## False-belief understanding and social preference over the first two years of school: A longitudinal study

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# False-Belief Understanding and Social Preference Over the First 2 Years of School: A Longitudinal Study

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The role of false belief in establishing children's social relationships during the transition to school was examined and compared to other social cognitive constructs. One hundred and fourteen 5-year-olds were recruited during their 1st year of school (Time 1); 106 children were retained 1 year later. False belief, emotion expression recognition, empathy, verbal ability, and peer-rated social preference were measured at both times. False belief at Time 1 had a direct influence on concurrent social preference, over and above the influence of emotion expression recognition and empathy. False belief made no independent contribution to later social preference accounting for stability in social preference. The role of social cognitive development is discussed with respect to how children establish and maintain their position in a peer group.

The successful management of peer relations has far-reaching implications for later socioemotional well-being, academic performance, and school adjustment (Johnson, Ironsmith, Snow, & Poteat, 2000; McDougall, Hymel, Vaillancourt, & Mercer, 2001; Parker & Asher, 1987). One feature of young children that has received sustained attention because of its presumed influence on peer social relationships is theory of mind (ToM), the ability to understand other's actions in terms of mental states (Wellman, 1990). Although ToM, and its core component false-belief (FB) understanding (Wellman, Cross, & Watson, 2001), is thought to be a fundamental skill enabling children to function adaptively in social situations, few studies have addressed the question of how FB *over time* is linked with the ability to *establish* and *maintain* peer relationships.

A recent meta-analysis by Slaughter, Imuta, Peterson, and Henry (2014) highlights the need to clarify the longitudinal impact of ToM on social relationships, both from a theoretical standpoint to determine whether individual differences in ToM do in fact have an important and lasting influence on later social relationships, and from an applied clinical standpoint to inform the design and timing of interventions for children at risk of social isolation. The few existing longitudinal studies (Banerjee, Watling, & Caputi, 2011; Caputi, Lecce, Pagnin, & Banerjee, 2012) have not yet examined the specific and unique influence of FB on social relationships during the first years of formal schooling, a key time in a child's life when he or she is negotiating a new social context. Importantly, this period covers both the initial establishment of relationships in a new peer group and the maintenance of these relations. To address this gap in the literature, the current study comprises a longitudinal examination of the influence of FB on children's social relationships during the first 2 years of formal schooling. Furthermore, in addition to examining how and when the influence of FB on social relationships may come about, it is crucial to distinguish the influence of FB on social relationships from the likely influences of closely related domains of children's social cognition, such as their ability to recognize emotional expressions and their empathic orientation (de Rosnay, Harris, & Pons, 2008; Saarni, 1999). Thus, in the current study, we employ a

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longitudinal approach to determine the respective roles of FB, emotion expression recognition, and empathic orientation in establishing children's social relationships in the 1st year of formal schooling, and whether early FB has an independent, longitudinal influence on children's later social relationships during their 2nd year of schooling.

There are two key accounts for why FB should be related to children's social relationships. First, consistent with the early proposal of Lalonde and Chandler (1995), children with more advanced FB may be at an advantage when establishing peer relationships because they are better able to understand the perspectives of their peers; that is, FB allows children to read and respond to complex social situations more effectively (Astington, 2001; Astington & Jenkins, 2000; Hughes & Leekam, 2004; Moore & Frye, 1991). Second, the social nature of peer interaction itself may provide opportunities for children to hone their understanding of mind (Hughes & Leekam, 2004). Taken together, a reciprocal association is plausible, such that children with better FB are more able to adapt to social interactions and manage relationships more effectively, which in turn provides a social context that supports the growth of their psychological understanding, including their FB (Dockett & Degotardi, 1997; Slaughter, Dennis, & Pritchard, 2002). It is this theoretical supposition that a longitudinal approach is uniquely able to examine.

Based on these two accounts of the possible relations between FB and social relationships, predictions can be made about expected concurrent and longitudinal relations between them. The most straightforward prediction is that young children use their FB understanding *directly* to manage their social interactions, and therefore, higher levels of FB understanding should predict more effective social interactions concurrently, once children have had some time to learn about each other in a school context (Denham & Holt, 1993). In this view, it might also be expected that children with higher levels of FB in the 1st year of school will fare more favorably with peers a year later, and it is important to examine this possible longitudinal association. It is also important to note that if this view is correct, longitudinal stability in children's social relationships may to some extent turn on the enduring influence of individual differences in FB understanding. This point is elaborated below.

In addition to the view that FB may exert a direct influence on social relationships, Astington (2001) has argued: "A more important question, perhaps, is whether there are consequences of an early understanding of false-belief that endure and are apparent later on" (p. 687). Astington's question, while raised in relation to preschool children, expresses an important developmental possibility: Earlier individual differences in FB may set in motion distinctive sociodevelopmental pathways that take on their own momentum. In the context of the current investigation, the enduring consequences of early individual differences in FB may be that children's social position, which reflects their social track record, becomes self-maintaining (Denham & Holt, 1993; de Rosnay et al., 2008; Ladd, Price, & Hart, 1988). In this view, children's position in a social network, once established, should be relatively stable because it reflects inherent (social) structure, and one would thus predict, given a relatively stable social environment, that social position is resilient to change. Interestingly, this view implies that the influence of child factors (i.e., social understanding, including FB) on social relationships should be strongest when children enter new environments.

Given the importance placed on FB for influencing and shaping peer interaction, it is crucial to choose an appropriate index to measure children's social relationships. The enduring nature of social structures in school settings is arguably captured in peer-rated measures of sociometric status or *social preference.* Social preference was specifically chosen to capture the complex nature of social relationships, as each child's social preference score comprises a composite score from multiple peer raters. This provides a unique insight into how children's social relationships are perceived and integrated in their peer group at school. Such insights are not typically captured by teacher- or parent-rated measures of social competencies (e.g., Babad, 2001; Cillessen & Mayeux, 2004; French & Waas, 1986).

While the fundamental function of ToM understanding is to "master social situations" (Begeer, Malle, Nieuwland, & Keysar, 2010), no study has directly examined how early-appearing social preference—a sociometric index—and FB—an individual cognitive capacity—influence each other both concurrently and over time. The current literature with 4- to 7-year-olds offers some support for concurrent and longitudinal associations between ToM and children's social behavior, more broadly construed. For example, parent and teacher ratings of children's social competencies (e.g., prosocial behavior and social skills) have been shown to be associated with FB and other ToM measures (e.g., Eggum et al., 2011; Liddle & Nettle, 2006; Watson, Nixon, Wilson, & Capage, 1999; Weimer & Guajardo, 2005; see also

Astington, 2003, for a review). While these studies point to the importance of FB throughout elementary school, they do not measure children's social relationships directly. As such, it remains necessary to assess the relation between FB and social relationships via peer report rather than rely solely on broader questionnaire indices of social competence.

Studies that have specifically investigated concurrent associations between FB and peer-rated social relationships have typically yielded mixed results. Higher FB understanding scores have indeed been associated with peer acceptance or popularity within the peer group (e.g., Dockett & Degotardi, 1997; Peterson & Siegal, 2002). For example, Cassidy, Werner, Rourke, Zubernis, and Balaraman (2003) reported a significant, albeit modest, concurrent association between ToM understanding (including FB) and peer-rated likability in preschoolers that was independent of individual differences in language ability. However, frequently others have failed to document such associations once the influence of covariates such as language have been accounted for (e.g., Badenes, Estevan, & Bacete, 2000; Braza et al., 2009; Diesendruck & Ben-Eliyahu, 2006; Slaughter et al., 2002). Shedding some light on an inconsistent literature, a recent meta-analysis of 22 studies has found a significant positive, albeit modest, concurrent association between ToM and children's peer-rated social relationships (Slaughter et al., 2014). This meta-analysis has demonstrated that there is a significant relation between these two constructs, but the longitudinal association and the underlying causal relations between FB and social relationships is still unclear.

Where longitudinal methods have been used, there has been a tendency to focus on friendship interactions (i.e., conversations, play) rather than sociometric indices of social relationships (Astington & Jenkins, 2000; Hughes & Dunn, 1998). The few longitudinal studies that have measured social relationships using peer sociometric methods have favored longitudinal and indirect influences of ToM on social preference rather than straightforwardly comparing concurrent with longitudinal associations (Banerjee et al., 2011; Caputi et al., 2012). No studies have taken both measures of FB and social preference during the 1st year of school and followed children longitudinally. Simultaneously examining the concurrent and longitudinal associations allows an examination of the potential incremental impact of later gains in FB understanding on social preference, which has far-reaching implications for the design and timing of interventions that aim to train children's FB understanding (e.g., Lecce, Bianco, Devine, Hughes, & Banerjee, 2014).

We have so far focused largely on the possibility that FB causally influences social preference, whether early on in children's school experience or consistently over time. As already noted, however, there could be reciprocal relations between FB and social relationships, so it is also essential to examine whether early peer relationships exert a longitudinal influence on later FB understanding (Hughes & Leekam, 2004). Consistent with this order of influence, Hughes and Dunn (1998) showed that dyadic mental-state talk at 4 years uniquely predicted a broad index of ToM (including FB) a year later, lending support to the view that FB skills are further developed within friendship interactions, as they are in family interactions (Ensor & Hughes, 2008). However, friendship per se is not the same as social relationships as measured via sociometric indices. The two constructs are strongly overlapping (Bukowski, Pizzamiglio, Newcomb, & Hoza, 1996), but one can have friends without being well liked, and studies that focus on preexisting friendships inherently overlook children who do not have friends. So it is important to determine whether such reciprocal processes also operate in the broader domain of social preference. In keeping with this possibility, Banerjee et al. (2011) have shown among older children that peer rejection has a causal, longitudinal influence on their emerging understanding of faux pas, which is an advanced ToM skill that relies heavily on FB mastery (Baron-Cohen, O'Riordan, Stone, Jones, & Plaisted, 1999). In light of such findings, we examine whether social relationships early in children's school experience are having a similar influence on their understanding of mind, as indexed by their understanding of FB.

We focus specifically on children's FB understanding, as in many previous studies, first, because it is a core feature of broader ToM development (i.e., belief-desire psychology; Bartsch & Wellman, 1995) and, second, because the manner in which ToM is assessed is tightly bound to a child's age, and FB understanding is the most salient ToM insight for children between 4 and 5 years of age (Hughes et al., 2000; Wellman et al., 2001). As children get older, however, they rapidly approach ceiling on conventional FB tasks, and this raises challenging measurement issues regarding longitudinal assessment of FB. Nevertheless, decades of ToM research have clearly shown that whereas children are relatively good at identifying FBs in simple tasks by 5 years, it takes longer for them to *use*

*their awareness of FB* to reason effectively about other commonplace psychological phenomena (Hughes et al., 2000; Lagattuta, Sayfan, & Blattman, 2010). These tasks include nice/nasty surprise (de Rosnay, Pons, Harris, & Morrell, 2004; Harris, Johnson, Hutton, Andrews, & Cooke, 1989), second-order FB (Perner & Wimmer, 1985), understanding surprise per se (Ruffman & Keenan, 1996), and faux pas understanding (Baron-Cohen et al., 1999). In the current study, we were able to measure FB directly in 5-year-olds using conventional tasks because of the considerable individual differences that still exist in children at that time (Hughes et al., 2000; Wellman et al., 2001). After more than a year in school, however, children were too old to administer these FB tasks. At Time 2, therefore, we operationalized children's FB understanding using the nice/nasty surprise paradigm because it was age appropriate (Harris et al., 1989; Hughes et al., 2000), it provides a valid and widely used measure of FB mastery (de Rosnay et al., 2004; Hughes et al., 2000; Hughes et al., 2005), and despite being an advanced FB measure, it is a simple procedure that does not require children to engage in complex recursive reasoning about mental states (see Miller, 2009, for a discussion on second-order FB).

In the nice/nasty surprise paradigm, children are presented with a situation in which a protagonist expects that he will get what he wants (but a nasty surprise awaits) or something he does not want (but a nice surprise awaits). By 3 years of age, children are adept at understanding how people will feel based on desire fulfillment; they have very little difficulty inferring someone's emotion based on a match between his or her desires and a salient outcome (e.g., getting what you want; Harris et al., 1989; Wellman, 1990). But when the protagonist in the nice/nasty surprise task also holds an FB (i.e., a mistaken expectation), research shows that children are able to identify the protagonist's FB before they see the relevance of his FB for his desire fulfillment, that is, his feelings. Thus, at 6 years of age, the nice/nasty surprise tasks is quintessentially a measure of children's advanced FB reasoning because it assesses how they use their knowledge of FB to modify their desire psychology (Wellman, 1990). In fact, the nice/nasty surprise task can also be administered as a straightforward FB test by directing children's attention to the protagonist's belief rather than his feelings, but it has been shown that this does not challenge children's advanced FB reasoning (de Rosnay et al., 2004; Hughes et al., 2000).

By focusing our investigations on children's abilities to identify and reason specifically about FB, we were able to directly compare this important feature of ToM with other widely utilized indices of children's social understanding (Blair, 2005; Caputi et al., 2012; de Rosnay et al., 2008). Few studies directly compare the influence of different aspects of social understanding on children's social relationships (although, see Cassidy et al., 2003; Denham, McKinley, Couchoud, & Holt, 1990, in younger children; and Braza et al., 2009), and many use composite measures of social understanding or ToM (e.g., Caputi et al., 2012). While this latter approach yields moderately robust global scores for ToM, and captures a lot of variation, it lacks conceptual precision because different kinds of child capacities are merely combined, which circumvents the developmental transitions in FB reasoning we have described above. Two domains of social understanding that have been shown to be of relevance for children's social behavior, and that have sometimes overlapped with FB measures, are the capacity to recognize basic emotions, and empathic orientation.

Conceptually, the recognition of basic emotions is unlike most domains of ToM studied in childhood, which, despite being diverse, generally require children to grasp the causes and consequences of mental attitudes, and express these ideas in ways that fit with our everyday folk psychology (Bartsch & Wellman, 1995; de Rosnay et al., 2008). Recognizing basic emotion expressions, on the other hand, taps into children's perceptual sensitivity. Although words are necessary to communicate basic emotions, typically developing children have clearly mastered such labels before 4 years of age (Pons, Harris, & de Rosnay, 2004). Notwithstanding this early competence, accurate labeling of real emotions (e.g., photographs of children expressing emotion) has itself been shown to influence children's social interactions: It seems that sensitivity to others' expressions may be a distinctive feature of social understanding (Izard et al., 2001; Schultz, Izard, Ackerman, & Youngstrom, 2001). Given the conceptual and methodological differences in measuring children's FB, on one hand, and their abilities to recognize and label basic emotions, on the other hand, it is necessary to ask if these factors exert independent influences on children's social relationships. We thus assess them independently.

While children's empathic orientation has sometimes been directly equated with FB understanding (i.e., cognitive empathy; Blair, 2005), it is also frequently measured as a set of behavioral dispositions

or *proclivities*, such as in a teacher report of child behavior with peers. It has long been recognized that just because a child understands someone else's perspective does not guarantee he or she will act altruistically or sympathetically toward that person (Underwood & Moore, 1982). It is also important to examine empathic behavioral tendencies in conjunction with a conceptual understanding of mind (e.g., FB) to better understand how children are perceived by their peers. Indeed, empathic orientation has also been shown to positively influence children's social conduct (Eisenberg, 2000).

Finally, the putative association between FB and social relationships may in fact turn on covariation between these factors and children's verbal abilities. Both ToM (Astington & Baird, 2005) and, to a lesser extent, social relationships (Slaughter et al., 2002) have been shown to draw on linguistic skill even among typically developing children, with linguistically sophisticated children performing better on most social understanding tasks, in particular, FB (Milligan, Astington, & Dack, 2007).

To summarize, three distinctive perspectives emerge on likely relations between children's FB and their social relationships. (a) If children are highly dependent on their FB to read and respond to complex real-life social interactions, and FB understanding is stable, then FB should robustly predict children's social preference during the 1st year of school, and also longitudinally. That is, Time 1 FB will be correlated with Time 1 social preference, in addition to predicting Time 2 social preference. (b) However, if early FB sets in motion a pattern of peer relations that become self-sustaining, as might be implied by Astington's (2001) question, then although we should expect to see an early influence of FB on children's social preference when they start school, stability in peer preference is nonetheless likely best understood in terms of the inherent stability of social systems rather than the continuous influence of individual differences in child factors. That is, while Time 1 FB would be expected to correlate with Time 1 social preference, only Time 1 social preference will predict Time 2 social preference. (c) Finally, although there is less evidence of such effects in the literature, it remains important to consider the possibility that the relation between FB and social preference is reciprocal, and therefore we would expect that early success or difficulty with peers may create environments that support or impede the growth of children's social understanding. We therefore examine the longitudinal influence of social preference on children's increasing mastery of FB reasoning in the 2nd year of school, as measured on the nice/nasty surprise advanced ToM task (Hughes et al., 2000). That is, we examine whether Time 1 social preference predicts Time 2 advanced FB.

Against this framework, we also examine the influence of emotion expression recognition and empathic orientation on children's social preference, while controlling for verbal abilities. In doing so, we hope to clarify whether FB in fact plays an independent role in children's social adjustment during the first years of formal schooling.

## Method

### *Participants*

The sample consisted of 114 Australian children (58 boys) recruited during their 1st year of formal schooling (Time 1) from three inner suburban schools in a major Australian city. One year later (Time 2), the sample comprised 106 (93%) of the originally tested children. A relatively homogeneous, middle-class sample was sought to minimize diversity in privilege or economic hardship. Schools were identified for recruitment based on average house prices in the area, and Estimates of Personal Income for Small Areas provided by the Australian Bureau of Statistics. All participants had written parental consent. The mean age at Time 1 was 5 years 7 months (*SD* = 5.1 months, range = 55–77 months), and the mean age at Time 2 was 6 years 8 months (*SD* = 4.8 months, range = 70–90 months).

The three schools initially approached agreed to take part, and all children entering the schools for the first time (Time 1) were invited to participate, a single class intake in each case. Recruitment and testing was staggered over 2 years in two schools, resulting in five groups of children. While most children (97%) had attended preschool at least 2 days a week, none of the recruited schools were associated with preschools or had reception classes, and children came from many different care arrangements, as is typical in this area.

Ninety-eight percent of children had at least one parent who had completed high school or had vocational training, and 58% had at least one parent who had also completed tertiary education. There were no exclusion criteria and no child experienced serious economic disadvantage. Children came from a mixture of ethnic backgrounds common to the local areas and all spoke English fluently. No children were identified by the school as having developmental disabilities at the time of testing.

*Materials*

*Verbal Ability*

The Test of Early Language Development–3 (TELD; Hresko, Reid, & Hammill, 1999) was used as an assessment of children's verbal mental ability (VMA) at both time points. The TELD is a measure of both expressive and receptive language skills, which were summed to create a global score. This comprehensive index of language development was chosen because such measures demonstrate stronger relations with children's FB than measures of receptive vocabulary (Milligan et al., 2007). Children's raw, unstandardized scores were used in the analysis.

*Time 1 FB*

Six FB understanding ToM tasks were administered. There were two unexpected contents items based on Perner, Leekam, and Wimmer (1987), and two unexpected transfer items based on Wimmer and Perner (1983). In both unexpected transfer and unexpected contents items, children were asked a reality control question, for example, "What is really inside the box?" in addition to a target FB test question, for example, "What does Lily think is inside the box?" To be awarded 1 point for the FB tasks, children had to correctly answer both the reality control question and the target FB question. In addition, children were given one nice and one nasty surprise task (described next), but they were only scored on the basis of their response to the FB question, a variation on the unexpected contents FB task (Hughes et al., 2000). One point was awarded for correctly identifying the protagonist's FB and correctly identifying the true contents of the container (reality control question).

Children performed similarly on the six FB tasks and had little trouble with the control questions (> 98% pass). Thus, children received an FB score from 0 to 6. Internal consistency for the six FB items was high, $\alpha = .78$.

Each task was read aloud by the experimenter and supplemented with color drawings.

*Time 2 Advanced FB*

Four advanced FB tasks were administered—two nice surprise and two nasty surprise—based on Hughes et al. (2000) and de Rosnay et al. (2004). The *nice/nasty surprise* advanced FB tasks are widely used and highly reliable (Hughes et al., 2000; Hughes et al., 2005). All four tasks required children to attribute a feeling to a story protagonist based on the match between his or her desires (e.g., He likes Coke) and his or her expectation (e.g., He [mistakenly] thinks he will get Coke; Harris et al., 1989). For example, to pass one of the nice surprise stories, children had to attribute a negative feeling (e.g., sadness or disappointment) to the protagonist on basis of the (false) belief that he will receive a hated food, when in fact the child knows he will receive a favorite snack. Two tasks contained an unexpected transfer FB (one nice surprise) and two contained an unexpected contents FB (one nice surprise). Children were awarded a score of 1 for each task if they passed the reality control question (see above), the target FB question (see above), and attribute a suitable feeling to the protagonist based on his or her desire/preference and FB (de Rosnay et al., 2004).

Children had little trouble with the control questions (> 99% pass), and as expected based on previous research, they approached ceiling on the FB question (Harris et al., 1989): Eighty-seven (83%) children passed four FB questions. Thus, children solely received an *advanced FB* score between 0 and 4. Internal consistency for the four items was acceptable, $\alpha = .65$.

Each task was read aloud by the experimenter and supplemented with color drawings.

*Recognition of Emotional Expressions (Emotion)*

At both time points, children were administered a task assessing their ability to match emotional facial expressions with correct labels, based on the Assessment of Children's Emotion Skills (20 photographs of school-aged children expressing different facial expressions; Schultz, Izard, & Bear, 2004). To ensure comprehension, children were initially asked to label two expressions: joy and sadness. All children passed. Children were then shown five emotion expressions together at a time (four blocks: joy, sadness, anger, fear, and surprise) and were asked to point to each nominated expression (in a preordered random sequence). Children did not have to produce labels; they merely had to indicate their best answer. One point was awarded for each correctly identified emotion. Internal consistency across all individual trials (20 trials) was acceptable, Time 1 $\alpha = .66$ and Time 2 $\alpha = .61$.

*Empathic Orientation (Empathy)*

At both times, teachers rated children's empathic orientation using a widely used questionnaire based

on the scale developed by Eisenberg et al. (1998) and adapted by Findlay, Girardi, and Coplan (2006). Children were rated by different teachers at each time point. The teacher-rated empathy scale consisted of six items (e.g., "This child usually feels sympathy for other children who are upset or sad"), measured on a 3-point Likert scale, 0 = *doesn't apply*, 1 = *sometimes applies*, and 2 = *certainly applies*. Internal consistency was high, Time 1 $\alpha$ = .87 and Time 2 $\alpha$ = .80.

### *Social (Peer) Preference*

Social preference was assessed using the peer nomination sociometric interview technique developed by Coie, Dodge, and Coppotelli (1982) at Time 1 and Time 2 to provide information on children's relative social standing in their peer environment. Following accepted procedures, children were asked to nominate three children in their class that "they like to play with the most" and three children "they do not like to play with" using photographs of their peers as prompts. Cross-gender nominations were permitted (Graziano, Keane, & Calkins, 2007). Each child's individual *like most* and *like least* scores were standardized within classroom to take into account different-sized peer groups. In the two schools where recruitment took place over 2 years, children were only permitted to nominate peers from their own year level. Social preference was calculated by subtracting classroom-standardized *like least* from standardized *like most* nominations, an index of peer-rated social standing that has been widely used in the developmental literature.

Between 55% and 82% ($M$ = 68%) of children were recruited from each class. Given the longitudinal nature of the study opt-out recruitment was not permissible as determined by the ethics board. Children remained in the same classroom and year groups at Time 2 and therefore had access to the same peer group at each time point, an important feature of the study. Between Time 1 and Time 2, eight children left their school; these children did not differ significantly from the Time 2 sample in terms of social preference, $t(113) = .77$, $p = .440$.

### *Procedure*

Children were seen individually in a quiet room at school over two sessions at both time points (i.e., four sessions). The mean duration between the first session of each time point was 346 days ($SD$ = 25.8 days). At both time points, the first session was scheduled for early in the third of four school terms to ensure that children knew their peers reasonably well (approximately 6 months). At Time 1, children were photographed and they completed the emotion task and TELD–3 in the first session. In the second session, children were presented with the FB tasks and the sociometric interview. The mean duration between Sessions 1 and 2 at Time 1 was 80 days ($SD$ = 43.7 days). At Time 2, all children completed the TELD–3, advanced FB, and emotion tasks in the first session, and the sociometric interview in the second session. The mean duration between Sessions 1 and 2 at Time 2 was 50 days ($SD$ = 33.7 days). Most children completed all tasks, but due to absence from school and scheduled classroom activities some children were unable to complete every session or every task within a session. At both time points, teachers completed the empathy questionnaire at the end of each school year, and knew the children very well.

## Results

Descriptive statistics are presented in Table 1 and bivariate relations between study variables are presented in Table 2. There was no significant difference between boys and girls on any study variable, $t$s < 1.76, $p$s > .081. Several features of Table 2 are noteworthy. First, there was strong stability in VMA, and between FB and advanced FB. These two measures were also robustly correlated concurrently and longitudinally, replicating the known association between ToM and VMA (Milligan et al.,

Table 1
*Descriptive Statistics for Study Variables*

| Measure | *n* | *M* | *SD* | Range |
|---|---|---|---|---|
| Time 1 | | | | |
| VMA | 113 | 60.46 | 5.16 | 44–77 |
| FB | 113 | 4.23 | 1.87 | 0–6 |
| Emotion | 112 | 14.60 | 2.99 | 5–20 |
| Empathy | 111 | 9.66 | 2.53 | 1–12 |
| Social preference | 114 | .02 | 1.67 | −4.42–3.34 |
| Time 2 | | | | |
| VMA | 104 | 64.11 | 4.40 | 53–75 |
| Advanced FB | 106 | 1.97 | 1.13 | 0–4 |
| Emotion | 106 | 15.82 | 2.54 | 7–20 |
| Empathy | 106 | 8.48 | 2.81 | 0–12 |
| Social preference | 106 | 0 | 1.66 | −4.55–4.33 |

*Note.* VMA = verbal mental ability; FB = false-belief; emotion = recognition of emotional expressions.

Table 2
*Summary of Bivariate Correlations Between Linguistic Ability, False Belief, Emotion Expression Labeling, Empathy, and Social Preference at Time 1 and Time 2*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. T1 VMA | — | .52** | .37** | .09 | .17 | .61** | .52** | .30** | .14 | .17 |
| 2. T1 FB | | — | .25** | .16 | .35** | .49** | .58** | .15 | .15 | .33** |
| 3. T1 emotion | | | — | .09 | .31** | .34** | .33** | .31** | .11 | .31** |
| 4. T1 empathy | | | | — | .31** | .14 | .02 | .00 | .27** | .20* |
| 5. T1 social preference | | | | | — | .22* | .10 | .15 | .21* | .72** |
| 6. T2 VMA | | | | | | — | .38** | .25* | -.03 | .20* |
| 7. T2 advanced FB | | | | | | | — | .11 | .13 | .25* |
| 8. T2 emotion | | | | | | | | — | .08 | .07 |
| 9. T2 empathy | | | | | | | | | — | .26** |
| 10. T2 social preference | | | | | | | | | | — |

*Note.* T1 = Time 1; T2 = Time 2; VMA = verbal mental ability; FB = false belief; emotion = recognition of emotional expressions.
*$p < .05$. **$p < .01$.

2007). Second, there was remarkable stability in social preference. Finally, FB at Time 1 was concurrently and longitudinally associated with social preference. However, Time 1 social preference was not significantly associated with advanced FB.

Three planned hierarchical regression models were constructed to evaluate the three perspectives, formulated in the Introduction, that outline possible patterns of association between FB and social preference. Regression Models 1 and 2 comprise an examination of the influence of FB on concurrent and longitudinal social preference (Perspective 1). Additionally, Model 2 also allows for an examination of Perspective 2, the longitudinal role of FB on social preference over and above stability in children's social preference scores by including social preference at Time 1 on the third and final step of the model. Finally, Model 3 examines the inverse relation between FB and social preference (Perspective 3) by examining the influence of Time 1 social preference on Time 2 advanced FB understanding.

Although there were no sex differences on any study variable, sex was nonetheless controlled for in the regression models as in previous studies (Braza et al., 2009) and the omission of sex did not affect the overall results reported below. Additionally, age was included at the first step of all regression models; findings remained unchanged when this variable was removed so the more parsimonious models are reported.

In the first model, predicting Time 1 social preference, sex and VMA were entered on the first step and FB, emotion, and empathy were entered on the second step (see Model 1, Table 3). The model was only significant with the inclusion of the second step, $F(5, 104) = 6.77$, $p < .001$. It is notable that FB, emotion, and empathy all made an independent significant contribution to the prediction of children's social preference and, furthermore, that each contribution was of a relatively similar magnitude.

Table 3
*Hierarchical Multiple Regression Analyses Predicting Social Preference at T1 (Model 1) and T2 (Model 2)*

| | Model 1 T1 social preference | | Model 2 T2 social preference | |
|---|---|---|---|---|
| Variable | $\Delta R^2$ | β | $\Delta R^2$ | β |
| Step 1 | .05 | | .03 | |
| Sex | | .15 | | .05 |
| T1 VMA | | .15 | | .17 |
| Step 2 | .19** | | .16** | |
| Sex | | .08 | | −.02 |
| T1 VMA | | -.10 | | −.09 |
| T1 FB | | .29** | | .31** |
| T1 emotion | | .24* | | .24** |
| T1 empathy | | .23** | | .15 |
| Step 3 | — | | .35** | |
| Sex | | — | | −.05 |
| T1 VMA | | — | | −.01 |
| T1 FB | | — | | .10 |
| T1 emotion | | — | | .08 |
| T1 empathy | | — | | −.02 |
| T1 social preference | | — | | .68** |
| Total $R^2$ | .25** | | .54** | |

*Note.* T1 = Time 1; T2 = Time 2; VMA = verbal mental ability; FB = false belief; emotion = recognition of emotional expressions.
*$p < .05$. **$p < .01$.

In the second model, predicting social preference at Time 2, the same overall approach was taken, with the addition of Time 1 social preference on a third step (see Model 2, Table 3). The first step, with sex and VMA, was not significant. At the second step, the overall model was significant, $F(5, 96) = 4.58$, $p = .001$, with both FB and emotion making independent contributions to the longitudinal prediction of social preference. The addition of Time 1 social preference on the third step further improved model fit, $\Delta F(1, 95) = 72.72$, $p < .001$; however, only Time 1 social preference was a significant predictor of Time 2 social preference at this step. Neither FB nor Time 1 emotion was a significant longitudinal predictor of Time 2 social preference over and above the stability of social preference.

Although FB and Time 1 emotion failed to make independent contributions to Time 2 social preference, the possibility remained that, combined, they improved children's Time 2 social preference even when controlling for Time 1 social preference. Therefore, a post hoc analysis was conducted along the lines of Model 2 in which Time 1 social preference was entered at the second step, and FB, Time 1 emotion, and Time 1 empathy were entered at the final step. The overall model statistics were identical to Model 2 but the third step confirmed that the addition of the social understanding variables in the final step did not make an overall improvement to the model, $F < 1$, $\Delta R^2 = .01$.

A third model was constructed to examine the possibility of a reciprocal relation, that is, the influence of earlier social preference on advanced FB (see Table 4). Thus, sex, Time 1 VMA, and Time 1 social preference were entered on the first step; Time 1 emotion and empathy were entered on the second step; and FB was entered on the final step. At the first step, only Time 1 VMA significantly predicted advanced FB, $F(3, 98) = 12.42$, $p < .001$. At the second step, there was no change in the overall significance of the model, and neither Time 1 emotion nor empathy contributed to advanced FB. The addition of Time 1 FB at the final step significantly improved model fit, $\Delta F(1, 95) = 23.02$, $p < .001$, and revealed that even after controlling for other variables, FB was the strongest longitudinal predictor of advanced FB. This adds considerable support to the conceptual coherence between FB and advanced FB, and also speaks against a simple reciprocal relation between FB and social preference.

Despite poor evidence for reciprocal relations (see Tables 2 and 4), a post hoc analysis was conducted to examine *concurrent relations* between advanced FB and Time 2 social preference, over and above the longitudinal stability in social preference, a conditional question. This approach was taken because, in the context of stability in social preference, it is of theoretical and practical importance to determine whether children who increased or decreased in their social preference were also those who had higher or lower advanced FB scores, respectively. On the first step, sex, Time 2 VMA, and Time 1 social preference were entered. This step was significant, $F(3, 100) = 36.97$, $p < .001$, $R^2 = .53$. Only social preference at Time 1 predicted social preference at Time 2, $\beta = .72$, $p < .001$, reflecting the overarching stability. However, the addition of advanced FB, as well as Time 2 emotion and empathy, at the second step significantly improved model fit, $\Delta F(3, 97) = 3.40$, $p = .021$, $\Delta R^2 = .05$. At this step, in addition to Time 1 social preference, $\beta = .70$, $p < .001$, there was a significant association between advanced FB and Time 2 social preference, $\beta = .19$, $p = .014$. The inclusion of an advanced FB and Time 1 social preference interaction term on a final step did not significantly improve model fit, $\Delta F(1, 96) = .05$, $p = .832$, $\Delta R^2 = .00$.

Table 4
*Hierarchical Multiple Regression Analyses Predicting Advanced False Belief at Time 2*

| | Model 3 Advanced FB | |
|---|---|---|
| Variable | $\Delta R^2$ | β |
| Step 1 | .28** | |
| Sex | | .03 |
| T1 VMA | | .51** |
| T1 social preference | | .04 |
| Step 2 | .02 | |
| Sex | | .03 |
| T1 VMA | | .46** |
| T1 social preference | | .00 |
| T1 emotion | | .15 |
| T1 empathy | | −.02 |
| Step 3 | .14** | |
| Sex | | −.00 |
| T1 VMA | | .24* |
| T1 social preference | | −.12 |
| T1 emotion | | .14 |
| T1 empathy | | −.02 |
| T1 FB | | .47** |
| Total $R^2$ | .43** | |

*Note.* VMA = verbal mental ability; FB = false belief; emotion = recognition of emotional expressions.
*$p < .05$. **$p < .01$.

## Discussion

The current study is the first longitudinal investigation of the relation between social cognition and social relationships over the first 2 years of children's formal schooling. Given the central position of FB understanding in research on children's social cognition (Bartsch & Wellman, 1995; Wellman et al., 2001), and the presumed importance of FB for children's social relationships (e.g., Eggum et al., 2011), this study is uniquely placed to contribute to our understanding of the longitudinal processes that underpin children's social relationships and inform interventions to support children at risk of social isolation or rejection from the peer group.

Our findings clearly demonstrate that during the 1st year of school, when children are establishing new relationships, those with better FB are more likely to be rated positively by their peers; on balance, they are more likely to be judged as someone whom others like to play with, or less likely to be judged as someone whom others do not like to play with. This finding is consistent with the widely held view that FB exerts a direct influence on children's social relations, and is consistent with the results of the recent meta-analysis by Slaughter et al. (2014) on the concurrent association between FB and social preference. Additionally, the current study is the first to demonstrate that over and above the impact of FB on children's social preference, children's capacities to recognize emotion expressions and their proclivities to behave empathically also have influences on their social preference that are of a similar magnitude to FB. Furthermore, our data suggest that this relation does not turn on children's verbal abilities, which covary profoundly with FB (Milligan et al., 2007). These findings are encouraging because they confirm, in a single study, that various aspects of children's social understanding—FB, emotion recognition, and empathy—previously identified in the extant literature as independent influences on social preference (de Rosnay et al., 2008; Dunn, 2000), are likely exerting a simultaneous influence on social preference.

Examining the longitudinal impact of FB, the current study showed that FB was robustly related to children's social preference in the 2nd year of school, consistent with the view that FB has an ongoing influence on children's social preference. Again, this relation was independent of children's ability to recognize emotional expressions or their verbal abilities. However, the influence of early FB on later social preference was not independent of children's earlier social preference. Thus, consistent with Astington's (2001) question, the findings from the current study may be interpreted to suggest that FB does set in motion a pattern of peer relationships that become self-sustaining: Once children have established themselves in a new peer group, their position in this group is relatively stable. This is an important finding and demonstrates the profound ongoing influence of children's position in a social group that, once established, appears to largely take on a life of its own (Denham & Holt, 1993; Jiang & Cillessen, 2005). That none of the Time 1 child measures, whether independently or combined, predicted later social preference, and the strength of the effect suggest that other unmeasured mechanisms or processes may be working to maintain social hierarchies and organization. For example, it is plausible that as children get older their expectations about their own role within a group become increasingly galvanized and may be manifested as a social identity or self-concept (e.g., Harter, 1982) that somewhat structures their future social encounters (Sandstrom & Coie, 1999). While this is an intriguing possibility, there is little research to shed light on how indices of social relationships (e.g., social preference, peer acceptance, social status) translate across different social environments in childhood.

To further investigate the interplay between FB and social preference within the context of robust stability in our measure of social preference, the association between advanced FB and Time 2 social preference was examined over and above the stability in social preference. For children of equal social preference at Time 1, those performing better on advanced FB were also more likely to have improved their social preference at Time 2. This finding is open to various interpretations. In keeping with the conventional view (e.g., Slaughter et al., 2002), it can be taken as further evidence of the direct influence of FB on (change in) social preference. However, the results suggest another possibility; that is, children whose social preference changed (for whatever reason) were likely to experience a corresponding change in their advanced FB understanding. Again, these influences could be reciprocal. In future research, it will be important to understand how individual trajectories of FB understanding over time are related to social preference, a task that requires more than two time points.

In addition to examining the longitudinal influence of FB on later social preference, the current study also examined the possibility that children's early success with peers may create conditions that

support or impede the growth of their FB (Banerjee et al., 2011). There was little evidence for such an inverse relation between FB and social relationships. This finding suggests, at least in typical 5-year-old children in a stable social environment, that FB understanding shapes social interactions rather than social interactions creating a context for the development of FB. However, the interplay between FB and social context at this age may still be reciprocal; it is plausible that children's interpersonal experiences at this age will begin to inform the development of more complex FB reasoning, such as faux pas understanding. Indeed, such a pattern of association between early social relationships and later faux pas understanding has been demonstrated by Banerjee et al. (2011). Further research on the longitudinal association between FB and children's social relationships during the school years is clearly necessary.

### *Implications and Future Directions*

Starting school is an important sociodevelopmental juncture that roughly corresponds to a conceptual shift in children's abilities to identify FBs and to use FB reasoning to better understand others (Harris et al., 1989; Wellman, 1990). It is therefore of practical importance to clarify the relation between FB and children's social relationships. The findings of the current study imply that if we want to make the most impact on social relationships we should support children's early understanding of FB when they enter school. Encouragingly, however, improvements in FB understanding in later years also appears to positively influence social preference, albeit considerably more modestly than stability in children's existing social hierarchy.

It is also important, however, not to oversimplify the social challenges and opportunities facing children, and imagine that FB understanding provides a singular explanation for children's capacities. Indeed, the current study also suggests that in addition to supporting FB understanding, helping children's emotion recognition and fostering their empathy may have an equally important positive impact on social relationships, over and above FB understanding. Thus, as our findings and the findings of others (see de Rosnay et al., 2008, for a discussion) show there are many aspects of children's social understanding, including their understanding of the causes and consequences of emotion and other aspect of mental life (Banerjee et al., 2011; Denham et al., 1990, 2003; Izard et al., 2001) that likely contribute to their social relationships.

Additionally, FB may influence children's social relationships indirectly by, for example, supporting effective prosocial behavior (Caputi et al., 2012). In keeping with the early arguments of Wellman (1990), the child's mastery of FB has wide-ranging ramifications, which includes changes to the way we understand emotional phenomena. Thus, FB understanding is often necessary to grasp others' expressive, emotional behavior in terms of their idiosyncratic construal of reality. However, sophisticated perspective taking skills are clearly not always necessary for manifestly empathic behaviors, such as those measured by empathic orientation in the current study (Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992). Still, it is self-evident that sophisticated perspective taking *can* be used to put ourselves in a different kind of relation to others, so that we experience empathy for them.

The current study, while making an important and unique contribution to the literature, only focused on one transition in children's lives, that is, the transition to formal schooling. To provide further evidence for the conclusion drawn from this study, a promising avenue will be to examine the role of social understanding—including early ToM (Wellman & Liu, 2004) and advanced ToM (Miller, 2009)—at various points when children change social environments.

### *Limitations and Conclusion*

A number of limitations of the current study must be recognized. First, as discussed in the Introduction, it was important that children experienced a relatively stable school environment, without which it is difficult to evaluate the possibility that social organization becomes self-sustaining. However, recruitment of all children within each class was not possible nor was including nonparticipating children on the class list for social preference nominations. This resulted in a somewhat restricted peer group for children's social preference nominations, which may have created a sampling bias and restricts the validity of the social preference index. This sampling issue limits the strength of our conclusions, although there is no reason to assume that it was necessarily biased toward over- or underestimating children's social preference. The more likely possibility is that our sampling introduced additional error into the estimation of social preference stability, although Jiang and Cillessen (2005) report similar overall levels of stability in their meta-analysis examining social preference over time. Nevertheless, further research on the longitudinal relation between FB and social

preference, including a greater proportion of children from each class, would help to clarify our conclusions.

A second methodological challenge was the fact that children's social experiences prior coming to school were relatively unknown. An important strength of the current study was, fortuitously, the fact that children arrive in their new school predominantly unknown to each other, allowing reasonable confidence that the Time 1 relations documented reflect the influence of social understanding (FB, emotion, and empathy) on social preference, and not the reverse. However, this is not to say that children's prior social experience is not of relevance to their social preference upon entering a new school environment, and this is an important question we could not address in the design of the current study. Nevertheless, we can conclude that that the social understanding skills children bring with them to a new environment play an important role in the formation of new relationships.

Third, in addition to FB, emotion recognition, and empathy, there are numerous other child characteristics (such as executive functioning, prosocial behavior, and academic functioning) that have been shown to be associated with social relationships at school that, due to the size of the current study, did not permit consideration (for a review see Rubin, Bukowski, & Parker, et al., 2006). Of particular importance is executive functioning, which has been shown to play a crucial role in both ToM understanding (e.g., Carlson & Moses, 2001; Hughes & Ensor, 2007) and social relationships (e.g., Hughes, White, Sharpen, & Dunn, 2000). As such, including executive functioning in future longitudinal studies examining ToM and social relationships will help refine the nature of the relation between these constructs over time.

Finally, it should be highlighted that children's empathy was assessed via teacher report, while remaining measures were derived from child report. While multimethod studies are typically advised, the fact that teachers only contributed to the findings via their empathy reports may have influenced the findings of the current study. Although this teacher-reported empathy measure has been widely used (e.g., Eisenberg, 2000; Eisenberg et al., 1998; Findlay et al., 2006), teachers may not always be privy to the range of children's empathic behaviors toward their peers, which may have underestimated the role played by empathy in children's social relationships.

Notwithstanding these limitations, the current study highlights the role of FB in establishing children's position in their social groups, and the enduring nature of this social position. Given that poor social relationships during the early school years have been shown to have far-reaching implications for later relationships and adjustment, the current longitudinal study provides a unique insight into the role played by FB in the establishment and maintenance of social relationships and highlights the lasting power of peer group dynamics, and by doing so provides practical implications for the timing and design of interventions to promote positive social relationships.

## References


Astington, J. W. (2001). The future of theory-of-mind research: Understanding motivational states, the role of language, and real-world consequences. *Child Development*, *72*, 685–687. doi:10.1111/1467-8624.00305

Astington, J. W. (2003). *Sometimes necessary, never sufficient: False-belief understanding and social competence*. New York, NY: Psychology Press.

Astington, J. W., & Baird, J. A. (2005). *Why language matters for theory of mind*. New York, NY: Oxford University Press.

Astington, J. W., & Jenkins, J. M. (2000). Theory of mind and social behavior: Causal models tested in a longitudinal study. *Merrill-Palmer Quarterly*, *46*, 203–220.

Babad, E. (2001). On the conception and measurement of popularity: More facts and some straight conclusions. *Social Psychology of Education*, *5*, 3–29. doi:10.1023/A:1012780232587

Badenes, L. V., Estevan, R. A. C., & Bacete, F. J. G. (2000). Theory of mind and peer rejection at school. *Social Development*, *9*, 271–283. doi:10.1111/1467-9507.00125

Banerjee, R., Watling, D., & Caputi, M. (2011). Peer relations and the understanding of faux pas: Longitudinal evidence for bidirectional associations. *Child Development*, *82*, 1887–1905. doi:10.1111/j.1467-8624.2011.01669.x

Baron-Cohen, S., O'Riordan, M., Stone, V., Jones, R., & Plaisted, K. (1999). Recognition of faux pas by normally developing children and children with Asperger syndrome. *Journal of Autism and Developmental Disorders*, *29*, 407–418. doi:10.1023/A:1023035012436

Bartsch, K., & Wellman, H. M. (1995). *Children talk about the mind*. New York, NY: Oxford University Press.

Begeer, S., Malle, B. F., Nieuwland, M. S., & Keysar, B. (2010). Using theory of mind to represent and take part in social interactions: Comparing individuals with high-functioning autism and typically developing controls. *European Journal of Developmental Psychology*, *7*, 104–122. doi:10.1080/17405620903024263

Blair, R. J. R. (2005). Responding to the emotions of others: Dissociating forms of empathy through the study of typical and psychiatric populations. *Consciousness and Cognition: An International Journal*, *14*, 698–718. doi:10.1016/j.concog.2005.06.004

Braza, F., Azurmendi, A., Munoz, J. M., Carreras, M. R., Braza, P., Garcia, A., . . . Sanchez-Martin, J. R. (2009). Social cognitive predictors of peer acceptance at age 5 and the moderating effects of gender. *British Journal of Developmental Psychology*, *27*, 703–716. doi:10.1348/026151008X360666

Bukowski, W. M., Pizzamiglio, M. T., Newcomb, A. F., & Hoza, B. (1996). Popularity as an affordance for friendship: The link between group and dyadic experience. *Social Development*, *5*, 189–202. doi:10.1111/j.1467-9507.1996.tb00080.x

Caputi, M., Lecce, S., Pagnin, A., & Banerjee, R. (2012). Longitudinal effects of theory of mind on later peer relations: The role of prosocial behavior. *Developmental Psychology*, *48*, 257–270. doi:10.1037/a0025402

Carlson, S. M., & Moses, L. J. (2001). Individual differences in inhibitory control and children's theory of mind. *Child Development*, *72*, 1032–1053. doi:10.1111/1467-8624.00333

Cassidy, K. W., Werner, R. S., Rourke, M., Zubernis, L. S., & Balaraman, G. (2003). The relationship between psychological understanding and positive social behaviors. *Social Development*, *12*, 198–221. doi:10.1111/1467-9507.00229

Cillessen, A. H. N., & Mayeux, L. (2004). Sociometric status and peer group behavior: Previous findings and current directions. In J. B. Kupersmidt & K. A. Dodge (Eds.), *Children's peer relations: From development to intervention* (pp. 3–20). Washington, DC: American Psychological Association.

Coie, J. D., Dodge, K. A., & Coppotelli, H. (1982). Dimensions and types of social status: A cross-age perspective. *Developmental Psychology*, *18*, 557–570. doi:10.1037/0012-1649.18.4.557

Denham, S. A., Blair, K. A., DeMulder, E., Levitas, J., Sawyer, K., Auerbach-Major, S., & Queenan, P. (2003). Preschool emotional competence: Pathway to social competence. *Child Development*, *74*, 238–256. doi:10.1111/1467-8624.00533

Denham, S. A., & Holt, R. W. (1993). Preschoolers' likability as cause or consequence of their social behavior. *Developmental Psychology*, *29*, 271–275. doi:10.1037/0012-1649.29.2.271

Denham, S. A., McKinley, M., Couchoud, E. A., & Holt, R. (1990). Emotional and behavioral predictors of preschool peer ratings. *Child Development*, *61*, 1145–1152. doi:10.1111/j.1467-8624.1990.tb02848.x

de Rosnay, M., Harris, P. L., & Pons, F. (2008). Making links between emotion understanding and developmental psychopathology in young children. In C. Sharp, P. Fonagy, & I. Goodyear (Eds.), *Social cognition and developmental psychopathology* (pp. 343–385). New York, NY: Oxford University Press.

de Rosnay, M., Pons, F., Harris, P. L., & Morrell, J. M. B. (2004). A lag between understanding false-belief and emotion attribution in young children: Relationships with linguistic ability and mothers' mental-state language. *British Journal of Developmental Psychology*, *22*, 197–218. doi:10.1348/026151004323044573

Diesendruck, G., & Ben-Eliyahu, A. (2006). The relationships among social cognition, peer acceptance, and social behavior in Israeli kindergartners. *International Journal of Behavioral Development*, *30*, 137–147. doi:10.1177/0165025406063628

Dockett, S., & Degotardi, S. (1997). Some implications of popularity at age four. *Journal of Australian Research in Early Childhood Education*, *1*, 21–31.

Dunn, J. (2000). Mind-reading, emotion understanding, and relationships. *International Journal of Behavioral Development*, *24*, 142–144. doi:10.1080/016502500383241

Eggum, N. D., Eisenberg, N., Kao, K., Spinrad, T. L., Bolnick, R., Hofer, C., . . . Fabricius, W. V. (2011). Emotion understanding, theory of mind, and prosocial orientation: Relations over time in early childhood. *Journal of Positive Psychology*, *6*, 4–16. doi:10.1080/17439760.2010.536776

Eisenberg, N. (2000). Empathy and sympathy. In M. Lewis & J. M. Haviland-Jones (Eds.), *Handbook of emotions* (2nd ed., pp. 677–691). New York, NY: Guilford.

Eisenberg, N., Fabes, R. A., Shepard, S. A., Murphy, B. C., Jones, S., & Guthrie, I. K. (1998). Contemporaneous and longitudinal prediction of children's sympathy from dispositional regulation and emotionality. *Developmental Psychology*, *34*, 910–924. doi:10.1037/0012-1649.34.5.910

Ensor, R., & Hughes, C. (2008). Content or connectedness? Mother-child talk and early social understanding. *Child Development*, *79*, 201–216. doi:10.1111/j.1467-8624.2007.01120.x

Findlay, L. C., Girardi, A., & Coplan, R. J. (2006). Links between empathy, social behavior, and social understanding in early childhood. *Early Childhood Research Quarterly*, *21*, 347–359. doi:10.1016/j.ecresq.2006.07.009

French, D. C., & Waas, G. A. (1986). Teachers' ability to identify peer-rejected children: A comparison of sociometrics and teacher ratings. *Journal of School Psychology*, *23*, 347–353. doi:10.1016/0022-4405(85)90047-0

Graziano, P. A., Keane, S. P., & Calkins, S. D. (2007). Cardiac vagal regulation and early peer status. *Child Development*, *78*, 264–278. doi:10.1111/j.1467-8624.2007.00996.x

Harris, P. L., Johnson, C. N., Hutton, D., Andrews, G., & Cooke, T. (1989). Young children's theory of mind and emotion. *Cognition and Emotion*, *3*, 379–400. doi:10.1080/02699938908412713

Harter, S. (1982). The Perceived Competence Scale for Children. *Child Development*, *53*, 87–97. doi:10.2307/1129640

Hresko, W. P., Reid, D. K., & Hammill, D. D. (1999). *Test of Early Language Development* (3rd ed.). Austin, TX: Pro-Ed.

Hughes, C., Adlam, A., Happe, F., Jackson, J., Taylor, A., & Caspi, A. (2000). Good test-retest reliability for standard and advanced false-belief tasks across a wide range of abilities. *Journal of Child Psychology and Psychiatry*, *41*, 483–490. doi:10.1017/S0021963099005533

Hughes, C., & Dunn, J. (1998). Understanding mind and emotion: Longitudinal associations with mental-state

talk between young friends. *Developmental Psychology*, *34*, 1026–1037. doi:10.1037/0012-1649.34.5.1026

Hughes, C., & Ensor, R. (2007). Executive function and theory of mind: Predictive relations from ages 2 to 4. *Developmental Psychology*, *43*, 1447–1459. doi:10.1037/0012-1649.43.6.1447

Hughes, C., Jaffee, S. R., Happe, F., Taylor, A., Caspi, A., & Moffitt, T. E. (2005). Origins of individual differences in theory of mind: From nature to nurture? *Child Development*, *76*, 356–370. doi:10.1111/j.1467-8624.2005.00850_a.x

Hughes, C., & Leekam, S. R. (2004). What are the links between theory of mind and social relations? Review, reflections and new directions for studies of typical and atypical development. *Social Development*, *13*, 590–619. doi:10.1111/j.1467-9507.2004.00285.x

Hughes, C., White, A., Sharpen, J., & Dunn, J. (2000). Antisocial, angry, and unsympathetic: "Hard-to-manage" preschoolers' peer problems and possible cognitive influences. *Journal of Child Psychology and Psychiatry*, *41*, 169–179. doi:10.1111/1469-7610.00558

Izard, C., Fine, S., Schultz, D., Mostow, A., Ackerman, B., & Youngstrom, E. (2001). Emotion knowledge as a predictor of social behavior and academic competence in children at risk. *Psychological Science*, *12*, 18–23. doi:10.1111/1467-9280.00304

Jiang, X. L., & Cillessen, A. H. N. (2005). Stability of continuous measures of sociometric status: A meta-analysis. *Developmental Review*, *25*, 1–25. doi:10.1016/j.dr.2004.08.008

Johnson, C., Ironsmith, M., Snow, C., & Poteat, G. M. (2000). Peer acceptance and social adjustment in preschool and kindergarten. *Early Childhood Education Journal*, *27*, 207–212. doi:10.1023/B:ECEJ.0000003356.30481.7a

Ladd, G. W., Price, J. M., & Hart, C. H. (1988). Predicting preschoolers' peer status from their playground behaviors. *Child Development*, *59*, 986–992. doi:10.2307/1130265

Lagattuta, K. H., Sayfan, L., & Blattman, A. J. (2010). Forgetting common ground: Six-to seven-year-olds have an overinterpretive theory of mind. *Developmental Psychology*, *46*, 1417–1432. doi:10.1037/a0021062

Lalonde, C. E., & Chandler, M. J. (1995). False belief understanding goes to school: On the socio-emotional consequences of coming early or late to a first theory of mind. *Cognition and Emotion*, *9*, 167–185. doi:10.1080/02699939508409007

Lecce, S., Bianco, F., Devine, R. T., Hughes, C., & Banerjee, R. (2014). Promoting theory of mind during middle childhood: A training program. *Journal of Experimental Child Psychology*, *126*, 52–67. doi:10.1016/j.jecp.2014.03.002

Liddle, B., & Nettle, D. (2006). Higher-order theory of mind and social competence in school-age children. *Journal of Cultural and Evolutionary Psychology*, *4*, 231–244. doi:10.1556/JCEP.4.2006.3-4.3

McDougall, P., Hymel, S., Vaillancourt, T., & Mercer, L. (2001). The consequences of childhood peer rejection. In M. R. Leary (Ed.), *Interpersonal rejection* (pp. 213–247). New York, NY: Oxford University Press.

Miller, S. A. (2009). Children's understanding of second-order mental states. *Psychological Bulletin*, *135*, 749–773. doi:10.1037/a0016854

Milligan, K., Astington, J. W., & Dack, L. A. (2007). Language and theory of mind: Meta-analysis of the relation between language ability and false-belief understanding. *Child Development*, *78*, 622–646. doi:10.1111/j.1467-8624.2007.01018.x

Moore, C., & Frye, D. (1991). The acquisition and utility of theories of mind. In D. Frye, & C. Moore (Eds.), *Children's theories of mind: Mental states and social understanding* (pp. 1–14). Mahwah, NJ: Erlbaum.

Parker, J. G., & Asher, S. R. (1987). Peer relations and later personal adjustment: Are low-accepted children at risk? *Psychological Bulletin*, *102*, 357–389. doi:10.1037/0033-2909.102.3.357

Perner, J., Leekam, S. R., & Wimmer, H. (1987). Three-year-olds' difficulty with false belief: The case for a conceptual deficit. *British Journal of Developmental Psychology*, *5*, 125–137. doi:10.1111/j.2044-835X.1987.tb01048.x

Perner, J., & Wimmer, H. (1985). John thinks that Mary thinks that..: Attribution of second-order beliefs by 5- to 10-year-old children. *Journal of Experimental Child Psychology*, *39*, 437–471. doi:10.1016/0022-0965(85)90051-7

Peterson, C. C., & Siegal, M. (2002). Mindreading and moral awareness in popular and rejected preschoolers. *British Journal of Developmental Psychology*, *20*, 205–224. doi:10.1348/026151002166415

Pons, F., Harris, P. L., & de Rosnay, M. (2004). Emotion comprehension between 3 and 11 years: Developmental periods and hierarchical organization. *European Journal of Developmental Psychology*, *1*, 127–152. doi:10.1080/17405620344000022

Rubin, K. H., Bukowski, W. M., & Parker, J. G. (2006). *Peer interactions, relationships, and groups*. Hoboken, NJ: Wiley.

Ruffman, T., & Keenan, T. R. (1996). The belief-based emotion of surprise: The case for a lag in understanding relative to false belief. *Developmental Psychology*, *32*, 40–49. doi:10.1037/0012-1649.32.1.40

Saarni, C. (1999). *The development of emotional competence*. New York, NY: Guilford Press.

Sandstrom, M. J., & Coie, J. D. (1999). A developmental perspective on peer rejection: Mechanisms of stability and change. *Child Development*, *70*, 955–966. doi:10.1111/1467-8624.00069

Schultz, D., Izard, C. E., Ackerman, B. P., & Youngstrom, E. A. (2001). Emotion knowledge in economically disadvantaged children: Self-regulatory antecedents and relations to social difficulties and withdrawal. *Development and Psychopathology*, *13*, 53–67. doi:10.1017/S0954579401001043

Schultz, D., Izard, C. E., & Bear, G. (2004). Children's emotion processing: Relations to emotionality and aggression. *Development and Psychopathology*, *16*, 371–387. doi:10.1017/S0954579404044566

Slaughter, V., Dennis, M. J., & Pritchard, M. (2002). Theory of mind and peer acceptance in preschool children. *British Journal of Developmental Psychology*, *20*, 545–564. doi:10.1348/026151002760390945

Slaughter, V., Imuta, K., Peterson, C., & Henry, J. (2014). *Meta-analysis of theory of mind and peer popularity in the preschool and early school years*. Manuscript submitted for publication.

Underwood, B., & Moore, B. (1982). Perspective-taking and altruism. *Psychological Bulletin*, *91*, 143–173. doi:10.1037/0033-2909.91.1.143

Watson, A. C., Nixon, C. L., Wilson, A., & Capage, L. (1999). Social interaction skills and theory of mind in young children. *Developmental Psychology*, *35*, 386–391. doi:10.1037/0012-1649.35.2.386

Weimer, A. A., & Guajardo, N. R. (2005). False belief, emotion understanding, and social skills among Head Start and non-Head Start children. *Early Education and Development*, *16*, 341–366. doi:10.1207/s15566935eed1603_3

Wellman, H. M. (1990). *The child's theory of mind*. Cambridge, MA: MIT Press.

Wellman, H. M., Cross, D., & Watson, J. (2001). Meta-analysis of theory-of-mind development: The truth about false belief. *Child Development*, *72*, 655–684. doi:10.1111/1467-8624.00304

Wellman, H. M., & Liu, D. (2004). Scaling of theory-of-mind tasks. *Child Development*, *75*, 523–541. doi:10.1111/j.1467-8624.2004.00691.x

Wimmer, H., & Perner, J. (1983). Beliefs about beliefs: Representation and constraining function of wrong beliefs in young children's understanding of deception. *Cognition*, *13*, 103–128. doi:10.1016/0010-0277(83)90004-5

Zahn-Waxler, C., Radke-Yarrow, M., Wagner, E., & Chapman, M. (1992). Development of concern for others. *Developmental Psychology*, *28*, 126–136. doi:10.1037/0012-1649.28.1.126