Cognitive Development 39 (2016) 93–102

Contents lists available at ScienceDirect

Cognitive Development

Sibling cognitive sensitivity as a moderator of the relationship between sibship size and children's theory of mind: A longitudinal analysis

Heather Prime[a], André Plamondon[b], Sharon Pauker[a], Michal Perlman[a], Jennifer M. Jenkins[a,*]

[a] Ontario Institute for Studies in Education, University of Toronto, 252 Bloor St. West, Toronto, Ontario, Canada
[b] Laval University, 2320, rue des Bibliothèques Québec, Quebec City, QC, Canada

ARTICLE INFO

Article history:
Received 3 February 2015
Received in revised form 26 February 2016
Accepted 6 March 2016

Keywords:
Sibling interactions
Sibship size
Cognitive sensitivity
Theory of mind
Moderation

ABSTRACT

Inconsistent findings regarding the association between sibship size (i.e., number of children in the home) and children's theory of mind led us to hypothesize a moderating role for quality of sibling interactions. In line with a parental resource dilution framework, it was expected that coming from a large sibship (3+ children) would be associated with lower theory of mind scores in the absence of a cognitively sensitive older sibling. Data were collected from 385 children and their next in age older siblings: at Time 1 children were 3.15 years (*SD* = 0.27) and their older siblings were 5.57 years (*SD* = 0.77). Children were, on average, 1.65 years older at Time 2. A longitudinal design, wherein theory of mind (Time 2) was predicted while controlling for earlier theory of mind (Time 1), was used to support directionality of effects. Results indicated that sibship size was negatively related to theory of mind at low but not high levels of sibling cognitive sensitivity. Findings suggest a compensatory role for cognitively sensitive older siblings in large families and highlight the need to consider process-based features of sibships.

A child's ability to represent their own and others' mental states and identify how they relate to behavior is critical to their ability to engage in meaningful social exchanges. Preschool represents a developmental period of substantial growth in mental state understanding and, despite a similar trajectory of development in typically developing children, individual differences in the speed of attainment are evident (Hughes et al., 2005; Wellman & Woolley, 1990). Different accounts for observed variability in theory of mind (ToM) development have been offered, including child- (e.g., language and executive functioning; Astington, 2001; Hughes & Ensor, 2005) and family-level (e.g., social disadvantage; Cutting & Dunn, 1999), as well as genetic (Hughes & Cutting, 1999) influences.

Children's social understanding is constructed within social interactions (Carpendale & Lewis, 2004; Fernyhough, 2008). Given that siblings afford children with heightened exposure to social contexts related to social-cognitive growth (i.e., pretend play, conflict, conversations; Dunn, 2002), there has been interest in children's ToM development in the context of their sibling environments. Perner, Ruffman, and Leekam (1994), as well as Jenkins and Astington (1996), showed a linear progression in false belief understanding with increasing sibship size (i.e., number of children in the home), suggesting that children learn about the effects of beliefs on behavior through interactions involving siblings. Since that time, however,

* Corresponding author at: Applied Psychology and Human Development, OISE/UT, 252 Bloor Street West, Floor 9-240, Toronto, ON M5S 1V6, Canada.
E-mail addresses: heather.prime@mail.utoronto.ca (H. Prime), andre.plamondon@gmail.com (A. Plamondon), sharon.pauker@gmail.com (S. Pauker), michal.perlman@utoronto.ca (M. Perlman), jenny.jenkins@utoronto.ca (J. M. Jenkins).

http://dx.doi.org/10.1016/j.cogdev.2016.03.005
0885-2014/

findings with respect to sibship size and ToM have been inconsistent. Some studies indicate that it is older and not younger siblings that are particularly important for children's ToM (Ruffman, Perner, Naito, Parkin, & Clements, 1998; McAlister & Peterson, 2013), while others suggest that the effect lies in the presence of more knowledgeable partners (e.g., older peers, parents, grandparents) rather than older siblings specifically (Lewis, Freeman, Kyriakidou, Maridaki-Kassotaki, & Berridge, 1996). Some studies have suggested that exposure to child-like minds (i.e., ages 12 months to 12 years) accounts for the sibling advantage rather than the total number of older and younger siblings in the household (Cassidy, Fineberg, Brown, & Perkins, 2005; McAlister & Peterson, 2007; Peterson, 2000). Finally, there are studies that have failed to show any advantage of having siblings in ToM development (Arranz, Artamendi, Olabarrieta, & Martin, 2002; Carlson & Moses, 2001; Hughes & Ensor, 2005; Pears & Moses, 2003; Peterson & Slaughter, 2003), and others that have indicated a disadvantage of having siblings (Cole & Mitchell, 2000; Tompkins, Farrar, & Guo, 2013). Thus, the current status of the association between sibship size and children's ToM abilities remains unclear.

Previous studies on this topic have focused on the structural features of sibships, which may be contributing to the observed inconsistencies in the literature (Arranz et al., 2002; Cutting & Dunn, 1999; Dunn, 2002). Assessing mere exposure to social input is not sufficient, as it is not just the amount but also the nature of children's social interactions that influence children's mental state understanding (Carpendale & Lewis, 2004; Dunn, 2002). For instance, affective quality is an important feature of social exchanges, functioning as it does to promote engagement, conversation and further interaction (Carpendale & Lewis, 2004). Additionally, cognitively-attuned input assists children in their internalization of social interactions, a key process in children's ToM development (Fernyhough, 2008). Indeed, sensitive qualities of parental behavior (i.e., affectionate and cognitively-attuned) have been linked to gains in children's social understanding (Laranjo, Bernier, Meins, & Carlson, 2010; Meins et al., 2002; Stevens, 2008).

Given the evidence for the relationship between cognitively-attuned and positively valenced input and children's ToM found in the parenting literature, the current study sought to look at sibling sensitivity as a potential moderator of the relationship between sibship size and ToM. Typical processes explored in sibling dyads include affective quality (Dunn, Slomkowski, & Beardsall, 1994), teaching and scaffolding behaviour (e.g., Howe & Recchia, 2009; Klein, Feldman, & Zarur, 2002), as well as provision of mind-related input such as internal state talk (e.g., Dunn, Brown, Slomkowski, Tesla, & Youngblade, 1991; Howe, Petrakos, & Rinaldi, 1998; Jenkins, Turrell, Kogushi, Lollis, & Ross, 2003). Previously, a measure called *cognitive sensitivity* was developed to gauge the extent to which social partners (i.e., parents and siblings) engage in behaviours that promote the development of children's social and cognitive development (Prime et al., 2015; Prime, Perlman, Tackett, & Jenkins, 2014). The measure integrates elements of affective (i.e., positively valenced turn-taking), communicative (i.e., provision of readily understandable information) and mind-reading (i.e., assessing and responding to verbal and nonverbal cues) behavior to measure partner sensitivity to children's inferred cognitive states. There is demonstrated variability in the extent to which siblings can identify and sensitively respond to children's levels of cognitive functioning (Prime, Perlman et al., 2014). The current study utilized this measure to index a potential moderating factor.

In thinking about the ways in which the relationship between sibship size and ToM development might change as a function of sibling cognitive sensitivity, it is useful to consider the larger literature on sibship size and children's cognitive development. Children growing up with siblings have been shown to demonstrate poorer language skills, IQ, and academic achievement (Downey, 1995, 2001; Zubrick, Taylor, Rice & Slegers, 2007). This pattern of findings has been explained primarily through a process of resource dilution; as families grow, a finite amount of parental resources (both economic and interpersonal) are diluted so that each individual child receives less from their parents (Downey, 1995, 2001; Lawson & Mace, 2009). There is evidence to suggest that sensitive older siblings can compensate for this effect. In a recent study, children from large sibships were at risk for poor receptive vocabulary development when they had siblings with low levels of sensitivity. This effect was not observed in children whose siblings were high in sensitivity (Prime, Pauker, Plamondon, Perlman, & Jenkins, 2014). We would expect a similar pattern in ToM development, given the significant behavioural overlap between ToM and other measures of cognitive development, including language (Wade, Browne, Plamondon, Daniel, & Jenkins, 2015). That is, children with more siblings may be at risk for poor development of ToM, by way of diluted parental resources, if they do not have older siblings who themselves engage in ToM-promoting (i.e., sensitive) behaviours. Older siblings, in particular, are better able to respond sensitively to their preschool sibling's inferred mental states than younger siblings. This is likely related to their older age and, thus, heightened skill-set (Prime, Perlman et al., 2014), and/or the power differential inherent to sibling dyads (Perlman, Siddiqui, Ram, & Ross, 2000). Thus, we were interested in looking at older, as opposed to younger, siblings' cognitive sensitivity as a potential moderating factor.

It was hypothesized that coming from a larger sibship (i.e., 3+ children) would be associated with lower ToM. However, we expected that this would be qualified by an interaction between sibship size and older sibling cognitive sensitivity; children from larger sibships will show enhanced ToM when they have older siblings with high versus low levels of cognitive sensitivity. That is, siblings with high levels of cognitive sensitivity will play a compensatory role in large sibships.

1. Current study

The current study utilized a longitudinal design to investigate older sibling cognitive sensitivity as a moderator of the relationship between sibship size and preschool children's ToM development. Previous studies on siblings and theory of mind have been primarily cross-sectional (with some exceptions; McAlister & Peterson, 2007, 2013). A longitudinal design