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## Late, but not early, arriving younger siblings foster firstborns' understanding of second-order false belief



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### ABSTRACT

This study examined the influence of younger siblings on children's understanding of second-order false belief. In a representative community sample of firstborn children ( $N = 229$ ) with a mean age of 7 years ( $SD = 4.58$ ), false belief was assessed during a home visit using an adaptation of a well-established second-order false belief narrative enacted with Playmobil figures. Children's responses were coded to establish performance on second-order false belief questions. When controlling for verbal IQ and age, the existence of a younger sibling predicted a twofold advantage in children's second-order false belief performance, yet this was the case only for firstborns who experienced the arrival of a sibling after their second birthday. These findings provide a foundation for future research on family influences on social cognition.

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### Introduction

Individual differences in children's development of *theory of mind* (ToM), defined as the "understanding of mental states, what we know or believe about thoughts, desires, emotions, and other psychological entities both in ourselves and in others" (Miller, 2009, p. 749), have traditionally

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been explored using the *false belief task* (Perner & Wimmer, 1983). Researchers have noted various sources of individual differences on this task, including number of siblings (Lewis, Freeman, Kyriakidou, Maridaki-Kassotaki, & Berridge, 1996; McAlister & Peterson, 2007; Perner, Ruffman, & Leekam, 1994; Ruffman, Perner, Naito, Parkin, & Clements, 1998), family sociodemographic status (Cole & Mitchell, 2000; Cutting & Dunn, 1999), and maternal education level (Pears & Moses, 2003). Passing false belief tasks has also been found to be related to children's language (Astington & Jenkins, 1999) and executive function (Carlson & Moses, 2001).

Although it is well established that preschoolers with older siblings outperform those without siblings on ToM tasks (Lewis et al., 1996; Ruffman et al., 1998), the influence of younger siblings on ToM remains unclear. Piaget (1959) suggested that both younger and older siblings facilitate social understanding through discussion and reflection. Dunn (1994) claimed that siblings influence social understanding through talk about causality and internal states, management of conflict by parents, joint play, shared jokes, and reasoning about moral issues; both younger and older siblings may equally facilitate ToM (Jenkins & Astington, 1996; Perner et al., 1994; Peterson, 2000). Indeed, in a recent meta-analysis by Devine and Hughes (2016), the number of child-aged siblings, regardless of birth order, predicted false belief understanding during early childhood.

Despite these findings, the evidence is mixed. Some studies found no effect of younger siblings on ToM tasks (Calero, Semelman, Salles, & Sigman, 2013; Farhadian et al., 2010; Ruffman et al., 1998; Shahaieian, 2015), and in one case younger siblings had a negative effect on ToM (Wright & Mahford, 2012). Younger siblings may influence ToM development negatively by placing increased demands on parents' time, resulting in a decrease in mother–firstborn positive interactions (Baydar, Greek, & Brooks-Gunn, 1997), including play and conversation with the firstborn child (Dunn & Kendrick, 1980a, 1980b). It is also possible that parents' explanations to their firstborn children are frequently interrupted due to younger siblings' demands (Wright & Mahford, 2012). The *age threshold model* proposes that younger siblings may need to reach a certain threshold in age before providing a positive influence on ToM (Kennedy, Lagattuta, & Sayfan, 2015). If so, it is possible that some null findings may be due to the younger siblings in those studies being too young to provide any advantage.

Younger siblings may become more important in fostering children's more advanced understanding of minds during middle childhood, but research on sibling influences on the later development of ToM remains limited (Devine & Hughes, 2016; Hughes, 2016; Miller, 2009). Most studies examining younger sibling influence on ToM focused on first-order false belief tasks (Miller, 2009). However, during middle childhood, second-order false belief tasks are thought to be more age appropriate (Perner & Wimmer, 1985). Whereas first-order false belief tasks typically assess children's understanding that someone may have beliefs that differ from their own, a second-order task assesses whether children understand that one story character can have a mistaken belief about another character's belief. Some children pass this higher-order test of ToM between 6 and 7 years of age (Perner & Wimmer, 1985).

Findings about sibling influence on ToM in older children are mixed; in some cases both younger and older siblings facilitated higher-order ToM performance (Kennedy et al., 2015; McAlister & Peterson, 2007), but in other studies younger siblings had no effect (Calero et al., 2013; Miller, 2013). It is possible that older siblings begin to benefit from younger siblings as the latter become more proficient playmates (Lagattuta et al., 2015). Alternatively, as firstborn children start school and spend less time with family members, the initial sibling advantage may disappear.

Before a more definitive conclusion can be drawn, larger-scale studies are required to tease apart the benefits of particular kinds of sibling constellations (Cassidy, Fineberg, Brown & Perkins, 2005). Studies finding no effect of younger siblings may have lacked sufficient statistical power to detect smaller effects once samples are separated into *sibling constellation groups* (i.e., sibling presence, birth order, age spacing, and gender composition) (see Miller, 2013). "Only child" subsamples typically are small (Miller, 2013). This not only leads to a decrease in power to detect an advantage in having a sibling over none but also results in samples with a very high proportion of children who have siblings—in some studies more than 90%, which exceeds the estimate that 80% of children in Western families have a sibling (Volling, 2012).

Although previous research on ToM has highlighted covariates that need to be accounted for in studies of sibling influence, rarely have these all been controlled in a single study, which may also explain the mixed findings. These covariates include child age (Wellman, Cross, & Watson, 2001),

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