British Journal of Developmental Psychology (2019)

The British Psychological Society

www.wileyonlinelibrary.com

Brief report

Some but not all aspects of (advanced) theory of mind predict loneliness

Susanne Koerber[1]* and Christopher Osterhaus[2]

[1]Freiburg University of Education, Germany
[2]Ludwig-Maximilians-Universität München, Germany

Children's (advanced) theory of mind (AToM) has been related to numerous real-world social consequences, including regarding their feelings of loneliness. A recent study has shown that AToM does not rely on a single underlying ability, instead involving three distinct factors: social reasoning, reasoning about ambiguity, and recognizing transgressions of social norms. The present study of 229 5- to 8-year-olds investigated whether and how these three aspects of AToM cognition are related to children's feelings of loneliness while controlling for the influence of self-esteem. Our results show that social reasoning is the only AToM factor that is related to children's loneliness, and it is independent from children's self-esteem. Our findings have consequences for the conceptualization of AToM and our understanding of children's feelings of loneliness and their ability to form friendships.

Statement of contribution

What is already known on this subject

- Theory-of-mind (ToM) understanding is related to children's ability to form friendships and to their loneliness.
- Results are mixed concerning the effects of *advanced* ToM.
- Recent studies show that *advanced* ToM is comprised of three separate factors.

What the present study adds

- Social reasoning is the only *advanced* ToM factor that is related to children's feelings of loneliness.
- Our results add to our knowledge about diverse real-world consequences of AToM.
- Our findings have consequences for the conceptualization of AToM.

Theory of mind (ToM) is an important aspect of social cognition that first emerges around the age of 4 years and continues to develop during elementary school. ToM has been related to numerous real-world social consequences, including the ability of children to successfully engage in social interactions. While there are strong theoretical reasons to assume that ToM and the social insights that result from it are related to children's ability to form friendships, the empirical evidence is mixed: Fink, Begeer, Peterson, Slaughter, and de Rosnay (2015) found that chronic

**Correspondence should be addressed to Susanne Koerber, Institute of Psychology, Freiburg University of Education, Kunzenweg 21, 79117 Freiburg, Germany (email: susanne.koerber@ph-freiburg.de).*

DOI:10.1111/bjdp.12302

friendlessness at an age of 7 years is predicted by a poor ToM understanding at an age of 5 years, while Peterson, O'Reilly, and Wellman (2016) found a significant relation between (advanced) ToM and social isolation in 6- to 14-year-old deaf children but not in children with normal hearing.

Wellman (2018) considered that more attention should be paid to how to measure advanced theory of mind (AToM), and indeed, Osterhaus, Koerber, and Sodian (2016) showed that frequently used AToM measures involve three distinct, weakly correlated abilities: social reasoning, reasoning about ambiguity, and recognizing transgressions of social norms. *Social reasoning* comprises abilities in higher-order false-belief reasoning, social understanding (e.g., understanding a double bluff), and the ability to read off emotions and mental states from the eyes. *Reasoning about ambiguity* involves the need for children to understand that the interpretative nature of the human mind determines how someone perceives an ambiguous stimulus. *Recognizing transgressions of social norms* comprises the recognition of faux pas and other transgressions of social norms.

Theoretically, there are two aspects of AToM that might be most closely related to children's ability to form friendships. First, social reasoning requires that children understand the recursive nature of mental states (i.e., one mental state is inferred based on another mental state), which is a prerequisite for the social insights that are associated with ToM. Understanding the complex mental states of others allows children to establish more intimate connections with their peers and hence should result in more-profound friendships. Second, recognizing transgressions of social norms seems to entail a more intuitive processing of social information, and it comprises measures that are closely related to autistic traits (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001), which may give rise to friendlessness.

From an applied perspective, the study of loneliness is important because there is a high prevalence (20%) of chronic loneliness during elementary school (Lempinen, Junttila, & Sourander, 2018), and children who report high levels of loneliness experience school-related disadvantages and also suffer from emotional, mental, and physical problems (Heinrich & Gullone, 2006).

The present study investigated the relation between loneliness and distinct AToM factors, while taking children's self-esteem into account as a control measure. Self-esteem is related to ToM (Bosacki, 2000), and low self-esteem is associated with self-reported feelings of loneliness and difficulties interacting with peers (e.g., Rubin, LeMare, & Lollis, 1990).

Method

Participants

We recruited 229 5- to 8-year-olds from nine kindergartens and six elementary schools in Germany, comprising 67 kindergarteners (M = 5.17; SD = 3 months; 38 girls), 97 first graders (M = 6.92, SD = 5 months; 48 girls), and 65 second graders (M = 7.92; SD = 5 months; 37 girls). Written consent was obtained from the parents for all children.

Materials

Loneliness was measured using the Loneliness and Social Dissatisfaction Scale (Cassidy & Asher, 1992). That scale comprises 15 3-point Likert items scored from 0 (feeling lonely) to 2 (not lonely) that assess children's self-reported social relations and their feelings of

loneliness (e.g., 'Do you have many friends in kindergarten/school?'). The reliability of the scale was acceptable, with Cronbach's $\alpha = .67$.

Self-esteem was measured with seven items reported by Chaplin and Norton (2015) that asked children to indicate on a 5-point Likert scale how they feel about themselves [from 0 (bad) to 4 (good)] regarding their physical appearance and cognitive, social, or scholastic competencies (e.g., 'When I see a picture of myself, I feel. . .'). The reliability of the scale was acceptable, with Cronbach's $\alpha = .63$. There were no substantial systematic differences in the reliabilities of the loneliness and self-esteem scales between the age groups.

AToM was assessed using 15 items reported by Osterhaus *et al*. (2016) plus three additional items: Two assessed reasoning about ambiguity (see Carpendale & Chandler, 1996), and the third was from the Eyes Test (Baron-Cohen *et al*., 2001). These items were included to enlarge the item pool. A description of all tasks and the replication of the factor structure is given in Osterhaus and Koerber (under review).

Procedure

Each kindergartener was tested in two one-on-one interviews, while each elementary-school child was tested in a small-group test (typically involving three to seven children) and a one-on-one interview (lasting approximately 20 min). The interview always preceded the small-group testing (or the second interview for the kindergarteners); with a few exceptions, both were conducted on the same day.

Results

Descriptives

The children reported an average loneliness score of 1.62 ($SD = 0.28$; range = 0.67–2.0) and an average self-esteem score of 3.15 ($SD = 0.62$; range = 1.43–4.0). The mean percentage of correct responses was 40% ($SD = 21\%$, range = 0–90%) for social reasoning, 66% ($SD = 27\%$, range = 27–100%) for recognizing transgressions of social norms, and 42% ($SD = 35\%$; range = 35–100%) for reasoning about ambiguity. A multivariate analysis of variance revealed that none of the variables included in this study differed significantly between boys and girls [Pillai's trace = 0.02, $F(5, 223) = 0.84$, $p = .52$ (F values for all individual comparisons = 0.00–1.83)].

Regression analysis

Table 1 lists the correlations between all of the study variables. We used linear regression analysis to determine whether children's loneliness is related to AToM (while controlling for self-esteem), with loneliness as the dependent variable and the three AToM factors, self-esteem, and age as the independent variables. This revealed that children's loneliness was significantly predicted by their social reasoning and self-esteem, but not by the other AToM factors or age (Table 2).

Discussion

Feeling lonely in kindergarten and early elementary school is predicted by the social reasoning and self-esteem of children. This represents the main finding of our study,

Table 1. Correlations for all measures

		1	2	3	4	5	6	7
1	Loneliness	1						
2	Social reasoning	.148*	1					
3	Recognizing transgressions of social norms	−.007	.238***	1				
4	Reasoning about ambiguity	−.026	.275***	.192**	1			
5	Self-esteem	.263***	.168*	.118	.054	1		
6	Age	.115	.459***	.229***	.242***	.391***	1	
7	Sex	.078	.001	.089	.023	.080	−.032	1

Note. *$p \leq .05$; **$p \leq .01$; ***$p \leq .001$.

Table 2. Regression analysis predicting loneliness

Variables	*b*	β	*t*	*p*
Constant	1.17		8.33	<.001
Self-esteem	0.16	.248	3.54	<.001
Social reasoning	0.02	.157	2.11	.036
Recognizing transgressions of social norms	−0.01	−.051	−0.76	.447
Reasoning about ambiguity	−0.01	−.059	−0.87	.385
Age	−0.001	−.028	−0.35	.725

showing that not *all* aspects of AToM are related to loneliness. Reasoning about ambiguity and recognizing transgressions of social norms are not associated with feelings of loneliness, which confirms our hypothesis that it is the social insights related to AToM that enable children to form friendships.

While there is an ample developmental literature on preschool ToM, the empirical evidence on AToM competencies and their underlying abilities is sparse. Our finding lends additional support to the three-factor model of AToM: The real-world social consequences of AToM are not uniform, with them instead depending on which specific aspect of this broad construct is measured. In this way, our results may explain earlier inconsistent findings in the literature, which could be a consequence of the different tasks used (Fink *et al.*, 2015; Peterson *et al.*, 2016; Wellman, 2018). The association between social reasoning and children's loneliness was not exceptionally strong ($\beta = .16$). However, this strength of association is consistent with the effect sizes from meta-analyses on the social consequences of ToM, which are typically around 0.20 (Slaughter, Imuta, Peterson, & Henry, 2015).

Studies of the social consequences of ToM do not always consider relevant control measures that may cause a spurious correlation. Our results show that the association between social reasoning and loneliness is independent of the influence of self-esteem. Autistic traits are another possible confounder, but they are primarily associated with recognizing transgressions of social norms (Baron-Cohen *et al.*, 2001), which we found were not related to loneliness. The reliabilities of the loneliness and self-esteem scales were lower than those found in the original studies, but they were still acceptable, and they did produce sufficient variance to indicate a correlation with social reasoning.

Future research should investigate ToM and loneliness experimentally (e.g., AToM trainings) and longitudinally. As our data show, AToM has real-world consequences, and so this aspect of children's advanced social cognition deserves as much attention as do their early milestones.

Acknowledgements

We are grateful to all research assistants for their help in the data collection and to all teachers, children, and parents for their friendly collaboration and support of this research.

References

Baron-Cohen, S., Wheelwright, S., Hill, J., Raste, Y., & Plumb, I. (2001). The "reading the mind in the eyes" test revised version: A study with normal adults, and adults with Asperger syndrome or high-functioning autism. *Journal of Child Psychology and Psychiatry*, *42*, 241–251. https://doi.org/10.1111/1469-7610.00715

Bosacki, S. L. (2000). Theory of mind and self-concept in preadolescents: Links with gender and language. *Journal of Educational Psychology*, *92*, 709–717. https://doi.org/10.1037//0022-0663.92.4.709

Carpendale, J. I., & Chandler, M. J. (1996). On the distinction between false belief understanding and subscribing to an interpretive theory of mind. *Child Development*, *67*, 1686–1706. https://doi.org/10.1111/j.1467-8624.1996.tb01821.x

Cassidy, J., & Asher, S. R. (1992). Loneliness and peer relations in young children. *Child Development*, *63*, 350–365. https://doi.org/10.2307/1131484

Chaplin, L. N., & Norton, M. I. (2015). Why we think we can't dance: Theory of Mind and children's desire to perform. *Child Development*, *86*, 651–658. https://doi.org/10.1111/cdev.12314

Fink, E., Begeer, S., Peterson, C. C., Slaughter, V., & de Rosnay, M. (2015). Friendlessness and theory of mind: A prospective longitudinal study. *British Journal of Developmental Psychology*, *33*, 1–17. https://doi.org/10.1111/bjdp.12060

Heinrich, L. A., & Gullone, E. (2006). The clinical significance of loneliness: A literature review. *Clinical Psychology Review*, *26*, 695–718. https://doi.org/10.1016/j.cpr.2006.04.002

Lempinen, L., Junttila, N., & Sourander, A. (2018). Loneliness and friendships among eight-year-old children: Time-trends over a 24-year period. *Journal of Child Psychology and Psychiatry*, *59*, 171–179. https://doi.org/10.1111/jcpp.12807

Osterhaus, C., & Koerber, S. (under review). *(In-)Coherence in social cognition beyond preschool? Extending the preschool ToM scale*.

Osterhaus, C., Koerber, S., & Sodian, B. (2016). Scaling of advanced theory-of-mind tasks. *Child Development*, *87*, 1971–1991. https://doi.org/10.1111/cdev.12566

Peterson, C. C., O'Reilly, K., & Wellman, H. M. (2016). Deaf and hearing children's development of theory of mind, peer popularity, and leadership during middle childhood. *Journal of Experimental Child Psychology*, *149*, 146–158. https://doi.org/10.1016/j.jecp.2015.11.008

Rubin, K. H., LeMare, L. J., & Lollis, S. (1990). Social withdrawal in childhood: Developmental pathways to peer rejection. In S. R. Asher & J. D. Coie (Eds.), *Peer rejection in childhood* (pp. 217–249). New York, NY: Cambridge University Press.

Slaughter, V., Imuta, K., Peterson, C. C., & Henry, J. D. (2015). Meta-analysis of theory of mind and peer popularity in the preschool and early school years. *Child Development*, *86*, 1159–1174. https://doi.org/10.1111/cdev.12372

Wellman, H. M. (2018). Theory of mind across the lifespan? *Zeitschrift für Psychologie*, *226*, 136–138. https://doi.org/10.1027/2151-2604/a00033032rfx4d

Received 15 March 2019; revised version received 19 July 2019