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The relationship between executive functioning and language: Examining vocabulary, syntax, and language learning in preschoolers attending Head Start

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ABSTRACT

Early childhood marks a time of dynamic development within language and cognitive domains. Specifically, a body of research focuses on the development of language as related to executive functions, which are foundational cognitive skills that relate to both academic achievement and social–emotional development during early childhood and beyond. Although there is evidence to support the relationship between language and executive functions, existing studies focus mostly on vocabulary and fail to examine other components of language such as syntax and language learning skills. To address this gap, this study examined the relationship between executive functioning (EF) and three aspects of language: syntax, vocabulary, and language learning. A diverse sample of 182 children (67% Latino and 33% African American) attending Head Start were assessed on both EF and language ability. Findings demonstrated that EF related to a comprehensive latent construct of language composed of vocabulary, syntax, and language learning. EF also related to each individual component of language. This study furthers our understanding of the complex relationship between language and cognitive development by measuring EF as it relates to various components of language in a sample of preschoolers from low-income backgrounds.

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Introduction

Early childhood marks a time of rapid and dynamic development of language and cognition, both of which have been identified as core domains of children's school readiness (Phillips & Shonkoff, 2000; Snow & Van Hemel, 2008). Research suggests that individual differences in both of these domains exist before children enter formal schooling and that these differences relate to later achievement (Dickinson & Tabors, 2001; Ryan, Fauth, & Brooks-Gunn, 2006; Snow, 1983, 1991). Unfortunately, preschool-aged children from low-income backgrounds lag behind their higher-income peers in language and cognitive performance (Hoff, 2006, 2013; Ryan et al., 2006). This achievement gap is concerning considering the large number of children aged 5 years and under living below the poverty line (National Center for Children in Poverty, 2013) and considering that early language and cognitive performance sets the foundation for later academic success (Bull, Espy, & Wiebe, 2008; Catts, Fey, Zhang, & Tomblin, 1999; Fuhs, Nesbitt, Farran, & Dong, 2014; Griffin, Burns, & Snow, 1998).

To address this concern, early childhood researchers have focused on identifying and understanding the contribution of malleable, domain-general skills, such as executive functioning (EF), because they facilitate learning across domains (Blair & Razza, 2007; George & Greenfield, 2005; Nayfeld, Fuccillo, & Greenfield, 2013). These skills are particularly important to identify and foster among children from low-income families because they could potentially buffer against the negative effects associated with living in poverty (McClelland, Morrison, & Holmes, 2000). There is considerable evidence to suggest a relationship between young children's domain-general EF skills and language development (Bohlmann, Maier, & Palacios, 2015; Fuhs & Day, 2011; Weiland, Barata, & Yoshikawa, 2014). Although there is evidence to support this relationship, existing studies typically measure only vocabulary knowledge and fail to examine the relationship between EF and other components of language, such as syntax and language learning skills. It is critical to understand how various components of language interrelate with EF to effectively support development during early childhood. To address this need, this study examined the relationship between EF and three components of language—vocabulary, syntax, and language learning—in a sample of preschoolers attending Head Start.

Executive functioning during early childhood

Executive functions are a set of foundational cognitive skills that allow children to monitor and control thoughts and behavior. These skills help one to actively manipulate information, especially in problem-solving situations that require flexible thinking, inhibition of prepotent responses, and manipulation of information in working memory (Blair, 2002; Davidson, Amso, Anderson, & Diamond, 2006; Miyake et al., 2000). These functions facilitate the learning of new information and have been linked to multiple aspects of school readiness, including language, math, science, and social/emotional competence (Blair & Razza, 2007; Bull et al., 2008; Nayfeld et al., 2013; Ponitz, McClelland, Matthews, & Morrison, 2009).

When examining the relationship between EF and language, there is considerable theory and evidence to suggest that these two competencies are related. From a theoretical perspective, it is intuitive that children would need a certain amount of cognitive control and flexibility (i.e., EF) to effectively develop language (Samuelson & Smith, 2000; Woodward & Markman, 1998; Zosh, Brinster, & Halberda, 2013). Information processing theory claims that individuals receive input from the environment (i.e., sensory information) and subsequently use a variety of cognitive processes, including executive functions, to manage, manipulate, organize, and store this new information (Klahr & MacWhinney, 1998; Munakata, 2006). Research suggests that language development requires the use of this cognitive processing system to recruit and integrate information from a wide range of sources (Woodward & Markman, 1998; Zosh et al., 2013). During early childhood, these relationships are empirically supported; children who have higher EF have been shown to have higher language skills (Fuhs & Day, 2011; Fuhs et al., 2014; Hongwanishkul, Happaney, Lee, & Zelazo, 2005; Müller, Zelazo, & Imrisek, 2005; Weiland et al., 2014). These relationships have been found for many of the