



Associations among false-belief understanding, executive function, and social competence: A longitudinal analysis

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ABSTRACT

A growing number of studies demonstrate associations among false-belief understanding (FBU), executive function (EF), and social competence. This study extends previous studies by exploring longitudinal associations among FBU and its correlates within a low-income sample of preschoolers attending Head Start. Sixty-eight children (time 1 mean age = 5 years 2 months) were assessed over their preschool and kindergarten years. Results indicated bidirectional relations between FBU and social competence; FBU in preschool was positively associated with social competence in kindergarten and social competence in preschool was positively associated with FBU in kindergarten. Preschool EF was positively associated with social competence both in preschool and kindergarten and with FBU in preschool. Mediation analyses suggest that the bidirectional longitudinal link between FBU and social competence was independent of EF. These findings extend the FBU literature by examining its development and correlates in early childhood. Implications for future research and practice are discussed.

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1. Introduction

One aspect of social cognition that has received increased attention in recent years is the development of children's understanding of mind. Within this domain, false-belief understanding (FBU) has been the most often studied theory of mind development. Research suggests that during the preschool years, children acquire an understanding of false-belief; that is, they recognize that others can hold and act on beliefs that are untrue. Once children have acquired false-belief understanding, they are able to mentally represent one's own, as well as another's, mental state (Gopnik & Astington, 1988). Consequently, false-belief understanding serves as a primary indicator of developing theory of mind in young children.

Given that an understanding of the mind is believed to be a powerful social tool (Moore & Frye, 1991), researchers hypothesized that FBU serves important social functions. As expected, a growing body of research has linked FBU with increased prosocial behavior and decreased problem behavior (for review see Astington, 2003; Hughes & Leekam, 2004). A correlate of FBU and social competence that has received considerable attention in recent years is executive function (EF). EF refers to a collection of cognitive skills that underlie goal-directed behaviors (Welsh, Pennington, & Groisser, 1991). Research supports an association between EF and FBU during early childhood (Carlson, Mandell, & Williams, 2004; Frye, Zelazo, & Palfai, 1995). Moreover, research suggests that EF has implications for children's social competence (Fahie & Symons, 2003; Hughes, Dunn, & White, 1998).

Although a number of studies have shown that FBU and EF are important correlates of social competence, no studies have simultaneously examined the longitudinal associations among these constructs. To clarify the developmental pathways among FBU, EF, and social competence, we focused on the transition from preschool to kindergarten. This timeframe has special

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significance to both researchers and educators in that FBU and EF each have substantial implications for children's readiness for and adjustment to school, both socially and academically (Astington, 2003; Blair, 2002; Blair & Razza, 2007). Moreover, little is known about FBU and its links with EF and social competence in children from low-income and ethnically heterogeneous backgrounds. Thus, the present study explores these associations in a sample of children enrolled in Head Start, the federal educational daycare program for low SES children. The promotion of school readiness is especially important for such children, as they are at increased risk for school failure (Klebanov, Brooks-Gunn, McCarton, & McCormick, 1998; McLoyd, 1998).

1.1. The association between false-belief understanding and social competence

By definition, children who demonstrate an understanding of false-belief are able to interpret another person's mental state (Kuhn, 1999). From a theoretical perspective, this ability to interpret the perceptions, desires, and beliefs of other people has important implications for children's social development. Specifically, over the preschool years children become increasingly able to predict and explain associations between mental states and actions (Gopnik & Astington, 1988). During this time, children learn that mental states are related to both emotional and behavioral outcomes (Wimmer & Perner, 1983). Thus, children's knowledge of false-belief, coupled with their understanding of the association between belief and behavior, may influence children's social competence.

Although the concurrent association between FBU and social competence is supported within both normative and clinical samples (see Hughes & Leekam, 2004), the direction of this association remains unclear. One possibility frequently implied in the literature is that FBU promotes social competence. According to this theory, the ability to simultaneously represent multiple and conflicting beliefs may allow children to better coordinate their own thoughts and beliefs with those of others, which would result in more successful interactions (Astington & Jenkins, 1995). Empirical support for this theory comes from studies in which FBU accounts for unique and significant variance in children's social competence (Capage & Watson, 2001; Razza & Blair, 2003). Furthermore, longitudinal studies support FBU as a predictor of peer communication skills and social behavior (see Astington, 2003).

A second possibility is that positive social interaction stimulates the development of FBU. This theory is based on the premise that children's experiences with other people's thoughts and beliefs during pretend play may increase their awareness of the distinction between mental states and reality, which would foster FBU (Flavell, Flavell, & Green, 1987; Youngblade & Dunn, 1995). Empirical support for this theory is found in the literature, albeit via a broad interpretation of social competence. For instance, cooperation with siblings and engagement in conversation about emotions and the causes of behavior predicted FBU in young children (Dunn, 1995).

A third possibility also exists, which is that the association between FBU and social competence is bidirectional, whereby positive social interactions present the opportunity for learning more about the association between thought and behavior, and increased understanding of one's own and other's minds encourages successful social behavior (Moore, Barresi, & Thompson, 1998; Watson, Nixon, Wilson, & Capage, 1999). Moreover, recent reviews of the literature provide support in favor of a reciprocal association (Astington, 2003; Hughes & Leekam, 2004). Unfortunately, however, this model has not been widely tested in single studies. Thus, the first goal of this study is to clarify the direction of the association between FBU and social competence across the preschool and kindergarten years.

1.2. The association between false-belief understanding and executive function

EF refers generally to cognitive processes that support goal-oriented behavior. More specifically, EF refers to inhibitory control, attentional flexibility, and working memory processes that are understood to be central to engagement in and successful completion of relational reasoning and planning and problem solving tasks (Diamond, 2002; Welsh et al., 1991). The extant literature supports EF as an important correlate of FBU during the preschool years (Carlson & Moses, 2001; Hughes, 1998a,b). Specifically, concurrent associations have been found between FBU and EF components, including attentional flexibility (Frye et al., 1995), inhibitory control (Carlson & Moses, 2001), and working memory (Hughes, 1998a).

A growing body of research supports the hypothesis that EF precedes and is necessary for the acquisition of FBU. This argument is consistent with the *emergence* account of false-belief development, which asserts that a certain level of executive ability is required for the construction of mental concepts. In other words, the ability to consider multiple mental representations is not possible without some executive skill (see Moses, 2001). Consistent with this hypothesis, cross-sectional research suggests that EF accounts for unique and significant variance in children's FBU (Carlson, Moses, & Breton, 2002; Hughes, 1998a). Moreover, longitudinal research suggests that EF, specifically inhibitory control, contributes to FBU, but not vice versa (Carlson et al., 2004; Hughes, 1998b). Despite these findings, the developmental ordering of EF and FBU remains unclear. For example, once initial FBU scores were considered in a model predicting later FBU from initial EF, only one of four EF tasks was an independent predictor of later FBU (Hughes, 1998b). Moreover, when EF was an independent predictor of FBU, FBU scores were not correlated across the two time points (Carlson et al., 2004). Given that EF may influence later FBU primarily through its concurrent association with FBU, we examined FBU at T1 as a mediator of the link between EF at T1 and FBU at T2 (see Fig. 1).

Although the directional association between EF and FBU has important implications for understanding cognitive development, this association may also reveal specific links between cognitive and social development. EF has been linked with self-regulation (Cole, Usher, & Cargo, 1993), and impairments in EF have been consistently reported for childhood disorders including autism and ADHD (for review, see Pennington & Ozonoff, 1996). Given the associations among EF and social competence (Hughes et al., 1998; Shultz, Izard, Ackerman, & Youngstrom, 2001), EF and FBU (Carlson et al., 2004; Hughes, 1998b), and FBU and social competence (for review, see Astington, 2003; Hughes & Leekam, 2004), it has been proposed that EF may impact social competence both directly and indirectly (Hughes et al., 1998). Thus, it is possible that FBU partially mediates the association between EF and social

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