



# Executive function in at-risk children: Importance of father-figure support and mother parenting



Alyssa S. Meuwissen<sup>\*</sup>, Michelle M. Englund

Institute of Child Development, University of Minnesota, 51 East River Rd, Minneapolis, MN, 55455, USA

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## ABSTRACT

Given the dearth of research about father-figures' influence on children's cognitive development, we investigated the impact of father support, together with maternal parenting, on children's executive function (EF) in the lab (42 and 54 months) and at school (K–3rd grade) in a longitudinal, prospective, at-risk sample ( $N = 182$ ) using path analysis. Both mother parenting and father-figure support significantly predicted child EF. In the final model, concurrent father-figure support was associated with child EF in both early and middle childhood, and mother parenting in early childhood predicted middle childhood EF. Attachment status moderated the path from mother parenting to early childhood lab EF; mother parenting significantly predicted early childhood EF only for securely attached participants. Findings suggest that both mothers and fathers are important for the development of EF in at-risk children, and point to the importance of including fathers in research and interventions.

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## 1. Introduction

Early caregiving experiences are widely recognized as salient for children's cognitive development (Carlson, 2009; De Bellis, 2005; NICHD Early Child Care Research Network, 2000). An important aspect of cognitive development that has gained increasing prominence in recent years is executive function (EF). EF refers to the processes used when controlling one's own behavior to achieve a goal (Carlson, Zelazo, & Faja, 2013). Although research clearly indicates that specific mothering behaviors (e.g., sensitivity, autonomy support, socialization) predict EF development in middle class samples (e.g., Bernier, Carlson, & Whipple, 2010; Kochanska, Murray, & Harlan, 2000; Sethi, Mischel, Aber, Shoda, & Rodriguez, 2000), we know much less about these parenting behaviors in at-risk families, where they are also likely to be very important. Furthermore, despite the recognition of the importance of men in children's lives, we know very little about the role of father-figures in the development of children's EF. Also, attachment status has been hypothesized to affect cognitive development by moderating children's ability to learn skills from high quality parenting (De Ruiter & van IJzendoorn, 1993), but this has not been examined thoroughly with EF outcomes.

Given the current state of the field regarding parenting and the development of EF in children, the purpose of the present study is three-fold. First, we seek to clarify the effects of mother parenting on children's EF by examining them in an at-risk sample. Second, we

examine whether the support that at-risk children receive from father-figures has an effect on the development of children's EF over and above mother parenting. Third, we consider the role of attachment status as a moderator in the relation between parenting and children's EF development.

### 1.1. Executive function

Executive function is a group of cognitive processes that includes the higher-level skills of working memory, inhibiting undesired behaviors, and mental flexibility (Mikaye, Friedman, Emerson, Witzki, & Howerter, 2000). This construct encompasses earlier ideas about self-regulation, such as delay of gratification, impulsivity, and ego control – a psychoanalytic idea reflecting the degree to which a person exercises control over their desires and wishes (Block & Block, 1980). EF skills provide the basis for regulating one's own behavior to make progress toward a goal. EF shows rapid development in the preschool years and continues maturing through adolescence (Carlson et al., 2013).

EF skills are important across development. Once a child enters school, a major developmental task is to apply their EF skills successfully to the school context (e.g., sitting still, following directions, staying focused on one's own work). Such skills have been identified as key components of school readiness. Teachers have identified EF skills as even more important than basic academic knowledge for children entering kindergarten (McClelland et al., 2007). Low EF is associated with decreased classroom adjustment and ability to learn in elementary grades (Masten et al., 2012). Furthermore, EF continues to be associated with outcomes across the lifespan, such as educational attainment, social skills, mental health, physical health, personal finances, and criminal

<sup>\*</sup> Corresponding author.

E-mail addresses: sinne035@umn.edu (A.S. Meuwissen), englu008@umn.edu (M.M. Englund).

offenses (Mischel et al., 2011; Moffitt et al., 2011), indicating that developing good EF skills in childhood is a crucial step toward long-term success.

Skills such as EF which have a protracted development may be especially affected by environmental influences, including parenting (Hughes & Ensor, 2009). Researchers have suggested that children develop EF by gradually internalizing self-regulation from their experiences of being externally regulated by soothing and calming efforts of caregivers (e.g., Bernier et al., 2010; Bowlby, 1969; Carlson, 2009; Drake, Belsky, & Fearon, 2014; Moss, Gosselin, Parent, Rousseau, & Dumont, 1997). Mothers are a key source of caregiving, and maternal parenting quality is correlated with child EF (e.g., Brophy-Herb, Stansbury, Bocknek, & Horodyski, 2012; Kochanska et al., 2000). Given that high-quality caregiving is a protective factor in stressful environments (Carlson, 2003), the role of caregiving may be particularly important for low SES children.

### 1.2. Characteristics of mother parenting that promote EF

A body of research has identified various mothering characteristics that may facilitate the internalization of regulation, including sensitivity (warm, responsive caregiving), autonomy support (providing an appropriate level of independence while not controlling tasks or letting the child struggle), and structure/limit setting (setting consistent expectations for children and following through on rules). Sensitivity provides a basis for children to develop expectations of their environment as predictable and reliable. Autonomy support allows children to use their cognitive skills to their highest ability, and practice EF skills such as planning and monitoring their own errors. Structure and limit setting allows children a better opportunity to control their own behavior because they know what is expected from them. These dimensions of sensitivity (Bernier et al., 2010; Brophy-Herb et al., 2012; Kochanska et al., 2000), autonomy support (Bernier et al., 2010; Matte-Gagne & Bernier, 2011; Sethi et al., 2000) and socialization of self-regulation (Brophy-Herb et al., 2012; Kochanska et al., 2000) from mothers have all been linked to EF development across the preschool years. However, other caregiving figures are also likely to have an influence on the child; high quality support from father-figures may be especially beneficial for EF development because these relationships provide unique experiences for the child (Lamb, 2004).

### 1.3. Father-figures and EF

As with most parenting research, research on parenting and EF has tended to focus only on mothers, to the exclusion of male caregivers. Yet we know that including father-figures is necessary to fully understand the context of development, and improves prediction of child outcomes (Cabrera, Tamis-LeMonda, Bradley, Hofferth, & Lamb, 2000; Cowan, 1997; Cox & Paley, 2003; Lamb, 2004). Father-figures in the home may be important resources for children's developing self-regulation skills, and this may be especially important in at-risk families. There is evidence that father-child interactions provide children enriching experiences that are unique from mother-child interactions, and that the high-energy, unpredictable play facilitated by father-figures may be an important context for practicing self-regulation skills (Grossmann, Grossmann, Kindler, & Zimmermann, 2008; Lamb, 2004). Children who interact with multiple caregivers, especially caregivers who differ in their parenting styles, may be exposed to a wider diversity of stimulation, requiring them to switch rule sets when interacting with different caregivers, thereby promoting EF (Cabrera et al., 2000). Therefore, it is important for research on the parenting antecedents of EF to include father-figures in addition to looking at mothers.

Although little research has focused on father-figures' influences on EF, high quality father parenting has been found to be related to various aspects of children's cognitive development more generally, including lower likelihood of cognitive delay in infancy (Bronte-Tinkew,

Carrano, Horowitz, & Kinukawa, 2008), lower levels of behavior problems in school-aged children (DeKlyen, Biernbaum, Speltz, & Greenberg, 1998), and higher IQ, math and reading scores, even independently of mother parenting (Amato & Rivera, 1999; Coley, Lewin-Bizan, & Carrano, 2011). The quality of father involvement has been shown to be more important for child outcomes than the amount of time a father spends with his child (Easterbrooks & Goldberg, 1984). Although the importance of father-figures for children's cognitive development has been established, the impact of father-figures on EF development in particular is yet to be thoroughly investigated.

Research on EF development is just beginning to include father-figures. Bernier, Carlson, Deschenes, and Matte-Gagne (2012) found that the quality of a father-child play interaction at 18 months was correlated with the child's conflict EF score at 3 years old. In another study, Roskam, Stievenart, Meunier, and Noel (2014) obtained self-reports from both mothers and fathers in Belgium on parenting behaviors such as monitoring, discipline, and consistency. They found that mother and father parenting behaviors were both significantly related to 2- to 8-year-old children's inhibition capacities in laboratory tasks, although mother effects were stronger. Furthermore, Meuwissen and Carlson (2015) found that father autonomy support/control was related to concurrent EF skills for preschool children. Most of this work has been done with middle to high income samples. Only one study, to our knowledge, has investigated father contributions to child EF in a high risk sample, and this study found that father sensitivity with their toddlers did predict later preschool EF (Towe-Goodman et al., 2014). There is still much to learn about the role of fathers in varying contexts.

### 1.4. Low SES as a risk factor for low EF

Socioeconomic status (SES) may be an especially important context for the development of EF. Children from low SES backgrounds appear to be at a higher risk for EF deficits (Clark et al., 2013; Hackman, Gallop, Evans, & Farah, 2015; Noble, McCandliss, & Farah, 2007; Rochette & Bernier, 2014). SES disparities in EF are apparent in children as young as 2 years old, and tend to persist through middle childhood. A significant portion of the association between SES and EF can be explained by the home and family environment (Hackman et al., 2015). For example, factors such as low parent education (Matte-Gagne & Bernier, 2011; Rafferty, Griffin, & Lodise, 2011), and having an adolescent mother (Rafferty et al., 2011) are more common in low SES families and have been associated with both lower quality of parenting and child EF deficits.

Indeed, the quality of parent-child relationships may be especially crucial for children in low SES families. In a sample of low-income adolescent mothers, Rafferty et al. (2011) found that the quality of mother parenting had a stronger effect on cognitive development than demographic risk factors. Mothers' sensitive caregiving predicts a variety of cognitive and social outcomes, and has been found to function as a buffer between children and stressful environments or social disadvantages (Carlson, 2003; Rochette & Bernier, 2014). In one important study that examined differences in how parenting influences EF in high- and low-SES families, Rochette and Bernier (2014) showed that mother parenting was more predictive of certain EF outcomes for lower-SES children than for higher-SES children, indicating that high quality parenting may be especially important in low-SES populations.

In addition to the importance of mother parenting, the quality of father-figure parenting is also a potentially important resource for low-SES children. The level of involvement by adult males in low-income families varies considerably, and fathers who are under high levels of life stress tend to be less involved with their children (Rosenberg & Wilcox, 2006). The Fragile Families study of low-income families in 20 US cities found that while most fathers were involved with their child's mother at the time of the birth, many faded from their children's lives in the next few years (Carlson & McLanahan, 2002). It is not clear in the literature, however, whether high quality,

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