Attachment in adults with high-functioning autism

Emma L. Taylor[1][#], Mary Target[2], Tony Charman[3]

[1]Mile End Hospital, London

[2]Psychoanalysis Unit, University College London, and the Anna Freud Centre, London

[3]UCL Institute of Child Health, London

Address correspondence to:

Emma Taylor
Disability Options Team
Mile End Hospital
Bancroft Road
London
E1 4DG
UK
e-mail: emma.taylor@thpct.nhs.uk

Running head: Attachment in adults with high-functioning autism

Abstract

This study assessed attachment security in adults with high-functioning autism spectrum disorders, using the Adult Attachment Interview (AAI; George, Kaplan & Main, 1996). Of twenty participants, three were classified as securely attached, the same proportion as would be expected in a general clinical sample. Participants' AAIs were less coherent and lower in reflective function than those of controls, who were matched for attachment status and mood disorder. A parallel interview suggested that some aspects of participants' responses were influenced by their general discourse style, while other AAI scale scores appeared to reflect their state of mind with respect to attachment more specifically. There was little evidence that attachment security was related to IQ, autistic symptomatology or theory of mind. This study suggests that adults with autism can engage with the AAI and produce scoreable narratives of their attachment experiences, and a minority demonstrate secure attachment.

Attachment in adults with autism has, to our knowledge, not been investigated before. It is therefore necessary to rely on what is known about attachment in children with autism to provide an empirical background to the current study. The earliest theories of autism linked it directly with attachment, either claiming that inappropriate parenting actually caused or exacerbated autism (Bettelheim, 1967; Mahler, 1968; Tinbergen & Tinbergen, 1972) or, conversely, that autism resulted in a fundamental inability to form attachments (Kanner, 1943). As recently as DSM-III (APA, 1980), the mandatory diagnostic criteria included "a pervasive lack of responsiveness to other people" (p.89), implying the absence of any form of attachment. These ideas were based on the general impression that those with autism are not particularly interested in other people, and often actively avoid interactions and physical contact even when they are distressed.

However, from the 1980s, researchers began using the Strange Situation (Ainsworth, Blehar, Waters & Wall, 1978) to explore the attachments of children with autism spectrum disorders in a more systematic way (a number of related disorders are clustered with autism in the DSM-IV-TR (APA, 2000); for simplicity I will use the term autism to cover all of these disorders often described as being on the autism spectrum). A series of studies demonstrated that children with autism showed active preferences for their caregivers over a stranger, that they were distressed by separations from the caregiver and sought proximity when they were reunited (Capps, Sigman & Mundy, 1994; Field, 1987; Rogers, Ozonoff & Maslin-Cole, 1991, 1993; Shapiro, Sherman, Calamari & Koch, 1987; Sigman & Mundy, 1989; Sigman & Ungerer, 1984). Sometimes these things were done in atypical ways, and sometimes unusual behaviour was observed that appeared to be unrelated to attachment, but it seemed to have been demonstrated conclusively that some children with autism were capable of demonstrating secure attachment. The studies were inconsistent in whether they found attachment security at a comparable rate to that

observed in typical development or children with general developmental delays. Recent research by van IJzendoorn et al. (2007) also demonstrated that the attachment security of children with high-functioning autism was not related to their parents' sensitivity (in contrast to the findings in typically-developing children), but that children with better social functioning were more likely to be securely attached.

A meta-analysis (Rutgers, Bakermans-Kranenburg, van IJzendoorn & van Berckelaer-Onnes, 2004) showed that children with autism and cognitive delay are less likely to be classified as securely attached than typically-developing children. However, children with high-functioning autism (HFA; autism spectrum disorder with IQ in the average range or above) have normal levels of attachment security. This meta-analytic result is unusual because there is little evidence that cognitive delay reduces attachment security in children with other developmental disorders (Dissanayake & Crossley, 1996, 1997; van IJzendoorn, Goldberg, Kroonenberg & Frenkel, 1992; Willemsen-Swinkels, Bakermans-Kranenburg, Buitelaar, van IJzendoorn & van Engeland, 2000). So why should cognitive delay reduce attachment security in children with autism? One suggestion put forward by several authors is that autism in itself may disrupt the formation of secure attachments, but children with higher cognitive abilities are somehow able to compensate for this disruption. This suggests that, although children with HFA are successfully forming secure attachments, they may be doing so in a different way from other children, using effortful cognitive strategies to compensate for difficulties in automatic social and emotional responsiveness (Dissanayake & Sigman, 2001).

Understanding mental states in autism

The best-established measure of attachment in adulthood is the Adult Attachment Interview (AAI; George, Kaplan & Main, 1996). It is essential in the context of this

research to note that AAI attachment status is strongly related to measures of people's tendency and ability to consider others' internal states (Biringen et al., 2000; Fonagy, Steele, Steele, Moran & Higgitt, 1991; Slade, Grienenberger, Bernbach, Levy & Locker, 2005). In the attachment literature this has become known as mentalising, and in the context of attachment it has been operationalised as reflective function, a manualised measure of "the capacity to perceive and understand oneself and others' behaviour in terms of mental states" (Fonagy, Steele, Steele & Target, 1997). In autism and social cognition research, the same ability has traditionally been known as "theory of mind". Although the tasks used, particularly in the early days of theory of mind research, differ a great deal from the active, flexible use of reflective function during the AAI or in everyday life, both concepts are attempting to characterise the same collection of skills used in social interactions and self-reflection.

It is well established that there is a specific impairment in mentalising in children and adults with autism compared to typically developing and learning disabled controls (Baron-Cohen, Leslie & Frith, 1985; see Baron-Cohen, 2000, for a review). As a body of research built up, it became apparent that most people with autism fail most theory of mind tasks, but a proportion of them do pass some tasks, at a later age and less consistently than their peers. Many individuals with HFA have some success even in more complex and naturalistic theory of mind tasks (see Yirmiya, Erel, Shaked and Solomonica-Levi, 1998, for a meta-analysis). As with attachment, it appears that theory of mind is associated with cognitive ability in autism to a degree that is not the case in typical development (Happé, 1995). Children with HFA are not simply delayed in their acquistion of theory of mind, but appear to follow a different developmental trajectory (Kaland et al., 2002; Peterson, Wellman & Liu, 2005; Serra, Loth, van Geert, Hurkens & Minderaa, 2002). As discussed above with respect to attachment, it has become accepted

that people with autism lack an intuitive ability to understand others' mental states and so resort to effortful cognitive strategies (Frith, Happé & Siddons, 1994) which allow them to solve this type of problem in a different way from other people, at a later age and with different patterns of results.

Attachment in adults with autism - the current study

The aim of this study is to explore whether the unexpected success of children with autism in forming secure attachments can be replicated in adults with autism. Children with HFA form secure attachments at a rate comparable to typically-developing children, while children with autism and cognitive delay are less likely to form secure attachments but nevertheless a considerable proportion of them do so. Given the established relationship in typical development between a person's childhood attachment classification and their classification in adulthood (Hamilton, 2000; Waters, Merrick, Treboux, Crowell & Albersheim, 2000), it might be predicted that this relationship would also hold true in autism. However, all of the research on attachment in autism to date has used the Strange Situation, or modified versions of it. The AAI relies heavily on discourse coherence, which is a particular difficulty for adults with autism. Also, while the Strange Situation is an assessment of a specific relationship with a specific other person, the AAI is an attempt to access internal working models of attachment relationships in general. The major aim of this research is to explore whether adults with HFA are able to engage with the AAI and to examine the patterns in their responses.

Research questions and predictions

- Can adults with autism engage with the AAI? If so, are they less likely than adults without autism to be classified as secure?

We considered two possible outcomes for people with autism. As their ability to discuss

4

internal states is limited (and they are generally aware of this, and may try to avoid this type of question), they may be unable to cope with the demands of the AAI and so be classified as insecure or disorganised. Alternatively, using their limited or qualitatively different mentalising skills, they may be able to find a way of "hacking out" the AAI (Happé, 1995); that is, arriving at an appropriate response via an unexpected or lengthy route. This suggests that their ability to respond in a "secure" way may be related to other abilities, for example IQ, which is known not to be the case for adults without autism.

- Will adults with autism respond to the AAI in a way that primarily reflects their states of mind with respect to attachment, or will their responses be more strongly influenced by their general discourse style?

People with autism by definition have difficulties in communication, and even very high-functioning adults struggle with conversational pragmatics and narrative coherence (Diehl, Bennetto & Young, 2006; Hale & Tager-Flusberg, 2005; Mundy & Markus, 1997). Much of the AAI is based on the recall of childhood memories, and there is some evidence that people with autism form and retrieve memories in an idiosyncratic way (Williams, Goldstein & Minshew, 2006). Therefore, even if adults with autism are able to form a secure state of mind with regard to attachment, it is not clear whether they will be able to discuss this in a way that would allow their AAI transcripts to be coded as secure. In this study, a parallel interview will be used as a comparison measure of discourse style: if an interviewee talks in an incoherent or vague way about neutral memories as well as about attachment, then this would appear to reflect a more general style of speech, whereas speaking in this way only during the AAI appears to indicate a specific state of mind with respect to attachment.

- How are the AAI responses of adults with autism similar to and different from those of adults without autism?

AAI transcripts are scored on a series of continuous rating scales, which aim to capture both the interviewee's actual childhood experiences of attachment relationships and his current state of mind with regard to attachment, and prototypical profiles on these continuous scores are used to assign an overall category. It is possible that the autistic adults' responses will not match these typical patterns: their differences in cognitive and verbal style might make them less able to talk coherently, relevantly and believably, or they may be more likely to be dismissive of discussing attachment relationships if they are aware of their own difficulties.

- How are AAI responses of adults with autism related to their autistic symptomatology, IQ and theory of mind?

To be classified as secure on the AAI requires the ability to describe events in close relationships and to some extent to report internal states in self and other (e.g. 'did you ever feel rejected as a child?', 'why do you think your parents behaved in the way they did?'). The ability of adults with autism to provide classifiable, secure responses to the AAI may therefore be linked with their success in more traditional theory of mind tasks. It is also predicted that security of attachment as assessed by the AAI will be associated with IQ and degree of autistic symptomatology, in line with the theory of mind and child attachment studies reviewed above.

<div align="center">Method</div>

Participants

Twenty participants were recruited through contact with support groups, and from participation in other research. Participation criteria were a diagnosis on the autism spectrum (including autism, pervasive developmental disorder or Asperger's syndrome), IQ above 70, fluent spoken English, and age above 18 years. Full demographics are given in the Results section.

Comparison group

AAI transcripts were available from two earlier studies, a group of parents whose children were being assessed in a community study of emotional development, where the parents were involved only in being given the AAI, and a group of adults with current mood disorder identified as part of a long-term follow-up of children in psychiatric services. From a sample of 39 control transcripts, 20 were selected to match the participants as closely as possible on the basis of attachment classification and current mood disorder. The intention of having a control group was to be able to compare response styles and patterns of scores across the continuous scales on the AAI, so the controls were matched for attachment classification to ensure that any differences in these scales were due to factors related to autism rather than the expected variation across different attachment categories. As AAI classification is affected by mood (Pianta, Egeland & Adam, 1996; Roisman, Fortuna & Holland, 2006), controls were also matched for mood disorder. Further details of the control group are given in the Results.

Measures

- Adult Attachment Interview

The Adult Attachment Interview (AAI; George et al., 1996) is a semi-structured interview that asks participants to recall their childhood relationships with parents and other attachment figures. Each AAI was audiotaped and subsequently transcribed by the interviewer. The AAI transcript is scored according to criteria developed by Main and Goldwyn (1998), on probable experience and state of mind scales. A transcript can usually be assigned to one of three organised attachment categories – secure/autonomous, insecure/dismissing or insecure/preoccupied - by comparing that transcript's pattern of scores with the prototypical pattern that characterises each category. If a transcript proves

difficult to classify, it can be assigned two or three alternative categories. Participants who display a marked and unusual mixture of contradictory mental states are assigned to "cannot classify", regarded as an abnormal category on the assumption that adults generally have a single integrated strategy or state of mind with respect to thinking and talking about early attachments. In this case, a 'forced' classification into the most appropriate organised category or categories is given, secondary to "cannot classify". Participants who show major lapses in monitoring of reasoning or discourse when discussing traumatic events are assigned to a fourth category, "unresolved/disorganised". They are also given a best fitting alternative "organised" category.

All AAI transcripts in this study were scored on five probable experience scales and eight state of mind scales. The control interviews were coded by an AAI coder trained and certified as reliable (MT). Coding of the interviews with ASD participants was divided between MT and another reliable coder. Possible scores on all scales range from 1 (little evidence of the characteristic being scored) to 9 (extreme evidence). In some cases it is not possible to assign a scale score, particularly for experience scales, if the participant does not report many specific memories. Of particular interest in the current study are the two coherence scales, high scores on which are associated with the secure/autonomous category: coherence of mind and coherence of transcript. The scoring criteria describe coherence as "connectedness of thought, such that the parts of the discourse are clearly related, form a logical whole, or are suitable or suited and adapted to context" (Main & Goldwyn, 1998, p.44). Both coherence scores are strongly related to overall attachment security, as they are heavily weighted in assigning secure status. All AAI transcripts were also scored for reflective function (RF), which is the operationalisation of mentalising specifically within the context of attachment. The RF criteria were developed by Fonagy et al. (1991; 1997) and scores range from -1 to 9, with

higher scores being given to indications of "the subject's ability to understand psychological states, including conscious and unconscious motivations, underlying their own reactions and those of others, especially their parents" (Fonagy et al., 1991, p.210). Again, high reflective function is strongly related to overall attachment security (Fonagy et al., 1991), but unlike coherence scores it is not used to assign interviewees to the secure/autonomous category.

- Autism Diagnostic Observation Schedule

The Autism Diagnostic Observation Schedule (ADOS; Lord, Rutter, DiLavore & Risi, 1999), module 4, is a semi-structured assessment for use with adults with autism who have fluent language. It was used in this study to confirm a diagnosis of autism or autism spectrum disorder, and to provide a continuous measure of symptom severity in the domains of communication and reciprocal social interaction. Although the latter is not its intended use, it has been used in this way in other studies (see for example Aldred, Green & Adams, 2004; Joseph, Tager-Flusberg & Lord, 2002).

- Wechsler Abbreviated Scale of Intelligence

The Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999) was used as a brief measure of IQ, to exclude any participants with an IQ below 70 and to explore the relationship between attachment and cognitive ability. It has been demonstrated that the WASI can provide a valid estimate of full-scale IQ for adults with autism spectrum disorders (Minshew, Turner & Goldstein, 2005).

- Theory of mind measures

Two well-established research measures of theory of mind were used. The "reading the mind in the eyes" task (Baron-Cohen, Wheelwright, Hill, Raste & Plumb, 2001) was developed with high-functioning autistic adults; participants are asked to match thirty-six

pictures of the eye area of human faces to emotion words. The "strange stories" task (Happé, 1994) was developed to be used with children with autism, and adapted for adults (Jolliffe & Baron-Cohen, 1999). Participants are read a series of scenarios and asked a single question at the end of each one to assess their comprehension. In the theory of mind stories, success relies on understanding the intention behind a non-literal utterance (such as a lie or a double-bluff). For this study, five theory of mind stories were selected, based on which stories had most effectively discriminated people with autism from controls in an earlier study (Brent, Rios, Happé & Charman, 2004).

- Parallel interview

The parallel interview is included in the Appendix, and the rationale for creating it is described in the Introduction. It was designed to follow the structure and demands of the AAI as closely as possible, without activating attachment representations. It was administered at the very end of the interview session, which meant it was at least two hours after the AAI, to reduce the likelihood of participants noticing the similarities in the interviews or referring back to their AAI responses. The parallel interview was scored on the AAI state of mind scales; transcripts were not assigned to categories, because of the lack of "experience" scales and the difficulty of scoring some state of mind scales based on anything other than interpersonal experiences. Previous research in a non-clinical sample (Crowell et al., 1996) demonstrated that overall classifications on a different parallel interview did not overlap significantly with those on the AAI, and that coherence scores from each interview were not correlated. Although classifications on Crowell et al.'s parallel interview were based on state of mind scales, these scores were not reported individually. However, for the parallel interview to give different classifications from the AAI, it can be assumed that the state of mind scores were not substantially similar, and this is what was tested in the present study. The parallel interview was coded by an AAI

coder trained and certified as reliable.

Procedure

Participants were invited to a single interview session with one researcher, which lasted a total of around three hours and included breaks between measures as necessary. After obtaining informed consent and collecting demographic information, the measures were administered in the following order: AAI, ADOS, WASI, the Eyes task, Strange Stories and the parallel interview. Twelve participants had recently (within the last year) completed the WASI in other research, and six had completed the ADOS, so in these cases participants gave permission for their scores to be obtained from the other researchers. Because of time constraints, six participants did not complete the parallel interview and three did not complete the Strange Stories. One parallel interview was lost due to tape malfunction. One participant completed twelve items of the Eyes task then asked to stop, so a score was pro-rated.

Results

Demographics

Participants comprised twelve men and eight women, all white European and aged from 19 to 60 years old (mean age 34). The age at which they had been given an autism spectrum diagnosis ranged from 4 to 58 years old, and the time elapsed since the diagnosis ranged from 0 to 16 years, with a mean of 6 years. The fact that most diagnoses were so recent is probably accounted for by the fact that fifteen participants had been given a diagnosis of Asperger's syndrome, which has only been included in the DSM since 1994. Four others had been given diagnoses of autism or high-functioning autism, and one of atypical autism. Half of the participants had received their diagnoses in national autism specialist centres, while most of the remainder had been diagnosed in local or tertiary health services.

According to the WASI, seven participants had a full-scale IQ in the range 85-115, eleven in the range 116-130, and two above 130. The group's mean full-scale IQ was 118. Verbal IQs ranged from 95 to 131 (mean 115) and performance IQs from 87 to 136 (mean 117).

Socioeconomic status was rated on the Registrar General's five-category scale (OPCS, 1990), according to parents' professions; where there was a disparity between parents, the higher rating was taken. Participants' professions were not used because of the frequent difficulties in education and employment experienced by adults with HFA. Four participants' parents were rated as social class 1 (professional), ten as social class 2 (intermediate) and six as social class 3 (skilled manual and non-manual). None were rated as social classes 4 or 5 (semi-skilled or unskilled). Five participants were currently married or cohabiting, and a further four were divorced or separated. Four participants had children.

On the ADOS, the criteria for a diagnosis of autism are as follows (autism spectrum criteria given in brackets): 3 (2) points in Communication, 6 (4) points in Reciprocal Social Interaction and a total of 10 (7) points. Ten participants met criteria for autism and six for autism spectrum disorder. The remaining four participants all missed autism spectrum criteria by one point. Two of them met criteria for both Communication and Reciprocal Social Interaction but their total was one point below the threshold, while the other two met criteria for Reciprocal Social Interaction and the total score, but only scored one point in Communication.

It is worth noting that many of the participants had additional psychiatric diagnoses, as is to be expected in this population, although the proportion was slightly higher than has been reported elsewhere (Barnard, Harvey, Prior & Potter, 2001; Green, Gilchrist, Burton & Cox, 2000; Tantam, 2000). Only five participants reported that they

had never been given another diagnosis, three had previously been given other diagnoses and twelve had current or recurring problems. According to self-reported diagnoses, eight were depressed at the time of the interview and three others had previously been depressed. Six were currently experiencing an anxiety disorder and two had histories of anxiety. Four had other current diagnoses and two had other previous diagnoses, including schizoaffective disorder, ADHD and dyslexia. In total, twelve participants had mood disorder at the time of the interview. Of the control group, thirteen were experiencing mood disorder when they completed the AAI (assessed using the SCID-I and II and the BDI). These proportions were not significantly different from each other in a two-tailed chi-square test ($\chi^2 = 0.11$, $df = 1$, $p = .74$).

The group from which the controls were drawn was aged 20-50 (mean age 34) with a mean full-scale IQ of 115 (range 88-146). Group members were categorised as social classes 1-4 on the Registrar General's scale (OPCS, 1990), with the majority being classes 2 and 3.

Descriptive data

- Scores on theory of mind measures

Scores on the Eyes task ranged from 17 to 34, with a mean of 25.6 out of 36. On the theory of mind Strange Stories, scores ranged from 6 to 10, with a mean of 8.1.

- AAI categories

All participants were assigned to an AAI category on the basis of their interviews, using standard criteria (Main & Goldwyn, 1998). In several cases it was necessary to assign two or three alternative classifications; in each case the first choice is reported below. The three organised categories are secure/autonomous (F), insecure/preoccupied (E) and insecure/dismissing (Ds). Participants assigned to one of the disorganised categories -

"cannot classify" (CC) or "unresolved" (U) - were also given a forced classification into one or more of the organised categories, according to the scoring directions. Participants' and controls' AAI classifications are reported in Table 1.

Table 1 about here

AAI classifications can be clustered into two groups (secure vs. insecure or disorganised), three categories (secure vs. preoccupied vs. dismissing, with disorganised participants forced into the best-fitting organised category), four categories (secure vs. preoccupied vs. dismissing vs. disorganised) or each category analysed separately (secure vs. preoccupied vs. dismissing vs. cannot classify vs. unresolved). Because of the small sample size, we focus on reporting two- and three-category analyses here. Two categories can be used to explore the simple question of the rate of attachment security, while using more categories allows a more detailed exploration of the types of internal working models of attachment within the sample.

Attachment classifications of participants and controls were compared using two-tailed chi-square tests. When three categories were used, the difference between participants and controls approached significance ($\chi^2 = 5.33$, $df = 2$, $p = .07$). The difference appears to be due to three controls whose primary classifications are "cannot classify" or unresolved but whose secondary classifications are secure. The two-category chi-square, comparing secure to insecure and disorganised classifications, showed no significant difference between participants and controls ($\chi^2 = 1.29$, $df = 1$, $p = .26$).

- AAI scale scores

All AAI transcripts were scored on five "probable experience" scales and eight "state of mind" scales, all of which range from 1 to 9. The "metacognitive monitoring" scale was

not used because of its overlap with reflective function. In some cases it was not possible to assign scores for one or more scales, particularly for experience scales, if participants did not report many specific memories. Several of the scales are scored separately for mother and father; in every case the two scores were averaged to give a single score for each scale. AAI transcripts were also scored for reflective function (Fonagy et al., 1997); possible scores range from -1 to 9. State of mind scores and reflective function scores for participants and controls are summarised in Table 2; none of the probable experience scores showed significant differences between the groups or correlations with other measures, so are not given in the table.

Table 2 about here

- Parallel interview scale scores

The parallel interviews were scored on the same state of mind scales as the AAIs, with the exception of "unresolved loss/trauma" because the parallel interview did not probe for this explicitly. Parallel interviews were also scored for metacognitive monitoring; it was not appropriate to code them separately for reflective function because the interview did not provide explicit opportunities to reflect on internal states. As can be seen, no participants showed any evidence of metacognitive monitoring in these interviews so would be unlikely to score for reflective function. Scale scores for the parallel interviews are summarised in Table 3.

Table 3 about here

Normality

Several of the continuous variables differed significantly from normal distributions, according to the Kolmogorov-Smirnov test and their skewness ratios. All analyses were therefore carried out using non-parametric tests (Spearman's rho, Mann-Whitney U, Wilcoxon's signed ranks test). They were also repeated using parametric alternatives (Pearson's r, independent-samples and paired-samples t-tests respectively), which are known to be reasonably robust to deviations from normality. In all cases the overall patterns of results were the same so parametric analyses are not reported separately.

Research questions

- Can adults with autism engage with the AAI? If so, are they less likely than adults without autism to be classified as secure?

The participants in the present study were all able to engage with the AAI sufficiently to provide transcripts that could be scored according to the usual criteria, and the general pattern of their classifications is described above. An expected distribution of AAI classifications in adults without autism was obtained from the meta-analysis by van IJzendoorn and Bakermans-Kranenburg (1996), which gives distributions for both clinical and non-clinical samples. The non-clinical samples are reported separately for men and women, although the distributions are not markedly different; the male sample was chosen for comparison because the present sample contained more men than women. The meta-analysis reports CC and U together as one disorganised category. Using chi-square tests, the present participants' AAI classifications differ significantly from the non-clinical meta-analysis whether viewed as two categories ($\chi^2 = 15.18$, $df = 1$, $p < .001$), three categories ($\chi^2 = 15.43$, $df = 2$, $p < .001$) or four categories ($\chi^2 = 15.22$, $df = 3$, $p = .002$). In the cases of three and four categories, two and three cells respectively had expected values below five, so these results should be interpreted with caution.

The clinical sample of van IJzendoorn and Bakermans-Kranenburg (1996) was

16

composed of a broad mixture, from adults with personality disorders, to abusive parents, to parents who did not themselves have clinical problems but whose children had conduct disorder or sleep disorder. This was felt to be a more appropriate comparison group for the present sample, given their high level of past and present clinical difficulties as well as autism. Chi-square tests comparing the present sample to the clinical distributions show no significant differences for two ($\chi^2 = 0.07$, $df = 1$, $p = .79$), three ($\chi^2 = 0.30$, $df = 2$, $p = .862$) or four categories ($\chi^2 = 1.42$, $df = 3$, $p = .70$). In every case, one cell had an expected value below 5; this is because of the low prevalence of secure attachment in clinical samples. Again, this means that the results should be interpreted carefully, although the observed and expected values were strikingly similar.

- Will adults with autism respond to the AAI in a way that primarily reflects their states of mind with respect to attachment, or will their responses be more strongly influenced by their general discourse style?

Participants' state of mind scores for the AAI and parallel interviews were compared using Spearman's rho correlations, shown in Table 3. It was not possible to do this for derogation and reflective function/metacognitive monitoring because no participants scored above 1 on the parallel interview. As can be seen, there is significant agreement between scales across the two interviews for anger, passivity and lack of memory. No other variables are significantly correlated across the two interviews.

Wilcoxon signed ranks tests comparing participants' state of mind scores across the AAI and parallel interview are summarised in Table 3. Obviously the two interviews differ for metacognitive monitoring/reflective functioning and derogation, as all participants scored 1 on these scales in the parallel interview. Both coherence scores are also significantly higher in the parallel interview.

- How are the AAI responses of adults with autism similar to and different from

those of adults without autism?

Participants' and controls' scores on the continuous AAI scales were compared using Mann-Whitney U tests, summarised in Table 2. Participants' and controls' scores differ significantly ($p < .05$) on reflective function, coherence of transcript, coherence of mind and unresolved loss.

Although the two-category chi-square test had shown no significant difference in attachment security between participants and controls, the fact that some disorganised controls had a secondary classification as secure had led to concern that this might falsely inflate any difference between the groups. That is, those classified as secure would be expected to have higher scores for coherence and reflective function than those classified as insecure. Because of this, the analyses were repeated with only the 17 participants and 11 controls whose primary AAI classification was insecure or disorganised. In this subsample, participants and controls still differ significantly on reflective function ($p < .05$, effect size 0.75), coherence of transcript ($p < .01$, effect size 0.95) and coherence of mind ($p < .01$, effect size 0.88). However, the difference on unresolved loss is no longer significant. The larger effect sizes seem to be because the three secure autistic participants scored high on these three scales relative to the rest of the group, so reduced the difference from controls.

Although there is no space in the present paper for a discussion of the quality of the participants' responses to the AAI, brief excerpts are provided in Table 4 to give a flavour of the transcripts.

Table 4 about here

- How are AAI responses of adults with autism related to their autistic symptomatology, IQ and theory of mind?

Scores on the two AAI coherence scales, as well as reflective function scores, are strongly related to overall attachment security (Fonagy et al., 1991; Roisman, Padrón, Sroufe & Egeland, 2002). This was the case in the present sample, with participants and controls classified as secure tending to have higher scores on these scales. Therefore, any relationship between participants' scores on these continuous scales and other variables of interest (ADOS, IQ and theory of mind) would suggest that these variables are influencing the likelihood of participants being classified as secure. Spearman's rho correlations are reported in Table 5. Coherence of transcript is significantly negatively correlated with ADOS communication score; no other correlations reach significance.

Table 5 about here

Discussion

This study was an exploration of whether adults with autism would be able to engage with the AAI enough to provide interviews that could be scored and classified. As the participants were clearly able to do this, the more specific research questions allow us to speculate about the meaning of their responses and attachment classifications.

Given that the participants were able to engage with the AAI, the first question was how their responses would be classified and how this pattern compared to a sample without autism. Three of the twenty participants were classified as secure; this is a lower rate of security than is found in non-clinical samples, but does not differ significantly from the clinical meta-analytic sample of van IJzendoorn and Bakermans-Kranenburg (1996)

that was used for comparison. It is difficult to draw firm conclusions about how this finding sits alongside evidence of normal levels of attachment security in infants and children with HFA. One the one hand, secure attachment was not entirely absent in this sample and was certainly present at a rate comparable with other clinical samples. On the other hand, a far smaller proportion of the current participants was classified as secure, compared to 53% of children with autism assessed in the Strange Situation (Rutgers et al., 2004). This may either be due to participants' autism per se or to the high rate of mood disorders and other diagnoses within the sample, as mood disorder is known to be associated with insecure and disorganised attachment. This question could be clarified by further research among adults with HFA who do not have other clinical difficulties, although these people may be the exception rather than the rule. It is worth noting here that all but one of the eight participants categorised as "unresolved" or "cannot classify" had current mood disorder. Given the underlying question about the validity of using the AAI with this sample, it is also possible that the AAI did not activate attachment representations in all participants, although as a group they appeared to respond differently to the AAI than to the parallel interview. This could be explored by the parallel use of other adult attachment measures, as discussed below.

There is some evidence that participants' responses to the AAI were influenced by their general discourse style, as shown by the correlations in scale scores across the AAI and the parallel interview. That is, anger, passivity and lack of memory appeared to be characteristics of the speakers rather than specifically reflecting state of mind with respect to attachment. However, other characteristics of participants' discourse did vary across interviews, including both of the coherence scores which are strongly associated with overall attachment security. This suggests that aspects of their response to the AAI are influenced by their distinctive narrative styles, probably associated with their autism, but

20

that the AAI still manages to tap into a specific state of mind with respect to attachment. This is an indicator of the discriminant validity of the AAI.

Importantly, there was no overlap between the scales that correlated across the different interviews and those that differentiated autistic participants from non-autistic controls. As predicted, there were clear differences between participants and controls in the two coherence scores and reflective function, while most other scales did not even approach significance, particularly when secure participants were excluded. Reflective function is a measure of mentalising, a central difficulty for people with autism, so it was expected that the participants would score lower than the controls on this measure (although, surprisingly, reflective function scores did not correlate significantly with the theory of mind measures). The coherence scores are based on Grice's (1975) conversational principles of quality, quantity, relation and manner; many participants appeared to struggle particularly with quantity (responding either at great length or extremely tersely), and relation (moving repeatedly onto irrelevant topics).

Coherence and reflective function scores were used as an index of attachment security. Coherence of transcript was correlated with ADOS communication score, which is understandable as both are measures of appropriate reciprocal conversation, although they focus on slightly different aspects (the ADOS score includes nonverbal communication). It is interesting that coherence of transcript also shows some suggestion of a correlation with full-scale IQ, rather than verbal IQ; the interpretation of this is not clear, and as it did not reach significance it needs to be replicated. Both of these findings are consistent with the hypothesis that AAI security would be related to autistic symptomatology and IQ, as is the case with autistic children's security in the Strange Situation. There is little evidence here, however, that theory of mind measures are related to attachment measures, even to reflective functioning which is explicitly a measure of

21

mentalising (although the correlation with the Eyes task approaches significance). This lack of association is particularly interesting when set alongside the finding that the autism group and the control group differed significantly on coherence and reflective function scores. Two interpretations are possible. It may be that autistic symptomatology and mentalising ability are continuously correlated across all people with and without autism, but the measures used are better suited to picking up gross between-group differences rather than subtle within-group variations; this is discussed in more detail below. This is consistent with the observation that all of the correlations between security measures (reflective function, coherence of mind and coherence of transcript) and participant characteristics (ADOS scores, IQ and mentalising) were in the predicted direction but few were significant or even approached significance. The alternative conclusion is that there may be gross group differences between people with autism (low reflective functioning and mentalising, high autistic symptomatology) and people without autism, rather than each factor existing on a continuum. This latter idea does not seem to be consistent with existing findings about attachment and mentalising in typical development, but circumstances may be different for people with autism, particularly given the suggestion that they may form secure attachments in a different manner from typically-developing children and adults. Although attachment and mentalising have been explored together in typical samples, attachment-based mentalising measures like reflective function have not been compared to more traditional theory of mind measures. Overall, however, the general lack of association between attachment measures and these other variables (symptomatology, theory of mind and IQ) should make us more confident that the AAI was genuinely tapping into attachment representations in the participants, rather than acting as a proxy for other abilities or deficits.

Limitations

This was an exploratory study using the AAI with adults with autism for the first time. Participants were self-selected, with a higher proportion of women and more people with mood disorders than might be expected from other research in this area (Barnard et al., 2001; Ehlers & Gillberg, 1993). As it was not known at the outset whether the participants would be able to engage with the AAI at all, the sample size was relatively small, although the analyses had satisfactory power and findings were generally clear-cut. In all cases, the same patterns of results were replicated across parametric and non-parametric analyses. The lack of association between measures in the case of the last research question could be due to limitations in the sensitivity of the theory of mind and autism measures. Although the ADOS is a well established measure of autistic symptomatology, its intended use is diagnostic, and the brief duration may not be enough to pick up all of the relevant information among participants with less obvious difficulties; a self-report symptom measure could have picked up some more subtle or well-disguised difficulties. There appeared to be a ceiling effect in participants' scores on the Strange Stories, although not on the Eyes task. However, the WASI is a well-established measure whose validity has been established in people with HFA (Minshew et al., 2005), and like the ADOS and theory of mind measures, it showed little or no relationship with reflective function or coherence. This does suggest that IQ may really be unrelated to attachment status in adults with HFA. There is some evidence among children with autism of a threshold effect, that is those with IQ below 70 are less likely to be secure but those above this level are not (Rutgers et al., 2004), while there is only limited evidence for a continuous relationship where the likelihood of attachment security increases with IQ (Rogers et al., 1991). This may also hold for adults, that beyond a certain level of intelligence other factors are more relevant in determining attachment security. The parallel interview was developed specifically for this study and was not used in the control

group, so there are some questions about how it would be expected to relate to AAI responses in a sample without autism. For example, one concern is that it was shorter than the AAI, which could account for the difference in coherence scores. Ideally, it would have been preferable to have all the same measures for the controls as for the participants, so that the patterns of relationships in discourse style, IQ and so on could be directly compared across both groups.

Future research directions

It was suggested in the Introduction that children with autism who form secure attachments could be doing so in different ways from other children. The same may yet hold true of autistic adults with secure attachments, although the present study found no evidence of this. A study with more participants might be able to identify a sufficiently large group of secure adults with autism to allow group comparisons, rather than needing to rely on continuous measures as proxies for attachment security as this study has done.

It was predicted that the AAI would be a particularly difficult task for adults with autism because of its heavy reliance on discourse coherence, mentalising and conversational pragmatics. There are now semi-projective measures of attachment in adults (e.g. George & West, 2001) that rely less strongly on narrative than the AAI. If adults with autism demonstrated the same level of attachment security on these measures as found in the current study, it would give a measure of convergent validity and demonstrate that they were really being scored according to their states of mind with respect to attachment, rather than on how difficult they found the AAI. Using the AAI among adults with autism for the first time, this study has succeeded in demonstrating that the participants were able to respond to the interview in a way that could be classified, that some of them could be classified as securely attached and that their responses were at least partly independent of

their autism; it has also highlighted some interesting areas for future investigation.

Acknowledgements

References

Ainsworth, M.D.S., Blehar, M.C., Waters, E. & Wall, S. (1978). *Patterns of attachment: a*

psychological study of the strange situation. Hillsdale, NJ: Erlbaum.

Aldred, C., Green, J. & Adams, C. (2004). A new social communication intervention for

children with autism: pilot randomised controlled treatment study suggesting

effectiveness. *Journal of Child Psychology and Psychiatry, 45(8)*: 1420-1430.

American Psychiatric Association (1980). *Diagnostic and Statistical Manual of Mental*

Disorders (3rd ed.). Washington, DC: American Psychiatric Association.

American Psychiatric Association (2000). *Diagnostic and Statistical Manual of Mental*

Disorders (4th ed. – text revision). Washington, DC: American Psychiatric

Association.

Barnard, J., Harvey, V., Prior, A. & Potter, D. (2001). *Ignored or ineligible? The reality*

for adults with autism spectrum disorders. London: National Autistic Society.

Baron-Cohen, S. (2000). Theory of mind and autism: a fifteen-year review. In S. Baron-

Cohen, H. Tager-Flusberg & D.J. Cohen (Eds.), *Understanding other minds:*

perspectives from developmental cognitive neuroscience (2nd ed.). Oxford

University Press.

Baron-Cohen, S., Leslie, A.M. & Frith, U. (1985). Does the autistic child have a 'theory of

mind'? *Cognition, 21*: 37-46.

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.

Bettelheim, B. (1967). *The empty fortress: infantile autism and the birth of the self.* New York: The Free Press.

Biringen, Z., Brown, D., Donaldson, L., Green, S., Krcmarik, S. & Lovas, G. (2000). Adult Attachment Interview: linkages with dimensions of emotional availability for mothers and their pre-kindergarteners. *Attachment and Human Development, 2(2)*: 188-202.

Brent, E., Rios, P., Happé, F. & Charman, T. (2004). Performance of children with autism spectrum disorder on advanced theory of mind tasks. *Autism, 8(3)*: 283-299.

Capps, L., Sigman, M. & Mundy, P. (1994). Attachment security in children with autism. *Development and Psychopathology, 6(2):* 249-261.

Crowell, J.A., Waters. E., Treboux, D., O'Connor, E., Colon-Downs, C., Feider, O., Golby, B. & Posada, G. (1996). Discriminant validity of the Adult Attachment Interview. *Child Development, 67(5)*: 2584-2599.

Diehl, J., Bennetto, L. & Young, E. (2006). Story recall and narrative coherence of high-functioning children with autism spectrum disorders. *Journal of Abnormal Child Psychology, 34(1)*: 83-98.

Dissanayake, C. & Crossley, S.A. (1996). Proximity and sociable behaviours in autism: evidence for attachment. *Journal of Child Psychology and Psychiatry, 37(2)*: 149-156.

Dissanayake, C. & Crossley, S.A. (1997). Autistic children's responses to separation and reunion with their mothers. *Journal of Autism and Developmental Disorders, 27(3)*: 295-312.

Dissanayake, C. & Sigman, M. (2001). Attachment and emotional responsiveness in children with autism. In L.M. Glidden (Ed.), *International Review of Research in Mental Retardation: Autism, 23*: 239-266.

Ehlers, S. & Gillberg, C. (1993). The epidemiology of Asperger syndrome: a total population study. *Journal of Child Psychology and Psychiatry. 34(8)*: 1327-1350.

Field, T. (1987). Interaction and attachment in normal and atypical infants. *Journal of Consulting and Clinical Psychology, 55*: 853-859.

Fonagy, P., Steele, M., Steele, H., Moran, G. & Higgitt, A.C. (1991). The capacity for understanding mental states: the reflective self in parent and child and its significance for the security of attachment. I*nfant Mental Health Journal, 12(3)*: 201-218.

Fonagy, P., Steele, M., Steele, H. & Target, M. (1997). *Reflective functioning manual*. Unpublished manuscript, University College, London.

Frith, U., Happé, F. & Siddons, F. (1994). Autism and theory of mind in everyday life. *Social Development, 3(2)*: 108-124.

George, C., Kaplan, N. & Main, M. (1996). *Adult Attachment Interview*. Unpublished manuscript, Department of Psychology, University of California, Berkeley.

George, C. & West, M. (2001). The development and preliminary validation of a new measure of adult attachment: the Adult Attachment Projective. *Attachment and Human Development, 3(1)*: 30-61.

Green, J., Gilchrist, A., Burton, D. & Cox, A. (2000). Social and psychiatric functioning in adolescents with Asperger syndrome compared with conduct disorder. *Journal of Autism and Developmental Disorders, 30(4)*: 279–293.

Grice, H.P. (1975). Logic and conversation. In P. Cole & J.L. Moran (Eds.), *Syntax and semantics III: speech acts* (pp. 41-58). New York: Academic Press.

Hale, C.M. & Tager-Flusberg, H. (2005). Brief report: the relationship between discourse deficits and autism symptomatology. *Journal of Autism and Developmental*

Disorders, 35(4): 519-524.

Hamilton, C.E. (2000). Continuity and discontinuity of attachment from infancy through

    adolescence. *Child Development, 71(3):* 690-694.

Happé, F.G.E. (1994). An advanced test of theory of mind: understanding of story

    characters' thoughts and feelings by able autistic, mentally handicapped, and

    normal children and adults. *Journal of Autism and Developmental Disorders,*

    24(2): 129-154.

Happé, F.G.E. (1995). The role of age and verbal ability in the theory of mind task

    performance of subjects with autism. *Child Development, 66(3)*: 843-855.

Jolliffe, T. & Baron-Cohen, S. (1999). The Strange Stories test: a replication with high-

    functioning adults with autism or Asperger syndrome. *Journal of Autism and*

    Developmental Disorders, 29(5): 395-406.

Joseph, R.M., Tager-Flusberg, H. & Lord, C. (2002). Cognitive profiles and social-

    communicative functioning in children with autism spectrum disorder. *Journal of*

    Child Psychology and Psychiatry, 43(6): 807-821.

Kaland, N., Moller-Nielsen, A., Callesen, K., Lykke Mortenson, E., Gottlieb, D. & Smith,

    L. (2002). A new 'advanced' test of theory of mind: evidence from children and

    adolescents with Asperger syndrome. *Journal of Child Psychology and*

Psychiatry,

    43(4): 517-528.

Kanner, L. (1943). Autistic disturbance of affective contact. *Nervous Child, 2:* 217-250.

Lord, C., Rutter, M., DiLavore, P. C. & Risi, S. (1999). *Autism Diagnostic Observation*

    Schedule-WPS (ADOS-WPS). Los Angeles, CA: Western Psychological Services.

Mahler, M.S. (1968). *On human symbiosis and the vicissitudes of individuation: infantile*

    psychosis. New York: International Universities Press.

Main, M. & Goldwyn, R. (1998). *Adult attachment scoring and classification system*. Unpublished manuscript, Department of Psychology, University of California, Berkeley.

Minshew, N.J., Turner, C.A. & Goldstein, G. (2005). The application of short forms of the Wechsler intelligence scales in adults and children with high functioning autism. *Journal of Autism and Developmental Disorders, 35(1)*: 45-52.

Mundy, P. & Markus, J. (1997). On the nature of communication and language impairment in autism. *Mental Retardation and Developmental Disabilities Research Reviews, 3(4)*: 343-349.

Office of Population Censuses and Surveys (1990). *Standard Occupational Classification*. London: HMSO.

Peterson, C.C., Wellman, H.M. & Liu, D. (2005). Steps in theory-of-mind development for children with deafness or autism. *Child Development, 76(2)*: 502-517.

Pianta, R.C., Egeland, B. & Adam, E. (1996). Adult attachment classification and self-reported psychiatric symptomatology as assessed by the Minnesota Multiphasic Personality Inventory–2. *Journal of Consulting and Clinical Psychology, 64(2)*: 264-272.

Rogers, S.J., Ozonoff, S. & Maslin-Cole, C. (1991). A comparative study of attachment behavior in young children with autism or other psychiatric disorders. *Journal of the American Academy of Child and Adolescent Psychiatry, 30(3)*: 483-488.

Rogers, S.J., Ozonoff, S. & Maslin-Cole, C. (1993). Developmental aspects of attachment behavior in young children with pervasive developmental disorders. *Journal of the American Academy of Child and Adolescent Psychiatry, 32(6)*: 1274-1282.

Roisman, G.I., Fortuna, K. & Holland, A. (2006). An experimental manipulation of retrospectively defined earned and continuous attachment security. *Child*

Development, 77(1): 59-71.

Roisman, G.I., Padrón, E., Sroufe, L.A. & Egeland, B. (2002). Earned-secure attachment

status in retrospect and prospect. *Child Development, 73(4)*: 1204-1219.

Rutgers, A.H., Bakermans-Kranenburg, M.J., van IJzendoorn, M.H. & van Berckelaer-

Onnes, I.A. (2004). Autism and attachment: a meta-analytic review. *Journal of*

Child Psychology and Psychiatry, 45(6): 1123-1134.

Serra, M., Loth, F.L., van Geert, P.L.C., Hurkens, E. & Minderaa, R.B. (2002). Theory of

mind in children with 'lesser variants' of autism: a longitudinal study. *Journal of*

Child Psychology and Psychiatry, 43(7): 885-900.

Shapiro, T., Sherman, M., Calamari, G. & Koch, D. (1987). Attachment in autism and

other developmental disorders. J*ournal of the American Academy of Child and*

Adolescent Psychiatry, 26(4): 480-484.

Sigman, M. & Mundy, P. (1989). Social attachments in autistic children. *Journal of the*

American Academy of Child and Adolescent Psychiatry, 28(1): 74-81.

Sigman, M. & Ungerer, J.A. (1984). Attachment behaviors in autistic children. *Journal of*

Autism and Developmental Disorders, 14(3): 231-244.

Slade, A., Grienenberger, J., Bernbach, E., Levy, D. & Locker, A. (2005). Maternal

reflective functioning, attachment, and the transmission gap: a preliminary study.

Attachment and Human Development, 7(3): 283-298.

Tantam, D. (2000). Psychological disorder in adolescents and adults with Asperger

Syndrome. *Autism, 4(1)*: 47-62.

Tinbergen, E.A. & Tinbergen, N. (1972). *Early childhood autism, an ethological*

approach. Berlin: Paul Parey.

van IJzendoorn, M. & Bakermans-Kranenburg, M. (1996). Attachment representations in

mothers, fathers, adolescents and clinical groups: a meta-analytic search for

normative data. *Journal of Consulting and Clinical Psychology, 64(1)*: 8-21.

van IJzendoorn, M.H., Goldberg, S., Kroonenberg, P.M. & Frenkel, O.J. (1992). The relative effects of maternal and child problems on the quality of attachment: a meta-analysis of attachment in clinical samples. *Child Development, 63(4)*: 840-858.

van IJzendoorn, M.H., Rutgers, A.H., Bakermans-Kranenburg, M.J., Swinkels, S.H.N., van Daalen, E., Dietz, C., Naber, F.B.A., Buitelaar, J.K. & van Engeland, H. (2007). Parental sensitivity and attachment in children with autism spectrum disorder: comparison with children with mental retardation, with language delays, and with typical development. *Child Development, 78(2)*, 597–608.

Waters, E., Merrick, S., Treboux, D., Crowell, J. & Albersheim, L. (2000). Attachment security in infancy and early adulthood: a twenty-year longitudinal study. *Child Development, 71(3):* 684-689.

Wechsler, D. (1999). *WASI: Wechsler Abbreviated Scale of Intelligence*. San Antonio, TX: The Psychological Corporation, Harcourt Assessment.

Williams, D.L., Goldstein, G. & Minshew, N.J. (2006). The profile of memory function in children with autism. *Neuropsychology, 20(1)*: 21-29.

Willemsen-Swinkels, S.H.N., Bakermans-Kranenburg, M.J., Buitelaar, J.K., van IJzendoorn, M.H. & van Engeland, H. (2000). Insecure and disorganised attachment in children with a Pervasive Developmental Disorder: relationship with social interaction and heart rate. *Journal of Child Psychology and Psychiatry, 41(6)*: 759-767.

Yirmiya, N., Erel, O., Shaked, M. & Solomonica-Levi, D. (1998). Meta-analyses comparing theory of mind abilities of individuals with autism, individuals with mental retardation and normally-developing individuals. *Psychological Bulletin,*

124: 283-307.

Appendix: Parallel interview

[You've already told me that when you were younger you lived in X and Y.] Could you start by helping me to get oriented to the houses you lived in, where they were and so on? If you could tell me where your room was in the house, and whether you shared it?

I'd like you to try to describe your bedroom in the house where you lived as a young child, as far back as you remember.

Now I'd like to ask you to choose five adjectives or words that describe the room that you had, as far back as you can remember – as early as you can go, but say age 5 – 12 is fine. I know this may take a bit of time, so go ahead and think for a minute, then I'd like to ask you why you chose them. I'll write each one down as you give them to me.
Okay, now let me go through some more questions about your description of the room you had as a child. You used the word [...] to describe the room: are there any memories or incidents that come to mind, that would help me to understand why you chose that word?

Now I'd like to ask you to choose five adjective or words that describe the main room, the living room or the lounge, in the house you lived in at that time. I know this may take a bit of time, so go ahead and think again for a minute, then I'd like to ask you why you chose them. I'll write each one down as you give them to me.

Okay, now let me go through some more questions about your description of the living room when you were a child. You used the word [...] to describe the room: are there any memories or incidents that come to mind, that would help me to understand why you

chose that word?

Now I wonder if you could tell me, of all the different rooms that you had as a child (OR of those two rooms, the bedroom and living room), which did you like the best, and why? What did you like less about the other room(s)?

When you spent time in your room as a young child, what would you do in there?

[What do you remember about moving house as a child?] Was there ever a time when your bedroom was redecorated? Or any big changes, new things in it or things being moved around? Did you ever want to change anything about your room?

Can you remember being in your room when there was a storm? Where in the room were you? What did it look like?

Were there any other rooms that you liked to spend time in when you were a young child?

Now I'd like to ask you about your room (where you live/as it is) now. What is it like? What do you think of it?

If you could change three things about the room you have now, what would they be?

Table 1: AAI categories for participants and controls

	Three categories				
AAI classification	F	E	Ds		
participants	3	8	9		
controls	9	3	8		
	Five categories				
AAI classification	F	E	Ds	CC	U
participants	3	4	5	4	4
controls	6	0	7	1	6

F: secure/autonomous, E: insecure/preoccupied, Ds: insecure/dismissing, CC: cannot

classify, U: unresolved

Table 2: Scores on continuous AAI scales and reflective function scores

	Mean (SD)		Effect size
AAI scales	Autism	Controls	Autism vs. controls
RF	2.78 (1.75)	3.90 (1.77)	0.61*
Coherence: transcript	3.35 (1.73)	4.65 (1.53)	0.75*
Idealising	2.50 (1.69)	2.21 (1.30)	
Lack memory	2.70 (2.66)	3.13 (2.33)	
Anger	2.20 (1.56)	2.00 (1.39)	
Passivity	3.10 (2.02)	2.93 (1.65)	
Derogation: parents	1.60 (1.04)	1.71 (0.98)	
Derogation: attachment	1.75 (1.12)	2.40 (2.12)	
Coherence of mind	3.43 (1.74)	4.60 (1.56)	0.67*
Unresolved: loss	2.42 (1.98)	3.61 (2.02)	0.47*
Unresolved: trauma	2.65 (1.62)	2.75 (2.44)	

* p < .05 difference between group means on Mann-Whitney U test

Effect sizes of differences between group means are only given where significant

Autism n = 20, controls n = 20

Table 3: Participants' state of mind scores for the parallel interview, and correlations

with AAI state of mind scores

Parallel interview scores	Parallel mean (SD	AAI mean (SD)	Correlation
Metacognitive monitoring	1	2.78 (1.75)**	NA
Coherence of transcript	5.23 (2.13)	3.35 (1.73)*	-.14
Idealising	2.23 (1.96)	2.50 (1.69)	.27
Lack memory	1.85 (1.91)	2.70 (2.66)	.71**
Anger	1.92 (1.38)	2.20 (1.56)	.79***
Passivity	2.85 (2.08)	3.10 (2.02)	.65*
Derogation	1	1.60 (1.04)*	NA
Coherence of mind	5.38 (2.26)	3.43 (1.74)*	-.04

All participants scored 1 on "metacognitive monitoring" and "derogation" in the

parallel interview.

NA: could not be calculated, *p < .05, **p < .01, ***p < .001

Correlations are Spearman's rho. Highlighted AAI means are significantly different from

parallel interview means (Wilcoxon signed ranks test).

Table 4: Sample quotations from participants' responses to AAI questions

Participant classified as secure
Q6. When you were upset as a child, what would you do? Erm, I would cry and then I would find my mum, [participant laughs] and I would put my head on her lap and cry. [participant laughs] *(mm)* Which is nice.
Q11. Why do you think your parents behaved the way they did during your childhood? My mum saw, like, things that were hard for me and couldn't do so, you know more than another person so she felt she had to be more protective than another person. Which at the time served its purpose but then, sometimes you know when you then develop past your stage it takes them a while to realise that you've developed past that stage.
Participant classified as secure
Q6. [sigh] It depends what I was upset about. Er [3] could be fairly moody. I did have sort of temper tantrums, specially if I was playing with things like Lego or Meccano and it didn't go together the way I wanted. Everything would get smashed or thrown across the room. Uh [2] other times you know sort of, if it was more emotive things I'd tend to sort of shut myself away. Uh, just hide myself out. Uh, those days and you know specially sort of, you know I used to hide away with books and, just sort of, spend more time with myself.
Q11. Uh, I think probably it was actually pretty much reflective of their own [2] upbringing as well. Uh, both, you know, having said I didn't meet my maternal grandfather but, both are pretty systematic [sic] of their own nurturing. Uh, my mother's family was you know sort of all those things I described, warm, supportive through. Uh, and sort of very, close-knit. Whereas my father's family were, more, pretty much aloof, uh [2] disjointed shall we say as a family that sort of you know it was, a lot of loneliness through each other. Uh, my grandfather, though, you know, a great guy, uh, had seen a lot of problems through his life, you know he lost nine brothers in the first and second world war, didn't have very good relationship with his sisters on his own mother's death and, so, sort of was pretty distant through. Uh, so I think you know sort of, they, the way they

were, you know was sort of, pretty much, by environments they were raised in. Uh, I think

you know, my father's attitude specially as we were younger was that, he wanted to try

and, better improve himself, and didn't realise perhaps quite the cost, that, it was around.

[2]

Participant classified as dismissing

Q6. Um [2] well I'd cry. [participant laughs]

Q11. Um, so, I mean part of the reason was that most of the time they tried to be like

normal parents and I think at times they thought, um they obviously realised I did have

some sort of problem, *(mm)* and so were sort of trying their best to look after me.

Participant classified as dismissing

Q6. [7] I don't know, I can't really remember. Cry maybe, I don't know. Not quite sure.

Q11. [3] Because they thought that was the right way to bring somebody up. [4]

Participant classified as preoccupied

Q6. Um [2] I tended to, when I was crying I usually went off in a huff, *(right)* like, like

kids do, but when, when we were all young and my parents were still together of course

um, we all, me [Brother 1] and [Brother 2] were all in one bedroom. *(OK)* Me and

[Brother 1] had a bunk bed, [Brother 2] had his own little bed. *(right)* Almost like a cot.

Um but, so it was quite hard for me to run up to my own room by myself, but um, one

thing I did always sort of try and do was just, um, not talk, which is what kids do really,

you know when a kid's bad he does, "I'm not talking to you, I'm not talking to you." And I

still feel that way sometimes now, I mean, sure my, me and my parents do still sometimes

have silly arguments about things and when I do I tend to go off in a huff. *(right)* So, yeah,

has to be one of my patterns t-. Sort of with the thought process that um, I'll go away

before I say something I really regret. *(right)* In a way. It might be "I hate you", or, that

sort of thing. You know you don't mean that about your parents.

Q11. Um, well that thing I told you about, my mother's meeting with Miss, with Mrs

[Teacher] earlier, *(mm)* when she said she was concerned that might have been influential.

(mm) She might have, she kept it obviously very secret because, mind you it is quite easy

to keep a secret from a six-year-old, um, she probably thought to herself, what if [Own

name] were to know these things, that Mrs [Teacher] thinks he's got problems, *(mm)* and other people thinks he's got problems, so, I suppose in a way my mum was, I suppose another adjective for my mum's relationship with me would be 'protective'. *(right)* Because, you know she, perhaps she saw that um, she might even have thought to herself, problem equals genius. *(right)* Cos I've always thought um, genius is a very subjective word, it doesn't necess- it doesn't mean, really smart, necessarily, it can mean other things like um, you see things differently. Like I do, like Asperger's people do. Um, so, the way, a sens-, a sensitive characteristic, or characters can develop, uh, how, how y- you know how you move your body by flicking your fingers, it's just your creativity then let it be. *(OK)* So, she might have been protective in that way, and my dad as well. [2] Cos um, my dad always says that he doesn't know things, basically, he keeps on saying things like um, nobody told me about this, *(right)* that you've got on Tuesday, nobody told me that you were going to London on Wednesday. Um [2] but my mum, my mum ret-, retaliates by saying um, you should know them anyway, you don't need to find out from people, you should know what's happening with your children. You know that's, that maybe have been another thing which um led to the conflict between my mum and my dad, and eventually their split-up.

Participant classified as preoccupied

Q6. [2] Don't know. [3] I don't think I cried very much. *(mm)* I do r- I rem- cos I remember occasion when I when she'd been particularly nasty to me, *(mm)* and um, and w- my sister and I were both in bed and I was crying, and, my sister went down to, to tell my mother the, that I w- that I was crying, and I think she came back and ap- and I think she came up and actually apologised. Which made me cry more than ever. *(right)* But again I d- but again it's something I don't know w- I don't know whether it actually happened or whether it's something I dreamt or fantasised. *(sure)* [2] Um but uh but, as for what else I did when I f-, what did what did I do if I, [2] I don't know. I really can't remember what I used to do

if I was upset I mean, may maybe it was such a [2] such a common everyday thing for me to feel upset that um, it was something you know sort of like um, taken for granted, you know just sort of [2] part of my psyche. [2] I mean when I was, I remember when I was about eight, *(mm)* I, I used I used to feel I I, not sure whether I felt or thought, that the life I was living was a dream that one day I'd wake up. But interestingly the only specific change I envisaged, that I w- walked up when I woke up from this dream, was I'd be a boy. *(right)* I don't know why I mean you'd think you'd think I'd envisage all sorts of changes wouldn't you? I mean I used to r- write, I don't know whether I ever gave them to them but I used to write it, uh, lists of birthday and Christmas presents, such as "don't row, don't favour [Sister], try to love me". [2] Can't remember whether I actually gave them to them, I'm, I'm not sure how they'd have reacted if I had, but. [3] And um [2] w- a- at about the same time I was sent to a child guidance clinic, and again I can't remember why, but uh, I mean I was taken uh I was taken away from it uh, when I was ten cos my mother didn't want me to miss any more school, bef- before I took the eleven plus. You know the eleven plus exam which kids used to have to take? *(yeah)* Um, last year of primary school. Um [3] and um [2] about the o- ca- the only thing I remember about that, there's three things I remember, is that th- th- the um, psychiatrist I suppose she was, [cough] said that, most pe- most of her children most of the children, either played, there were various toys to play with, *(mm)* there was I remember there was a sandpit that you could dig up, *(mm)* uh, or talked and she said I used to they said I did b- I did both. *(mm)* And she said oh, and she said I I I, I, I w- I, seemed to be quite loyal to my fa- c- uh, I think she said I felt seemed to feel uncomfortable if I had to say anything against them, so there was so, so, so, there certainly was enough to s-, to say against them, in all conscious, a-, um, and um, also that I asked her who gave, you know she had a diploma on the on the wall *(mm)* with her degrees on it, and I asked her who gave it to her now very uncharacteristically got angry

she said nobody gave it to her she worked for it. *(right)* I suppose she must have had to work sh- maybe she w- maybe she had to work very hard. *(yeah)* And um [2] that's all I remember about the child guidance clinic. Except that the Christmas after I left, um I I came back to see everybody, and told them and told them everything I'd got for Christmas though the only thing I can actually remember was a c- copy of Jane Eyre [2] er which my i- in which mother had written "love from Mummy"! S- which has always ma- which has which has always made me feel very sceptical of the value of saying "love from" or f- people telling you they love you, cos she o- cos she obviously didn't, *(yeah)* and um, one one of the staff not not the psychiatrist somebody else, said oh saying "some people have all the luck". Which I didn't think I which I didn't think applied to me. [3] Um. [3] Can't remember why I t- can't remember why I told you that. [laugh] I'm not sure I'm not sure whether I told the psychol- the psychiatrist about b- about feeling I was li-, living a dream.

Q11. [2] [sigh] [2] Well, I think um, neither of them I think neither of them got any support from the other. *(mm)* And as I said before I think maybe the experience of having a child was not what they were hoping or expecting. Uh, I think possibly the pyloric stenosis and every and everything and [2] um, meant, you know, meant that my mother was unable to b- b- to bond with me and sort of and as I said don't know how old I, I was by the time we f- g- we finally c- came to go back to London and my father saw me I don't, I don't know whether he um, whether he whether he came out to [Place of birth] to see me there or, and, sin- since it was since it was not long after the war and he had been called up of course, *(mm)* though he was never sent abroad cos he was his health wasn't up to it, think he was categorised as C3 whatever they called it, but he might still have been serving, he might not have been able to get away. I mean I assume he was informed of my birth, but. See the thing is and, but that this is all speculation you see, I mean, after my mother, when my mother was in hospital, th- the first half of October 1995, and I went to

44

see her, and she'd had she'd had this kind of complete personality transplant. And the only reason I went to see her was I was going to an antique fair up in [Place] and she was at the [Hospital], and, and um, it you know it was just a bus ride away or even could even walk there really if, if you were feeling energetic. And I thought "oh god I suppose I'd better go and see her". And she and she and she greeted me in quite a friendly way and even introduced me to the nurse, and um, couldn't, couldn't believe it. And anyway during that period, f- for a week, couple of weeks, *(mm)* she actually did apologise for having been so horrible to me. And I really wish I'd asked her why she was, but you know it was just it was so unexpected I sort of muttered "oh, that's alright". So I missed the opportunity.

Participant classified as preoccupied

Q6. Um, it was usually, just go to my room [2] and [2] u- read a book or, or watch um, watch television, t- try to hide myself away from it all, because I was somewhere where I knew I was secure.

Q11. Um, w- w- well um, well I think as I said, because just they were, they were very, they were very concerned all about, all about n-, all about the sheltered life I was living, and I wasn't like m-, [laugh] like other kids that was m-, and, u-, and they were they were worried in case I might become very isolated as I got older. [3]

Participant classified as unresolved (secondary classification as preoccupied)

Q6. Erm, I'd pull my hair out or hit my head on the wall. And um yeah I'd pull my hair out or hit my head on the wall, or cry, or all of them.

Q11. Well, they didn't know I was autistic but they they knew I was special, and my mum always said she had a feeling I was autistic. But why they behaved the way they did was, I think that when I was little, [2] you know, I was cute and as I was got older I became a teenager, which in- which was which they saw as a monster maybe. You know once I became a teenager they said that I became more difficult and my behaviour went unmanageable so maybe they managed it in the only way they knew how, who knows. [2]

Participant classified as unresolved (secondary classification as preoccupied)

Q6. [5] Um [12] pretend I wasn't crying. [3] And I'd get away if I possibly could so I

could be on my own.
Q11. Because they just thought I was an awkward little brat and, they were, treating me in the ways they thought would *(mm)* either persuade or frighten me into what they called good behaviour.
Participant classified as unresolved (secondary classification as dismissing)
Q6. Throw tantrums. *(right)* Be resentful maybe? *(OK)* When my f- when father used to hit me. Wasn't making any difference. I had to be sent away. [sigh] Yeah, more or less out of par- parental control. *(right)* I think what I should of done was to um, was to have um sent you um [2] the er write-up, about my childhood.
Q11. It was out of sheer frustration. That's all that's all I can s-, [cough] I can say, they behaved as reasonably as they they could against me. I don't think there's no um, child guidance as there is now. [2] You know like you see these programmes when the child is being disruptive [2] give him or her time out, put them in the room, until they calm down. *(yeah)* No si- child psychologists. Don't know whether that's your, well it wouldn't be your role. It, y- you're probably a a a research um, you know like um, facilitator. Is that right?

Interviewer's words shown in italics. Pauses shown as number of seconds in square brackets.

Table 5: Correlations between participants' coherence and reflective function scores and

other variables of interest

Variables	Coherence of transcript	Coherence of mind	Reflective function
ADOS communication	-.48, p = .03*	-.36, p = .13	-.23, p = .34
ADOS RSI	-.31, p = .18	-.16, p = .50	-.29, p = .22
Verbal IQ	.36, p = .11	.30, p = .21	.25, p = .28
Performance IQ	.25, p = .30	.19, p = .43	.18, p = .44
Full-scale IQ	.41, p = .08	.25, p = .29	.23, p = .32
Strange stories mental	.37, p = .14	.21, p = .42	.26, p = .32
Eyes task	.29, p = .21	.27, p = .25	.38, p = .10

RSI: reciprocal social interaction

*p < .05