010) found that socioeconomic and emotional challenges, such as maternal depression, family income, and parental education, independently contributed to parent-rated self-regulation skills in a diverse sample of young children. However, since parents reported on both the challenge predictors and the children's outcomes, the

generalizability of this study's findings is limited. It is important to extend to this research by employing more objective, task-based measures of children's regulatory skills that eliminate the same-informant bias.

1.3. Non-linear effects of challenges on children's development

Researchers have theorized that not all levels of risk exposure are deleterious to children's development and that there are non-linear effects such that limited challenging experiences may be beneficial for children (Dienstbier, 1989; Rutter, 2006). For example, Rutter suggested that moderate levels of stress exposure might help build individual's resilience to future stressors (Rutter, 2006). This so-called "steeling" or "inoculation" effect implies that some challenging experiences may strengthen later resistance to stress by providing opportunities to successfully overcome limited adversity. In a nationally-representative sample of adults, Seery, Holman, and Silver (2010) corroborated this idea; they found curvilinear relations between lifetime adversity and well-being. Moderate levels of adversity, as indexed by three to four self-reported negative lifetime events (e.g. illness or injury, violence, family member's death, financial difficulties, relationship stress), were associated with the lowest levels of distress, functional impairment, and posttraumatic stress disorder symptoms and the highest amounts of life satisfaction when compared to low or high levels of lifetime adversity. However, most extant studies of adversity effects in early childhood employ linear models, where chronicity or severity of challenges predict a higher probability of negative outcomes (Evans, Li, & Whipple, 2013; Trentacosta et al., 2008), limiting our understanding of when and how non-linear effects emerge (Obradović, 2016).

Limited exposure to emotional challenges in the home may provide children with opportunities to practice self-regulation on a daily basis that could enhance their EFs over time. For example, children of parents who report mild parenting stress, marital conflict, or difficulties with their own emotions, may have more chances to learn how to cope with these limited challenges through regulating their own emotions and behavior compared to children of parents who report no discord at home. This idea is consistent with the finding that mid-range levels of parent-infant synchrony, which allow for mismatched emotional states and unpredictability, can be more promotive of maternal sensitivity (Bornstein & Manian, 2013) and attachment security (Jaffe et al., 2001) than high levels of coordination. However, complete asynchrony contributes to insecure attachment and low maternal sensitivity, as mothers become withdrawn and unresponsive. Similarly, higher levels of emotional challenges would most likely overwhelm children's capacities for self-regulation and undermine development of these skills over time.

1.4. Hot and cool executive functions during early childhood

Researchers often distinguish between "cool" EFs which reflect cognitive control in emotionally-neutral contexts, and "hot" EFs which reflect cognitive control in response to motivationally- and emotionally-significant demands (Prencipe et al., 2011; Zelazo & Carlson, 2012). Cool EFs are assessed in relatively abstract contexts, whereas hot EFs are assessed in contexts which involve rewards, such as gambling or waiting for a treat. A growing body of research suggests that contextual factors, such as the reliability of the experimenter in providing promised materials, can influence participants' performance on EF tasks in laboratory settings (Kidd, Palmeri, & Aslin, 2013; Mittal, Griskevicius, Simpson, Sung, & Young, 2015). Children's perceptions of the laboratory environment could affect the emotional valence of cool EF tasks, making the distinction between expression of hot and cool EFs less clear. Although both are considered "top-down" processes, hot and cool EFs have different neural correlates and developmental trajectories (Prencipe et al., 2011; Zelazo & Carlson, 2012). Lesion studies have

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