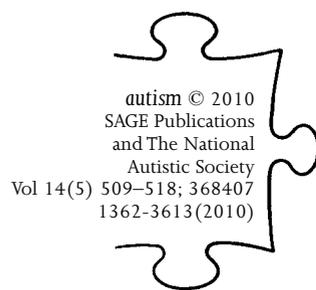


Judgements of self-understanding in adolescents with Asperger syndrome



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ABSTRACT Previous research has demonstrated that adults with high functioning autism (HFA)/Asperger syndrome (AS) judge others as having as much knowledge about their inner mental states as they do. The current study examined whether this pattern also applies to adolescents with HFA/AS because typically developing adolescents, in contrast to younger children, regard themselves as experts on their own inner states. Twenty-two adolescents with HFA/AS and 22 controls judged how much they versus a comparison person knew about 6 aspects of their inner states. In contrast to typically developing adolescents, those with HFA/AS judged the comparison person as having more knowledge about themselves than they did. This study suggests that adolescents with HFA/AS have more pronounced difficulties with this aspect of self-knowledge than do adults with this condition. The implications of this deficit for social functioning are discussed.

KEY WORDS
judgements
about the self;
Asperger
syndrome;
social
functioning

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Research has consistently demonstrated that autism spectrum disorders (ASD) are associated with theory of mind deficits such as difficulty in understanding other people's minds and feelings (Frith, 2003). More recent evidence suggests that aspects of self-knowledge may also be affected and that individuals with autism differ from matched controls concerning judgements of expertise of self-knowledge. Mitchell and O'Keefe (2008) found that individuals with ASD judged a chosen comparison person as

knowing as much about their own internal feelings (such as sadness, tiredness, et cetera) as they did. In contrast, controls regarded themselves as being the expert for this type of knowledge. For other aspects of self-knowledge that could be inferred more easily through external cues (e.g., knowledge about one's own favourite TV programme) both individuals with ASD and controls rated themselves as being the expert.

This pattern of response is particularly interesting when viewed in the context of normal development. In typical development young children also attribute more knowledge about their own internal states to significant others until around the age of 10 (Burton and Mitchell, 2003). Burton and Mitchell (2003) also demonstrated that children as young as 6 recognize that aspects of self-knowledge that can be discerned through external cues are easier for other people to identify than aspects that are primarily manifested internally. Raviv, Bar-Tal, Raviv and Peleg (1990) also investigated attributions about expertise in knowledge by asking young children and adolescents to make judgements about epistemic knowledge across a variety of domains, including pastimes, social relations, personal feelings and science. There was a gradual shift from parents to friends, siblings and self being judged the experts. This shift commenced at around age 9 and was completed by early adolescence. There has been no investigation of how this developmental shift in attributions of self-knowledge is affected in ASD. This study therefore explored the development of attributions of knowledge about internal states in adolescents with a diagnosis of high functioning autism/Asperger syndrome (HFA/AS) as opposed to matched, typically developing controls. By adolescence the transition for judging the self as the expert on one's own interior knowledge should be complete, making developmental differences between the two groups quite evident (Burton and Mitchell, 2003; Raviv et al., 1990). We predicted that the HFA/AS and the typically developing adolescents would judge themselves as knowing more about their favourite TV programme than their chosen comparison person. Both groups would also attribute their comparison person as knowing more about the comparison person's favourite TV programme than they do. However, for questions assessing more subtle interior states where less obvious external information is apparent the HFA/AS participants would judge their comparison as knowing more about the comparison person's favourite programme than they do. We further predicted that the ratings of how much the comparison person knows about an individual's internal states might differ as a function of the internal state assessed because these internal states are associated with different levels of external cues. Finally, as typically developing adolescents, in contrast to their peers with HFA/AS, are more likely to establish significant relationships with non-family members (Green et al., 2000), we

predicted group differences in the choice of the comparison person, with adolescents in the HFA/AS group being more likely to select a parent.

Method

Participants

The participants comprised 22 adolescents (19 male, 3 female) with HFA/AS and 22 controls matched for age, gender and IQ. The HFA/AS participants were recruited from several sources including a special school dealing with autism, a department of Special Education in a mainstream school and local support groups. All participants with HFA/AS had received a formal clinical diagnosis of HFA/AS from either a psychiatrist or clinical psychologist experienced in the area of autism. Clinical diagnosis was corroborated on the basis of scores above 12 on the Social Communication Questionnaire (SCQ; Rutter et al., 2003), where a cut-off score above 12 has been recommended as appropriate for research purposes (Lee et al., 2007). The characteristics of each group are shown in Table 1. There were no significant group differences in language comprehension or full scale IQ scores ($BPVS:t(1,42) = -1.76$; $WASI:t(1,42) = -1.87$, both $p > .05$).

Table 1 Demographic characteristics of the participants

	<i>HFA/AS participants (n = 22)</i>	<i>Typically developing participants (n = 22)</i>
Age		
M	14 years 5 months	14 years 2 months
SD	22 months	11 months
Range	11–16 years	12–15 years
SCQ		
M	24.09	
SD	5.07	
Range	16–34	
BPVS		
M	88.64	98.91
SD	22.02	16.28
Range	61–140	74–134
WASI		
M	94.36	102.04
SD	14.35	12.83
Range	79–136	79–128

Note. BPVS = The British Picture Vocabulary Scale (Dunn et al., 1997); SCQ = The Self-Concept Questionnaire (Mitchell and O'Keefe, 2008); WASI = The Wechsler Abbreviated Scale of Intelligence (Wechsler, 1999).

Materials and procedure

The *British Picture Vocabulary Scale* (BPVS; Dunn et al., 1997) is a picture-based measure of receptive vocabulary for children between the ages of 3 and 18. It is a reliable and valid measure of verbal fluency in British children and adolescents (Dunn et al., 1997).

The *Wechsler Abbreviated Scale of Intelligence* (WASI; Wechsler, 1999) yields a full-scale IQ score (FSIQ) based on two subtests, a verbal subtest that assesses vocabulary and a nonverbal subtest that assesses matrix reasoning. The abbreviated WASI is appropriate for use for individuals between the ages of 6 and 89.

The *Self-Concept Questionnaire* (Mitchell and O'Keefe, 2008) requires participants first to identify a comparison individual by asking participants to think about an individual in their lives who they feel closest to or who helps them most in their daily life. Participants then rate first their own expertise and then the comparison individual's expertise on six focal self-knowledge topics, including knowing when you feel ill, tired, sad, happy, are daydreaming and about what kind of person you are. Ratings were based on a 10-point scale (a score of 0 represents no/low knowledge about the topic; a score of 10 indicates high knowledge). Participants also rate two control questions using the same 10-point scale. The first question asks how much they and their comparison individual knew about their own favourite TV programme; the second asks how much the participant versus the comparison person knew about the comparison person's favourite TV programme.

Results

Responses to control questions

It was predicted that the HFA/AS and the typically developing adolescents would judge themselves as knowing more about their favourite TV programme than their comparison person and judge their comparison person as being more knowledgeable about the comparison person's favourite TV programme than they were. A 2 (group: HFA/AS vs. TDA) by 2 (self vs. comparison other) by 2 (question topic: programme I like vs. the programme my comparison person likes) ANOVA was conducted. There were no main effects but a significant interaction emerged between question type and rating, $F(1,40) = 25.73$, $p < .001$, $\eta_p^2 = 0.39$ (see Figure 1). Both groups made an appropriate judgement that they would know best about their favourite TV programme and the comparison person would know best about their favourite programme.

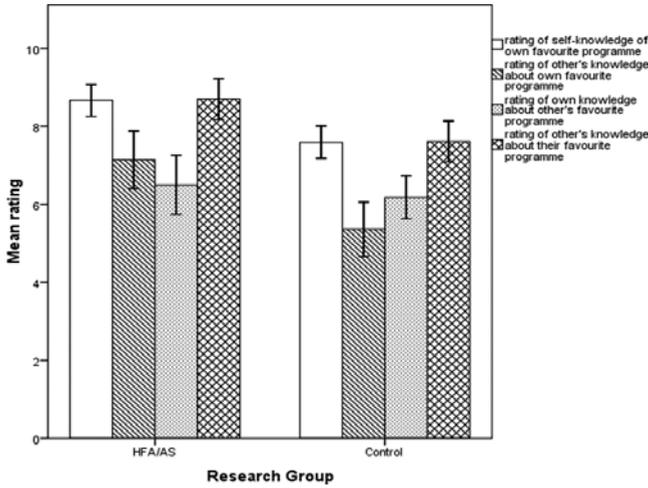


Figure 1 Participants' estimations (out of 10) on how much they and a comparison individual know about their favourite TV programmes. The error bars represent the standard error of the mean.

Responses to questions about interior knowledge

We predicted that HFA/AS participants would judge their comparison individual to possess as much knowledge about their internal states as they did. In contrast, controls would judge themselves, not their comparison person, as being the authority on their self-knowledge. Question type was entered as a variable in the analysis as correlation analyses indicated that ratings between the internal states were largely uncorrelated in both groups. Only 1 out of 15 correlations between self ratings of internal states was significant for each group (HFA/AS group: self-tired and self-kind ($r(20) = .89, p < .01$; TDA group: self-tired and self-happy ($r(22) = .69, p < .01$, two-tailed). A 2 (group: HFA/AS versus TDA) by 2 (rating: self vs. comparison individual) by 6 (question) ANOVA was subsequently conducted on participants' ratings. Two significant main effects were found for question $F(5, 36) = 17.05, p < .001, \eta_p^2 = 0.71$ and rating $F(1, 40) = 8.39, p < .01, \eta_p^2 = 0.17$. No significant main effect was found for group. These main effects were qualified by two significant interactions between group and self/other rating $F(1, 40) = 18.40, p < .001, \eta_p^2 = 0.31$ and self/other rating and question $F(5, 36) = 2.95, p < .05, \eta_p^2 = 0.29$. There was a significant three-way interaction between group, self-other rating and question $F(5, 36) = 2.57, p < .04, \eta_p^2 = .263$ (see Figures 2 and 3).

To help clarify the nature of the 3-way interaction, the groups were examined separately regarding the interaction between question and rating using a 2 (rating) \times 6 (question) ANOVA. For the HFA/AS group there was

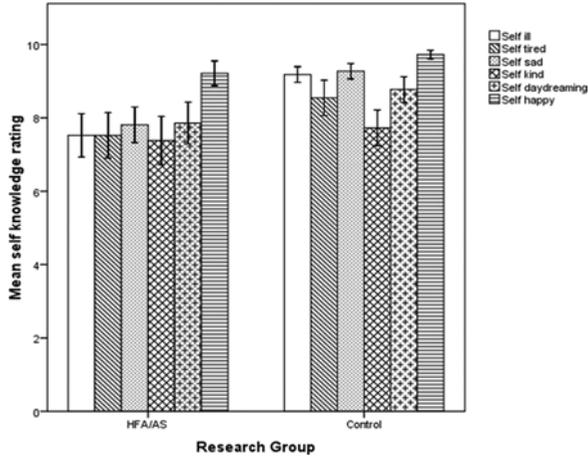


Figure 2 Participants’ estimations (out of 10) on how much knowledge they assigned to themselves in response to 6 questions of self-knowledge. The error bars represent the standard error of the means.

a significant main effect of question $F(5, 15) = 9.85, p < .001, \eta_p^2 = .76$, but no significant interaction term. Bonferroni pairwise comparisons suggested this difference was due to the HFA/AS group considering others knew more about when they were happy than about any other mental state. For the controls there was a significant main effect of both question $F(5, 17) = 6.52, p < .001, \eta_p^2 = .66$ and rating $F(1, 21) = 44.26, p < .001, \eta_p^2 = .69$, with the interaction term also being significant $F(5, 17) = 5.409$,

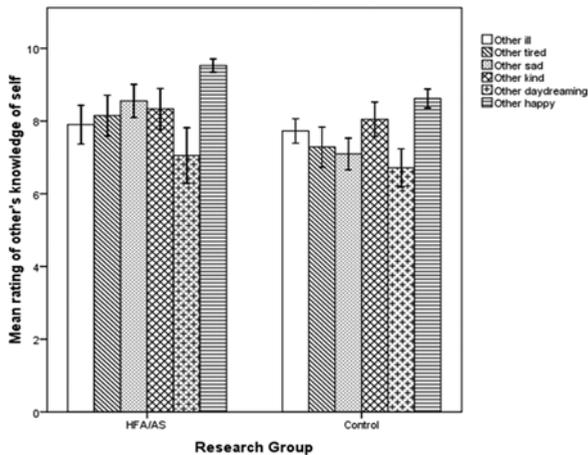


Figure 3 Participants’ estimations (out of 10) on how much knowledge they assigned to the comparison person in response to 6 questions of self-knowledge. The error bars represent the standard error of the mean.

$p < .01$, $\eta_p^2 = .614$. The control participants also credited others with knowing more about when they were happy than any other mental state, as determined by Bonferroni pairwise comparisons. The main effect of rating appeared due to control participants consistently attributing more knowledge to themselves than others (mean self rating = 8.87; mean other rating = 7.54, mean difference = 1.33, $p < .01$).

In view of the mean 8-point IQ difference, four pairs of children with the largest difference between them were dropped so that the group IQ mean was only .5 point different. On this subsample of 36 participants, the 2 rating by 2 group by 6 question ANOVA was repeated. The original findings were replicated in that main effects of question $F(5, 30) = 16.14$, $p < .01$, $\eta_p^2 = .72$ and rating $F(1,34) = 7.99$, $p < .001$, $\eta_p^2 = .19$ were again found. In addition there was significant group by rating interaction $F(1,34) = 21.89$, $p < .01$, $\eta_p^2 = .39$ and a group by question by rating interaction $F(5,30) = 2.50$, $p = .05$, $\eta_p^2 = .29$. Thus IQ did not affect the results.

Choice of comparison person

As predicted, a significant group difference was found with respect to the comparison person chosen. Eighty-six percent of the HFA/AS adolescents chose their mother as the comparison person compared to 50% in the TDA group. Moreover 22% of the control children chose a friend while only 5% of the HFA/AS adolescents did so. A further ANOVA (group \times rating \times question) was conducted on only those adolescents who chose their mother as the comparison person to explore whether the same findings emerged as for the total sample. Again there were significant main effects for question $F(5, 24) = 13.63$, $p < .01$ and rating $F(1, 28) = 7.28$, $p < .01$, a significant interaction between rating and group $F(1, 28) = 25.77$, $p < .01$, and a three way interaction between question, rating and group $F(5, 24) = 2.65$, $p < .01$. Thus, the nature of the comparison person did not seem to account for the results.

Discussion

In line with our predictions, the present study found that adolescents with HFA/AS judged a comparison person to know more about their internal states than they did. However with respect to the control questions about self-knowledge about their favourite TV programme, both the HFA/AS adolescents and the typically developing adolescents judged themselves as having more knowledge than their comparison person. Thus, like for Mitchell and O'Keefe (2008), these effects seem to be confined to the more subtle aspects of self-knowledge.

Our data are consistent with the view that there is a developmental delay in the ability to have self-insight for individuals with ASD (Mitchell and O'Keefe, 2008). Burton and Mitchell (2003) and Raviv et al. (1990) both found that typically developing adolescents, unlike their younger counterparts, recognized that they were the authority for all aspects of their self-knowledge. However our data further suggest that adolescents with HFA/AS appear to have more pronounced difficulties with their self-knowledge about their internal states than adults. Mitchell and O'Keefe (2008) found that adults with HFA/AS rated others as knowing about the same as they did for questions of subtle interior knowledge while our study showed that adolescents with HFA/AS rated others as knowing more than they did. In contrast, the controls in both studies judged themselves to have the most knowledge about their interior states. One explanation for the differences between the adolescents and adults with HFA/AS may be the type of comparison person chosen. The typically developing adolescents were more likely than the HFA/AS adolescents to choose a friend as opposed to their parent, in particular their mother. While the majority of the adult participants with ASD in the Mitchell and O'Keefe (2008) study still chose their parent, they were also now choosing partners and even friends to a greater degree than their adolescent counterparts. Longitudinal studies are required to disambiguate why these differences have arisen between the two studies. Another interesting aspect of our data is that when we examined our subgroup of participants who chose the parent as the comparison person, the same pattern of response occurred. It seems, therefore, that typically developing adolescents are confident that they know more about themselves, even when their mother is chosen as the comparison person, a finding that is consistent with the results of Raviv et al. (1990).

In line with the findings of Mitchell and O'Keefe (2008), there seemed to be variability in terms of how much the comparison person knew about their internal states. For both the controls and the HFA/AS participants, the comparison person was judged as being able to know better when they were happy as opposed to any other state. In fact in the present study the HFA/AS participants judged their own and others' knowledge of their happiness, an internal state, to be higher than their knowledge of their favourite TV programme. Mitchell and O'Keefe (2008) argue that there are more external cues available for judging happiness as opposed to other internal states. A qualitative examination of comments made by our participants in response to their happiness judgement confirmed this argument. Statements included 'We both know because it's obvious' and 'I show it'.

Finally, our data suggest that appropriate interventions might help to improve self-insight in young people with ASD. Meyer et al. (2006) noted that children with ASD were more likely than controls to self-report social

difficulties. Awareness of their lack of social skills may cause them to overestimate others' social competence and this, together with their deficits in theory of mind, may lead them to overestimate other people's knowledge of themselves. Therefore social skills training could be an intervention that improves their judgements of self-insight. Meyer et al. (2006) also found that difficulty with emotion decoding was a feature of children with autism. If children experience difficulties in understanding emotional information, they may have problems in understanding their own feelings and so credit others with knowing better. Therefore interventions that work on enhancing emotion decoding may be helpful in this group.

In conclusion, our study demonstrated that adolescents with HFA/AS displayed a lack of appreciation of the uniqueness of access to their own mind, suggesting a poorly differentiated sense of self. According to Russell (1996), children with autism lack experience of doing things alongside others and therefore only develop limited psychological awareness of the distinction between self and others. A poorly differentiated self-identity may underlie social difficulties in ASD and contribute to feelings of depression and anxiety that are often found in adolescents and adults with this condition (Hill et al., 2004; Howlin, 2000; Rinehart et al., 2002). One area for future research may be to investigate whether individuals with HFA/AS, particularly younger individuals, recognize that some aspects of self-knowledge like preferences for food are associated with more external cues than other aspects, for example feelings of sadness. Another area for future research may be examining the link between autobiographical memory and changes in attributions of self-knowledge. Autobiographical memory refers to memory for information about the self (Brewer, 1986), and Conway and Pleydell-Pearce (2000) argue that models of self play an integral role in autobiographical memory retrieval. Previous research has shown that autobiographical memory retrieval is impaired in people with HFA/AS (Goddard et al., 2007). Thus, if young people with ASD have difficulties in encoding information about the self (cf. Millward et al., 2000), these difficulties could be a potential mechanism for the deficits in autobiographical memory found in this population. If so it may be helpful to target improving self-knowledge in order to improve both access to autobiographical memory and mental well being.

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