Journal of Experimental Child Psychology 164 (2017) 1–15

Contents lists available at ScienceDirect

Journal of Experimental Child Psychology

journal homepage: www.elsevier.com/locate/jecp

Intergenerational associations in executive function between mothers and children in the context of risk

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ARTICLE INFO

Article history:
Received 31 March 2017
Revised 5 July 2017

Keywords:
Executive function
Inhibitory control
Working memory
Mothers
Children
Socioeconomic risk

ABSTRACT

Executive functioning (EF) is critical for school readiness and other important life skills. Previous investigations have often neglected the important influence of parental EF skills in shaping their own children's EF. This study attempted to replicate recent empirical work that has shown that maternal EF is positively related to child EF. An ecological theoretical framework was used to examine the maternal EF–child EF link in family environments characterized by significant risk and socioeconomic adversity. Data from 38 mother–child dyads revealed that larger maternal working memory capacity was associated with greater child accuracy and slower reaction times on a child-friendly Go/No-Go task of response inhibition but not on an Emotional Go/No-Go task. This finding suggests that in contexts of risk and adversity, slower reaction times, instead of reflecting weaker EF skills, might reflect an adaptive skill—that is, exercising appropriate caution and careful responding on a challenging task. Results provide additional evidence of an intergenerational link between maternal EF and child EF and yield new insights into the nature of EF in adverse environments.

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http://dx.doi.org/10.1016/j.jecp.2017.07.002
0022-0965/

Introduction

Executive functioning (EF) comprises a set of higher order cognitive processes that support the ability to regulate one's behavior (Best & Miller, 2010; Diamond, 2013). Often used interchangeably with terms such as *self-regulation* and *cognitive control*, executive functioning is typically conceptualized as three distinct but interrelated processes (e.g., Diamond, 2016): cognitive flexibility (paying attention and shifting attention between tasks), inhibitory control (controlling and withholding one's responses appropriately), and working memory (remembering rules while simultaneously engaging in other tasks).

Although consistent and compelling evidence indicates that EF—particularly working memory and inhibitory control—is a powerful predictor of child and adult outcomes (e.g., Blair & Razza, 2007; Diamond, 2016; Diamond, Barnett, Thomas, & Munro, 2007; Friedman, Miyake, Robinson, & Hewitt, 2011; McClelland, Acock, Piccinin, Rhea, & Stallings, 2013; McClelland et al., 2007; Moffitt et al., 2011; Tangney, Baumeister, & Boone, 2004), these outcomes have often been investigated separately with little regard to the meaningful influences that parents, particularly mothers, exert on their children. Given evidence that children develop higher order self-regulatory skills in part through exchanges with their caregivers (e.g., Cipriano-Essel, Skowron, Stifter, & Teti, 2013), we were interested in the extent to which child EF is influenced by similar EF abilities in parents. Because EF skills predict early school success and later outcomes, it was also important to explore how contextual factors, such as the broad home and family environment, might promote or impede the development of these skills. Therefore, a joint exploration of EF processes at the mother and child level would enable us to better understand how children develop EF skills and to what extent these skills are influenced by environmental factors. Our study was informed by an ecological theoretical framework to explore the link between maternal and child EF in the relatively understudied population of households characterized by significant risk and socioeconomic adversity.

Executive functioning in young children and adults

Early childhood is characterized by individual differences that underlie rapid growth in EF (Montroy, Bowles, Skibbe, McClelland, & Morrison, 2016). Inhibitory control has been a particular focus of research attention because it is among the earliest EF components to develop in young children (Diamond, 2016) and is fundamental to regulating one's behaviors during the transition to formal schooling. Inhibitory control and working memory appear to be correlated in young children (Senn, Espy, & Kaufmann, 2004), with cognitive flexibility (or set shifting) building on these two foundational processes (e.g., Morasch, Raj, & Bell, 2013). Factor models representing child EF are more likely to indicate two factors—inhibition and working memory—rather than the three factors more commonly found in adult EF data (e.g., Hughes, Ensor, Wilson, & Graham, 2010; St Clair-Thompson & Gathercole, 2006; Wiebe et al., 2011). In research that has examined theory of mind, working memory and inhibitory control together predicted theory of mind development better than either subskill alone (Carlson, Moses, & Breton, 2002). This finding suggests that these two subskills may interact in consequential ways to predict important cognitive and social outcomes for children.

Because the componential nature of EF is more evident in adults than in children (e.g., Miyake et al., 2000; Wiebe, Espy, & Charak, 2008), an examination of specific EF processes, particularly working memory, might be more appropriate when studying adult populations. Working memory capacity—a measure of working memory—reflects the number of items that can be successfully stored in memory at any given time (e.g., Engle, 2002) and is associated with the ability to use cognitive reappraisal and to self-regulate in stressful situations that are common in the parenting context (Deater-Deckard, Sewell, Petrill, & Thompson, 2010). Results from the change detection task indicate that working memory capacity is correlated with higher order cognitive abilities, indicating that this measure might provide important information about individual differences in fundamental cognitive processes (Cowan, Fristoe, Elliott, Brunner, & Saults, 2006; Rose, Feldman, & Jankowski, 2012; see Simmering, 2017, for a review). A low level of working memory is associated with low socioeconomic status (SES; Hackman et al., 2014), which in turn predicts higher levels of stress, poorer physical health, and greater incidence of psychopathology (Adler et al., 1994). EF capabilities are closely related with caregiving quality and parenting behaviors (Azar, Reitz, & Goslin, 2008), and individual differences in working memory capac-