# Friendlessness and theory of mind: A prospective longitudinal study

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Chronic friendlessness in childhood predicts adverse mental health outcomes through-out life, yet its earliest roots are poorly understood. In theory, developing a theory of mind (ToM) should help children gain mutual friends and one preschool study (Peterson & Siegal, 2002. *Br J Dev Psychol*, 20, 205) suggested a cross-sectional connection. We therefore used a 2-year prospective longitudinal design to explore ToM as a predictor of mutual friendship in 114 children from age 5 to 7 years after controlling potential confounds including language ability and group popularity. Confirming friendship's distinctiveness from group sociometric status, numerous group-rejected children (53%) had a mutual friend whereas 23% of those highest in group status did not. Five-year-olds with a mutual friend significantly outperformed their friendless peers on a comprehensive ToM battery (basic and advanced false belief). Longitudinally, chronically friendless 7-year-olds (no friends at either testing time) stood out for their exceptionally poor Time 1 ToM understanding even after controlling for group popularity, age, and language skill. Extending previous evidence of ToM's predictive links with later social and cognitive outcomes, these results for mutual friendship suggest possible interventions to help reduce the lifelong mental health costs of chronic friendlessness.

'*Without friends no one would choose to live, though he had all the other goods*' wrote Aristotle (384–322 BC; 2007). Indeed, numerous studies link the problem of being 'friendless' or 'chumless' with a host of adverse mental health outcomes including low self-worth, social anxiety, depression, loneliness, and suicidal or paranoid ideation (e.g., Bagwell, Newcomb, & Bukowski, 1998; Pedersen, Vitaro, Barker, & Borge, 2007). Furthermore, the negative impact of friendlessness on emotional and psychological well-being applies both during childhood (e.g., Parker & Asher, 1993) and throughout adolescence (Ladd & Troop-Gordon, 2003; Pedersen *et al.*, 2007). Even in adulthood, childhood friendlessness has significant adverse long-term repercussions for mental health (Bagwell *et al.*, 1998). Ladd and Troop-Gordon (2003) found that chronic friendlessness (developing between kindergarten and third grade) longitudinally predicted pre-adolescent loneliness and psychological disorder even after controlling statistically for other predictors like rejection by the peer group. Nangle, Erdley, Newman,

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Mason, and Carpenter (2003) found that children's feelings of loneliness and depression were a direct function of not having a reciprocated friendship whereas group popularity was only indirectly influential. In a 12-year longitudinal study, Bagwell *et al.* (1998) found that even after controlling for contemporaneous mental health predictors (e.g., job success), a young adult's having had no mutual friends in childhood uniquely predicted adult psychopathology (especially depression). The same was not true for sociometric group popularity.

Conversely, children who are lucky enough to have at least one mutual friend are buffered against adverse effects of such negative situations in the wider peer group as social isolation or peer rejection (e.g., Newcomb, Bagwell, Bukowski, & Hartup, 1998). Again, this is true not only childhood but in adolescence and not only cross-sectionally (e.g., Parker, Saxon, Asher, & Kovacs, 1999) but also longitudinally (Laursen, Bukowski, Aunola, & Nurmi, 2007). Overall, friendship seems to protect children to a certain degree against debilitating cycle of social isolation and personal maladjustment (Laursen *et al.*, 2007).

Consequently, it is crucial, not only for developmental theory but also from an applied clinical perspective, to discover what the early roots of mutual friendship are and to find out what can cause, perpetuate or protect against chronic friendlessness. These are aims of this study.

Friendship is distinguished from other kinds of positive situations with peers by its reciprocated, mutual character. By definition, friendship is a dyadic bond. Each friend needs to single the other out for special regard, and this entails mutual liking not just social convenience or one-way admiration. Furthermore, substantial evidence shows that sociometric popularity in the peer group differs from mutual friendship. Many children who are disliked or ignored by the group in general have at least one best friend and are satisfied with this friendship situation (Parker & Asher, 1993). Conversely, some children who are group 'popularity stars' (earning more sociometric preference votes than most of their peers) have no mutual friends at all and feel lonely and dissatisfied (Parker & Asher, 1993; Renshaw & Asher, 1983).

Investigation into how young children forge and maintain their first mutual friendships is crucial not only for theories of how of close relationships develop (e.g., Noller, Feeney, & Peterson, 2001) but also because, in contrast to a large research literature on group popularity (see Rubin, Bukowski, & Parker, 2006; for a review), there has been very little study of reciprocated friendship, especially in children under age 8. Even cross-sectional studies are few (but see Peterson & Siegal, 2002), and no known past studies have explored the earliest roots of chronic friendlessness longitudinally, despite evidence from older groups showing the adverse long-term impact of later friendship failure on adolescent and adult mental health (e.g., Bagwell *et al.*, 1998).

Therefore, owing to the central and unique significance of mutual friendship for lifelong psychological adjustment, we began where reciprocated friendships themselves often begin, namely in the first year of a child's full-day compulsory schooling at age 5. Our goal was to examine aspects of children's social understanding (Dunn, 1995; Harris, 2006) and other control variables as possible predictors and correlates of reciprocated friendship both cross-sectionally in initial friendship formation (Hughes & Dunn, 2002) and longitudinally as factors in friendship stability versus friendlessness. Owing to its applied as well as theoretical significance, we were particularly interested in the development of chronic long-term friendlessness.

We chose social understanding of theory of mind (ToM) as a likely predictor of reciprocated friendship for both theoretical and empirical reasons. ToM is the child's

awareness that people's behaviour is shaped by their inner thoughts and feelings even when these are at odds with external reality (Wellman, 1990). Deemed one of the most significant developmental milestones of early childhood (Flavell, 2004), it is traditionally assessed using standard inferential false belief (FB) tests requiring explicit predictions (via speech, pointing etc.) about the actions or thoughts of protagonists with FBs that the child being tested does not share. Assessed in this way, ToM understanding exhibits a major conceptual shift from consistent failure at 3 years to consistent success by age 5 or 6 (Wellman, Cross, & Watson, 2001). Although recent studies of infant visual fixation have claimed that infants as young as 10 months (Luo, 2011) or 15 months of age (Onishi & Baillargeon, 2005) already understand FBs, it is unclear how best to interpret this infant looking-time data (Low & Perner, 2012). Rather than an implicit ToM already being present in the first year of life, an alternative view is that infants need only learn to perceive regularities in agents' overt behaviour to succeed on the looking-time measure (Ruffman, Taumoepeau, & Perkins, 2012).

Theoretically, Hughes, and Dunn (1998) proposed that cognitive ToM understanding should facilitate friendship formation. They found indirect evidence for this in a significant correlation between ToM scores and young playmates' use of mentalistic terms in informal conversation. Empirically, the strongest evidence for a specific link (albeit a cross-sectional one) between mutually reciprocated friendship and ToM emerged from the sole (to our knowledge) previous study (Peterson & Siegal, 2002) in which the two constructs were examined together. Peterson and Siegal (2002) tested 4-year-old preschoolers and found that even after taking account of general language ability and group sociometric status as popular or rejected, those preschoolers who had at least one mutual friend scored higher on ToM tests than their peers who had none.

Other prospective longitudinal studies suggest that individual differences in 5-year-olds' ToM scores relate to a range of behavioural outcomes. For example, Renouf *et al.* (2010) found that ToM at age 5 predicted direct and indirect physical aggression at age 6, as assessed by the Preschool and Kindergarten Behavior Scale (PKBS: Merrell, 1995). Also using the PKBS, Razza and Blair (2009) found a link between classroom social skills (e.g., 'attempts new tasks before asking for help') and 5-year-olds' ToM, although language ability and executive functioning (EF) skills were additional predictors. McAlister and Peterson (2013) likewise found that ToM understanding at age 4–5 years longitudinally predicted EF skills at ages 5–6 and that this was true even after controlling for language and initial EF skill. Lecce, Caputi, and Pagnin (2014) found that ToM at age 5 longitudinally predicted academic achievement at age 7 although the effect was mediated by sensitivity to teachers' criticism. Similarly, Caputi, Lecce, Pagnin, and Banerjee (2012) found that an association between ToM at age 5 and sociometric group popularity at age 7 was mediated by prosocial helpfulness as reported by teachers. As a final example, Banerjee, Watling, and Caputi (2011) used a faux-pas recognition test, rather than FB, as the 5-year-old ToM index and found bidirectional and cyclic longitudinal associations with sociometric rejection by the peer group between ages 5 and 9, suggesting that adverse group relations may impair mastery of ToM just as poor ToM understanding may lead to increased group rejection.

Thus, it is clear that, in broad terms, there are connections between 5-year-olds' ToM scores and many other cognitive, academic, and social variables besides friendship. In theory, reciprocated friendship might also contribute to, and be assisted by, the development of explicit ToM. Children could gain insight into another person's thoughts in unique ways by sharing the intimacy of a reciprocated friendship. At the same time, an already sound ToM understanding could assist the forging of mutual friendships in the first

place. Like other close relationships, friendship requires awareness of how friends' perspectives differ from one's own (Noller *et al.*, 2001). Therefore, in theory, having sound ToM skills upon entering the arena of initial friendship formation (e.g., with the transition to full-day peer contact in school) could prove to be an asset for attracting friends and understanding their thoughts and feelings well enough to keep the relationship going. Conversely, being less capable than average at appreciating others' perspectives could plausibly interfere with early friendship formation at age 5 and/or with the challenges inherent in sustaining it over time.

Yet no previous study has examined ToM longitudinally as predictor of mutual friendship. Indeed, even cross-sectionally, only one previous study (Peterson & Siegal, 2002) has examined their interconnection (see above). Thus, our main goal was to examine ToM as a prospective longitudinal predictor of reciprocated friendship versus friendlessness in the early years of primary school. Drawing upon theory in the absence of previous longitudinal evidence to go on, we predicted that early mastery ToM understanding would position children well for forging friendships in the first place and for maintaining these over time. Thus, ToM at age 5 should prospectively predict consistently reciprocated friendship status at age 7. We also anticipated cross-sectional links at age 5, building on Peterson and Siegal's (2002) similar findings for 4-year-olds.

In addition to ToM, we assessed five additional possible predictors at age 5 to see whether they might relate to children's mutual friendship status at age 5 and/or age 7, namely: (a) emotion understanding, (b) spontaneous helpfulness/prosocial behaviour, (c) ability to delay gratification (d) verbal ability and (e) sociometric popularity status within the peer group as a whole. The rationale for inclusion of these variables was twofold. First from a control perspective, it was of interest to see whether any links we might observe between early ToM and later friendship reciprocity would be direct ones versus the product of joint connections with other variables as in the case of Lecce *et al.*'s (2014) and Caputi *et al.*'s (2012) prospective longitudinal studies. In addition, we were interested in these variables as possible friendship correlates in their own right. Although there has been little or no previous study of most of them in relation to young children's mutual friendship (even cross-sectionally), several past studies suggest possible links to ToM, as described in more detail below. Hence, it was important for the sake of our predictions and interpretations to be able to control them statistically. Furthermore, despite lack of any direct past empirical evidence, there were theoretical grounds in each case for a possible association with mutual friendship formation versus friendlessness, as we now outline.

Emotion understanding (EU) involves detection of, and insight into, affective states such as anger, joy or sadness (Harris *et al.*, 1989). Initial past evidence from a similar age group (Dunn, 1995) showed EU scores to be unrelated to ToM scores on FB tests, suggesting the value of examining both separately as complementary indices of early social cognition. Unlike ToM, Dunn (1995) also found in the same study that EU scores at 40 months prospectively predicted attitudes to school at age 6. Children with advanced EU skills for affective perspective taking were more positive about the overall school experience (including the classroom peer group) at the end of first grade. By contrast, Hughes and Dunn (1998) did find a significant overall correlation between EU and ToM in preschoolers although there were numerous inconsistencies among patterns for individual tasks within and across domains. No known study has examined EU in relation to reciprocated mutual friendship in this age group. Nevertheless, in theory, it seems plausible that children who readily understand others' positive and negative emotions should be well placed to resolve disputes, offer support, and generally forge early

friendships that are amenable to mutual reciprocation. Thus, despite less past evidence than in the case of ToM, we tentatively hypothesized that friendless children would score lower than others in EU.

We also naturalistically observed and coded spontaneous helpfulness to peers in a free play session given at age 5. Our inclusion of this variable was largely exploratory for our chosen age group although McGuire and Weisz (1982) had found more spontaneously helpfulness to peers during school recess by 12-year-olds who had a mutual friend than by friendless youths. False belief understanding of ToM has also been shown to correlate with prosocial behaviour in some past research (e.g., Caputi *et al.*, 2012). Yet other studies have tested for a link and reported null findings (e.g., Travis, Sigman, & Ruskin, 2001). Thus, we made no specific predictions but treated this variable as exploratory. On a similarly exploratory basis, we included delay of gratification (DG), or 'willpower' (Mischel *et al.*, 2010). While no known study has linked this variable directly with mutual friendship, there is an impressive body of longitudinal evidence from Mischel, Shoda, and Peake (1988) and Mischel *et al.* (2010) linking it, as measured at age 4, to academic achievement, career success, and mental health during adolescence and adulthood. Furthermore, children who are able to postpone consumption of reward for the sake of later gain might, in theory, apply the same strategies in dyadic relationships to benefit reciprocal friendship.

Language ability is a well-known ToM correlate (see Milligan, Astington, & Dack, 2007; for a relevant meta-analysis) and therefore was an important variable to include as a control. We wanted to make sure that any links we might observe between ToM and friendship were not accidental by-products of individual differences in language skill, even though Peterson and Siegal (2002) had previously demonstrated language-independent links between ToM and mutual friendship in 4-year-olds. Similarly, we included sociometric group popularity as an important control variable, given its known links with both ToM understanding (e.g., Banerjee, Watling, & Caputi, 2011) and mutual friendship (Parker & Asher, 1993). Based on Peterson and Siegal, we predicted that links between ToM at age 5 and mutual friendship at age 5 and age 7 would emerge independently of group sociometric status, just as in the case of language.

## Method

### Participants

One hundred and fourteen children (58 boys) were recruited from the kindergarten classes of three inner suburban schools in Sydney, Australia's largest city. We chose the kindergarten year as our longitudinal starting point as the first year of compulsory schooling in this community and hence the point at which many children gain their first exposure to full-day contact with a classroom peer group. In fact, even though short-term friendships develop earlier, especially in those with some preschool experience (Hughes & Dunn, 1998), there is surge in stable mutual friendship with school entry. Ladd and Troop-Gordon (2003) found that chronic friendlessness likewise first emerges between kindergarten and third grade.

The children in our sample all had English as a native language, though representing a mixture of ethnic backgrounds common to the area. None were seriously economically disadvantaged. Reciprocated (mutual) friendships were assessed both initially (age 5) and again 24 months later in a prospective longitudinal design. Mean age at Time 1 was

5.61 years (range: 4.5–6.42, *SD* = 0.42) and at Time 2 was 7.73 years (range: 6.67–8.50, *SD* = 0.38). Both tests took place in Term 3 when familiarity with classmates was well established. Eighteen children were unavailable at Time 2 owing to mobility. Thus, the Time 2 sample comprised 96 children (an 85% retention rate) and included 49 boys. For ethical reasons, we required active written parental informed consent for every child together with the child's own verbal assent. Our resultant response rate (68% of available families consented) was high relative to other published sociometric research using similarly ethically stringent recruitment methods (Hollmann & McNamara, 1999).

## Measures

### Verbal ability

The Test of Early Language Development (TELD-3: Hresko, Reid, & Hammill, 1999) was individually administered to assess children's verbal ability. Comprehensively measuring lexical and syntactic skills both expressively and receptively, this norm-referenced test has been widely used in ToM research (Milligan *et al.*, 2007) and has excellent psychometric properties and convergent validity with other published language tests. We used raw (unstandardized) scores in statistical analyses to permit independent analysis of chronological age effects.

### ToM/False belief

Our six item FB battery included four first-order and two advanced FB tests. The first-order set had two unexpected contents tasks based on Perner, Leekam, and Wimmer (1987) and two changed location tasks similar to Baron-Cohen, Leslie, and Frith's (1985). For the two advanced FB measures, we drew on Hughes *et al.*'s (2000) reasoning that a more sophisticated grasp of ToM is required when a task demands that one mental state (e.g., emotion) be inferred on the basis of another mental state (e.g., FB) than in the case of first-order FB where only a single mental state inference is required. Thus, like Hughes *et al.* (2000), we chose emotion FB tests as our advanced ToM measures, a choice supported by past empirical evidence (e.g., Harris, Johnson, Hutton, Andrews, & Cooke, 1989; Hughes *et al.*, 2000) that emotion FB is not consistently passed until the age of 6 years or later. The specific emotion FB tasks we used were very similar to those of Hughes *et al.* (2000).

All six tasks we chose have been widely used and validated (Milligan *et al.*, 2007; Wellman *et al.*, 2001) and are shown to have good reliability and internal consistency (e.g., Hughes *et al.*, 2000). Tasks were narrated as story-book vignettes accompanied by coloured drawings. Each had at least one test question about the protagonist's FB, belief-based action, or false-belief-based emotion plus one control question that also had to be correct for a pass. A total FB score summed these six items and had sound internal consistency: Cronbach's $\alpha$ = .78.

### Emotion understanding

Based on Pons, Harris, and de Rosnay (2004), three age-appropriate components of emotion understanding (EU) were chosen from the Test of Emotion Comprehension (TEC) to assess EU. All components involved short vignettes about pictured protagonists with test questions requiring choice from four pictured facial expres-

sions. All components assessed positive and negative emotions equally. The dimensions of emotion that were measured were (a) emotions based on diverse desires, (b) emotions deriving from ignorance versus knowledge of reality, and (c) the understanding hidden of emotion. There were two diverse desire tasks and four tasks each for dimensions (b) and (c). All components assessed equal number of positive and negative emotion scenarios.

We also incorporated two false-belief-based emotion tasks described above into the EU total so that this initial 12-task total could (and did) yield scores from 0 to 12. Initial analysis showed that one story of dimension (b) was uncorrelated with all other tasks, and it was thus omitted from further analyses. Children thus received a possible EU score between 0 and 11. Cronbach's test revealed acceptable internal consistency ($\alpha$ = .60), notwithstanding the wide range of diverse constructs assessed.

*Prosocial behaviour*

Children's prosocial behaviour was assessed during a free play session with two other peers. The trio was filmed unobtrusively, with no adults in the room, for seven minutes playing with a large toy zoo. Using Ensor and Hughes' (2010) methods, five prosocial acts were coded: Sharing, helping, comforting, praising, and attempting to alleviate peer distress. Each could arise spontaneously or in response to a request. Inter-rater reliability was good across all five categories: Cohen's $\kappa$ = .73. Prosocial total scores (range: 0–8) reflected overall helpfulness to peers during free play.

*Delay of gratification*

Children's ability to delay gratification (DG) was assessed via eight sticker-choice trials interspersed between FB and EU tests, using the procedure of Thompson, Barresi, and Moore (1997). At the beginning of the session, children learned they would be collecting stickers but could choose, 'one sticker now or two for later'. Two envelopes were prepared with the child's name. The *now* envelope was handed to the child while the experimenter kept their *for later* envelope out of sight. An array of stickers was shown at each choice point. Children opting for immediate reward retained the sticker in their *now* envelope. Those opting for delay received nothing in hand until the end of that day's session. Children's choices were highly consistent across the eight trials: Cronbach's $\alpha$ = .90. A proportional DG score ranging from 0 to 1.00 was computed by dividing the child's total stickers by the maximum possible (16). A few children not completing all trials received pro-rated scores based on the trials they had completed. Only two children in this sample consistently opted for immediate reward. All others chose to delay on between 50% and 100% of trials.

*Sociometric peer preference*

Group popularity was assessed using the sociometric interview technique developed by Coie, Dodge, and Coppotelli (1982). This widely used test comprehensively assesses children's group popularity standing in their peer environment. Over 50% of each classroom participated, thus meeting requirements for accurate sociometric assessment (Schultz *et al.*, 2004). Each child, interviewed individually with photographs, was asked to nominate three children in their class that 'you like to play with the most', and three children, 'you do not like to play with'. Cross-gender nominations were permitted. To

account for the differing numbers of children in each classroom, 'like most' and 'like least' totals were standardized. The child's standardized 'like most' total minus his/her standardized 'like least' total yielded a sociometric peer preference score via the standard method (Coie *et al.*, 1982). Popular, average, and rejected categorical classifications were derived likewise (Coie *et al.*, 1982). Preference scores ranged from −3.59 to + 3.52 in this sample, with a *SD* of 1.61.

*Mutual (reciprocated) friendship*
In a separate individual interview, children were asked to nominate their top three 'best friends' in the class. Cross-gender nominations were permitted. Friendship tiers were classified from 1 to 3 as follows:

   *Tier 1:* Child and reciprocating friend choose each other as first 'best' friend (*n* = 28).
   *Tier 2:* At least one of the child's three best friends reciprocates by including child in their top three 'bests' (*n* = 53).
   *Tier 3:* No reciprocated friend nomination for any of the top three friends (*n* = 33).

To assess comparability of the Tier 1 and 2 methods, independent-samples *t*-tests compared children defined as 'friended' via the Tier 1 method with those so defined via Tier 2 on all focal Time 1 variables. No significant differences emerged for any – That is age, FB, EU, DG, prosocial behaviour, or Time 1 peer preference: All *t*s < 1.90, all *p*s = *ns*. Thus, like Parker and Asher (1993), we used Tier 2 as our operational definition of reciprocated mutual friendship on the grounds that this less restricted index has sound empirical as well as ecological validity for an age group where multiple close friendships are normative.

*Change in friendship reciprocity from Time 1 to Time 2*
Children's friendship reciprocity was assessed at 7 years of age to determine changes in friendship reciprocity over time. Combining Time 1 and Time 2 data yielded the following four friendship reciprocity categories:

   +/+: Reciprocal friend at both Time 1 and Time 2 (*n* = 46); 'stable mutual friend'.
   −/+: No reciprocal friend at Time 1 but a reciprocal friend at Time 2 (*n* = 20); 'gains friend'.
   +/−: Reciprocal friend at Time 1 but no reciprocal friend at Time 2 (*n* = 21); 'loses friend'.
   −/−: No reciprocal friend at either Time 1 and Time 2 (*n* = 9); 'chronic friendless'.

**Procedure**
Both in kindergarten when children were age 5 (Time 1), and again 24 months later in second grade (Time 2), children were interviewed individually in a quiet room at school using the best friend nomination protocol described above. In addition, at Time 1 only, in two separate sessions no more than a week apart, children took the sociometric measure of group popularity plus the tests of verbal ability, ToM, EU, and gratification delay described above. Task and trial orders were varied. Children were randomly assigned to one of two task orders. In the final Time 1 session, prosocial behaviour was observed during group free play.

# Results

## Descriptive statistics and preliminary analyses

Table 1 shows means and *SD*s for all Time 1 predictor variables and their intercorrelations. Girls displayed more prosocial acts ($M$ = 2.76) than boys ($M$ = 2.03), $t$(111) = 2.16, $p$ = .033, but gender was unrelated to any other Table 1 variable. Nor was it associated with friended/friendless status at age 5, $\chi^2$(1) <1, $N$ = 114, $p$ > .35. Thus, we combined the genders to enhance power in the main statistical analyses. Age correlated only with language and EU while DG was not related to any Time 1 variable.

## Predicting mutual friendship versus friendlessness at Time 1

Table 2 shows children's scores on Time 1 variables as a function of whether or not they currently had a mutual friendship. Independent-samples *t*-tests showed that friendless 5-year-olds had significantly lower verbal ability, lower ToM scores, less frequent DG, lower group sociometric preference, and fewer spontaneous prosocial behaviours than reciprocally friended children. However, there was no significant difference in EU. Comparing group sociometric status with reciprocal friendship at Time 1, our results supported previous evidence from older children in showing the relative independence of these two aspects of children's peer relations even at age 5. For example, of the 35 sociometrically 'popular' children we tested, 8 (23%) had no mutual friendship. Even more strikingly, 53% (16/30) of children who scored as 'rejected' by the peer group had at least one mutual friend. Clearly friendship is different from group popularity in early childhood, just as other research has shown it to be during middle childhood and pre-adolescence (e.g., Parker & Asher, 1993).

**Table 1.** Descriptives and bivariate correlations for Time 1 predictor variables

| | 1 (Sex) | 2 (Age) | 3 (VA) | 4 (ToM) | 5 (DG) | 6 (EU) | 7 (SP) | 8 (PB) | Mean (*SD*) |
|---|---|---|---|---|---|---|---|---|---|
| 1. Sex | – | .08 | .15 | .15 | .03 | −.07 | .16 | .20* | – |
| 2. Age | | – | .25** | .14 | .10 | .35** | .03 | .10 | 5.66 (.41) |
| 3. Verbal ability (VA) | | | – | .52** | −.04 | .45** | .17 | .21* | 60.22 (5.29) |
| 4. False belief (ToM) | | | | – | −.08 | .50** | .35** | .15 | 4.18 (1.88) |
| 5. Delay of gratification (DG) | | | | | – | −.04 | −.03 | .11 | 0.77 (.19) |
| 6. Emotion understanding (EU) | | | | | | – | .18 | .06 | 6.06 (2.25) |
| 7. Sociometric (group) preference (SP) | | | | | | | – | .19* | 0.05 (1.61) |
| 8. Prosocial behaviour (PB) | | | | | | | | – | 2.38 (1.86) |

*Note.* ToM, theory of mind.
*$p$ < .05; **$p$ < .01.

**Table 2.** Means (and SDs) by friendship category at Time 1

| | Friendship reciprocity at 5 years | | Group difference t |
| --- | --- | --- | --- |
| | Has mutual friend (n = 81) | Friendless (n = 33) | |
| Verbal ability | 61.1 (5.2) | 58.8 (4.9) | 2.17* |
| False belief (ToM) | 4.6 (1.7) | 3.4 (2.1) | 3.18** |
| Delay of gratification | 0.80 (0.16) | 0.68 (0.24) | 2.93** |
| Emotion understanding | 6.2 (2.2) | 5.7 (2.2) | 1.15 |
| Sociometric (group) preference | 0.30 (1.53) | −0.66 (1.83) | 2.86** |
| Prosocial behaviour | 2.7 (2.0) | 1.6 (1.2) | 2.91** |

*Note.* ToM, theory of mind.
*$p < .05$; **$p < .01$.

Independent contributions of these significant bivariate correlates of age 5 friendship reciprocity were investigated using binary logistic regression (see Table 3). 'Mutually friended' was the reference category, and Time 1 friendlessness was the outcome variable. Owing to high correlations between verbal ability, ToM, and EU, an initial model was run including only these variables. This model was significant, $\chi^2_3(N = 112) = 11.10, p < .05$, Nagelkerke pseudo-$R^2 = .13$, but only ToM made a significant independent contribution. As such, ToM was included in the final model along with gratification delay, prosocial behaviour, and peer preference. The overall model was significant, $\chi^2_4(N = 111) = 28.13$, $p < .001$, Nagelkerke pseudo-$R^2 = .32$ (see Table 3). Compared to those with mutual friends, 5-year-olds without a reciprocal friendship scored significantly lower in ToM scores and gratification delay. Expressed in *SD* increments, for every *SD* increase in DG, likelihood of having a reciprocal friend rose 2.10 times. With each *SD* gain in ToM, the likelihood of Time 1 mutual friendship rose 1.80 times.

### Prospective longitudinal predictors of friendship situation at age 7

Table 4 shows means and *SD*s for children grouped according to combined friendship patterns from age 5 to 7 years. Nine (9.4% of Time 2 children) remained chronically friendless, with no mutual friendship either at the start or the end of the 2-year longitudinal period. Another 46 had mutual friendships at both points. The remaining 41 changed status, 19 moving from friendless to mutually friended and 22 moving the opposite way. One-way ANOVAs followed by Tukey's post-hoc tests ($p < .05$) compared these four groups. Significant group differences emerged for ToM understanding, $F(3, 91) = 7.50$,

**Table 3.** Summary of Time 1 binary logistic regressions predicting Time 1 status as reciprocally friended versus friendless

| Variable | B | SE | Wald |
| --- | --- | --- | --- |
| Delay of gratification | .75 | .25 | 8.92** |
| False belief (ToM) | .59 | .24 | 5.75* |
| Sociometric (group) preference | .24 | .15 | 2.55 |
| Prosocial behaviour | .60 | .32 | 3.52 |

*Note.* ToM, theory of mind.
*$p < .05$; **$p < .01$.

**Table 4.** Means and *SD*s for Time 1 (5 years) predictor variables by longitudinal friendship status at Time 2 (7 years)

| Predictor | Friendship status | *n* | Mean | *SD* |
|---|---|---|---|---|
| T1 Age (months) | Chronically friendless | 9 | 67.78 | 4.09 |
| | Loses friendship | 21 | 69.43 | 4.74 |
| | Gains friendship | 20 | 66.70 | 5.85 |
| | Stable mutual friend | 46 | 68.09 | 4.74 |
| T1 Verbal ability (raw score) | Chronically friendless | 9 | 58.11 | 3.95 |
| | Loses friendship | 21 | 60.90 | 5.29 |
| | Gains friendship | 20 | 59.50 | 5.16 |
| | Stable mutual friend | 45 | 60.96 | 5.43 |
| T1 False belief total (/6) | Chronically friendless | 9 | 1.67 | 2.12 |
| | Loses friendship | 21 | 4.76 | 1.48 |
| | Gains friendship | 20 | 3.95 | 1.67 |
| | Stable mutual friend | 45 | 4.60 | 1.68 |
| T1 Emotion comprehension | Chronically friendless | 9 | 4.78 | 2.28 |
| | Loses friendship | 21 | 6.57 | 1.99 |
| | Gains friendship | 20 | 5.95 | 2.24 |
| | Stable mutual friend | 44 | 6.20 | 2.29 |
| T1 Delay of gratification | Chronically friendless | 9 | 0.74 | 0.16 |
| | Loses friendship | 21 | 0.79 | 0.17 |
| | Gains friendship | 20 | 0.67 | 0.27 |
| | Stable mutual friend | 44 | 0.81 | 0.15 |
| T1 Prosocial behaviour | Chronically friendless | 9 | 1.11 | 0.93 |
| | Loses friendship | 20 | 2.40 | 1.70 |
| | Gains friendship | 20 | 2.00 | 1.26 |
| | Stable mutual friend | 46 | 2.89 | 2.15 |
| T1 Sociometric group preference scores | Chronically friendless | 9 | −2.12 | 1.35 |
| | Loses friendship | 21 | −0.37 | 1.74 |
| | Gains friendship | 20 | 0.08 | 1.45 |
| | Stable mutual friend | 46 | 0.72 | 1.29 |

$p < .001$, sociometric preference score, $F(3, 91) = 10.18$, $p < .001$, and frequency of prosocial acts, $F(3, 91) = 3.32$, $p < .05$. In the case of ToM and sociometric preference, pairwise Tukey's test comparisons showed that the chronically friendless 7-year-olds scored below all other groups who did not differ significantly from one another. For prosocial acts, the only difference was between the chronically friendless and those with mutual friends at both times. Verbal ability ($p > .60$) and EU ($p > .30$) showed no significant group differences, whereas DG, although marginally significant by ANOVA ($p < .05$), yielded no statistically significant pairwise contrasts via the more conservative Tukey's test ($p = .067$).

To see whether the link between low ToM understanding and chronic friendlessness was independent of sociometric popularity with the group as a whole, an ANCOVA was run with friendship status as the grouping variable, FB scores as the outcome variable, and sociometric peer preference as the covariate. The result was statistically significant, $F(3, 90) = 5.35$, $p = .002$. Thus, even after due allowance was made for popularity versus rejection by the peer group as a whole, children who remained chronically friendless at age 7 stood out for their significantly poorer performance on FB tests of ToM 2 years earlier at age 5.

**Table 5.** Summary of multinomial logistic regressions predicting longitudinal friendship status at Time 2 (Stable mutual friendship at both ages (+/+) is reference category.)

| Age 7 status | B | SE B | Wald | OR | 95% CI |
|---|---|---|---|---|---|
| Loses friend (+/−) | | | | | |
| Delay of gratification | .01 | .36 | 0.00 | 1.01 | [0.50, 2.04] |
| False belief (ToM) | .49 | .37 | 1.81 | 1.64 | [0.80, 3.36] |
| Group preference | −.58 | .21 | 7.59** | 0.56 | [0.37, 0.85] |
| Prosocial behaviour | −.16 | .30 | 0.30 | 0.85 | [0.48, 1.52] |
| Chronically friendless (−/−) | | | | | |
| Delay of gratification | −1.30 | .65 | 4.03* | 0.27 | [0.08, 0.97] |
| False belief (ToM) | −1.98 | .85 | 5.45* | 0.14 | [0.03, 0.73] |
| Group preference | −1.47 | .50 | 8.53** | 0.23 | [0.09, 0.62] |
| Prosocial behaviour | −1.04 | .99 | 1.10 | 0.35 | [0.05, 2.48] |
| Gains friend (−/+) | | | | | |
| Delay of gratification | −.85 | .33 | 6.47* | 0.43 | [0.22, 0.82] |
| False belief (ToM) | −.44 | .33 | 1.78 | 0.65 | [0.34, 1.23] |
| Group preference | −.28 | .22 | 1.60 | 0.76 | [0.50, 1.15] |
| Prosocial behaviour | −.33 | .34 | 0.92 | 0.72 | [0.37, 1.40] |

*Note.* OR, odds ratio; CI, confidence interval; ToM, theory of minds.
*$p < .05$; **$p < .01$.

Finally, we used multinomial logistic regression to further investigate simultaneous predictors of patterns of change in friendship reciprocity over the 2 years. The reference group was stable mutuality (mutually friended at Times 1 and 2: [+/+]). Due to the high correlation between verbal ability, ToM, and EU, an initial control model was run including only these variables. The resulting model was significant, $\chi_9^2(N = 94) = 22.73$, $p < .01$, Nagelkerke pseudo-$R^2 = .23$. However, the only significant predictor in this model was ToM. As such, only ToM was included in the final model. The latter examined the simultaneous impact of gratification delay, ToM, prosocial behaviour, and sociometric preference on friendship reciprocity patterns from 5 to 7 years. This model was significant, $\chi_{12}^2(N = 93) = 57.50$, $p < .001$, Nagelkerke pseudo-$R^2 = .50$. As Table 5 shows, relative to the consistently friended group (+/+), children who remained without friendships at either time (−/−) were significantly lower in FB, sociometric group preference, and gratification delay 2 years earlier at age 5. Losing one's previous reciprocally friended status (+/−) was linked only with lower sociometric group preference. Finally, children who had gained mutual friendship between age 5 and age 7 (+/−) were significantly lower in DG at Time 1 than those who retained mutual friendship longitudinally. Expressed in terms of *SD* increments on Time 1 measures, for a single *SD* increment in FB understanding, children were 3.7 times less likely to be classified −/− compared to +/+ children. For each *SD* increment in sociometric group preference, children were 2.7 times less likely to be classified +/−, and 7.3 times less likely to be classified −/− relative to +/+ children. For each SD increase in DG, their odds of being +/+ rather than −/− or −/+ were 3.7 or 2.3 times greater, respectively.

## Discussion

As we had predicted on the basis both of theory and of limited data from one previous cross-sectional study of 4-year-olds (Peterson & Siegal, 2002), ToM understanding at age 5

emerged as a strongly significant predictor of children's having or not having a mutually reciprocated friendship both contemporaneously during initial friendship formation in kindergarten and also longitudinally from age 5 to age 7. Furthermore, the prospective link between ToM understanding at age 5 and having a mutual friend at age 7 remained significant even after controlling statistically for other related variables such as verbal ability, EU, age, prosocial behaviour, and group sociometric status with peers. Children who remained chronically friendless from age 5 through age 7 already stood out from the three other longitudinal friendship categories at age 5 for their dramatically poorer ToM understanding on first-order and advanced FB tests.

While these findings for mutual friendship are novel, they add to a growing body of evidence showing prospective longitudinal links between 5-year-olds' cognitive under-standing of ToM and other aspects of their social, emotional, and cognitive functioning in school several years later. These include academic achievement (Lecce *et al.*, 2014), sensitivity to teachers' criticism (Lecce, Caputi, & Hughes, 2011), aggressiveness to peers (Renouf *et al.*, 2010), classroom comportment skills (Razza & Blair, 2009), and popularity status in the peer group (Banerjee *et al.*, 2011). Our findings added importantly to this picture by showing that an unusually slow start in the development of ToM understanding at age 5 is also a powerful predictor of chronic friendlessness from age 5 through age 7. In general, these longitudinal data confirm that individual differences in how quickly children master an understanding of others' minds have demonstrable long-term significance not only for friendship but also for many other aspects of their social and academic development well beyond preschool (Hughes & Leekam, 2004).

In addition to highlighting both the early and the later significance of ToM understanding for friendship, our contrasting results for other variables warrant comment. At age 5, besides higher ToM, children with reciprocated friendships also scored higher in verbal ability, prosocial behaviour, and gratification delay. However, in the prospective longitudinal data, only ToM stood out as a clearly significant predictor of chronic friendlessness. The 7-year-olds who never managed to forge a reciprocated friendship throughout the study's 2 years had been just as linguistically adept at age 5, just as prosocially helpful to peers, just as skilled on EU tests, and not significantly less capable of delaying gratification than their peers. Only their significantly lower ToM understand-ing predicted their future status as chronically friendless.

What could explain the special significance of ToM as a prospective longitudinal predictor of mutual friendship versus friendlessness? Or, to put it another way, why did other variables we examined not emerge as clearly as ToM did in either the contemporaneous or the longitudinal friendship correlations? The pattern for DG was especially puzzling. At Time 1, children who would later gain a mutual friendship longitudinally scored lower in DG than the chronically friendless (see Table 4). Also, despite statistical significance via logistic regression, the DG contrast between friendship status groups was uniformly non-significant via more conservative Tukey's tests. One explanation for these inconsistent results could be our multitrial DG scoring method (see Mischel *et al.*, 1988, for a comparison of this with other commonly used methods of testing for DG, such as forced choice). Averaging over multiple trials may have contributed to the fact that a full 98% of our sample delayed gratification on at least 50% of their opportunities. For whatever reason, the fact that virtually all the children in this sample opted to delay on at least some trials may well explain the absence of clear associations for this variable as we measured it. Further research on friendship and gratification delay using other measurement techniques is clearly warranted.

Measurement issues could also help explain the absence of a clear longitudinal connection between prosocial behaviour and mutual friendship (and, for that matter, the lack of a significant contemporaneous correlation at age 5 between prosocial behaviour and ToM). We measured prosocial behaviour directly via naturalistic observation of peers' play, whereas most previous studies reporting significant links with ToM have used a proxy prosocial measure (parents' or teachers' scale ratings). Indeed, the one known previous study that, like ours, used direct observational measurement likewise found no significant correlations with ToM in either an ASD group or non-ASD control children (Travis *et al.*, 2001). While potentially more sensitive to actual helping behaviour, direct observation suffers from the difficulty of being only a limited sampling at one point in time in one setting whereas teachers and parents have a wider range of exposure to prosocial acts in many contexts.

Our finding that EU bore no significant relationship to mutual friendship at either Time 1 or Time 2 was unexpected. However, it is consistent with previous findings (a) that ToM and EU are separate, non-overlapping dimensions of social cognition (Cutting & Dunn, 1999; Dunn, 1995) and (b) that preschool ToM predicts different school-aged outcomes from those predicted by EU (Dunn, 1995). Our findings add to this picture by demonstrating that an understanding of other minds is more central than emotion awareness to the forging and maintaining of mutual friendships. Of course, such a conclusion must remain tentative pending replication across different age groups and using a wider range of ToM and EU tasks than we did. Indeed, all of our findings warrant replication given the inevitable limitations of any single study of the complex patterns of associations that exist over time between children's social thinking and their social behaviour in both the intimate context of reciprocal friendship and the larger arena of social popularity status in the peer group. It now remains to future studies to examine early mutual friendship status as a predictor of later social–cognitive outcomes, given the likely bidirectionality of links between the two. Conceivably, these may be complicated, as in Banerjee *et al.*'s (2011) group popularity study, by cyclic alternation. They found ToM as a predictor of group rejection at one age was followed by the reverse at a later age.

Nevertheless, pending such further study, our discovery of a longitudinal link between ToM understanding and chronic friendlessness remains an important one for both theory and for clinical practice. In theory, the link is, indeed, plausibly bidirectional. Via trust, insight, intimate conversation, and the mutual affirmation that experiencing a reciprocal friendship is apt to build (e.g., Dunn, Cutting, & Fisher, 2002), children might gain greater ToM-based understanding of their friends' minds. This could then generalize to heightened ToM-based understanding of people at large. At the same time, children who enter formal schooling with an already well-developed grasp of FB and other ToM concepts might use this conceptual knowledge to forge and maintain mutual friendships among their classroom peers. Early ToM understanding might likewise be important for sustaining friendship through the conflicts and upheavals of the important social transition from family to peer focus between ages 5 and 7 (Hughes & Dunn, 2002).

Clinically, assuming it is replicated, the link we discovered between low ToM understanding at age 5 with chronic friendlessness 2 years later at age 7 could prove useful both diagnostically and therapeutically. As past research shows (e.g., Bagwell *et al.*, 1998), children who are chronically friendless in middle and later childhood are at heightened risk of adverse emotional, academic, and psychiatric outcomes not only during childhood but through the remainder of life. The earliest roots of chronic friendlessness appear from our data to include poor ToM understanding of FB. Given that FB tests are quick and easy to administer and highly reliable (Peterson, Wellman, & Liu,

2005; Wellman *et al.*, 2001), they might prove a useful addition to the assessment repertoires of therapists and school counsellors concerned with early intervention to prevent chronic friendlessness, although of course not constituting an adequate substitute for a comprehensive diagnostic work-up. At the same time, an impressive body of ToM training research (e.g., Lohmann & Tomasello, 2003) shows that typically developing preschoolers' understanding of minds can be enhanced by brief, targeted interventions. This could provide a supplementary tool, along with playgroups and social-skill-building exercises (e.g., Rubin *et al.*, 2006), for early intervention on behalf of friendless young children during the early years of school when mutual friendships, if built and maintained, become ' key predictors of later enjoyment and adjustment to school' (Dunn *et al.*, 2002, p. 621).

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