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Social Understanding of High-Ability Children in Middle and Late Childhood

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Abstract

Despite its importance in social development, social understanding has hardly been studied in high-ability children. This study explores differences in social understanding between children in high-ability and regular classrooms, specifically theory of mind (ToM) and perception accuracy, as well as associations between individual characteristics (age, gender, peer acceptance, and cognitive ability) and social understanding. Participants were 671 children in Grades 1 to 6 (55% boys; *M* age 9.20 years). Children in high-ability classrooms had higher ToM scores in Grades 1 to 3 and were more accurate perceivers of acceptance than children in regular classrooms. No group differences were found for ToM in Grades 4 to 6. ToM was associated with several individual characteristics, in particular age and cognitive ability. Perception accuracy was mainly related to peer acceptance. Suggestions for future research and implications for practitioners are discussed.

Keywords

high-ability children, theory of mind, perception accuracy, cognitive ability, peer acceptance

A widespread belief among parents and teachers of children with high abilities is that they excel in the academic domain, but are vulnerable in the social domain (Gauck & Trommsdorff, 2009; Geake & Gross, 2008; Hoogeveen, van Hell, & Verhoeven, 2005). Research supporting this belief is inconclusive. In some studies, high-ability children were indeed more at risk for problems in the social domain than average-ability children (Freeman, 2006; Silverman, 1993). Other studies have failed to find such differences (Gallucci, Middleton, & Kline, 1999; López & Sotillo, 2009) or found fewer social problems for high-ability children than average-ability children (Richards, Encel, & Shute, 2003). These mixed results raise the question whether high-ability children differ from average-ability children in their social development. They also raise the question of which individual differences are associated with social development among high-ability children.

The current study examined both questions by focusing on the social understanding of high-ability children in middle and late childhood. Middle childhood roughly ranges from 6 to 10 years (i.e., Grades 1-3). Late childhood, also referred to as early adolescence, ranges from 9 to 13 years (i.e., Grades 4-6). Although the high-ability children in this study had an IQ of 130 or more, we chose to refer to them as "high ability" rather than "gifted" because definitions of giftedness typically include more than just high intelligence (Sternberg & Davidson, 2005).

Social Understanding

Previous research on the social development of high-ability children has mainly focused on social behavior such as competence, adjustment, and behavioral and emotional problems (Neihart, Reis, Robinson, & Moon, 2002). Their social understanding and the individual characteristics that are related to differences herein are, however, largely unexplored. Social understanding refers to children's mental representations of the social world and related mental processes that precede social behavior (Olson & Dweck, 2008), and it has been associated with a range of social behaviors. Positive relations have been found with social skills (Bosacki & Astington, 1999). Negative relations have been found with peer rejection and aggression (Dodge et al., 2003), depression (Hoglund & Leadbeater, 2007), bullying and victimization (Sutton, Smith, & Swettenham, 1999), and sensitivity to criticism (Cutting & Dunn, 2002).

The current study is among the first to explore social understanding in a sample of high-ability children, and does so by examining general theory of mind (ToM) skills and situation-specific perception accuracy. ToM is the ability of people to attribute mental states (e.g., beliefs, desires, and intentions) to other people to explain or predict their behavior (Bosacki & Astington, 1999; Sutton et al., 1999). Most research on ToM has been conducted with young children and with individuals with atypical development, specifically

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autism (Miller, 2009). A few studies have been conducted in middle and late childhood. In middle childhood, children acquire a second-order understanding of others' beliefs (Miller, 2009). They also develop an appreciation of the fact that people can say things they do not literally mean (Filippova & Astington, 2008; Muris et al., 1999). In late childhood, children acquire in-depth knowledge of the content of other people's thoughts, feelings, and the related motives and goals (Bosacki & Astington, 1999; Hoglund, Lalonde, & Leadbeater, 2008).

Perception accuracy is the degree of correspondence between how others view a person and how this person thinks others view him or her (Kenny & DePaulo, 1993). For example, it is the ability of John to accurately assess how many peers like him. Perception accuracy is a valuable social understanding skill in daily social interactions (Blanch-Hartigan, Andrzejewski, & Hill, 2012) and can be assessed for a range of behaviors, traits, and affective judgments (Bellmore & Cillessen, 2003). In this study, we focused on children's affective perception accuracy, specifically of acceptance and rejection by peers. In general, children are more accurate perceivers of acceptance than of rejection. This may be because most children actively show whom they like, but are less clear in expressing whom they dislike (Bellmore & Cillessen, 2003; Cillessen & Bellmore, 1999).

Individual Differences in Social Understanding

So far, ToM and perception accuracy have not been studied in high-ability children specifically, but they have been examined in average-ability children. This research has shown large individual differences among children that are related to age, gender, acceptance by peers, and cognitive ability (Bosacki & Astington, 1999; Cillessen & Bellmore, 1999; Hoglund et al., 2008; Malloy, Albright, & Scarpati, 2007; Salley, Vannatta, Gerhardt, & Noll, 2010; Slaughter, Dennis, & Pritchard, 2002; Wellman, Cross, & Watson, 2001). Extending this research to high-ability children is important because it adds to our knowledge of the social development of these children and may help practitioners making decisions about an appropriate social emotional curriculum or intervention.

The first factor that relates to differences in children's social understanding is age. When children become older their brains mature and their social experiences grow (Bruner, 1990; Casey, Tottenham, Liston, & Durston, 2005). Both processes enable children to think increasingly more in-depth about the social world. Indeed, both ToM and perception accuracy have been found to improve with increasing age (Malloy et al., 2007; Salley et al., 2010; Wellman et al., 2001).

A second factor that relates to children's social understanding is gender. In middle and late childhood, girls usually spend more time in dyadic interactions than boys (Rose & Rudolph, 2006). In these interactions, girls also tend to disclose more information about themselves than boys. Consequently, girls have more opportunities to develop their social understanding than boys. In line with this reasoning, girls typically show higher ToM scores than boys (Bosacki & Astington, 1999; Hoglund et al., 2008). A mixed picture has been found for perception accuracy. In some studies, girls are more accurate perceivers than boys (Cillessen & Bellmore, 1999), but in other studies, boys and girls perform at similar levels (Malloy et al., 2007; Salley et al., 2010).

Peer acceptance is a third factor that is related to children's social understanding. Children's acceptance by peers is a reflection of the differences that exist in the quality and amount of peer interactions they have. On one end of the continuum of peer acceptance are children who are liked by many peers and disliked by few (Coie, Dodge, & Coppotelli, 1982). These children show prosocial behavior (Newcomb, Bukowski, & Pattee, 1993) and are easy to play and work with. They elicit many positive interactions from their peers (Bierman, 2004). On the other end of the continuum are children who are disliked by many peers and liked by few (Coie et al., 1982). They show antisocial behavior or withdraw from interactions (Cillessen, van IJzendoorn, van Lieshout, & Hartup, 1992; Newcomb et al., 1993). These children tend to hurt or annoy other children, which results in negative interactions and active avoidance of them by peers (Bierman, 2004). One would expect that children with many positive peer relations would develop a better social understanding (cf. Bruner, 1990). However, research findings concerning the associations between peer acceptance and social understanding are less clear. With regard to ToM, some studies have found a positive relation between peer acceptance and ToM (Slaughter et al., 2002), whereas others did not find a relation (Bosacki & Astington, 1999). The association between peer acceptance and perception accuracy seems to depend on valence. Negative associations have been found between peer acceptance and perception accuracy of acceptance, whereas positive associations have been found with perception accuracy of rejection (Cillessen & Bellmore, 1999).

The final factor to consider is cognitive ability. This factor is directly related to the question of whether high-ability children differ from average-ability children in their social understanding. Previous research with average-ability children indicates a positive relation between cognitive ability and social understanding. In early childhood, cognitive skills such as language ability (for a review, see Milligan, Astington, & Dack, 2007) and executive functions (Moses, 2005) have been found to be positively related to children's ToM. In middle and late childhood, only verbal abilities have been studied. This research also showed a positive relation with ToM (Bosacki & Astington, 1999). To date, no studies have examined whether cognitive ability is related to perception accuracy. However, differences in cognitive ability are considered to be important in the development of all aspects of social understanding (Dunn, 1996; Olson & Dweck,

Table 1. Sample Characteristics by Group and Grade.

	High-ability classroom				Regular classroom			
Grade	*n*	*M* age	*SD* age	Percentage boys	*n*	*M* age	*SD* age	Percentage boys
1	26	6.45	0.60	50.0	62	6.67	0.38	56.5
2	40	7.45	0.46	52.5	50	7.63	0.50	42.0
3	67	8.51*	0.44	73.1*	61	8.83*	0.49	47.5*
4	74	9.36*	0.45	54.1	61	9.75*	0.50	50.8
5	92	10.45*	0.58	64.1*	59	10.87*	0.53	45.8*
6	31	11.40*	0.68	51.6	48	11.69*	0.56	52.1

*$p < .05$.

2008). Therefore, we also explored the association between cognitive ability and perception accuracy.

Group Differences in Social Understanding

In the previous section, we described that cognitive ability is positively related to children's social understanding. Since high-ability children master cognitive skills at a younger age than average-ability children (Steiner & Carr, 2003), it can be expected that, on average, they will have a better developed ToM and perception accuracy than average-ability age mates. A recent review article provides additional support for the idea that high-ability children have a better social understanding than average-ability children (Walker & Shore, 2011). Walker and Shore (2011) explored possible connections between giftedness and ToM, and highlighted several additional characteristics of gifted children that may enhance ToM. Besides advanced cognitive abilities, these characteristics included metacognitive skills, high alertness and attention, and the ability to manage novelty.

Present Study

The aim of the present study was to extend current knowledge of the social development of high-ability children by examining their social understanding, specifically ToM and perception accuracy. Two questions guided this study. First, we examined which individual difference factors were related to social understanding. We hypothesized that age would be positively related to ToM and perception accuracy. We also expected that girls would have a higher ToM score and perception accuracy than boys. In addition, we hypothesized that peer acceptance would be positively associated with ToM and perception accuracy of rejection but negatively with perception accuracy of acceptance. Finally, we expected that cognitive ability would be positively related to ToM and perception accuracy.

Our second research question was whether the predictors of social understanding would differ between children in high-ability classrooms and children in regular classrooms. We hypothesized that children in high-ability classrooms would have higher ToM scores and would be more accurate perceivers of acceptance and rejection than children in regular classrooms. Because high-ability classrooms are more homogeneous with regard to cognitive ability than regular classrooms, we also expected that the prediction of social understanding by the individual difference factors would be weaker in high-ability classrooms than in regular classrooms.

Method

Participants

Participants were high-ability children and average-ability children in Grades 1 to 6 from high-ability schools (aimed at children with an IQ more than 129) and regular schools in the Netherlands. In the high-ability schools, 330 children from 23 classrooms in 10 schools participated (*M* age = 9.22 years, *SD* = 1.50; 60.0% boys). The majority of these children (95.2%) spoke Dutch at home, 3.6% spoke both Dutch and a different language, and 1.2% spoke only a language other than Dutch at home. The average classroom size was 15.26 children (range = 11-18).

In the regular schools, 341 children from 14 classrooms in five schools participated (*M* age = 9.18 years, *SD* = 1.79; 49.1% boys). Most children (89.7%) spoke only Dutch at home, 8.2% spoke both Dutch and a different language, and 2.1% spoke only a language other than Dutch at home. The average classroom size was 26.71 children range = 18-30.

Parental consent was obtained for all participating children. In high-ability schools, 94% of the children participated. In regular schools, 92% of the children participated. Of the children not included in the sample, 13 children in high-ability schools and 13 children in regular schools had no parental permission to participate. Twenty-eight children were absent during the data collection.

Table 1 presents the sample characteristics by grade and group. Independent-samples *t* tests revealed that children in high-ability classrooms were slightly younger than children in regular classrooms in Grades 3 to 6 (Cohen's *d* for the significant differences ranged from 0.47 to 0.82). In Grades 3 and 5, there were more boys in the high-ability classrooms than in the regular classrooms (Cohen's *d*s 0.53 and 0.37, respectively). There were no other differences between the two groups.

Measures

Peer Acceptance. Peer acceptance was derived from children's peer nominations of whom they liked most and least in their classroom. Children received a list with the names of all children in their classroom. They nominated up to 10 peers for the questions "liked most" and "liked least." Cross-sex nominations were allowed. The maximum number of nominations that could be received depended on classroom size and ranged from 10 to 16 in high-ability classrooms and from 16 to 28 in regular classrooms. The number of nominations received per question was summed for each child. Proportion scores were calculated by dividing the nominations received by the number of nominators in the classroom. Subsequently, peer acceptance was determined by subtracting the proportion score for liked least from the proportion score for liked most.

Cognitive Ability. Cognitive ability was measured by children's abstract reasoning scores and their academic achievement. Abstract reasoning was assessed with the Raven Standard Progressive Matrices (Raven, Court, & Raven, 1996). This nonverbal multiple choice test provides children with 60 incomplete visual patterns and asks them to complete each pattern by choosing the correct piece from six available pieces. Answers were scored as either 0 = *incorrect* or 1 = *correct* and were then summed into an abstract reasoning score. The abstract reasoning scores were standardized into *z* scores within the total sample before the computation of cognitive ability.

Academic achievement was indicated by mathematical ability and reading comprehension, both measured with standardized national achievement tests. Mathematical ability tests were assigned in Grades 1 to 6. Reading comprehension tests were assigned in Grades 2 to 6. Two versions of the mathematical ability test (Jansen & Kraemer, 2002; Jansen, Scheltens, & Kraemer, 2009) as well as two versions of the reading comprehension test (Krom, van Berkel, & Jongen, 2010; Staphorsius & Krom, 1998) were used in the schools. The versions measured the same construct but differed in scaling. To correct for differences in scaling, both mathematical ability and reading comprehension were standardized into *z* scores in the total sample.

Cognitive ability was computed by taking the average of the available standardized scores for abstract reasoning, mathematical ability, and reading comprehension. The internal consistency was good (α = .82). Cognitive ability was based on three measures for 48.4% of the children, on two measures for 25.8% of the children, and on one measure for 24.7% of the children. For the remaining 1.0% (i.e., seven children) no cognitive measures were available.

Theory of Mind. Previous studies have focused on different aspects of ToM in middle childhood (e.g., Filippova & Astington, 2008; Muris et al., 1999) and late childhood (e.g., Bosacki & Astington, 1999; Hoglund et al., 2008). In line with these studies, we used two measures to assess ToM: one for children in Grades 1 to 3 and one for children in Grades 4 to 6.

Theory of mind (Grades 1-3). In Grades 1 to 3, seven vignettes from the ToM-test by Muris et al. (1999) were used to assess children's understanding of irony, humor, figure of speech, and second-order belief (Muris et al., 1999; Steerneman, Meesters, & Muris, 2000). Some vignettes were adjusted so that half of the vignettes had female characters and half had male characters. An example vignette is a situation in which two girls hear two women talking about the weather. Although it is raining hailstones, one woman says to the other: "it is really beautiful weather today." Following each vignette, several questions were asked. In order to make the vignettes suitable for group assessment, the open questions were changed to multiple choice questions. Questions that checked understanding (e.g., "Is it true what the woman says?") could be answered with yes or no. Children answered questions concerning explanations (e.g., "Why do you think the woman says that she thinks it is beautiful weather?") by choosing one of four options. In total, there were 17 items each scored as 0 = *incorrect* or 1 = *correct*. The items were summed into a total ToM-score that could range from 0 to 17 (α = .69). The means (standard deviations in parentheses) for Grades 1 to 3 were 10.95 (2.76), 13.15 (2.52), and 14.41 (2.00), respectively.

Theory of mind (Grades 4-6). Two vignettes were used to assess ToM in Grades 4 to 6 (Bosacki, 2000; Bosacki & Astington, 1999). The vignettes and questions were translated and the characters' names were changed to familiar Dutch names. One vignette involved three boys in an ambiguous situation on the soccer field and the other vignette involved three girls in an ambiguous situation on the playground. Both vignettes assessed ToM with eight open-ended questions. For example, children were asked "Why do you think the boy chose the other boy to be on his team?" and "How do you think the boy feels? Why?"

The vignettes were coded following Bosacki and Astington's (1999) directions. All no-responses and tangential answers (i.e., the 0-scores) were coded by the first author. Two independent coders, third-year undergraduate students of Educational Science, scored all remaining answers. The interrater reliability was substantial for 11 questions (κ > .60), moderate for two questions (κ between .40 and .60), fair for one question (κ = .38), and low for two questions (κ < .20; Landis & Koch, 1977). The two questions with low interrater reliability were dropped. For the remainder questions, discrepancies between the coders were discussed with the first author until agreement was reached.

The scores on the subscales were summed into a total ToM score. These scores could range from 0 to 44 with higher scores indicating a higher ToM. The means (standard deviations in parentheses) for Grades 4 to 6 were 18.92 (4.61), 20.32 (4.15), and 22.71 (4.58), respectively. The internal consistency for the complete questionnaire was comparable to the original questionnaire (α = .65).

Perception Accuracy. Perception accuracy was measured with peer nominations (cf. Cillessen & Bellmore, 1999). It indicated the accuracy of children's perceptions of how many peers accepted and rejected them (Malloy & Cillessen, 2008). Children could nominate up to 10 peers for "likes you most" and "likes you least." Perception accuracy for acceptance was computed by subtracting the number of nominations received for "liked most" from the number of nominations given for "likes you most." Perception accuracy for rejection was computed by subtracting the nominations received for "liked least" from the nominations given for "likes you least." All scores were transformed to get an absolute accuracy score (i.e., a score of −5 became a score of 5). Consequently, a higher score indicated lower perception accuracy. Perception accuracy was best at a score of zero (i.e., the actual number of liked most/least nominations received equaled the perceived number of liked most/least nominations). Because nominations were capped at 10, children could receive more nominations for "liked most" and "liked least" than they could give for "liked you most" and "liked you least." To correct for this effect, all scores above 10 were truncated to 10. For acceptance, six scores in regular classrooms (1.8%) and one score in high-ability classrooms (0.3%) were corrected. For rejection, we also truncated six scores in regular classrooms (1.8%) and one score in high-ability classrooms (0.3%).

Procedure

High-ability schools and regular schools that used the standard national achievement test were contacted by letter and telephone to ask for their participation. Both high-ability schools and regular schools had a heterogeneous classroom structure. That is, children of several grades were grouped in one classroom. Usually, children in Grades 1 to 3 were in the same classroom as were children in Grades 4 to 6.

After consent was obtained from school authorities, parents received a letter that informed them about the purpose of the study and asked for their consent. At one school, the school authorities requested a passive consent procedure. At all schools, separate consent was obtained for the child's participation in the study and the use of the results of the achievement tests. Ethical approval for the study was obtained from the university's Ethical Board for Behavioral Science.

The data collection took place on 2 days that were 5 to 15 days apart. On the first day, the Raven was administered. Children received classroom instruction and took the test individually at their own pace. On the second day, children completed sociometric questionnaires and vignettes. They received instructions for the sociometric questionnaires. The confidentiality of their answers was stressed and they were asked not to discuss their nominations during or after testing. Then, the children completed the questionnaire. All children in Grade 1 and children with reading difficulties were assessed individually. In Grades 1 to 3, the vignettes were assessed group-wise. The experimenter read each vignette and the possible answers to the children. Long vignettes and all questions and possible answers were read twice to allow the children to check their answers. In Grades 4 to 6, children completed the vignettes individually. The completion of the sociometric questionnaires and vignettes took approximately 1 hour.

The academic achievement scores were obtained from the classroom teachers. In one classroom, the reading comprehension test was assessed by the first author because these scores were not available at the school.

Data Analysis

We ran multilevel models using the Mixed Models procedure in SPSS 19. Multilevel modeling allowed us to examine individual differences in ToM and perception accuracy while taking into account that children in the same context (i.e., classroom) may be more similar to each other than to children in another context.

Before running the models, we centered the variables age, peer acceptance, and cognitive ability to make the interpretation of the intercepts more meaningful. For ToM in Grades 1 to 3, we centered the variables on the mean of Grades 1 to 3. For ToM in Grades 4 to 6, we centered on the mean of Grades 4 to 6. For perception accuracy, the variables were centered on the means of the total sample.

After centering, we set out to find the model that best fitted our data. Model 1 included random intercepts at Level 1 and Level 2 but no predictors. This model showed to what extent there was variation within and between classrooms. In Model 2, the Level 1 predictors age, gender (0 = *boy*, 1 = *girl*), peer acceptance, and cognitive ability were added. In Model 3, we included the Level 2 predictor group (0 = *regular classroom*, 1 = *high-ability classroom*). Model 4 was run to examine whether the associations between individual characteristics and social understanding depended on classroom level. In this model, random slopes for Level 1 and cross-level interactions (i.e., group * age, group * gender, group * peer acceptance, and group * cognitive ability) were added. Because of the small sample size at Level 2, we tested the cross-level interactions one by one, adding for each model a Level 1 random slope and the cross-level interaction. In other words, we ran four separate models for each outcome variable. If two or more of these separate models yielded significant results, we ran a final model including the significant random effects and cross-level interactions.

Table 2. Means and Standard Deviations of Peer Acceptance, Cognitive Ability, Theory of Mind, and Perception Accuracy by Group.

	High-ability classroom		Regular classroom					
Variable	*M*	*SD*	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*
Peer acceptance	0.17	0.34	0.12	0.23	2.22	569.90	.027	0.17
Cognitive ability	0.24	0.85	–0.38	0.97	8.82	657.40	<.001	0.68
Theory of mind (Grades 1-3)	14.14	2.23	12.20	2.87	6.63	300.99	<.001	0.75
Theory of mind (Grades 4-6)	20.32	4.81	20.32	4.41	0.02	363.00	.984	–0.00
Perception accuracy (acceptance)	2.68	2.07	3.21	2.51	–3.02	653.18	.002	–0.23
Perception accuracy (rejection)	2.09	2.10	2.79	2.78	–3.51	650.37	<.001	–0.28

Table 3. Bivariate Correlations Among Age, Peer Acceptance, Cognitive Ability, Theory of Mind, and Perception Accuracy.

Variable	1	2	3	4	5	6	7
1. Age	—	.11**	.63**	.44**	.22**	.13**	.03
2. Peer acceptance		—	.10**	.11	.22**	.50**	–.63**
3. Cognitive ability			—	.59**	.29**	.05	–.04
4. Theory of mind (Grades 1-3)				—	—	.07	–.04
5. Theory of mind (Grades 4-6)					—	.21**	–.09
6. Perception accuracy (acceptance)						—	–.21**
7. Perception accuracy (rejection)							—

**p < .01.

Results

Descriptive Statistics and Correlations

Table 2 presents the means and standard deviations of peer acceptance, cognitive ability, ToM, and perception accuracy by group. Independent samples *t*-tests showed statistically significant differences between children in high-ability classrooms and children in regular classrooms on peer acceptance, cognitive ability, ToM (only in Grades 1-3), and perception accuracy. Specifically, children in high-ability classrooms were on average more accepted by their peers than children in regular classrooms. In addition, children in high-ability classrooms performed better on the cognitive ability measure than children in regular classrooms. Also, Grades 1 to 3 children in high-ability classrooms had a higher ToM score than Grades 1 to 3 children in regular classrooms; no group differences were found for ToM in Grades 4 to 6. Finally, children in high-ability classrooms had lower scores than children in regular classrooms for perception accuracy of acceptance and rejection. This indicated that children in high-ability classrooms were more accurate perceivers of acceptance and rejection than children in regular classrooms.

Table 3 contains the bivariate correlations among the main study variables. With regard to the associations among the outcome variables, the analyses showed that ToM was not related to perception accuracy of acceptance or rejection in Grades 1 to 3. In Grades 4 to 6, there was a statistically significant correlation between ToM and perception accuracy of acceptance, indicating that a higher ToM score was related to less accurate perceptions of acceptance. ToM scores in Grades 4 to 6 were not related to perception accuracy of rejection. A statistically significant, negative correlation was found between perception accuracy of acceptance and perception accuracy of rejection. In other words, the more accurate children were in estimating their acceptance, the less accurate they were in estimating their rejection.

Multilevel Analyses for Theory of Mind

Separate analyses were conducted for children in Grades 1 to 3 and children in Grades 4 to 6 because they completed different measures of ToM. The results of both analyses are presented in Table 4.

Grades 1 to 3. Model 1 for ToM in Grades 1 to 3 showed that 22.04% of the variance could be attributed to differences between classrooms (i.e., Level 2 variance/Level 2 + Level 1 variance = 1.73/7.85). The remaining 77.96% of the variance could be attributed to differences within classrooms.

Model 2 revealed that the addition of the Level 1 fixed effects (i.e., age, gender, peer acceptance, and cognitive ability) significantly improved model fit. This is demonstrated by the decrease in −2log likelihood, $\chi^2_{change}(4) = 141.69$, $p < .001$. Closer examination of this finding showed that age and cognitive ability were positively associated with ToM in Grades 1 to 3. Gender and peer acceptance were not related to ToM in these grades.

Table 4. Fixed-Effects Estimates (Top) and Variance–Covariance Estimates (Bottom) for Models of the Predictors of ToM.

	ToM (Grades 1-3)			ToM (Grades 4-6)			
Parameter	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 4
Fixed effects							
Intercept	13.36* (0.33)	13.03* (0.20)	12.50* (0.22)	20.27* (0.35)	19.20* (0.30)	19.25* (0.43)	19.43* (0.40)
Level 1							
Age		0.04* (0.01)	0.05* (0.01)		0.08* (0.02)	0.08* (0.02)	0.10* (0.02)
Gender		0.18 (0.27)	0.23 (0.27)		2.41* (0.44)	2.40* (0.44)	2.41* (0.43)
Peer acceptance		0.78 (0.48)	0.69 (0.47)		2.06* (0.74)	2.08* (0.74)	1.93* (0.74)
Cognitive ability		1.43* (0.17)	1.22* (0.18)		1.93* (0.33)	1.94* (0.35)	3.20* (0.54)
Level 2							
Group			1.05* (0.28)			–0.09 (0.51)	–0.09 (0.46)
Cross-level interactions							
Group * Cognitive ability							–2.11* (0.71)
Random parameters							
Level 2							
Intercept	1.73* (0.70)	0.18 (0.19)	0.00 (0.00)	1.36 (0.87)	0.17 (0.45)	0.16 (0.45)	0.00 (0.00)
Level 1							
Intercept	6.12* (0.51)	4.68* (0.40)	4.63* (0.38)	20.11* (1.55)	16.38* (1.27)	16.38* (1.27)	16.14* (1.20)
Cognitive ability							0.00 (0.00)
−2Log likelihood	1460.60	1318.91	1306.97	2147.47	2054.03	2054.00	2045.37

Note. Standard errors are in parentheses.
$^*p < .05$.

The random intercept at Level 2 was no longer significant in Model 2, suggesting that there was no additional variance between classrooms to be explained. For two reasons, we still decided to run Model 3 to examine whether adding group as a Level 2 fixed effect would increase model fit. The first reason is that group differences were one of the main research questions of our study. The second reason is that the nonsignificant random intercept may have been caused by the small sample size at Level 2. In the case of a small sample, a significant decrease in −2log likelihood may be a better indication of model fit than the significance of the random parameter (Heck, Thomas, & Tabata, 2010). The analyses showed that adding the fixed effect for group improved the model $\chi^2_{change}(1) = 11.94$, $p < .001$. Children in high-ability classrooms scored significantly higher on ToM than children in regular classrooms.

Finally, we ran four models, one for each Level 1 predictor, to examine whether the slopes of the Level 1 predictors varied between classrooms and whether possible differences could be explained by group. In each model, we included a random slope and cross-level interaction. For example, in the model for age, we included both a random slope for age and the cross-level interaction group * age. None of these models improved model fit. Therefore, Model 3 remained the best fitting model for ToM in Grades 1 to 3.

Grades 4 to 6. Model 1 demonstrated that most of the variance (93.67%) in ToM in Grades 4 to 6 was explained by differences within classrooms. Differences between classrooms accounted for 6.33% of the variance. Model 2 showed that the Level 1 fixed effects significantly improved model fit, $\chi^2_{change}(4) = 93.44$, $p < .001$. Age, peer acceptance, and cognitive ability were positively related to ToM, and girls scored higher than boys.

For the same reasons as for ToM in Grades 1 to 3, we ran the model including the Level 2 fixed-effect group, even though the intercept at Level 2 was not significant in Model 2. Model 3 revealed that there were no group effects in addition to the Level 1 fixed effects, $\chi^2_{change}(1) = 0.03$, $p = .86$.

After Model 3, we ran the four models with random slopes and cross-level interactions. Adding the random slope for cognitive ability and the cross-level interaction for group * cognitive ability significantly improved model fit, $\chi^2_{change}(1) = 8.63$, $p = .003$. Since the other three models did not improve model fit, this model was considered to be the best-fitting model. The estimates of this final model are presented as Model 4 in Table 4. To examine the cross-level interaction effect, we conducted a simple slopes analysis (see, Preacher, Curran, & Bauer, 2006). This analysis revealed that cognitive ability was a stronger predictor of ToM in Grades 4 to 6 in regular classrooms, $b = 3.20$, $SE = 0.54$, $t(364) = 5.91$, $p < .001$, than in high-ability classrooms, $b = 1.08$, $SE = 0.44$, $t(364) = 2.44$, $p = .02$.

Multilevel Analyses for Perception Accuracy

Acceptance. Table 5 presents the models predicting perception accuracy for acceptance and rejection. In Model 1 for

Table 5. Fixed-Effects Estimates (Top) and Variance–Covariance Estimates (Bottom) for Models of Predictors of Perception Accuracy.

	Perception accuracy of acceptance				Perception accuracy of rejection			
Parameter	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Fixed effects								
Intercept	2.89* (0.14)	2.89* (0.14)	3.36* (0.19)	3.40* (0.19)	2.38* (0.11)	2.49* (0.12)	2.69* (0.16)	2.66* (0.16)
Level 1								
Age		0.01 (0.01)	0.01 (0.01)	0.01 (0.01)		0.02* (0.01)	0.01* (0.01)	0.03* (0.01)
Gender		–0.10 (0.16)	–0.13 (0.16)	–0.19 (0.15)		–0.10 (0.15)	–0.12 (0.15)	–0.08 (0.14)
Peer acceptance		3.95* (0.27)	4.01* (0.27)	6.14* (0.60)		–5.28* (0.25)	–5.24* (0.25)	–7.15* (0.62)
Cognitive ability		–0.07 (0.11)	0.03 (0.11)	–0.02 (0.11)		–0.14 (0.10)	–0.08 (0.10)	–0.08 (0.10)
Level 2								
Group			–0.80* (0.23)	–0.76* (0.23)			–0.34 (0.20)	–0.37 (0.19)
Cross-level interactions								
Group * Age				—				–0.02* (0.01)
Group * Peer acceptance				–2.95* (0.73)				2.74* (0.77)
Random parameters								
Level 2								
Intercept	0.41* (0.16)	0.37* (0.14)	0.23* (0.11)	0.24* (0.10)	0.14 (0.10)	0.17* (0.08)	0.14 (0.08)	0.12 (0.09)
Level 1								
Intercept	4.96* (0.28)	3.65* (0.21)	3.65* (0.21)	3.34* (0.19)	5.49* (0.31)	3.19* (0.18)	3.13* (0.18)	2.76* (0.16)
Age				—				0.00 (0.00)
Peer acceptance				2.00 (1.08)				2.82* (1.12)
−2Log likelihood	3012.04	2790.55	2780.18	2744.93	3060.69	2675.42	2672.63	2621.96

Note. Standard errors are in parentheses.
*$p < .05$.

perception accuracy of acceptance, 7.64% of the variance could be attributed to differences between classrooms. The remaining 92.36% of the variance was due to differences within classrooms. Adding the Level 1 fixed effects in Model 2 significantly improved model fit, $\chi^2_{change}(4) = 221.49$, $p < .001$. Peer acceptance was positively related to perception accuracy of acceptance. Because children with accuracy scores close to zero were the most accurate perceivers of acceptance, this indicates that the more accepted children were by peers, the less accurate perceivers of acceptance they were.

In Model 3, we added group as a Level 2 fixed effect. This adjustment of the model improved model fit, $\chi^2_{change}(1) = 10.37$, $p = .001$. Children in high-ability classrooms were more accurate perceivers of acceptance than children in regular classrooms.

Model 3 also showed that additional variance was to be explained at Level 1 and Level 2. Model 4 revealed that adding the cross-level interaction of group * peer acceptance significantly improved model fit, $\chi^2_{change}(1) = 35.25$, $p < .001$. The simple slopes analysis showed that peer acceptance was a stronger predictor of perception accuracy of acceptance in regular classrooms, $b = 6.14$, $SE = 0.60$, $z = 10.21$, $p < .001$, than in high-ability classrooms, $b = 3.18$, $SE = 0.44$, $z = 7.32$, $p < .001$.

Rejection. Model 1 for perception accuracy of rejection showed that 5.06% of the variance was between classrooms and 94.94% of the variance was within classrooms. In Model 2, the addition of the Level 1 fixed effects significantly improved model fit, $\chi^2_{change}(4) = 385.27$, $p < .001$. Age was positively associated with perception accuracy of rejection, indicating that perception accuracy of rejection decreased with increasing age. Peer acceptance was negatively associated with perception accuracy, indicating that the more children were accepted by their peers, the more accurate perceivers of rejection they were.

In Model 3, group as Level 2 fixed effect did not significantly improve model fit, $\chi^2_{change}(1) = 2.79$, $p = .09$. There were no differences between children in high-ability and regular classrooms in perception accuracy of rejection.

As with the previous outcome variables, four models with random slopes and cross-level interactions were run to determine whether the associations between the Level 1 predictors and perception accuracy of rejection varied by classroom and whether possible variations could be explained by group. The models for age and peer acceptance each significantly improved model fit. Therefore, a new analysis was run that included the random parameters for age and peer acceptance and the cross-level interactions. The estimates of this model are presented as Model 4 in Table 5. The additions led to a significant improvement in model fit, $\chi^2_{change}(4) = 50.67$, $p < .001$. Both cross-level interactions were statistically significant. Simple slopes analyses revealed that age was related to perception accuracy of rejection in regular classrooms, $b = .03$, $SE = 0.01$, $z = 4.00$, $p < .001$, but not in high-ability classrooms, $b = 0.00$, $SE = 0.01$, $z = 0.30$, $p = .76$. Peer acceptance was stronger related to perception accuracy of rejection in regular classrooms, $b = -7.15$, $SE = 0.62$, $z = -11.50$, $p <$ .001, than in high-ability classrooms, $b = -4.41$, $SE = 0.46$, $z = -9.64$, $p <.001$. The random slope for peer acceptance was statistically significant, indicating that the association between classrooms varied between classrooms. Because the cross-level interaction with group was entered in the model, this shows that other classroom factors than high-ability classrooms versus regular classrooms also accounted for this effect.

Discussion

This study examined the social understanding of high-ability children in middle and late childhood, a topic that has received little empirical attention. Two questions guided the study. First, we examined to what extent age, gender, peer acceptance, and cognitive ability were related to social understanding. Second, we studied whether the predictors of ToM and perception accuracy of acceptance and rejection differed between high-ability classrooms and regular classrooms.

With regard to ToM, we found that age and cognitive ability were positively associated with ToM in Grades 1 to 3. In addition, Grades 1 to 3 children in high-ability classrooms had on average a higher ToM score than Grades 1 to 3 children in regular classrooms. In Grades 4 to 6, age and peer acceptance were positively associated with ToM. Girls also had a better ToM than boys in these grades. Furthermore, cognitive ability was positively associated with ToM although this effect was weaker in high-ability classrooms than in regular classrooms.

Regarding perception accuracy, the results showed that children who were more accepted by peers had higher perception accuracy scores for acceptance, indicating that they were less accurate perceivers of acceptance. This effect was, however, stronger in regular classrooms than in high-ability classrooms. Also, children in high-ability classrooms were more accurate perceivers of acceptance than children in regular classrooms. For perception accuracy of rejection, we found a positive association between age and perception accuracy of rejection in regular classrooms. This suggests that with increasing age children became less accurate perceivers of rejection, but only in regular classrooms. Finally, peer acceptance negatively predicted perception accuracy of rejection in both classroom types, indicating that the more accepted children were, the more accurate they knew by how many peers they were rejected. This effect was smaller in high-ability classrooms than in regular classrooms.

Individual Differences in Social Understanding

In the current study, peer acceptance was related to ToM in Grades 4 to 6, but not in Grades 1 to 3. This mixed picture is in line with the mixed findings in previous studies (e.g., Bosacki & Astington, 1999; Slaughter et al., 2002), and may be explained by the fact that peer relations become more important with age (Parker, Rubin, Erath, Wojslawowicz, & Buskirk, 2006). Because children help each other to understand others in positive peer interactions, the role of peers in the development of ToM may also increase with age. Together with the increasing importance of peer relations, the variation in peer relations grows. That is, whereas accepted children have had a few years of positive peer experience in middle childhood, they have had many years of positive peer experiences in late childhood. Rejected children, however, have missed a few years of these positive peer experiences in middle childhood, but they have missed positive peer experiences for many years in late childhood. Consequently, peer acceptance may become more strongly related to ToM with increasing age.

In line with previous research, children's cognitive ability was positively related to ToM in middle and late childhood (Bosacki & Astington, 1999; Miller, 2009). Our study extended previous findings by showing that not just language abilities, but cognitive abilities in general are related to ToM. In late childhood, however, cognitive ability seems to be a stronger predictor of ToM in regular classrooms than in high-ability classrooms. This finding suggests that the impact of cognitive ability decreases with increasing abilities. In other words, it seems that a certain level of cognitive ability may be enough to perform well on the ToM task.

For perception accuracy, associations between peer acceptance and perception accuracy of acceptance and rejection were found. In line with previous studies (Cillessen & Bellmore, 1999), children who were more accepted were less accurate perceivers of acceptance and more accurate perceivers of rejection. This finding contradicts the theoretical assumption that children with positive and more peer interactions would have more social understanding. However, it may make sense that peer acceptance is differently related to accurate perception of acceptance and rejection. When children have to estimate how many peers accept and reject them, they have to make two decisions. First, they have to decide whether peers generally like or dislike them. Second, they have to decide which peers like or dislike them. The second decision is harder to make because relationships with specific peers need to be evaluated. As a result, accepted children may be aware that no children rejected them, making them accurate perceivers of rejection (cf. Decision 1). They may also be aware that they are accepted by many children but this might increase the chance of false positives, which would reduce their accuracy scores. Similarly, rejected children may be aware that they are not accepted, making them accurate perceivers of acceptance. They may not accurately know how many people reject them, because rejection is not always openly communicated.

Contrary to our expectation, cognitive ability was not related to perception accuracy. This suggests that children with more cognitive abilities do not benefit from these abilities in the social understanding tasks examined in this study. One explanation of this finding is that differences in perception accuracy among children with different cognitive abilities may express themselves at a different time in development. A prerequisite for determining whether children with more cognitive abilities are ahead of their peers in development is that older children have more social understanding than younger children, which was not the case in our study. Since previous research has shown that perception accuracy develops into adolescence (Malloy & Cillessen, 2008), it may be that individual differences in perception accuracy based on cognitive ability do not emerge until adolescence, so later than the age range tested in the present study.

Restriction of range might be another explanation of the nonsignificant association between cognitive ability and perception accuracy. That is, although children from all ability levels were represented in the study, half of the sample was selected based on their high intelligence. In other words, the selected sample of children was more homogeneous in cognitive ability than a random sample of children would have been. Associations among variables are often weaker when a sample is selected on one of the variables (e.g., Sackett & Yang, 2000). Thus, cognitive ability might be related to perception accuracy when a more heterogeneous sample of children will be studied.

Group Differences in Social Understanding

An interesting finding was that children in high-ability classrooms had a higher ToM score than children in regular classrooms in middle childhood above and beyond differences in cognitive ability. Although not recently studied, an explanation could be that, despite high variability, high-ability children read more and more complex stories at a younger age than average-ability children (Terman, 1925). When children read stories they are exposed to thoughts, feelings, and motives that differ from their own. This enables them to think more in depth about other people's thoughts and feelings in new situations. Another explanation could be that high-ability children not only read more but also have other skills and abilities, such as better meta-cognitive skills, to deal with novelty and interpersonal sensitivity that help them infer other people's states of mind more accurately (Walker & Shore, 2011).

Contrary to ToM in middle childhood, no group differences were found for ToM in late childhood above and beyond cognitive ability. Several explanations can be given for this finding. First, it could be that a certain level of understanding of thinking about other people's thoughts and feelings is enough to perform well on ToM tasks. Both children in regular classrooms and high-ability classrooms may have reached such understanding. This explanation is in line with ToM in early childhood (Miller, 2009; Wellman et al., 2001) which shows that at certain ages virtually all children have developed a certain level of ToM. Another explanation is that different measures were used to assess ToM in middle and late childhood. Whereas ToM in Grades 1 to 3 was assessed with multiple choice questions, ToM in Grades 4 to 6 was assessed with open-ended questions. Possibly, high-ability children who are able to reason more in-depth about thoughts and feelings of others may not yet be able to also articulate these ideas in writing. Future studies may use structured interview to partial out these kinds of effects.

Children in high-ability classrooms were also more accurate perceivers of acceptance than children in regular classrooms. In addition, peer acceptance was related less strongly to perception accuracy of both acceptance and rejection in high-ability classrooms than in regular classrooms. A possible explanation is that characteristics of high-ability children such as better meta-cognitive skills and interpersonal sensitivity led to these results. An alternative explanation can be found in the context in which these children were educated. High-ability classrooms were significantly smaller than regular classrooms. Two related advantages may have arisen from the smaller classroom size for high-ability children. First, it is likely that children in smaller classrooms are more familiar with each other than children in larger classrooms. Consequently, they would be more informed about who likes them and who does not. Second, making a decision about how many peers accept and reject oneself may be easier when one has fewer peers to consider. Although the children were provided with a list of names of all the children in their classroom, the task may still have been easier for children in the high-ability classrooms, especially for those who were highly accepted or rejected.

Limitations

This study had a few limitations. First, as described above, the school context of high-ability children and average-ability children differed to some extent. Some caution is therefore warranted when drawing conclusions about group differences between high-ability and average-ability children. That is, although we found group differences between children in high-ability classrooms and regular classrooms, these findings could be contributed to differences in ability, classroom characteristics, or a combination between them. Therefore, a recommendation for future research is to study high- and average-ability children within the same classroom context.

A second limitation is that we used a cross-sectional design. Therefore, no causal conclusions can be drawn. That is, cognitive abilities may influence the development of ToM, but ToM may also influence the development of cognitive abilities. Similarly, children's social interactions with peers may influence the accurate perception of acceptance and rejection, but these perceptions may also influence children's interactions in return. Longitudinal studies are needed to clarify what influences the development of social understanding in high-ability children.

Future Research Directions and Implications for Practitioners

In this study, we took a first step to examine the social understanding of high-ability children. The insights from the study raise interesting questions for future research. The findings showed, for example, that high-ability children have higher ToM scores than average-ability children in middle childhood. Future research should examine what mechanisms cause this difference. New studies may also want to explore whether (some) high-ability children also score higher on other social understanding tasks.

Children's social understanding may be a protective factor for the development of social problems. Since the only differences that we found between children in high-ability classrooms and regular classrooms were in favor of high-ability children, it seems unlikely to expect that they will show more problems in this area than average-ability children. However, we did not test whether the differences in ToM and perception accuracy actually led to differences in social outcomes (e.g., social skills). Longitudinal research that assesses both the social understanding of high-ability children and the subsequent social outcomes could provide insight into this important question.

The study has some implications for practitioners working with high-ability children. The finding that children with more cognitive abilities have a more developed ToM in middle childhood indicates that they already acquired the second-order understanding of belief. In other words, they are able to understand the minds of others in more depth than their average-ability peers. Teachers can play into these advantages by using nonliteral jokes and challenge the students to come up with as many ways to think about a social situation as possible.

In late childhood, high-ability children who are also well accepted among peers could be asked to be mediators in conflicts between peers. Because these children are able to take several perspectives in a social situation, they will be able to explain to peers how both parties feel in a conflict. They can act as a third party communicating a "neutral" point of view, which may help to solve the conflict. The training to become a mediator may also help high-ability children to further advance their social understanding.

However, the social understanding of high-ability children should not be overestimated. Although some significant differences were found between high-ability children and average-ability children in middle childhood, no differences were found in late childhood. Thus, whereas high-ability children may be many years ahead in their cognitive development in middle childhood, in late childhood they seem to be at the same level as their age mates in the development of social understanding. In addition, practitioners need to be aware that although high-ability children may understand social situations better than average-ability children, this is not always reflected in their behavior (Edmunds & Edmunds, 2004).

To conclude, this study was among the first to examine social understanding, a topic that has previously been studied in average-ability children but was largely unexplored in high-ability children specifically. The present study showed that individual differences in age, gender, peer acceptance, and cognitive ability are largely comparable between children in high-ability classrooms and children in regular classrooms, although high-ability children seem to have a better developed ToM in middle childhood than average-ability children. The widespread belief among parents and teachers that children with high abilities are vulnerable in the social domain was not supported by our data. To the contrary, their advanced cognitive abilities may enable high-ability children to better understand social situations than average-ability peers.

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