Neuropsychological functioning and social communication in children excluded from primary school

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Overview

Autistic Spectrum Disorders (ASD) are characterized by difficulties in reciprocal social interaction and communication, with restricted interests and stereotyped behaviours (ICD-10 criteria; World Health Organisation, 1996). Many of the difficulties experienced by individuals with ASD have been attributed to deficits in mentalising- the ability to attribute mental states to oneself and others in order to explain and predict behaviour. This thesis begins by considering the contribution that advanced theory of mind tasks have made to our understanding of mentalising abilities in ASD. It is concluded that there is substantial evidence that even the highest functioning individuals experience difficulties with mentalising. However, further progressing our understanding of mentalising in ASD will require a number of methodological improvements- in particular, greater attention given to controlling the effects of IQ and executive functioning.

The empirical paper draws on these methodological points and explores mentalising and other aspects of social cognition in children excluded, or at risk of exclusion, from primary schools. Previous research has suggested that a sub-group of these children may have unidentified ASD (Gilmour, Hill, Place, & Skuse, 2004). The current study assessed primary school children on a range of measures of social cognition, including theory of mind. Children excluded from school were significantly more likely to meet ICD-10 criteria for ASD than comparisons. Furthermore, they were significantly more likely than comparisons to show deficits in social cognition and mentalising similar to those documented in ASD. It is

concluded that there is strong evidence for a sub-group of children excluded from school with unidentified ASD.

The critical appraisal expands on the implications of these findings, focusing on the issues involved in screening for ASD, and reflecting on clinical issues raised by the research.

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Literature Review

What do advanced Theory of Mind Tasks tell us about mentalising abilities in Autistic Spectrum Disorders?

1.0 Abstract.

Theory of mind, the ability to attribute mental states to oneself and others (Kleinman, Marciano, & Ault, 2001) has long been considered a central deficit in autism. In recent years there has been increasing interest in the mentalising abilities of higher-functioning individuals with autism, assessed using 'advanced' theory of mind tasks. This review considers what these tasks have contributed to our understanding of mentalising abilities in high-functioning individuals with autism. It is argued that there is substantial evidence for deficits in theory of mind even in the highest functioning individuals. Such deficits are not task or domain-specific, but instead reflect pervasive differences in the way individuals with autism process information about the social world. The review ends by considering implications for theoretical models of autism and future research design.

2.0 Introduction.

2.1 Autism.

Autism is a pervasive developmental disorder characterised by deficits in reciprocal social interaction and communication, with restricted interests and stereotyped behaviours (ICD-10 criteria; World Health Organisation, 1996). People with autism often experience difficulties with social relationships and fail to understand subtle aspects of verbal and non-verbal communication, such as sarcasm or gestures. Autism is now widely acknowledged to be a spectrum disorder comprising individuals with profound learning difficulties through to people with average or above average IQ. Similarly, the severity of social communication difficulties may vary. ICD-10 currently includes a number of specific disorders within the autistic spectrum, including childhood autism, Asperger Syndrome, Atypical Autism and Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS).

2.2 Theory of mind.

Many authors have suggested that the core impairments of autism could result from a deficit in 'Theory of Mind'. Theory of Mind (ToM) is the ability to attribute mental states, such as beliefs, feelings and desires to other people (Kleinman, Marciano, & Ault, 2001) and to oneself. This ability allows people to understand what motivates the behaviour of other people, and is also commonly referred to as mentalising (e.g., Baron-Cohen, Campbell, Karmiloff-Smith, Grant, & Walker, 1995).

2.3 False belief tasks.

ToM is typically assessed using variants of the 'False Belief Task', where the participant is 'presented with a situation in which they know the true identity of a hidden object but must deduce that another person, without such knowledge, will misidentify the object' (Kleinman et al., 2001, p.29). Baron-Cohen, Leslie, and Frith (1985) find that 90% of typically developing children aged between 3 and 6 years pass such tasks, whilst only 20% of children with autism do so. Deficits in mentalising ability have been shown to occur for individuals with autism across a range of age and intellectual ability / IQ scores (Kleinman et al., 2001).

However, not all individuals with Autistic Spectrum Disorders (ASD) will fail false belief tasks. For example, Kerr and Durkin (2004) find that representing mental states as 'thought bubbles' facilitates performance on false belief tasks amongst children with autism. Additionally, many studies find that the majority of adults with high-functioning autism or Asperger Syndrome will pass false belief tasks despite experiencing significant difficulties with social communication in everyday life (e.g., Baron-Cohen, Jolliffe, Mortimore, & Robertson, 1997; Happé, 1994; Roeyers, Buysee, Ponnet, & Pichal, 2001). However, false belief tasks have a ceiling corresponding to a mental age of around 6 years, and so it is not unreasonable to expect that older or higher-functioning (in terms of IQ / mental age) individuals with ASD would pass such tasks. Passing false belief tasks simply indicates that the person has theory of mind abilities equivalent to those of a typically developing 4 year old (Baron-Cohen, O'Riordan, Stone, Jones, & Plaisted, 1999). As a result,

performance on false belief tasks fails to capture the real life mentalising difficulties of many individuals with ASD (Abell, Happé, & Frith, 2000).

2.4 Advanced theory of mind tasks.

During the past decade there has been increasing interest in developing ToM tasks that measure the ability of these higher functioning individuals with ASD. Such tasks are usually termed 'advanced' ToM tasks, in that they are designed to test the mentalising ability of older and higher ability individuals who will usually pass false belief tasks. There are now several well-established advanced ToM tasks, but to date there has been no attempt to review the contribution that these tasks have made to our understanding of mentalising abilities in ASD. This review will consider each type of task separately, presenting a critique of the research findings as well as considering the reliability and validity of the task itself, before concluding with some suggestions for future research in this area. Particular emphasis will be given to the influence of verbal ability and executive functioning, as these cognitive domains have been shown to influence performance on other theory of mind tasks (e.g., Carlson, Moses, & Breton, 2002; Jenkins & Astington, 1996). As most studies do not demonstrate significant differences between high-functioning autism and Asperger Syndrome (Baron-Cohen, Wheelwright, Spong, Scahill, & Lawson, 2001) this review will refer simply to autistic spectrum disorders (ASD).

3.0 Story tasks.

The Strange Stories Test (Happé, 1994) suggests that individuals with ASD experience difficulties making mental state inferences about non-literal utterances. This test comprises a set of short vignettes about everyday situations in which people say things they do not literally mean (e.g., telling lies, making jokes or using metaphor). Mentalising is required because understanding the speaker's intent is crucial to understanding the utterance.

3.1 Research with adults.

Happé (1994) finds that individuals with autism give significantly more inappropriate mental state explanations for non-literal utterances compared to adults with learning disabilities and typically developing children, and argues that this demonstrates mentalising deficits in higher functioning individuals with ASD. Studies using vignettes closely matched to Happé (1994) find consistent deficits making mental, but not physical, inferences amongst groups with ASD (e.g., Brent, Rios, Happé, & Charman, 2004; Jolliffe & Baron-Cohen, 1999; Kaland, Møller-Nielson, Smith, Lykke Mortensen, Callensen, & Gottlieb, 2005). This holds even when groups are matched on age, gender and IQ (Jolliffe & Baron-Cohen, 1999). Studies using more adapted versions fail to find deficits but also fail to adequately validate their versions of the task, and so it is not clear whether the findings can be meaningfully compared (e.g., Ponnet, Roeyers, Buysee, De Clercq, & Van Der Heyden, 2004; Roeyers et al., 2001). Roeyers et al. (2001) compare a group of adults with ASD to a group of comparison adults on an adapted version of the

Strange Stories. Their task uses the original vignette structure, but adapts the content to adult situations and language. They find no differences in the number of mental state terms used or in the number of correct mental state explanations given. However, this study fails to control IQ. The vignettes are not piloted and no physical inference control stories are included, so it is not clear whether the difficulty level is set appropriately. Ponnet et al. (2004) remedy some of these limitations by including a control group matched on age and IQ, and again find no differences between groups on frequency or appropriateness of mental state explanations. However, again this study does not include physical inference control stories. This is particularly problematic given that Ponnet et al. (2004) present their participants with two other mentalising tasks prior to administering the Strange Stories (the 'Empathic Accuracy Test' and the Eyes Test) that may have primed the use of mental state terms and improved performance in the ASD group. Counterbalancing the order of presentation would have strengthened this study.

3.2 Research with children.

The Strange Stories have also been used to demonstrate deficits in theory of mind in children and adolescents with ASD. Kaland, Møller-Nielson, Callesen, Lykke Mortensen, Gottlieb, and Smith (2002) describe an adapted Strange Stories paradigm ('Stories from Everyday Life') in which the participant is required to make both physical and mental state inferences about the same vignette. They find that participants with ASD perform more poorly than typically developing children on mentalising stories even when age and IQ are entered as covariates. This supports the findings from the adult literature suggesting that individuals with ASD have

difficulties making mental state inferences (Happé, 1994; Jolliffe & Baron-Cohen, 1999). Interestingly, Kaland et al. also include reaction time data for half the vignettes administered and find that children with ASD take longer than comparison children to make both physical and mental state inferences, with the difference being more pronounced on mental state inferences. Unfortunately they do not report whether these differences remain significant if IQ is entered as a covariate. In this study prompt questions were asked if participants gave an incorrect response (e.g., asking additional clarification questions or instructing the participant to re-read the final paragraph). Individuals with ASD required significantly more prompts than comparison adults overall, and required more prompts on mental state inferences compared to physical state inferences. These findings suggest that making inferences, and particularly mental state inferences, is more effortful for children with ASD compared to typically developing children.

Although Kaland et al. (2002) report administering the original Strange Stories and finding high correlations between the two measures, these results are unfortunately not reported. The same research group present data using the original Strange Stories Test and find that children and adolescents with ASD perform more poorly on mentalising inferences than controls, whilst no differences are seen on physical inferences (Kaland et al., 2005). Brent et al. (2004) compare a group of children with ASD aged 6-12 years with a typically developing control group on the Strange Stories and find that children with ASD perform more poorly on the mentalising stories but not on the physical inference stories. Interestingly, they also find that performance on mentalising and physical inference stories is correlated in both ASD and typically developing children. This implies the stories contain shared demands

not specific to making physical or mental inferences, and therefore research in this area needs to address generic information processing contributions to successful task performance, such as working memory and executive functioning (Brent et al., 2004).

3.3 Reliability / validity issues.

There are a number of issues with the use of the Strange Stories Test as a measure of mentalising ability in high-functioning individuals with ASD. Participants are typically allowed unlimited time to formulate responses, with the vignette left in view for reference in order to minimise the effects of memory on performance. However, this clearly allows for much greater time to reason through the situation than would be available in everyday social interactions. As Hermelin and O'Connor (1985) suggest, this may encourage individuals with ASD to give some form of mental state answer through cognitive reasoning processes. The Strange Stories therefore may not capture the unique difficulties faced by individuals with ASD in everyday life. Several studies comment on the idiosyncratic response style of participants with ASD (Kaland et al., 2005) but do not attempt to analyse this in any more detail. Similarly, giving prompts when incorrect responses are given (e.g., Kaland et al., 2002) gives increased salience to relevant information and so may minimise task demands. Drawing attention to relevant information in false belief tasks facilitates performance in both typically developing children (see Roth & Leslie, 1998) and those with ASD (Kerr & Durkin, 2004).

Although Happé (1994) reports reasonable attempts at validating the task, there remain a number of issues. No study validates the assertion that each vignette has only one reasonably appropriate explanation for the non-literal utterance. Additionally, if this statement were assumed to be true, there seems little justification for allowing appropriate physical explanations for mental state inferences to be scored as correct (see Happé, 1994 for scoring criteria). It seems plausible that individuals who make physical state explanations of situations and interaction when a mental state explanation is more parsimonious would appear odd in everyday life. Equally, responses can be scored as incorrect due to factual or inferential errors, and yet the implications of these error types might be very different. Finally, there has been no substantial attempt to explore the typical developmental trajectory on this task, and so it is not clear how to interpret findings suggesting that some vignettes are more difficult than others. For example, humour develops through childhood and adolescence (e.g., Reddy, Williams, & Vaughan, 2002). Without such information it is difficult to justify why different subsets of vignettes are included in different studies- this means that true replication is not achieved. Addressing these methodological and conceptual issues in further research would lend greater support to the assertion that individuals with ASD show mentalising deficits when interpreting non-literal utterances.

4.0 Cartoon tasks.

There is limited evidence for mentalising deficits in ASD from cartoon / humour tasks. Participants are presented with cartoons requiring understanding of false belief to appreciate the humour. However, only two studies have explored how individuals with ASD perform on the Cartoon Task (Happé, Winner, & Brownell, 1998).

Brent et al. (2004) find no differences between children with ASD and typically developing children on this task, and furthermore find that performance on the cartoons does not correlate with performance on the Strange Stories. They suggest that the Cartoons Task may not be a useful tool for measuring ToM in children, as they may not have acquired the conventions of humour. In contrast, Emerich, Creaghead, Grether, Murray, and Grasha (2003) find that adolescents with autism have significantly more difficulty than typically developing adolescents in comprehending cartoons and jokes. However, the cartoons used in Emerich et al. were not designed to elicit mentalising responses, so it is unclear how to interpret this finding. Gallagher et al. (2000) use the Cartoons Task to explore the neural correlates of ToM using functional magnetic resonance imaging (fMRI). They find that there is considerable overlap in brain regions activated by story and cartoon tasks. Gallagher et al. suggest that in viewing cartoons people (with or without ASD) try to work out what the artist intended the cartoon to mean, engaging mentalising activity. This may also help to explain why the Cartoons Task fails to demonstrate mentalising deficits in ASD. It is clear that far more research is needed to explore the typical developmental trajectory of humour and to explore how adults with ASD perform on the Cartoons Test.

5.0 Eyes tasks.

Adults and children with ASD show deficits relative to typically developing individuals on the Eyes Test. Participants are shown photographs of the eye region of faces and asked to choose which mental state term best describes what the person is thinking or feeling (Baron-Cohen, Jolliffe et al., 1997). This task requires theory of mind since the participant has to understand mental state terms and match them to aspects of facial expression. To control for difficulties with basic emotion recognition skills and face perception, participants are asked to complete a basic emotion recognition task (recognising happy, sad, angry, disgusted, fearful, and surprised emotions from faces- Ekman & Friesen, 1971) and to judge gender from the eye region alone.

5.1 Research with adults.

Adults with ASD perform more poorly than comparison adults on the mentalising task but not on either control task (Baron-Cohen, Jolliffe et al., 1997; Kleinman et al., 2001). These deficits remain even when task difficulty is increased and groups are matched on verbal IQ (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001). A compelling case for the sensitivity of this task in detecting mentalising deficits is made by Baron-Cohen, Wheelwright, Stone, and Rutherford (1999), who present data from three extremely high-functioning individuals with ASD (IQ scores 130-143) and compare these individuals to an age-matched control group. The individuals with AS perform > 1 *SD* below the mean of the control group on the Eyes Test, whilst performing > 1 *SD* above the mean of the control group on a physical

reasoning task. This study is particularly convincing in that it demonstrates the presence of deficits even in the highest functioning individuals. Furthermore, by including the Tower of Hanoi task, a measure of planning and problem-solving, they demonstrate that deficits in executive functioning are unlikely to account for the mentalising deficits observed. Although a few studies report contradictory findings (Roeyers et al., 2001; Ponnet et al., 2004), these studies are also the only studies to use slightly different stimuli and administration protocols. Ponnet et al. (2004) find no differences between adults with ASD and controls, and whilst their sample size is relatively small (n = 19) the groups are matched in terms of age and IQ. Their task asks participants to choose the appropriate mental state word to match photographs of the eye region from three options and is therefore less robust psychometrically than the Baron-Cohen et al. (2001) task, which includes four response options.

5.2 Research with children.

The Eyes Test has also been used to demonstrate theory of mind deficits in children and adolescents with ASD. Introducing the Children's Version of the Eyes Test, Baron-Cohen et al. (2001) find that children with ASD perform more poorly than typically developing children aged 8-10 and 10-12 years, but do not differ from typically developing children aged 6-8 years. By including a challenging physical inference task, Baron-Cohen et al. show that mentalising deficits in the ASD group cannot be due to global reasoning deficits since the ASD group perform better than typically developing children on this control task. However, they do not adequately control the effects of IQ on performance, as IQ is not directly measured in the typically developing participants. Although limited by the very small ASD sample (n

= 15) and failure to control IQ, this study does establish the typical developmental trajectory on this task using a substantial control sample (n = 53).

Brent et al. (2004) replicate these findings, comparing a group of children with ASD aged 6-12 years with a group of typically developing children. Children with ASD perform less well than typically developing children on the Eyes Test, and whilst performance does not correlate with IQ, it does correlate with language age equivalents. Interestingly, they find that whilst performance on the Eyes Test correlates with performance on the Strange Stories in typically developing children, this correlation is not seen in children with ASD. They raise the possibility that the social communication system is more fractionated in children with ASD compared to typically developing children. Whilst this is an appealing hypothesis that might help to explain the variability in presentation of individuals with ASD, it seems a little premature given that this study does not include measures of executive functioning. Within the age range tested, executive functions are still developing in line with the development and myelination of the frontal lobes (see Paus, 2005) and so it is crucial to examine how these abilities affect performance. It is plausible that children with relatively better executive functioning would demonstrate more integrated (and hence more highly correlated) social communication abilities due to their greater ability to integrate knowledge and skills across contexts (tasks) compared to children with relatively poorer executive functioning.

5.3 Reliability / validity issues.

Although it is unfortunate that the majority of studies using the Eyes Test stem from the same research group, this has clearly contributed to greater emphasis on measure development promoting more reliable research findings (see Baron-Cohen et al., 2001). Construct validity is established by correlating performance on the Eyes Test with severity of autistic spectrum traits (using the Autism Spectrum Quotient- Baron-Cohen, Wheelwright, Skinner, Martin & Clubley, 2001). Further support for the construct validity of the measure is found by Kleinman et al. (2001), who correlate performance on the Eyes Test with a similarly structured Voice Test (see later in this review) and find that individuals with ASD struggle on both tasks. In contrast to the Strange Stories, the Eyes Test is more readily amenable to producing continuous measures of performance, such as reaction time or error analyses. This makes it a more sensitive measure for use amongst very high-functioning individuals who may be able to use their significant intellectual resources to reason through mentalising tasks, albeit in an idiosyncratic or laborious manner. S. Baron-Cohen (personal communication, October 12, 2005) reports that his research group do not have any reaction time data from their computerised version of the Eyes Test ready for publication; it is to be hoped that such data become available shortly.

However, the Eyes Test has less ecological validity than other advanced theory of mind tasks. In everyday situations a person has more information available to them to judge mental states. Although other aspects of facial expression provide less information about mental states than the eyes (e.g., mouth position- Baron-Cohen, Wheelwright, & Jolliffe, 1997), there is much information gleaned from context and

contingent events surrounding the facial expression. Integrating information from such different contexts is likely to be dependent on sufficiently advanced executive functioning- this may help to explain the failure of the Eyes Test to correlate with other measures of mentalising in children (Brent et al., 2004). Additionally, it is likely that the simplified stimuli of the Eyes Test mean that performance on this test, as with other static measures of mentalising, may not correlate highly with symptom severity. Although Baron-Cohen et al. (2001) report a significant inverse correlation between performance on the Eyes Test and the Autism Spectrum Quotient, this is a relatively new measure of symptom severity. Stronger evidence would be generated by using more psychometrically established measures (e.g., Autism Diagnostic Interview- Lord, Rutter, & Le Couteur, 1994).

6.0 Voice tasks.

6.1 Research with adults.

Two studies provide preliminary evidence for deficits in mentalising from voice stimuli in adults with ASD (Kleinman et al., 2001; Rutherford, Baron-Cohen, & Wheelwright, 2002). Kleinman et al. (2001) present the phrase 'The quick brown fox jumped over the lazy dog' spoken with varying emotional expressions, and ask participants to choose between two adjectives to describe the mental state of the speaker. They find that whilst comparison participants approach ceiling performance, participants with ASD do not and show far greater within group variability. By also administering the Eyes Test, they find that attributing mental states is easier when presented with voices than with static pictures of the eyes. A similar measure is presented by Rutherford et al. (2002). The 'Reading the Mind in the Voice Test' presents participants with segments of dialogue and a forced choice between the target mental state and its semantic opposite. Rutherford et al. find that adults with ASD perform significantly more poorly than age and IQ matched comparison participants, and furthermore that performance on the Voices Test does not correlate with verbal IQ.

6.2 Reliability / validity issues.

Both these measures require psychometric improvements, as Rutherford et al. acknowledge. Offering just two forced-choice options means that the likelihood of performing well on the task simply by chance is far too high. Increasing the response

options and the number of items would significantly increase the robustness of the measure and thus make it more useful in examining subtle deficits. Similarly, using the target word and its semantic opposite is likely to be too easy for adult participants- as demonstrated by ceiling performance by comparison participants in the Kleinman et al. study. These limitations make it difficult to interpret the finding that attributing mental states is easier from voice than from eye information. Further studies are required to replicate these findings with a more psychometrically robust version of the task and to explore how typically developing children and children with ASD perform.

7.0 Animations.

Analysing the spontaneous narratives of individuals with ASD exposes subtle ongoing deficits in mentalising abilities, manifest as giving inappropriate mentalising responses (Abell et al., 2000; Klin, 2000).

7.1 Research with adults.

Klin (2000) uses the Heider and Simmel (1944) animations to explore differences in social attribution between a group of adults with ASD and comparison adults matched on age and verbal IQ. These animations feature geometric shapes moving in both random and contingent patterns around a rectangle. Marked differences are seen in the ability to generate pertinent explanations of events in the movie. Adults with ASD use significantly fewer appropriate mental state terms than comparisons, with on average one-third of attributions made by the clinical groups being unrelated to the movie. Interestingly, when participants were instructed to view the shapes as people, performance improved slightly but non-significantly in the ASD group, but not in the comparison group. Furthermore, performance did not correlate significantly with verbal IQ, age or language competence (Klin, 2000).

7.2 Research with children.

Bowler and Thommen (2000) use the Heider and Simmel (1944) stimuli to explore mentalising abilities in children with autism aged 7-10 years. They find that even typically developing children perform at floor level when asked to describe the

events, and so it does not appear to be a useful stimulus for exploring mentalising in children.

In contrast, Abell et al. (2000) adapt the Heider and Simmel movie and use it to demonstrate deficits in mentalising in children with ASD. They present participants with animations involving a red triangle and a blue triangle moving around a rectangle. Participants view the animation and are then asked to describe what happened. They compare a group of children with autism to a verbal mental age (VMA) and age matched group of children with learning disabilities, a group of typically developing children and a group of adult comparisons. Although no differences are seen between groups in the frequency of mentalising responses, children with autism give significantly more inappropriate mentalising responses than any other group (36%, versus just 3% in the children with learning disabilities, 7% in typically developing children and 2% in adult controls). This supports evidence from other advanced tasks suggesting that it is not the use of mental state terms that distinguishes individuals with ASD from typically developing individuals, but rather the ability to use these terms appropriately when required.

7.3 Reliability / validity issues.

The novel non-verbal stimuli of these narrative tasks, coupled with continuous measures of performance, reveal deficits in mentalising more readily than static, dichotomous measures (see Klin, 2000). Despite the relatively few studies available using animations, reasonable attempts have been made to establish reliability and validity. The Abell et al. (2000) animations were piloted with typically developing

adults, showing that adults gave correct descriptions for 89% of mentalising animations, 93% of goal-directed animations and 64% of random animations. Although this is based on a very small sample, the fact that different animations elicit different types of description supports the face validity of this measure. Furthermore, criterion validity is addressed using performance on false belief tasks, as even those participants who passed standard false belief tasks performed poorly on the theory of mind animations (Abell et al, 2000). Unfortunately, performance on the animations has not yet been examined in relation to social competence.

The ability to coherently describe the events in each animation is dependent on a number of factors, crucially including executive functions such as generativity, working memory, the ability to integrate information from a variety of sources and so on (see Abell et al, 2000 for a different view). No study has yet examined the relationship between performance on the animations and executive functioning. Although it is notable that animations requiring mentalising responses are more challenging for individuals with ASD than those requiring physical / goal-directed responses (Abell et al., 2000), it is not clear from the studies conducted whether this reflects increased executive or memory demands. Describing events as the animations are shown (rather than at the end) would decrease memory demands and potentially reveal even greater difficulties on the theory of mind animations, as individuals with ASD would have reduced opportunity to scaffold their mentalising abilities with verbally-mediated reasoning strategies (see Klin, 2000). If executive dysfunction does account for difficulties experienced by individuals with ASD, structuring responses more highly (as in Klin, 2000) would be expected to yield improved performance compared to unstructured response formats (as in Abell et al.,

2000). This is an empirical question that warrants testing. Furthermore, it is plausible that performance by individuals with ASD may be facilitated by giving 'character roles' to the geometric shapes (as in Abell et al., 2000), and it remains to be demonstrated what effect removing this cue would have on performance. This may facilitate performance by highlighting the presence of another mind- suggesting that individuals with ASD possess the concept of others' mental states, but fail to apply this concept spontaneously and / or apply it in an idiosyncratic manner.

8.0 Naturalistic measures.

Naturalistic measures of mentalising ability have provided preliminary evidence for mentalising deficits in ASD.

8.1 Research with adults.

Heavey, Phillips, Baron-Cohen, and Rutter (2000) argue that naturalistic assessments increase the sensitivity of theory of mind tasks, since they tap into 'on-line' processing skills. They explore how individuals with ASD infer the thoughts and feelings of actors seen in short clips, comparing this group with an age and IQ matched comparison group. Adults with ASD make more errors when asked to report characters' thoughts, feelings and intentions than comparisons, suggesting deficits in theory of mind abilities. Furthermore, this could not be explained in terms of language ability. However, as Heavey et al. acknowledge, performance on such measures cannot be considered a pure test of mentalising ability, since such tasks are clearly dependent on other skills such as executive functioning. It is interesting to note that performance on this task failed to correlate significantly with performance on the Strange Stories, a far more established measure of mentalising ability that places fewer demands in terms of integrating information and allocating attentional resources. Furthermore, it is disappointing that this study does not include measures of everyday social competence, given that the reason given for developing these tasks was to more closely approximate everyday difficulties within a controlled setting (Heavey et al., 2000).

A similar approach is presented by Roeyers et al. (2001). They compare a group of adults with ASD to a group of age, gender and education matched comparisons on the 'Empathic Accuracy Task'. This task involves watching short videotapes of two strangers interacting, and answering questions about what each individual was thinking or feeling at particular points during the clip. Since the videotapes are genuine interactions, responses can be compared to the thoughts and feelings reported by the individuals immediately after the clip was recorded and indices of accuracy generated. Roeyers et al. (2001) find that individuals with ASD are poorer than comparisons in inferring unexpressed thoughts and feelings. This finding is replicated by Ponnet et al. (2004), comparing a group of adults with ASD and typically developing adults. Furthermore, Ponnet et al. find that individuals with ASD are particularly poor at inferring the thoughts and feelings of others when these involve past memories (i.e., 'This reminds me of...'), and when these involve other persons (i.e, 'He thinks I'm...'). In contrast, they are relatively better at inferring the thoughts and feelings of others when these relate to the self (i.e, 'I'm bored'). They suggest that these differences may be explained in terms of individuals with ASD using different behavioural cues to infer the mental states of others. Individuals with ASD have difficulty recognising emotions (e.g., Baron-Cohen et al., 2001; Howard et al., 2000). Similar analyses in terms of sensitivity to particular non-verbal gestures, patterns of eye gaze and so on would help to make more sense of the findings on the Empathic Accuracy Task. Furthermore, such detailed analyses would also yield greater insight into the everyday difficulties experienced by individuals with ASD and might help develop more useful social skills training than is currently available.

8.2 Reliability / validity issues.

It is unfortunate that these studies do not include measures of social competence to explore how well naturalistic assessments capture everyday difficulties- it is assumed that naturalistic measures will correlate better with adaptive functioning, but this is not tested empirically. Performance on these tasks does not simply reflect mentalising abilities. It is self-evident that they place demands on executive functioning, similar to most other advanced mind-reading tasks currently available. However, these studies do not control executive functioning and it is therefore difficult to be sure to what extent difficulties reflect mentalising deficits. In addition, the videotapes themselves require far greater validation with typically developing individuals than has yet been undertaken. As such, these studies should only be viewed as preliminary evidence supporting theory of mind deficits in ASD. Larger sample sizes will be required to reliably examine subtle differences between groups, such as the ability to infer thoughts about memories noted by Ponnet et al. (2004).

9.0 Conclusions.

Advanced theory of mind tasks demonstrate mentalising deficits in individuals with ASD, both children and adults. Although a few studies fail to detect such deficits, they are in the clear minority. Assuming that theory of mind deficits in high-functioning individuals are likely to be subtle, sample sizes across the literature are too small to enable sufficient statistical power to detect such effects, and this may help to explain contradictory findings. As methodologies become more complex, introducing continuous measures of performance such as reaction time and narrative abilities, it is becoming increasingly difficult to argue that deficits in mentalising reflect more fundamental differences in age, IQ or language abilities. Studies have found significant differences between individuals with ASD and comparisons even when age, IQ and language are carefully controlled in statistical analyses. Significant correlations between different tasks (e.g., Brent et al., 2004; Kleinman et al., 2001), involving different presentation and response formats, provide strong evidence for an underlying pervasive deficit in theory of mind, since additional (non-mentalising) factors vary between tasks.

9.1 Methodological limitations.

This is not to say, however, that it is clear what skills or cognitive domains are measured by each task. Across the literature as a whole, there is a failure to adequately control intellectual ability. Many studies only measure IQ in their clinical groups, arguing that IQ can be assumed to be within the normal range in their control participants (e.g., Roeyers et al, 2001). This is a far from adequate approach when

examining deficits that, if present, are likely to be subtle. Many tasks involve pass / fail analyses or other simple dichotomous measures that are widely acknowledged to be unsuitable for examining subtle deficits. Greater use of continuous performance measures, such as reaction time, will be required if our understanding of ToM in ASD is to develop. In addition, very few studies attempt to control for executive functioning, despite repeated statements that these tasks place considerable demands on executive skills (e.g., Brent et al., 2004; Ponnet et al., 2004). The case series reported by Baron-Cohen et al. (1999) is a notable exception, and as such provides some of the most compelling evidence for mentalising deficits in ASD. The approach adopted in that paper will be required in order to progress our understanding of how executive functioning, language, intellectual abilities and ToM interact. However, it is also clear that controlling executive functioning is far from easy. Studies of individuals with brain injuries have repeatedly demonstrated how difficult it is to detect executive dysfunction using standardised measures (Shallice & Burgess, 1991) even when difficulties are readily apparent in everyday life. Additionally, executive functions are not clearly delineated or defined- there is considerable overlap between terms used (for example, working memory and divided attention) and considerable shared demands between tasks.

9.2 Developmental trajectories.

There is also an overwhelming lack of understanding about the typical developmental trajectory on advanced theory of mind tasks. For example, it is far from clear that performance on each vignette on the Strange Stories would improve equally with age. This makes it difficult to interpret evidence of deficits on particular

vignettes. It is inadequate to assume that performance improves in a linear fashion through childhood and adolescence. For example, recognition of anger decreases during adolescence (Lawrence, Bernstein et al., 2006), and there is some evidence to suggest improved mentalising abilities in older adults compared to younger adults (Happé, Winner & Brownell, 1998). Recent studies of typically developing individuals suggest that mentalising abilities may plateau between the ages of 10 and 13 years, associated with the onset of puberty (Lawrence, Campbell, Bernstein, Pearson, & Skuse, 2006). Most studies have not explored whether there are sex differences in performance on these tasks. Baron-Cohen, Jolliffe et al. (1997) find evidence for a female advantage on the Eyes Test in typically developing individuals, but this finding is not replicated in later studies (Baron-Cohen et al., 2001). Lawrence, Bernstein et al. (2006) find that girls reach ceiling performance recognising happy faces at 6 years, whereas boys do not reach ceiling until 9 years of age. They note that where gender differences are present, they decrease with age. If present, sex differences are likely to be small and thus would require far larger sample sizes than typically employed in this literature.

9.3 Relationship to adaptive functioning.

Furthermore, the literature fails to relate performance on advanced ToM tasks to everyday social competence. Even naturalistic assessments, such as the Empathic Accuracy Task and Awkward Moments Test, have not yet been correlated with measures of adaptive functioning or measures of autistic traits. Preliminary attempts to relate performance on the Eyes Test to a measure of autistic symptom severity (the Autism Spectrum Quotient) were reported by Baron-Cohen et al. (2001), but this is a

relatively new measure whose psychometric properties and scoring criteria warrant further validation. Given that there is ongoing controversy regarding the validity of autistic spectrum diagnoses, and the extent to which diagnoses can be reliably distinguished, it would seem more useful to relate performance to autistic traits rather than to diagnoses. One relatively new measure that would facilitate this approach is the Developmental, Dimensional and Diagnostic Interview (3di- Skuse et al., 2004) a computerised psychiatric interview generating dimensional information for key symptom clusters (social expressiveness, reciprocal social interaction, language, use of gesture and other non-verbal communication, and stereotypy and repetitive behaviours). Adopting a similar, symptom-based approach to research has proved fruitful in other areas of research involving long-term social disability, such as psychosis.

9.4 Theoretical implications.

The presence of mentalising deficits in even the highest functioning individuals with ASD has a number of theoretical implications. Firstly, it confirms the importance of adopting a lifespan approach to the development of ToM, rather than simply focusing on the preschool years. It is clear that mentalising ability develops beyond the level required to pass false belief tasks (e.g., Happé et al., 1998) and these developments may be non-linear in nature (Lawrence, Campbell et al., 2006). Such non-linear trends in development will require further investigation, but clearly highlight the importance of considering stage of development (in addition to age and intellectual ability) when examining mentalising.

Secondly, it supports the validity of the term 'autistic spectrum disorder' to refer to individuals with autism, Asperger Syndrome and PDD-NOS. Individuals with these different diagnoses may present very differently, but share a core deficit in ToM. In recent years there has been much concern regarding 'over-diagnosis' of autistic spectrum disorders. If mentalising can be conceptualised as a continuum, the emphasis shifts from identifying a reliable and valid diagnosis to identifying the point at which intervention is required. This is not to disregard the importance of diagnosis- getting a diagnosis is often the only way to access appropriate educational, occupational, financial and social support. However, directing research towards finding appropriate and effective interventions for the 'symptoms' of ASD is likely to be of even greater benefit.

The failure to detect reliable and replicable sex differences in mentalising has implications for theories attempting to explain autism as an extreme form of the male brain (Baron-Cohen, 1999). As noted, if present, sex differences are likely to be very small, and it is unclear how important a role they may play. Autism is known to be far more prevalent in males than females, and there is consensus amongst clinicians that females with ASD may present very differently to their male counterparts. As Lawrence, Campbell et al. (2006) highlight, early differences in the emergence of mentalising abilities may become too small to detect in later childhood and adulthood. They outline two possibilities: boys are delayed in their acquisition of ToM skills, or they recruit different neural / information-processing strategies to reach the same goal. Functional imaging studies are clearly needed to explore this question, and address whether the processing strategies present in autism are indeed

an extreme version of those present in typically developing males (Baron-Cohen, 1999).

9.5 Directions for future research.

In order to progress our understanding of theory of mind abilities in ASD, a number of components must be built into any future research. Groups must be matched on both age and verbal IQ- given the subtlety of the deficits, it is essential that IQ is directly measured in both clinical and comparison groups. Including measures of autistic spectrum traits (e.g., 3di- Skuse et al., 2004) as well as measures of social competence and comprehensive assessments of executive functioning (e.g., The Test of Everyday Attention- Manly, Robertson, Anderson, & Nimmo-Smith, 1998) will be crucial. Although this means increased length of assessment, it also means that researchers can begin to examine the complex inter-relationships between these factors and mentalising abilities. This aim is best served by using ToM measures that yield continuous data (e.g., reaction time) and whose developmental trajectory is known (e.g., Eyes Test; Abell et al., 2000 animations).

Finally, it would also be helpful to draw greater attention to what high-functioning individuals with ASD are able to tell us about their experience of mentalising. Detailed case assessments of individuals, whilst sacrificing generalisability, allow for some fascinating insights into the subjective experiences of individuals with ASD. As one of the participants in Baron-Cohen et al. (1999) comments:

> My mind is like a digital computer: it is either on or off. Information is either true or false. Other people's minds are like analogue computers, with smoothly varying voltages and manifesting fuzzy logic.

Such cogent descriptions are a clear reminder of the need for studies in this area to attend to the subjective experience of individuals, as well as attempting to categorise and explain their difficulties.

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Empirical Paper

Neuropsychological functioning and social communication in children excluded from primary school

1.0 Abstract.

A sub-group of children excluded from school may have unidentified autistic spectrum disorders (ASD; Gilmour, Hill, Place, & Skuse, 2004). The current study tested this hypothesis by comparing children excluded from primary school to their peers on a range of neuropsychological and social cognitive measures sensitive to deficits in ASD. Children were also evaluated against ICD-10 criteria for ASD, conduct disorder and hyperkinesis. Over a third of excluded children met criteria for ASD in addition to conduct disorder and / or hyperkinesis. Children excluded from school were more likely than comparisons to show deficits on a range of measures, including pragmatic language, theory of mind and attentional switching. These deficits could not be accounted for by differences in IQ or socio-economic status. It is argued that there is strong evidence that a sub-group of children with conduct problems also have unrecognised ASD. Furthermore, there is a need for greater collaboration between clinical psychology and educational services to meet the needs of this group.

2.0 Introduction.

2.1 Exclusion.

The rate of permanent exclusion from school has risen over the past decade with 0.13% of children permanently excluded from schools in 2003 / 2004, 13% of which were from primary school (DfES, 2005). Such children obtain on average only 10% as much education as their peers (Parsons, 1996), with each excluded child costing public services over £30,000 (Bagley & Pritchard, 1998). Boys are four times more likely to be permanently excluded than girls, with Afro-Caribbean pupils twice as likely to be excluded as White pupils, whilst children with Special Educational Needs (SEN) are more than seven times more likely to be excluded than children without SEN (DfES, 2005). The relationship between early learning difficulties, exclusion from school and crime has been described as a 'downward spiral', in which children who lack basic literacy and numeracy skills develop low self-esteem and become disillusioned with education, eventually leaving school early and / or truanting (Basic Skills Agency, 1997). Being excluded from school is associated with a significantly higher likelihood of becoming a teenage parent, being unemployed or homeless later in life, or serving a sentence in prison (Social Exclusion Unit, 1998).

2.1.1 Persistent disruptive behaviour.

Persistent disruptive behaviour is the most common reason for permanent exclusion, accounting for 30% of all exclusions, with 20% attributed to verbal abuse towards adults and a further 20% to assault on other pupils (DfES, 2005). Research published

in the Social Exclusion Report (1998) suggests that teachers are uncertain of the distinction between poor behaviour and behaviour reflecting underlying difficulties requiring specialist management. With government and media attention directed at exclusion, there is increasing impetus to understand the factors underlying disruptive behaviour and hence introduce more appropriate supports and interventions (Ripley & Yuill, 2005).

2.1.2 Neurodevelopmental influences on disruptive behaviour.

There is an extensive literature describing pervasive neuro-developmental factors associated with disruptive behaviour in childhood. Children with disruptive behaviour are known to experience a range of neurocognitive deficits, across both verbal and visual domains, and hyperactivity (Moffitt, Caspi, Rutter, & Silva, 2001). Furthermore, there is evidence that the neurocognitive profile of children and young people with disruptive behaviour moderates the effectiveness of interventions (Fishbein et al., 2006).

High levels of unrecognised language impairment have been demonstrated in children with behavioural difficulties (e.g., Cohen, Barwick, Horodsky, Vallance, & Im, 1998). Many boys excluded from school have significantly poorer expressive language abilities than age-matched comparison boys; however, a significant proportion of children with disruptive behaviour problems do not show such structural language difficulties (Ripley & Yuill, 2005). There is preliminary evidence that a sub-group of children with disruptive behaviour show deficits in pragmatic language skills but not in more overt, structural language skills.

Pragmatics may be defined as the appropriate use and interpretation of language in relation to context (Bishop, 1997). Gilmour, Hill, Place, and Skuse (2004) explored pragmatic language skills in children diagnosed with conduct disorder (CD) and autistic spectrum disorders (ASD), a community sample of school-excluded children, and a group of typically developing children. Using the Children's Communication Checklist (Bishop, 1998), they showed that a significant proportion of children diagnosed with CD showed deficits in pragmatic language skills as severe as children diagnosed with ASD. Furthermore, over two-thirds of the school-excluded children showed deficits in pragmatic language skills comparable to the clinically defined ASD sample. Gilmour et al. argue that this demonstrates significant and unrecognised social communication deficits in a sub-group of children presenting with conduct problems. They suggest that a proportion of children with behavioural problems who are at risk of exclusion from school may have underlying unidentified ASD.

2.2 ASD and exclusion.

Individuals with ASD show deficits in social interaction and communication, with restricted interests and stereotyped behaviours (ICD-10 criteria; World Health Organisation, 1996). They often experience difficulties with social relationships and fail to understand subtle aspects of verbal and non-verbal communication such as sarcasm or gestures. It is widely thought that many difficulties experienced by individuals with ASD reflect deficits in theory of mind, the ability to attribute mental states to oneself and others in order to predict and explain behaviour (Baron-Cohen, Leslie, & Frith, 1985). Children with social communication deficits may fail to

appreciate social hierarchies, treating all people the same, and hence appearing rude to teachers (Gilmour et al., 2004). They may fail to appreciate the subtleties of language, such as metaphor and sarcasm, and so become bewildered when they are disciplined for following instructions literally. Since many children with ASD have average or above average IQ, they may be able to use their intellectual capacities to mask their social communication difficulties. Furthermore, children whose behaviour and social skills lag behind their intellectual potential are at risk of being labelled 'lazy' or 'deliberately difficult'. Barnard, Prior, and Potter (2000) warn that one in five children with autism are excluded from school, a rate almost twenty times the national average. It is therefore plausible that exclusions are occurring for children whose difficulties accessing the curriculum and regulating their behaviour could be better understood, and hence better managed, in the context of ASD.

2.3 Neurodevelopmental deficits in children excluded from school: ASD, CD or hyperactivity?

However, there are other developmental disorders in which disruptive behaviour is common, crucially Attention Deficit Hyperactivity Disorder (ADHD; Kim & Kaiser, 2000) and CD (Gilmour et al., 2004). To demonstrate previously unidentified ASD in a sub-group of children excluded from school, it is necessary to demonstrate that these children present with difficulties that discriminate ASD from other developmental disorders associated with disruptive behaviour. However, there is increasing recognition that the boundaries between developmental disorders, and between developmental disorders and psychiatric disorders, are less clear-cut than previously thought (Bishop & Baird, 2001; Gilmour et al., 2004). It is likely that

many disorders will share underlying neurocognitive deficits but manifest very differently, possibly as a result of interactions with environmental factors (Taylor & Warner Rogers, 2005).

This study therefore aimed to extend the findings of Gilmour et al. (2004) to explore the differences and similarities between children at risk of exclusion from school (henceforth 'excluded') and typically developing children, focusing on neurocognitive abilities known to be impaired in children with ASD. Since behavioural problems often increase in severity with age (e.g., Botting & Conti-Ramsden, 2000) this study focused on children attending primary schools. At this age, it is less likely that behavioural difficulties underlie neuropsychological deficits, as might be hypothesised in older children. Furthermore, if underlying neurocognitive deficits could be identified at an early age, appropriate supports could be put in place to improve the educational experience of such children and reduce the risk of academic underachievement in later years.

2.3.1 Diagnostic classification.

There is very little evidence documenting the incidence of developmental and psychiatric diagnoses in children excluded from school. However, it is known that children with ASD are significantly more likely to be excluded than peers (Barnard et al., 2000) and that children with unidentified special needs are more likely to be excluded than those whose needs have been identified (DfES, 2005). Research has shown that a significant sub-group of excluded children present with deficits similar in nature and severity to those seen in ASD (Gilmour et al., 2004). It was predicted

that children excluded from school would be significantly more likely to meet criteria for ASD compared to peers.

2.3.2 Intellectual functioning.

There is a substantial literature exploring the intellectual profile of children with ASD. Higher-functioning individuals with ASD are usually characterised by relatively better verbal abilities in comparison to non-verbal abilities (e.g., Klin, Volkmar, Sparrow, Cicchetti, & Rourke, 1995; Miller & Ozonoff, 2000). In contrast, literature on children with emotional and behavioural difficulties (EBD) suggests that these children are more likely to show the reverse pattern; that is, non-verbal better than verbal abilities (Plomin, Price, Eley, Dale, & Stevenson, 2002). It was predicted that children excluded from school who met criteria for ASD (henceforth 'excluded + ASD') would show better verbal abilities compared to non-verbal abilities.

2.3.3 Attentional / executive functioning.

Executive functioning is an umbrella term for high-level problem-solving behaviours usually thought to be under frontal lobe control (Duncan, 1986). It is a poorly specified term, but is thought to include processes such as focusing, sustaining and switching attention, forming abstract concepts, self-monitoring, and response inhibition. There is inconsistent evidence for executive dysfunction in higher-functioning individuals with ASD, with the most consistent finding being subtle deficits in attentional control / set-shifting (Liss et al., 2001). This contrasts with other developmental disorders in which executive dysfunction is pronounced. For

example, children with ADHD show deficits in response inhibition (Goldberg et al., 2005) and sustained attention (Manly, Robertson, Anderson, & Nimmo-Smith, 1998). Children with CD also show deficits in inhibiting responses, although this may simply reflect comorbidity with ADHD (Hill, 2002). Executive dysfunction is often most apparent when the individual is faced with a novel, challenging task that requires rapid integration of information, such as tests of theory of mind. It was therefore considered crucial to include measures of attention and executive functioning so that the influence of these measures on social cognition / communication could be explored. It was not expected that the excluded group would show marked attentional / executive dysfunction. However, if deficits were present, it was predicted that the excluded group would be more likely to present with difficulties in attentional control / set-shifting but not with difficulties in response inhibition or sustained attention (consistent with an ASD profile), with these deficits most apparent in the excluded + ASD sub-group.

2.3.4 Pragmatic language.

Children with ASD show significantly poorer pragmatic language skills than those with ADHD (Guerts et al., 2004), CD or typically developing children (Gilmour et al., 2004). It was hypothesised that excluded children would present with significantly poorer pragmatic language skills than comparison children, consistent with previous research (Gilmour et al., 2004). It was predicted that a significant proportion of excluded children would have pragmatic difficulties similar in severity to those documented in ASD (e.g., Bishop & Baird, 2001; Geurts et al., 2004; Gilmour et al., 2004). It was expected that the excluded + ASD group would show

the poorest pragmatic language skills followed by excluded children not meeting criteria for ASD, with typically developing children showing the best pragmatic language skills.

2.3.5 Social cognition.

A high percentage of individuals with ASD have difficulty recognising emotions from facial expression (Buitelaar, van der Wees, Swaab-Barneveld, & van der Gaag, 1999; Campbell et al., 2006; Hobson, 1986) and from the eyes (e.g., Baron-Cohen, Wheelwright, Spong, Scahill, & Lawson, 2001). Specific difficulties recognising fear have been demonstrated in individuals with social communication deficits similar to autism (Lawrence, Kuntsi, Coleman, Campbell, & Skuse, 2003), and in individuals with ASD (Howard et al., 2000).

There is considerable debate regarding emotion recognition abilities in conduct disorder. Children with psychopathic traits present with specific deficits in recognising and responding to facial emotions of sadness and fear (Stevens, Charman, & Blair, 2001), however, children with conduct disorder without such traits do not show deficits in emotion recognition (Buitelaar et al., 1999). Inconsistency in the literature is likely to partly reflect difficulties with the reliability and validity of conduct disorder as a diagnosis (e.g., Lewis, Lewis, Unger, & Goldman, 1984), a complex issue that will not be discussed at length here. It is possible that emotion recognition deficits in conduct disorder can be accounted for by the presence of psychopathic traits. In contrast, children with ADHD tend to make random errors consistent with poor attentional skills, otherwise performing as well as

typically developing children (Buitelaar et al., 1999).

These overlapping deficits may reflect genuine shared neurocognitive deficits and / or issues in how comorbidity is controlled within the literature. A recent study has established normative standards for recognition of facial emotions for typically developing children aged 6-16 years (Lawrence, Bernstein et al., 2006) and demonstrated that reliable recognition occurs at very different ages for different emotions. It was predicted that excluded children would perform more poorly than comparisons, and significantly less well than would be predicted from normative data. It was predicted that differences between groups would be most apparent for recognition of fear, consistent with ASD literature. Furthermore, it was expected that the excluded + ASD group would present with the poorest emotion recognition abilities, compared to excluded children without ASD and typically developing children.

A high proportion of individuals with ASD also show deficits in face recognition memory (Dawson et al., 2002) and in judging direction of eye gaze from static photographs (Campbell et al., 2006). Furthermore, there is a close correlation between emotion recognition, theory of mind and gaze monitoring skills (Campbell et al., 2006; Lawrence, Campbell et al., 2003; Lawrence, Kuntsi et al., 2003). To date there are no studies demonstrating deficits in these areas in children with other psychiatric conditions. It was predicted that excluded children would perform more poorly than comparisons in both areas, with the excluded + ASD group presenting with the poorest scores.

2.3.6 Theory of mind.

It has long been documented that individuals with ASD have deficits in theory of mind (e.g., Baron-Cohen, Leslie, & Frith, 1985). Performance on theory of mind tasks discriminates children with ASD from children with ADHD, CD and Oppositional Defiant Disorders (Buitelaar et al., 1999; Geurts et al., 2004). There are now several theory of mind tasks designed to explore mentalising abilities in higher-functioning children with ASD and typically developing children. One approach asks participants to describe short cartoons involving interactions between two triangles (Abell, Happé, & Frith, 2000). The task is sensitive to impairments in both adults and children with ASD (Campbell et al., 2006; Castelli, Happé, Frith, & Frith, 2000; Castelli, Frith, Happé & Frith, 2002). Individuals with ASD are able to use mental states to explain events in the animations, but are significantly poorer at giving appropriate mental state explanations. It was hypothesised that the excluded group would give significantly fewer appropriate mental state explanations than the comparison group, but that there would be no differences in the frequency of mental state terms used or in the ability to generate appropriate (non-mentalising) explanations. Children in the excluded + ASD group were expected to present with the lowest levels of appropriate mentalising, and perhaps also with idiosyncratic response styles. There is evidence that children and adults with significant social communication deficits tend to involve themselves in the narrative inappropriately (Kaland et al., 2005).

Recent work has focused on the relationship between attachment classification and mentalising abilities. Attachment theory emphasises the child's bond to the caregiver

as an explanatory framework for development and mental health. Evidence suggests there is considerable overlap between performance on advanced theory of mind tasks and quality of attachment in early adolescence (Humfress, O'Connor, Slaughter, Target, & Fonagy, 2002). However, although some reports have suggested that ASD is associated with poorer attachment (e.g., Bakermans-Kranenburg, Rutgers, Willemsen-Swinkels, & Van Ijzendoorn, 2003), meta-analysis suggests that this relationship is mediated by the presence of intellectual disability (Rutgers, Bakernmans-Kranenburg, van Ijzendoorn, & van Berckelaer-Onnes, 2004). It was expected that children in both the excluded and comparison samples would vary in the quality of their attachment to caregivers. However, it was predicted that deficits in mentalising would not be explained solely in terms of attachment quality, consistent with ASD literature.

2.4 Socio-demographic influences.

For all hypotheses, it was predicted that deficits in the excluded group could not be explained solely in terms of IQ or demographic variables known to be associated with exclusion from school. As noted earlier, disruptive behaviour is more common in males, particularly those of Afro-Caribbean origin, and in individuals with SEN. Disruptive behaviour and exclusion from school are both associated with a range of socio-economic variables (DfES, 2005). Although it has been repeatedly demonstrated that theory of mind (e.g., Noble, Norman, & Farah, 2005) and pragmatic language skills (D. Bishop, personal communication, May 5, 2006) are independent of socio-economic status (SES), the groups of excluded and comparison children were carefully balanced on a range of demographic and SES variables. Any

deficits detected can then reliably be attributed to difficulties with social cognition, rather than to the non-specific effects of poverty and social deprivation.

2.5 Summary of hypotheses.

The current study therefore aimed to test the hypothesis that a sub-group of children excluded from primary school present with significant deficits in social cognition and social communication, of a nature and severity consistent with ASD. Specifically, it tested the following hypotheses:

1. Excluded children will be significantly more likely to meet criteria for ASD than typically developing comparison children.
2. Excluded children meeting criteria for ASD will show better verbal abilities compared to non-verbal abilities.
3. Excluded children will present with subtle deficits in attentional control / switching relative to comparisons. Excluded children meeting criteria for ASD will show the poorest attentional control / switching skills.
4. Excluded children will present with poorer pragmatic language skills, and be more likely to meet clinical cut-off, compared to comparisons. Children meeting criteria for ASD will show the poorest pragmatic language skills.
5. Excluded children will be significantly poorer at identifying facial expressions of emotion, compared to comparisons, with excluded children meeting criteria for ASD showing the poorest skills.
6. Excluded children will be significantly poorer at judging direction of eye gaze, and at face recognition memory, than comparisons. Excluded children

meeting criteria for ASD show the poorest skills.

7. Excluded children will give significantly fewer appropriate mentalising responses than comparison children, with excluded children meeting criteria for ASD giving the fewest appropriate mentalising responses.
8. Deficits in social communication / social cognition amongst children excluded from school will not be accounted for by differences in IQ, SES or attachment.

3.0 Method.

3.1 Ethical approval.

Ethical approval was obtained for this study from the Great Ormond Street Hospital for Children NHS Trust / Institute of Child Health Ethics Committee (Research and Development registration number 01BS09- see Appendix A for ethical approval, consent forms and information sheets). To comply with ethical principles, details of families were not known to the researchers unless the family contacted the project directly. Consent for participation was formally obtained at the start of the assessment. Where the primary caregiver was not the legal guardian, written consent was obtained from the legal guardian. Families were not paid for participation; however, all families were entered into a prize draw for vouchers.

3.2 Relationship to other research studies.

This research was part of a larger study investigating social communication skills in children excluded from school. All child neuropsychological data were collected by the author. Parent and teacher questionnaires were gathered jointly by the author and another researcher, whilst the diagnostic interviews were conducted by another researcher (see Donno, 2006).

3.3 Design.

An independent groups design was used to explore differences between children who

had been excluded, or who were at risk of exclusion, and typically developing children not at risk of exclusion.

3.4 Power calculations.

Previous research using the Children's Communication Checklist (Gilmour et al., 2004) suggested an effect size of $d = 1.7$ between typically developing children and those at risk of exclusion. A conservative estimate was adopted ($d = 0.9$), as the effect sizes for other measures of social cognition in children excluded from school were unknown. At alpha = .05, this meant that 26 participants would be required in each group to enable sufficient statistical power to detect effects (Cohen, 1992).

3.5 Recruitment process.

Children and their families were recruited over a period of twelve months from primary schools in a deprived London borough. Approximately one third of the population in the borough are from ethnic minority backgrounds, with around 25% from African or Caribbean backgrounds. 33% of households are headed by a lone parent (compared to 22% nationally) and over a third of households are dependent on income support. Over 50% of primary age children speak English as an additional language (EAL), and over 58% are eligible for free school meals (Office for National Statistics, 2001). The borough experiences high levels of crime, social housing and mental health problems. Considering these multiple risk factors, it is unsurprising that the borough experiences amongst the highest rates of exclusion from primary school in London, with 5% of primary age pupils permanently excluded (DfES,

2002). However, many schools use 'unofficial' exclusions, asking parents to keep children at home for a few days without formal sanction (Hallam et al., 2005). It was therefore not possible to ascertain how many children were considered at risk of exclusion at the time of the study.

The process of recruitment is shown in Figure 1. Initially, all mainstream primary schools in the borough (N = 56) and the local Pupil Referral Unit (PRU) were contacted with details of the study and invited to participate. Sixteen schools participated, representing 26% of schools in the borough. This included one school for children with EBD, and one school for children with mild learning disabilities[1].

Participating schools were provided with information packs to pass to families with children who had been excluded from school, or were currently considered at risk of exclusion from school. The definition of 'at risk' is known to vary considerably between schools, with no clear relationship between particular challenging behaviours and exclusion (Hallam et al., 2005). Schools were asked to recruit only those children at high risk of exclusion whose disruptive behaviour had been of concern over time (rather than in isolated incidents).

The same schools were invited to recruit comparison children. Teachers were provided with details of particular age, ethnicity and ability levels of children sought as comparisons, and passed on information packs to families with appropriate children. Due to relatively slow recruitment in this phase, the researchers also visited several schools at the end of the school day to speak directly with parents. Group

[1] These schools provided teacher questionnaire data for children initially recruited through the PRU and subsequently placed at the school. They did not actively recruit participants.

membership was defined by teacher report.

3.6 Participants.

3.6.1 Exclusion criteria.

Children were excluded from either group if there was a known history of global learning disability or if their FSIQ fell below 70. Children and families were also excluded from the study if either the child or caregiver was not fluent in English, because of the emphasis on pragmatic language skills. Children aged less than 6 years were excluded due to the absence of normative data for the measures selected.

3.6.2 Excluded group.

Twenty-six children (23 males, 3 females) at risk of exclusion participated in the study. Children ranged between 6 and 13 years of age, and were diverse in terms of intellectual ability and ethnicity. Seven (27%) of these families were recruited through the PRU, with the remainder from mainstream schools. 15 (58%) had a known history of permanent or fixed term exclusions, the most serious categories of exclusion from school. Detailed demographics are shown in Tables 1-3.

Reasons for children being at risk of exclusion were sought from teachers, and provided for 14 children. Reasons given included previous history of fixed term or permanent exclusion (35%), persistent disruptive behaviour (29%), physical assault towards teachers or pupils (50%), and verbal abuse towards teachers and pupils

(29%).[2] The sample therefore represents the range of behaviours most commonly given as reasons for exclusion (DfES, 2005).

3.6.3 Comparison group.

Twenty-two typically developing children (18 males, 4 females) not at risk of exclusion were recruited as comparisons. Children ranged between 6 and 12 years, and showed similar diversity in intellectual ability and ethnicity to the excluded group. All of these children were attending mainstream schools, were not currently considered at risk of exclusion by teachers, and had never been excluded from school. Their demographics are shown in Tables 1-3.

3.6.4 Group balancing.

There were no statistically significant differences between the groups in age ($t(46) = -0.45$, ns) or gender ($\chi^2(1, N = 48) = 0.42$, ns). There were no differences in verbal IQ ($t(46) = -1.59$, ns). The groups differed in non-verbal IQ ($t(46) = -3.32$, $p < .01$) and overall IQ ($t(46) = -2.65$, $p < .05$), with the comparison group performing at a higher level than the excluded group.

Participants were compared in terms of ethnicity and indices of SES, as these have been shown to correlate with frequency of disruptive behaviour (see Tables 2 and 3). There were no statistically significant differences between groups in terms of ethnicity (χ^2 (2, $N = 48$) = 0.72, ns). Groups did not differ in terms of housing type

[2] Multiple reasons were provided for each child.

(council vs. private; χ^2 (3, N = 48) = 5.67, ns) frequency of single parent / carers (χ^2 (1, N = 48) = 1.34, ns) and frequency of EAL (χ^2 (1, N = 48) = 1.50, ns). Statistically significant differences were observed on employment status of the primary caregiver (employed vs. unemployed; χ^2 (1, N = 48) = 7.29, $p < .01$) with higher rates of unemployment in the excluded group. Parents of children in the excluded group had completed significantly fewer years of education than parents of comparison children (χ^2 (2, N = 48) = 16.62, $p < .001$).

As would be expected, families of excluded children were more likely to have had contact with social services (χ^2 (1, N = 48) = 25.37, $p < .001$). Past or current child protection concerns (as reported by the primary caregiver) were more likely in the excluded group (χ^2 (1, N = 48) = 18.46, $p < .001$), as was a history of contact with Child and Adolescent Mental Health Services / Child and Family Consultation Services (χ^2 (1, N = 48) = 12.08, $p < .001$)[3]. These differences provide an index of the severity of the behavioural problems presented by the excluded children.

3.7 Measures.

A battery of measures was completed with each child to assess a range of social communication abilities, as well as intellectual abilities, pragmatic language skills and executive functioning.

[3] None of these children had been (or were waiting to be) assessed for social communication difficulties prior to participating in the research.

3.7.1 Developmental and diagnostic information.

The Developmental, Diagnostic and Dimensional Interview (3di; Skuse et al., 2004) was completed with the primary caregiver. This computerised psychiatric interview uses parental and teacher report to assess for the presence of ICD-10 developmental and psychiatric disorders. An abbreviated version was administered to evaluate diagnoses of ASD, Hyperkinesis[4] and CD, and to screen for the presence of attachment difficulties. This includes questions about the child's response to separation and willingness to explore new environments. The 3di shows excellent test-retest and inter-rater reliabilities (most intraclass correlation coefficients > 0.90) and distinguishes almost perfectly between individuals with ASD and typically developing comparisons (Skuse et al., 2004).

3.7.2 Intellectual functioning.

Intellectual abilities were measured using the Wechsler Abbreviated Scales of Intelligence (WASI- Wechsler, 1999). This abbreviated measure of intellectual functioning provides measures of overall ability (Full Scale IQ- FSIQ), verbal ability (Verbal IQ- VIQ) and non-verbal ability (Performance IQ-PIQ). It shows excellent test-retest reliability (FSIQ .92) and discriminates well between individuals with global learning disabilities and typically developing individuals (Wechsler, 1999).

[4] ICD-10 criteria for Hyperkinesis encompass the DSM-IV disorder ADHD; the two terms are used interchangeably here.

3.7.3 Attentional / executive functioning.

Attention and executive functions were assessed using the Test of Everyday Attention for Children (TEA-Ch; Manly et al., 1998). This comprehensive battery provides measures of selective and sustained attention plus attentional control / switching across both auditory and visual domains. Raw scores are translated into scaled scores between 1 and 19 (M = 10, SD = 3). Scaled scores falling below 7 are usually considered impaired. The measure has good test-retest reliability (r ranging .57 to .87) and construct validity, showing high correlations with existing measures of attention / executive functioning (e.g., Stroop Colour Word Test- Golden, 1978). The TEA-Ch was designed to minimise the impact of overall intellectual functioning on performance, and most subtests are independent of IQ (with the exception of Creature Counting, Map Mission, Walk Don't Walk and Code Transmission, which show significant correlations with FSIQ in the range .17- .31). It discriminates well between children with ADHD and typically developing comparisons, with children with ADHD performing more poorly on virtually all subtests even when overall intellectual ability is controlled statistically (Manley et al., 1998).

3.7.4 Pragmatic language.

The Children's Communication Checklist (CCC; Bishop, 1998) was used as a measure of pragmatic language skills. This 70-item checklist was developed to distinguish between children with specific language impairment and children with pragmatic language difficulties. For each item, the rater is asked to indicate whether this 'does not apply', 'applies somewhat' or 'definitely applies'. The CCC yields a

number of subscale scores covering both structural and social aspects of language, with means and standard deviations established for typically developing populations as well as clinical groups (Bishop & Baird, 2001). Descriptions of the subscales and associated means can be found in Table 4. Of particular relevance to this study is the Pragmatic Composite scale. This includes ratings of inappropriate initiation, coherence, stereotyped language, use of context and rapport, and therefore provides an overall index of pragmatic language abilities. CCC subscales show high internal consistency, with alpha values ranging from .54 to .92, highest for the Pragmatic Composite. Whilst inter-rater reliability is only moderate (Pearson correlations ranging from .30 to .64), this is based on correlations between teacher and parent ratings (Bishop & Baird, 2001). Differences in ratings are to be expected when examining behaviours that are context specific. The CCC is sensitive to clinical levels of impairment, being able to distinguish reliably between different language and developmental disorders (Bishop & Baird, 2001; Geurts et al., 2004). It is also specific to language difficulties, discriminating well between children with internalising and externalising disorders and those with pragmatic language impairments (Gilmour et al., 2004).

The lower a child's score on the CCC, the greater the level of impairment. Significant clinical impairment was defined as CCC scores falling at least 3 *SD* below the population mean, on subscales or the Pragmatic Composite. This is a somewhat conservative criterion; however, it has previously been shown to provide the most reliable discrimination between children with pragmatic language disorders and other language / developmental disorders (Bishop & Baird, 2001). Since ASD is associated with particularly low scores on the Pragmatic Composite (Geurts et al.,

2004), it was considered crucial to adopt this stringent criterion in order to minimise the risk of incorrectly classifying children as impaired.

3.7.5 Social cognition.

Social cognition was assessed using the Schedules for the Assessment of Social Intelligence (SASI), a set of computerised measures of social cognition sensitive to deficits shown by individuals with ASD (Campbell et al., 2006; Dawson et al., 2002; Lawrence, Bernstein et al., 2006; Lawrence, Campbell, Bernstein, Pearson, & Skuse, 2006; Skuse, Lawrence & Tang, 2005). All tasks show excellent test-retest reliability and discriminate well between children with autism and typically developing children (Skuse et al., 2005). Before commencing each task, a check was made to ensure the child could read and understand the response options and use the computer adequately (if not, assistance was provided as needed). The tasks are as follows:

- *Facial expression recognition*: a series of faces displaying emotional expressions were developed for the SASI in collaboration with Paul Ekman (Ekman & Friesen, 1971). The facial images used show high inter-rater agreement (70 to 100%- Ekman & Friesen, 1976). 60 faces are presented, ten each of fear, anger, disgust, sadness, happiness and surprise. Each child was first asked to define these emotions ('what does it mean to be happy / when might you be happy?') and then shown six practice faces. The six emotion terms were presented at the side of each face. Scores are obtained for the number of correct answers for each emotion separately.

- *Gaze monitoring skills*: this is a novel computerised task measuring accuracy in detection of eye-gaze from a static photograph, with eyes deviated between 5 and 20 degrees from directly at the viewer. Children are presented with 30 faces (15 male, 15 female) and asked to indicate where the person is looking by clicking on the appropriate button ('to my left', 'into my eyes', 'to my right'). Scores are obtained for the percentage of correct responses.

- *Face Recognition Memory*: the Recognition Memory Test- Faces (Warrington, 1984) was presented in an automated format. This widely used test requires encoding, memory storage, and decoding of facial images. Children were presented with 50 black and white photographs of men and asked to decide whether the face was 'nice' or 'not nice' by clicking on a button. Each child was then presented with 50 pairs of photographs- one photograph previously seen, and one distracter. Children were asked to click on the button underneath the face they had already seen. Scores are obtained for total number of correctly recognised faces.

3.7.6 Theory of mind.

As described in Castelli et al. (2002), this task explores the ability to attribute intentions and mental states to contingent movements, and discriminates well between children with ASD and typically developing children (Abell et al., 2000). Children viewed eight short animations involving two triangles and were asked to describe what was happening in the cartoon. Encouragement and other non-specific prompts were given as needed but no other instructions provided. Two different

types of animation were presented: four shown to elicit mentalising responses (coaxing, tricking, mocking, surprising), and four shown to elicit goal-directed responses (fighting, leading, chasing, and dancing) as defined by Abell et al. (2000). Responses were recorded and later transcribed for analysis. Responses were coded for degree of intentionality (range 0-5, where 0 indicates no intentional language and 5 elaborate use), appropriateness (range 0-2, where 0 indicates an inappropriate or unrelated description of events, and 2 an accurate description), and length (range 0-4, ranging from no response to four or more clauses). Two researchers rated all transcripts independently. Inter-rater agreement was high (intentionality 87%; appropriateness 86%; length 98%). Discrepancies were discussed between raters and a final score agreed, in all cases adopting the more conservative rating. From these ratings, responses were classified as reflecting an Action response (intentionality rating of 1), an Interaction response (intentionality rating of 2 or 3), or a Mentalising response (intentionality ratings of 4 or 5). Finally, the number of appropriate mentalising responses were calculated by summing the number of mentalising responses awarded an appropriateness rating of 1 or 2.

3.8 Procedure.

Prior to the assessment, each family received a pack of questionnaires including the CCC, hyperkinesis and conduct scales. These were directly added to the 3di prior to completing the rest of the interview if available beforehand. If not, these questions were included as a routine part of the 3di interview. The same questionnaires were sent to the child's class teacher once consent was obtained to contact their school. Families were assessed in their own homes, except for one excluded child and one

comparison child seen at school by parental request. Caregiver and child were seen concurrently in separate rooms.

Measures were administered in the same fixed order throughout (WASI, SASI, TEA-Ch). The animations were presented in a random order. Children were given short breaks after each set of tasks or as requested, with a longer break imposed before the administration of the TEA-Ch. This was standardised for all children, with the exception of one excluded child who was administered the TEA-Ch in a separate session due to withdrawal of assent during the first assessment. The battery of measures took between 2 ½ and 3 hours to complete including breaks.

4.0 Results.

4.1 Assumptions of parametric statistics.

All variables were examined to ensure that the basic assumptions of parametric statistics were met.

4.1.1 Outliers.

One excluded child (case 18) was identified as a significant outlier on PIQ with an extremely high score of 136; however, removing his data from analysis did not affect the pattern of findings. Furthermore, this child was clinically significant, in that he met ICD-10 criteria for atypical autism. There are many examples of extremely high-functioning individuals in the literature (e.g., Baron-Cohen, Wheelwright, Stone, & Rutherford, 1999) and so his data were retained for analysis. There were outliers identified on recognition of happy expressions (cases 6, 18 and 20), fear (case 16), and anger (case 18). Removing these data did not affect the pattern of results and therefore they were retained for analysis. No other outliers were identified.

4.1.2 Normality.

There were minor concerns about normality in some variables; however, these were largely on measures such as the CCC subscales that are designed to be skewed. Wherever concerns were identified, non-parametric statistics were also completed to check the pattern of findings.

4.2 Statistical approach.

As noted earlier, the excluded and comparison groups were balanced for VIQ, age, gender, ethnicity and most measures of SES. However, there were significant differences between groups in PIQ, with excluded children performing less well than comparisons, and in education and occupation of the main carer. Occupation is a common measure of SES; however, in this sample many carers were working in lower-skilled occupations than would be expected from their education level, largely as a result of immigration affecting their ability to work in their profession. Furthermore, the numbers in each group did not allow for meaningful coding (e.g., using the Standard Occupational Classification- Office for National Statistics, 2000). The groups were balanced on many other indices of SES including frequency of single carers and proportion in social housing, both of which provide strong measures of social deprivation. Education of the primary carer was thought to be a more valid and reliable indicator than occupation in this sample, and would be expected to relate to neurocognitive development via parent-child interactions (Hauser, 1994).

A conservative approach was therefore adopted. Significant differences are reported here only if parametric and non-parametric analyses produced the same pattern of findings, and regression analyses indicated a significant independent effect of group after controlling for the effects of PIQ and education of carer.

4.3 Diagnoses.

ICD-10 diagnoses for ASD, CD and Hyperkinesis were obtained from the 3di interviews with parents (Donno, 2006). Nine children in the excluded group met criteria for ASD (Autism, Atypical Autism, Asperger Syndrome or PDD-NOS) compared to none of the comparisons. This difference reached statistical significance (χ^2 (1, N = 48) = 9.37, p < 0.01). All these children also met criteria for CD, and one for hyperkinesis.

Three children in the excluded group presented with attachment difficulties whilst no child in the comparison group showed such difficulties; this did not reach statistical significance (χ^2 (1, N = 48) = 2.71, ns). Two of the children who met criteria for ASD presented with attachment difficulties.

The excluded + ASD sub-group is too small for meaningful statistical analyses; however, trends in their neurocognitive profile will be reported, using effect sizes (Cohen, 1988) where appropriate to illustrate the magnitude of the difference between groups. Table 5 shows the demographics and neurocognitive profiles for the nine children meeting criteria for ASD, in addition to sub-group means and *SDs*. Means and *SDs* of the typically developing group are shown for comparison purposes.

4.4 Intellectual functioning.

The WASI was used as a measure of intellectual functioning. As noted earlier, no between group differences were observed for VIQ, whilst the comparison group performed significantly better on PIQ. Group differences in PIQ were accounted for by significant differences on both the Block Design ($t(46) = -2.63$, $p < .05$) and Matrix Reasoning subtests ($t(46) = -3.46$, $p < .001$). No differences were seen on either subtest contributing to VIQ- Vocabulary ($t(46) = -1.43$, ns) or Similarities ($t(46) = -1.49$, ns). A significant VIQ > PIQ discrepancy was observed in the excluded group ($t(25) = 2.99$, $p < .01$), but not in the comparison group ($t(21) = 0.41$, ns).

The excluded + ASD group showed intellectual functioning within the normal range, with VIQ ranging from 80 to 142 ($M = 106.11$, $SD = 18.67$) and PIQ ranging from 72 to 136 ($M = 98.22$, $SD = 18.28$- see Table 5). Performance was reasonably similar across all subtests contributing to IQ (Vocabulary $M = 48.78$, $SD = 11.86$; Similarities $M = 56.78$, $SD = 13.07$; Block Design $M = 48.44$, $SD = 11.09$; Matrix Reasoning $M = 48.56$, $SD = 12.24$). Nonetheless, a trend for VIQ > PIQ was apparent ($d = 0.43$, medium effect[5]).

4.5 Attention / executive functioning.

The TEA-Ch was used as a measure of attention and executive functioning. Means and *SDs* are shown in Table 6 for subtests and factor scores. Data from one child in

the excluded group (case 8) was removed from analysis as his performance on the tasks suggested he did not comprehend the instructions sufficiently for this to be a valid measure[6]. Another child in the excluded group (case 14) withdrew assent for participation partway through administration, and therefore scores are available for 6 of 13 subtests only. Two children in the excluded group (cases 22 and 24) and one in the comparison group (case 32) declined to complete the final subtest (Code Transmission). Data were not obtained for one further child in the excluded group (case 20) for Score DT due to stopwatch failure during testing.

Factor scores were derived by summing scaled scores as described in the TEA-Ch manual (Manley et al., 1998). The selective attention factor comprised scaled scores for Sky Search Attention Score and Map Mission. The sustained attention factor included scores from Score, Code Transmission, Walk Don't Walk, Score DT and Sky Search DT. Finally, the attentional control / switching factor comprised scores from Creature Counting (timing score) and Opposite Worlds. The Creature Counting Timing score is only calculated if the raw accuracy score exceeds 3; this was the case for 13 of 26 excluded children and 18 of 22 comparison children. Inspection of the means and *SDs* showed that children excluded from school tended to perform less well on all factor scores than comparisons (see Table 6). However, none of these differences reached statistical significance.

Significant differences were observed between groups on the Sky Search Target

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[5] This effect size uses the original standard deviations to calculate *d*. Alternative approaches use the paired *t* statistic; however, this potentially overestimates the effect size (Dunlop, Cortina, Vaslow, & Burke, 1996) and so a conservative approach was adopted.

[6] This child had a FSIQ of 73 (95% confidence interval: 68-80). Following the assessment he was referred to Educational Psychology services to determine whether his needs could be met in mainstream school.

($t(45) = -2.56$, $p < .05$), Creature Counting Total ($t(45) = -2.43$, $p < .05$), Score DT ($t(45) = -2.20$, $p < .05$) and Opposite World subtests ($t(44) = -3.16$, $p < .01$). No difference between groups was seen on the Creature Counting Timing Score- however, as noted earlier, this score can only be calculated if the raw accuracy scores exceed 3. Chi-square analyses revealed that comparison children were significantly more likely to have a timing score calculated than excluded children ($\chi^2 (1, N = 48) = 4.20$, $p < .05$), reflecting better performance by the typically developing group. A number of TEA-Ch subscales are known to correlate with VIQ, notably the Creature Counting subtest (Manley et al., 1998). VIQ was therefore included in regression analyses where a significant correlation was observed (Sky Search Target $r = .33$, $p < .05$; Creature Counting Total $r = .31$, $p < .05$; Score DT $r = .57$, $p < .001$; Opposite World $r = .38$, $p < .05$). PIQ and education of carer were also included as described earlier. Group remained a significant independent predictor on Opposite World ($\beta = 2.27$, $t(41) = 2.45$, $p < .05$) but not on the other subtests.

Children in the excluded + ASD group performed extremely poorly on subtests contributing to the attentional control / switching factor. It was not possible to calculate the Creature Counting Timing Score for three of the children due to their poor overall performance on this task. Furthermore, their performance on the opposite world subtest was also poor ($M = 6.56$, $SD = 2.92$). The magnitude of difference in mean between this sub-group and the comparison group on the Opposite World subtest was large ($d = 1.10$, large effect).

4.6 Pragmatic language.

The CCC was used as a measure of pragmatic language and obtained from teachers for 25 of 26 excluded children and 21 of 22 comparison children, and from parents for all children.

No significant differences were observed between parent and teacher ratings on subscales or the Pragmatic Composite. Furthermore, the pragmatic composite scores were moderately strongly correlated (r = .45, $p < .01$). Parent ratings are more closely linked to diagnosis (Bishop & Baird, 2001) and so only the parent data are presented here for brevity[7].

Means and *SDs* for subscales and the pragmatic composite are shown in Table 7. Considering the large number of parametric tests conducted on this measure, the more stringent significance level of $p < .001$ was adopted. As shown in the table, excluded children performed more poorly on the Pragmatic Composite ($t(46) = -7.38$, $p < .001$) and on many of the sub-scales (Inappropriate Initiation- $t(46) = -4.88$, $p < .001$; Coherence- $t(46) = -5.32$, $p < .001$; Use of Context- $t(46) = -7.44$, $p < .001$; Rapport- $t(46) = -5.63$, $p < .001$; Social Relationships- $t(46) = -6.48$, $p < .001$). No significant differences were observed on subscales measuring intelligibility / fluency ($t(46) = -1.26$, ns), syntax ($t(46) = -2.33$, ns), stereotyped language ($t(46) = -3.38$, ns) or interests ($t(46) = -1.38$, ns).[8]

[7] Teacher data are shown in Appendix B.

Clinically significant impairment was defined as any score falling more than 3 *SD* below the mean of the subscale or composite. Chi-square analyses were used to explore whether children excluded from school were more likely to fall within the clinical range than comparisons. Significant between group differences were seen for Coherence (χ^2 (1, N = 48) = 15.09, p < .001), Use of Context (χ^2 (1, N = 48) = 15.09, p < .001), Social Relationships (χ^2 (1, N = 48) = 13.54, p < .001) and the Pragmatic Composite (χ^2 (1, N = 48) = 12.08, p < .001). 42% of the excluded group showed Pragmatic Composite scores within the clinical range, compared to 0% in the comparison group.

The excluded + ASD group showed extremely poor pragmatic language abilities (M = 129.33, SD = 11.65; see Table 5). The sub-group mean fell more than 3 *SD* below population means and more than 3 *SD* below the mean of the comparison group. Six children fell more than 3 *SD* below the mean and a further two fell more than 2 *SD* below the mean. The magnitude of difference in mean between this group and the comparison group was very large indeed (d = 2.53). An effect size of this magnitude indicates that the average child in the comparison group performed above the 97.7th percentile of the excluded + ASD group (Cohen, 1988).

4.7 Social cognition.

4.7.1 Emotion recognition.

Means and *SD* for proportion of correct answers were calculated for each emotion,

[8] No between group differences were noted for the proportion of children with EAL. Furthermore, EAL did not correlate significantly with the pragmatic composite (r = .11, ns). Differences in the

and shown in Table 8. Children excluded from school tended to be less accurate in identifying emotions from facial expressions. However, no significant differences were seen between groups on any emotion. Raw scores were also converted to z-scores using age and gender stratified normative data from Lawrence, Campbell et al. (2006) in order to explore whether these children were significantly poorer at emotion recognition than would be expected in the general population.[9] One-sample *t*-tests revealed that excluded children were significantly poorer at recognising happy expressions compared to normative data ($t(25) = -2.48$, $p < .05$), with no other significant differences identified.

The z-scores for recognition of fear and happiness in the excluded + ASD group are shown in Table 5. An advantage was observed for comparison children in recognising fear ($d = 0.43$, medium effect) and happiness ($d = 0.90$, large effect). This trend is also seen for other facial emotions, with the exception of disgust in which children meeting criteria for ASD perform slightly better than comparisons.

4.7.2 Eye gaze monitoring.

Means and *SD* were calculated for the proportion of correct responses, and are shown in Table 9. Children excluded from school tended to perform more poorly on this task than comparisons ($t(46) = -2.65$, $p < .05$). However, there was no independent effect of group once PIQ and education of carer were entered into a regression analysis ($\beta = 5.89$, $t(44) = 1.90$, ns).

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pragmatic composite cannot therefore be attributed to EAL.

[9] Normative data are reproduced with permission in Appendix C.

Following the approach of Baron-Cohen, Wheelwright, Hill, Raste, and Plumb (2001), the highest score that could reasonably be obtained by chance was calculated. This score reflects the upper bound of the 95% confidence interval around chance scores. Thirty trials with three response options (p[correct] = 0.3) means that scores in excess of 13 (43% correct) are unlikely to occur simply by chance. One-sample *t*-tests were conducted to explore whether scores by excluded and comparison children were significantly different from chance. Comparison children showed scores significantly better than chance ($t(21) = 4.77$, $p < .001$), whilst the scores of children excluded from school were not significantly different from chance ($t(25) = 1.75$, ns). Thirteen of the excluded children performed at equal or less than chance level, compared to just four of the comparisons. This reached statistical significance (χ^2 (1, $N = 48) = 5.27$, $p < .05$).

The excluded + ASD sub-group performed poorly on this task ($M = 47.41$, $SD = 9.40$) and more poorly than comparison children ($d = 0.57$, medium effect). Four of the children showed Eye Gaze scores at or below chance level (see Table 5).

4.7.3 Face recognition memory.

Means and *SDs* were derived for the proportion of correctly recognised faces (shown in Table 9). Data was not available for one comparison child due to technical difficulties with the computer during administration. Although children excluded from school tended to recognise fewer faces than comparisons, this difference was not statistically significant ($t(45) = -1.11$, ns). Chance performance on this task is reflected in scores equal to or less than 31 (62%). Both excluded children ($t(25) =$

2.32, $p < .05$) and comparison children ($t(20) = 3.58$, $p < .01$) showed scores significantly better than chance level. There were no differences in the number of children in each group falling at or below chance level (χ^2 (1, $N = 48$) = 0.51, ns).

The excluded + ASD group performed well on this task ($M = 72.94$, $SD = 9.38$), slightly better than the comparison group (see Table 5). However, the magnitude of the difference between this sub-group and the comparison group was very small ($d = 0.20$, small effect).

4.8 Theory of mind.

Animations were compared in terms of the frequency of mentalising responses. Significantly more mentalising responses were given to animations designed to elicit mentalising responses, e.g., 'The little triangle tricked him', compared to those designed to elicit goal-directed responses, e.g., 'The little triangle pushed him' ($t(47) = -3.57$, $p < .001$). This supports the sensitivity of this task in measuring mentalising abilities in children.

There were no significant differences between groups in the frequency of mentalising responses given, either to goal-directed ($t(46) = -1.22$, ns) or mentalising animations ($t(46) = -1.95$, ns). However, there were significant differences in the frequency of appropriate mentalising responses, defined as the total number of responses receiving 1 or 2 point scores on appropriateness and 4 or 5 point scores on intentionality ratings. These data are shown in Table 9. Children excluded from school gave significantly fewer appropriate mentalising responses than comparisons ($t(46) = -$

2.18, $p < .05$). No significant correlations were seen between appropriate mentalising and VIQ ($r = .12$, ns), PIQ ($r = .18$, ns), age ($r = .10$, ns), attentional control / switching ($r = .06$, ns), education of carer ($r = .17$, ns) or attachment quality ($r = -.12$, ns).

Children in the excluded + ASD group showed poor mentalising abilities, with two children giving no appropriate mentalising responses at all. The magnitude of difference in mean appropriate mentalising between this sub-group and the comparisons was moderate ($d = 0.61$, medium effect). One child in the excluded + ASD group (case 12) responded in an extremely unusual manner to this task, switching between third-person and first-person accounts of the events. For example:

> [*Animation no. 5: Big triangle and little triangle are fighting.*]
> Pushing each other left and right, left and right, uh, uh oh pop! [*singing and humming*]. The little one out of the way and push the, er, big one stop fighting and get off me, get off me... stop it leave me alone, you ugly monster. Errrrr [*unarticulated vocalisations*] Big punching one no stop it. Don't push me I'll push you. Don't push me I'll push you.

> [*Animation no. 7: Little triangle tricks big triangle.*]
> They're fighting. Get off me. Um poke me get away I want to go back to school. Don't poke me get off me. Stop fighting. Thank you I'm going now. Shame on you, you can't fight.

No child in either the excluded or comparison groups showed a similar response

style.

4.9 Relationship between measures of social cognition.

Correlation analyses were conducted to explore the relationships between measures of social cognition. Significant correlations were observed between recognition of surprised and angry expressions (r = .34, p < .05) and between angry and sad expressions (r = .33, p < .05). Recognition of angry faces correlated significantly with performance on the Eye Gaze task (r = .34, p < .05). Finally, recognition of fearful facial expressions correlated significantly with frequency of appropriate mentalising responses (r = .37, p < .01), and frequency of mentalising responses given to mentalising animations (r = .44, p < .01), but not with frequency of mentalising responses given to goal-directed animations (r = -.01, ns). No other significant correlations were observed.[10]

4.10 Predicting exclusion and ASD status.

The pragmatic composite, eye gaze, recognition of happy and fearful faces, and appropriate mentalising scores were summed to create the Social Communication Index (SCI). These measures were selected on the basis of significant between group differences and / or theoretical relevance to ASD. Lower scores indicate poorer social communication skills. Means and *SDs* are shown in Table 10. Children excluded from school showed significantly lower scores than comparisons (t(46) = -6.87, p < .001). This difference held even when the pragmatic composite score was

[10] With alpha = .05 and 64 correlations calculated, three significant results would be expected by chance. All correlations were planned. It is therefore unlikely that these results reflect Type I error.

removed from the SCI, and PIQ and education of the carer controlled (β = 6.86, t(44) = 2.12, p < .05). Just 12% of excluded children showed SCI scores higher than 195.20 (1 *SD* below the comparison group mean), compared to 82% of comparison children. This difference was statistically significant (χ^2 (3, N = 48) = 24.67, p < .001).

The excluded + ASD group showed amongst the poorest SCI scores. Three children fell more than 1 *SD* below, three more than 2 *SD* below, and one more than 3 *SD* below the comparison group mean. The magnitude of difference in means compared to the comparison group was extremely large indeed (d = 2.09, large effect). An effect size of this magnitude indicates that the average child in the comparison group performs above the 97.7th percentile of the excluded + ASD group (Cohen, 1988).

4.10.1 Predicting exclusion status.

Logistical regression analyses indicated that the SCI predicted exclusion status significantly better than would be expected by chance (χ^2 (3, N = 48) = 34.78, p < .001) and remained a significant independent predictor even after controlling PIQ and education of carer (*Wald*(1) = 10.85, p < .001). SCI correctly classified 83.3 % of children as excluded or not excluded.

4.10.2 Predicting ASD diagnosis.

The SCI correlated very highly with ASD diagnosis (r = -.41, p < .01). Logistic regression analyses indicated that the SCI predicted diagnosis significantly better

than would be expected by chance (χ^2 (1, N = 48) = 9.42, p < .05) and remained a significant predictor even after controlling PIQ and education of carer (*Wald*(1) = 5.80, p < .05). SCI correctly classified 81.3% of children as meeting or not meeting criteria for ASD.[11]

[11] When measures of attentional control / switching were included in the SCI, the independent effect of SCI on exclusion and ASD status was reduced, and the proportion of children correctly classified was also reduced. They were therefore not included in the composite.

5.0 Discussion.

This study tested the hypothesis that a sub-group of children excluded from school show significant social communication difficulties, examining intellectual ability, pragmatic language, social cognition, attention and executive functioning, as well as psychiatric diagnosis. The findings from each area will be reviewed separately, before considering the implications of these findings for theory, and educational and clinical practice.

5.1 Diagnoses.

All children were evaluated against ICD-10 criteria for ASD, CD and Hyperkinesis. Nine children in the excluded group met criteria for ASD, nearly 35% of the sample. All of these children also met criteria for CD, and one for Hyperkinesis. It was striking that the gender ratio of this sub-group (8 males, 1 female) closely mirrored gender ratios reported for high-functioning ASD in clinical populations (e.g., Harrison, O'Hare, Campbell, Adamson, & McNeillage, 2006). Diagnosis of ASD was strongly associated with performance on a composite measure of social cognition / communication (SCI), which correctly classified over 81% of children. Although there are clearly difficulties in predicting classification with such small sub-samples, none of the excluded + ASD group had been previously assessed for social communication or other neurodevelopmental difficulties. The ability to discriminate these children from the wider conduct-disordered population therefore has considerable clinical utility. It is likely that a distinct sub-group of children with

conduct problems also experience clinically significant social communication difficulties, and potentially have an ASD.

5.2 Intellectual functioning.

Children excluded from school showed IQ scores across the full range of normal intellectual ability (FSIQ ranging from 73 to 144). VIQ was significantly higher than PIQ, whereas no differences between VIQ and PIQ were observed in the comparison group. Children excluded from school showed significantly poorer PIQ than comparisons, with differences noted on both the Block Design and Matrix Reasoning subtests. The sub-group of children meeting criteria for ASD showed IQ scores ranging from borderline to extremely high, with a tendency for VIQ to be somewhat higher than PIQ (statistically significant in the excluded group as a whole). This may help to explain why their difficulties are not detected, since the majority of scores fall within the average range. Such children may be able to compensate for their difficulties with social communication using their verbal abilities. This pattern of performance is consistent with high-functioning ASD profiles (Klin et al., 1995; Miller & Ozonoff, 2000), but not with EBD profiles, where the opposite pattern of scores is commonly observed (Plomin et al., 2002).

5.3 Attentional / executive functioning.

Children excluded from school showed remarkably comparable skills in attention / executive functions compared to peers. Differences observed on subtests of the TEA-Ch did not reach statistical significance once scores were combined to form factor

scores for selective attention, sustained attention and attentional control / switching. After controlling IQ, only performance on the Opposite World subtest discriminated between the groups. Children excluded from school were also significantly less likely to have a timing score calculated on Creature Counting. Both these subtests contribute to the attentional control / switching factor. Furthermore, the excluded + ASD group performed extremely poorly on these subtests. It is therefore clear that, although no differences in selective or sustained attention are observed, there may be subtle differences in attentional control. This pattern of findings is consistent with an ASD profile (Liss et al., 2001) but not with an ADHD or CD profile (Goldberg et al., 2005; Hill, 2002; Manley et al., 1998).

5.4 Pragmatic language.

Children excluded from school showed significantly poorer pragmatic language skills on the CCC than typically developing children. As predicted, no differences were seen on measures of structural language skills (intelligibility and fluency, and use of syntax). 42% of children excluded from school performed more than 3 *SD* below population norms, consistent with clinically significant levels of impairment. These differences could not be accounted for by more fundamental differences in IQ, SES or attention / executive functioning. This replicates the findings of Gilmour et al. (2004), with a striking level of similarity in mean scores and percentage of children meeting clinical cut-off points. Similar scores on the CCC have been shown to discriminate children with ADHD and CD from children with ASD (Gilmour et al., 2004; Geurts et al., 2004).

A low Pragmatic Composite score, in combination with poor scores on the Social Relationships and Interests subscales, discriminates children with pure pragmatic language deficits from those with ASD profiles (Bishop & Baird, 2001). Children excluded from school showed significantly poorer scores on Social Relationships than peers, with 46% falling more than 3 *SD* below population means. In contrast, no statistically significant differences were seen between groups on Interests, on either mean scores or percentage meeting clinical cut-off. Nonetheless, it is striking that 12% of the excluded group fell more than 3 *SD* below population means, compared to 0% of typically developing comparisons.

The majority of the excluded + ASD group showed significant difficulties with pragmatic language, with all but one child falling more than 2 *SD* below population means. It is interesting that case 19 (who met criteria for atypical autism) showed pragmatic language skills comparable to those of the comparison group. This child was the source of considerable concern to the researchers, and showed behaviours associated with emotional and sexual abuse (faecal smearing- Stower, 2000).[12] It might be argued that his emotional needs were mislabelled as social communication difficulties. However, this seems unlikely for several reasons. Firstly, there is no reason to think that children with ASD do not experience the full range of mental health difficulties in addition to their developmental disorder. Secondly, the 3di discriminates well between mental health difficulties and developmental disorders (Skuse et al., 2004). It is more plausible that this reflects measurement error. This child was being raised by his paternal grandmother as both his parents (and many of his siblings) experienced significant learning disabilities. Caregiver report may be

[12] This child was referred to local Child and Family Consultation Services following the assessment.

biased in this case due to this child's relatively good skills in comparison to his parents and siblings. This interpretation is supported by his teacher-rated pragmatic composite, which fell close to 2 *SD* below population means. Alternatively, he may represent an unusual symptom profile.

Furthermore, it is striking that these deficits are apparent whether rated by parents or teachers. Most studies suggest that parents tend to rate difficulties as more severe than teachers, and that parent ratings are more closely tied to diagnosis (Bishop & Baird, 2001). A similar pattern was observed here- however, no statistically significant differences were observed between parent and teacher ratings. This provides strong support for the pervasive nature of the pragmatic language difficulties experienced by this group of children.

5.5 Social cognition.

Children were assessed on a range of measures of social cognition, including recognition of emotions, judgement of eye gaze, face recognition memory and theory of mind.

5.5.1 Emotion recognition.

Children excluded from school tended to perform less well on emotion recognition tasks than peers, although this difference did not reach statistical significance. The predicted differences for recognition of fearful and sad expressions were not observed. Somewhat surprisingly, children excluded from school were significantly

poorer at recognising happy facial expressions than would be expected from population data. This is particularly surprising given that recognition of happy expressions is virtually at ceiling level by 6 years (Lawrence, Bernstein et al., 2006). It is unclear how to interpret this finding. It may be that children excluded from school are delayed in their acquisition of emotion recognition skills. However, if this were the case it would be reasonable to expect poorer performance relative to means on recognition of other emotions. This was not seen in this sample. Alternatively, it may be that further work is required to understand the normal developmental trajectory of performance on emotion recognition tasks. Normative data provided by Lawrence, Bernstein et al. (2006) demonstrates wide variability in performance in children aged 6-13 years; however, this may in part reflect the relatively small sample sizes in each age / gender group (*n* ranging 10-27). As such, detecting between group differences within this age range will require larger samples. Finally, it is plausible that children presenting with disruptive behaviour have less exposure to happy expressions than children without disruptive behaviour. This explanation is supported by the lack of significant differences between groups for negative emotions (disgust, anger and fear). This study cannot distinguish between these possibilities.

5.5.2 Eye gaze monitoring.

Children excluded from school were more likely to show poorer performance on this task, however, this difference did not remain significant after controlling PIQ. A relationship between eye gaze monitoring and PIQ has been demonstrated in previous studies (Lawrence, Campbell et al., 2003; Lawrence, Kuntsi et al., 2003).

Nonetheless, it is clear that children excluded from school perform significantly poorer than would be expected, with 50% performing at or below chance level. Children excluded from school were significantly more likely to perform at or below chance than their peers. The excluded + ASD group showed particularly poor performance, with four children performing at or below chance. These findings are consistent with previous research showing that a significant proportion of individuals with social communication difficulties show deficits on this task (Campbell et al., 2006).

5.5.3 Face recognition memory.

No significant differences were seen between groups, either in means or in likelihood of performing at chance level. This contrasts with previous research suggesting that a high proportion of individuals with ASD have difficulties on this task (Dawson et al., 2002). It may be that these deficits are not present in our sample, or that the sub-group identified is too small to detect subtle deficits of this nature. There is evidence that children with ASD may be slower to identify faces than typically developing children (Serra et al., 2003). Reaction time data was not collected for this task; it is possible that deficits would be apparent on reaction time but not on accuracy, particularly if excluded children adopted a different processing strategy than typically developing peers.

5.5.4 Theory of mind.

Children excluded from school showed significantly poorer mentalising skills than

their peers. As predicted, no differences were observed between groups in frequency of mentalising responses. Higher rates of mentalising responses were seen for animations designed to elicit mental state explanations, compared to those designed to elicit goal-directed explanations. This provides further support for the reliability and validity of this task in assessing the mentalising abilities of children (Abell et al., 2000).

However, differences were observed in the frequency of appropriate mentalising responses. Children in the excluded + ASD group performed particularly poorly, with 56% giving one or fewer appropriate mentalising responses. Furthermore, one child in the excluded + ASD group involved himself in the narrative inappropriately, switching into the first person when describing events. No other child showed a similar response style. This mirrors findings in the ASD literature, demonstrating that individuals with ASD use mental state concepts to explain events, but do so in an idiosyncratic and inappropriate manner (Campbell et al., 2006; Kaland et al., 2005). Deficits in mentalising ability discriminate children with ASD from those with ADHD or CD (Buitelaar et al., 1999; Geurts et al., 2004). Furthermore, these deficits could not be accounted for by IQ, SES, attention / executive functioning or attachment quality.

5.5.5 Relationship between measures of social cognition.

It is unclear how to interpret the mixed findings from the emotion recognition, eye gaze and face recognition memory measures. A significant proportion of individuals with ASD experience difficulty on these tasks (Campbell et al., 2006; Dawson et al.,

2002). However, there is inconsistency in the literature, with some studies suggesting that deficits reflect more fundamental differences in language ability (Ozonoff, Pennington, & Rogers, 1990) or perceptual complexity (Castelli, 2005). Differences between groups in this study cannot be attributed to IQ, since the groups were carefully balanced on VIQ and differences in PIQ and education of carer controlled for statistically. Three possibilities remain: that some individuals with autism do not have deficits on these tasks; that individuals with autism do, but the sub-group of excluded + ASD children do not show deficits on these tasks; or measurement error. Our study cannot distinguish between the first two options. Previous research using the CCC had suggested that differences between excluded children and peers would be large (Gilmour et al., 2004). However, it seems likely that deficits in social cognition, if present, will be subtle and require larger samples to detect effects. The challenge for future studies will be to determine what magnitude of difference will be clinically significant. A difference of just 1 *SD* might be associated with impaired development and progress in education. It was striking that when measures of social cognition were combined to form the SCI, differences between groups were pronounced and remained even when the pragmatic composite was removed. This suggests that differences between groups may be too subtle to be detected in a sample of this size.

A strong relationship has been demonstrated between these measures of social cognition (Campbell et al., 2006; Lawrence, Kuntsi et al., 2003). This was not seen in this study, with surprisingly few significant correlations between measures. Previous studies with children have suggested that social communication abilities may be more fractionated in children with ASD compared to typically developing

children (Brent, Rios, Happé, & Charman, 2004). Brent et al. show that performance on different theory of mind tasks correlates well in typically developing children, but not in children with ASD. It may be that a similar process is operating in this sample; however, the excluded + ASD subgroup is too small to allow this hypothesis to be tested statistically.

Perhaps the most theoretically significant correlation is seen between recognition of fearful expressions and appropriate mentalising. This replicates findings with typically developing adults (Cordon, Critchley, Dolan, & Skuse, 2006). Furthermore, deficits in fear recognition, eye gaze monitoring and face recognition memory are also seen in women with Turner's Syndrome (Campbell et al., 2002; Lawrence, Campbell et al., 2003; Lawrence, Kuntsi et al., 2003). Turner's Syndrome is a sporadic disorder occurring in females in which all or part of one X-chromosome is deleted (Lawrence, Campbell et al., 2003). Such women experience difficulties forming and maintaining peer relationships and difficulties interpreting non-verbal communication (e.g., Downey, Ehrhardt, Gruen, Bell, & Morishima, 1989; McCauley, Kay, Ito, & Treder, 1987; McCauley, Ross, & Sybert, 1994). They therefore present with social communication deficits that, although clinically significant, do not warrant a diagnosis of ASD. A similar picture is seen in our sample, with a sub-group of children excluded from school more likely to show deficits in pragmatic language skills and mentalising, and possibly with deficits in emotion recognition and eye gaze monitoring. With increasing recognition of autism as a spectrum disorder, there is likely to be greater exploration of the range of symptom profiles seen in atypical and / or sub-clinical populations. A sub-group of

children excluded from school may represent one such population and will warrant further investigation.

5.6 Is there a sub-group of children excluded from school with undetected ASD?

The results of this study provide strong evidence to suggest that a sub-group of children with disruptive behaviour have undetected ASD, and that their difficulties cannot be accounted for solely in terms of CD or ADHD. Firstly, 34% meet ICD-10 criteria for ASD in addition to CD or Hyperkinesis. The 3di provides a dimensional approach to diagnosis, and therefore is uniquely placed to capture subtle or atypical deficits. Research on this sample of children (see Donno, 2006) suggests that children excluded from school can be distinguished from their peers on dimensional measures of autistic traits, even if they do not meet criteria for ASD. Secondly, 42% show deficits in pragmatic language as severe as those seen in ASD. Although pragmatic language deficits are seen in other developmental disorders, the severity of the deficits documented in this study are more consistent with ASD (Bishop & Baird, 2001; Geurts et al., 2004; Gilmour et al., 2004). Furthermore, they present with deficits on theory of mind tasks similar to those documented in ASD (Abell et al., 2000); deficits in mentalising discriminate ASD from ADHD and CD (Buitelaar et al., 1999; Geurts et al., 2004). There is little evidence to suggest that attentional and executive functions are grossly impaired in this group, and no evidence to suggest difficulties with response inhibition as would be expected in ADHD or CD. If executive dysfunction is present in this group, difficulties are in attentional switching consistent with an ASD profile (Liss et al., 2001). Finally, there is no evidence to

suggest that these deficits can be explained by differences in IQ, SES or attachment quality.

5.7 What are the implications of these findings?

These startling findings have implications for practice and policy in clinical psychology and education, and for research.

5.7.1 Theoretical implications.

The findings of this study suggest that increased attention needs to be paid to the blurring of boundaries between mental health and developmental disorders. Research may have paid insufficient attention to the issue of comorbidity between ASD and CD. This makes distinguishing those children with additional social communication needs from the wider conduct disordered group very difficult, because of potential confounds in the research evidence. Greater integration between psychiatric and developmental approaches is likely to prove fruitful, both in theory and practice.

Furthermore, the findings provide further support for the conceptualisation of autism as a spectrum disorder. A significant sub-group of children excluded from school meet criteria for ASD, and show deficits on neuropsychological and neurocognitive measures similar in nature and severity to those documented in ASD. However, the data also show that the wider population of children excluded from school can be distinguished from their typically developing peers on indices of social cognition / communication (SCI). Furthermore, detailed analysis of the 3di interviews (presented

in Donno, 2006) shows that children excluded from school can be distinguished from peers on dimensional measures of autistic spectrum traits. If these findings are correct, it will be necessary to identify the point at which deficits become disabling (i.e., the point at which clinical intervention is required). Many individuals with ASD function very well and are extremely successful within contexts that maximise their skills and minimise the demands on social competence (Baron-Cohen et al., 1999). Arguing for a continuum of social competence (with extremely competent at one extreme and 'classical' autism at the other) is not to say that all individuals will want or require intervention.

Furthermore, the findings have implications for the debate concerning the validity of diagnoses within the autistic spectrum, in particular, whether Pragmatic Language Impairment (PLI; also termed semantic-pragmatic disorder) should be considered an ASD. This is a long and complex debate that will not be reviewed in detail here. However, this study shows that a substantial proportion of children excluded from school, who do not meet criteria for ASD, nonetheless have clinically significant impairments in pragmatic language skills. Many of these children also present with sub-clinical autistic spectrum traits (Donno, 2006). This group may represent another distinct sub-group within the excluded population, or alternatively represent a 'milder' version of the ASD group. This clearly warrants further investigation. With increasing understanding of the neurocognitive profiles of ASD, PLI and other developmental disorders, the boundaries between each symptom cluster may become even less clear-cut than previously thought.

5.7.2 Clinical practice.

Children excluded from school, and / or possessing a diagnosis of CD, should be assessed for the presence of social communication deficits. Community Mental Health Nurses (CMHNs) now provide input to PRU's in some areas of the country. This is a positive development, but there is a need to develop outreach services to mainstream education to help prevent exclusions. CMHNs are ideally placed to identify children with developmental and / or mental health needs that warrant assessment by a clinical psychologist.

There is a need for greater integration between child mental health services and child development services. Each service draws on quite separate literature, and approaches behavioural difficulties from very different angles. A combination of both perspectives will be required if the complex needs of this group of children are to be met. Many of the children in this sample presented with mental health needs in addition to developmental difficulties. These cases are likely to benefit from individual case formulations that place their behavioural difficulties in the context of both emotional and developmental difficulties. For example, one child meeting criteria for ASD also showed difficulties with attachment and anxiety associated with his mother's terminal illness. To acknowledge the role of developmental factors is not to diminish the importance of emotional disturbance on behaviour. However, changes will be required in training and system organisation as well as individual clinical reasoning if progress is to be made.

5.7.3 Educational policy and practice.

There is a need for greater recognition of the needs of children with social communication deficits. As this study demonstrates, these children will struggle in mainstream school and often find it difficult to access a Statement of Special Educational Need- without this they cannot receive the specialist one-to-one support they require. High-functioning children with ASD will present very differently to 'classical' autism, and their social functioning may vary greatly between situations. This means that observational assessments, although crucial, are likely to be insufficient to capture the strengths and difficulties of these children. Even if a child is seen by an Educational Psychologist, children are unlikely to complete psychometric ability assessments or detailed assessments of their social communication.

Greater collaboration between clinical psychology and educational psychology services is likely to be helpful in meeting the needs of this group. Interventions for disruptive behaviour may not be effective if social communication needs are not appreciated (Fletcher-Campbell & Wilkin, 2003; Fishbein et al., 2006). Specialist provision for ASD needs to be opened up to those children with social communication difficulties with or without a diagnosis of ASD.

5.8 Limitations.

There is clearly a need for replication of these findings, as the present study has a number of limitations that reduce the strength of conclusions that could be drawn

from the available data.

5.8.1 Sample characteristics.

Firstly, the sample sizes in each group are relatively small. Larger effect sizes were anticipated on the basis of previous research; however, it is apparent that the deficits are subtle and larger sample sizes will be required to explore deficits in social cognition. Secondly, the sample of excluded children here are extremely heterogeneous- in ability, in behaviour and in developmental level. Schools were asked to identify children whose behaviour had been of concern over time, and who were considered at high risk of exclusion. Nonetheless, the extent of behavioural difficulties varied across the group. In the absence of educational policy defining behavioural criteria for exclusion, future research should aim to refine inclusion criteria. This may help to reduce variability within groups; alternatively, it may be that children excluded from school are by definition a heterogeneous group.

5.8.2 Selection biases.

A related issue concerns potential selection biases in this sample. Schools were aware of the principal hypotheses of the study before commencing recruitment, and so it is possible that they selected only those children at risk of exclusion who presented with social communication deficits. This seems unlikely for two reasons. Firstly, given the high number of information packs given out by schools (n = 290) it seems highly unlikely that this reflects just the sub-set of children at risk of exclusion presenting with social communication difficulties. Secondly, on visiting schools to

describe the project it was apparent that there was very little awareness of how high-functioning children with ASD might present in classroom situations.

There is also a potential bias in the families who chose to participate in the project. Uptake was extremely low in the excluded group, with a response rate of less than 9%. It is possible that caregivers of children with social communication difficulties were more motivated to participate. Our data cannot exclude this possibility. However, even if this were to be true, it remains the case that none of the children meeting criteria for ASD had been assessed or were waiting to be assessed for social communication difficulties.

5.8.3 Neuropsychological assessment in uncontrolled environments.

Conducting neuropsychological assessments at home inevitably incurs difficulties. Children are potentially more distractible, and there is no guarantee of appropriate testing space being available (particularly in very deprived environments). This is likely to depress scores, particularly on long or challenging tasks. In this study, the effects of this were most apparent on the TEA-Ch, administered last in the battery. It was decided to administer measures in a fixed order in order to ensure that the most crucial data (IQ and social cognition) would be collected in each case. This is likely to explain the missing data for this measure. However, there is no reason to believe that these factors affected performance in the excluded group more than the comparison group.

5.8.4 Caregiver report.

There are also limitations associated with using caregiver / teacher report to reach conclusions about diagnosis. In clinical practice, a diagnosis of ASD should not be made without considering caregiver report, psychometric profile and direct observational assessments of the child (such as the Autism Diagnostic Observational Schedule; ADOS- Lord et al., 1989). Future research might aim to complete the ADOS with children in order to improve confidence in the diagnosis.

5.8.5 Psychopathy.

Children were not screened for the presence of psychopathic traits. It might be argued that the difficulties experienced by the sub-group meeting criteria for ASD could be better explained by psychopathy, as psychopathic traits are associated with deficits in social cognition (Stevens et al., 2001). This seems unlikely for several reasons. Firstly, the prevalence of psychopathy in the general population is extremely low (approximately 1%- Hare, 1993). It is therefore highly unlikely that nine children in our community sample show significant psychopathic traits. Furthermore, individuals with psychopathic traits do not show deficits in mentalising (Richell et al., 2003) and there is concern in the literature that some individuals labelled as psychopathic may in fact have ASD (Solderstrom, Sjodin, Carlstedt, & Forsman, 2004). Including a screening measure in future research would nonetheless allow this possibility to be excluded.

5.9 Conclusion.

This study provides strong support for the hypothesis that a significant sub-group of children excluded from school have unidentified ASD. Although there is a need to replicate these findings, the results of this study suggest that it may be appropriate to consider screening for social communication difficulties among children at risk of exclusion from primary school.

6.0 Tables and Figures.

6.1 Table 1: Means and *SD* for age and IQ scores.

	Mean age in years (*SD*)	**Mean FSIQ (*SD*)**	**Mean VIQ (*SD*)**	**Mean PIQ (*SD*)**
Excluded (*N* = 26)	9.21 (1.81)	93.50 (15.23)	98.19 (16.42)	90.23 (13.88)
Comparisons (*N* = 22)	9.44 (1.69)	105.82 (17.03)	105.73 (16.21)	104.68 (16.31)

6.2 Table 2: Gender and ethnicity demographic data.

	M:F ratio	**Ethnicity (frequency data)**			**No. of children with EAL**
		Afro-Caribbean	**White**	**South Asian**	
Excluded (*N* = 26)	23:3	15	10	1	4
Comparisons (*N* = 22)	18:4	10	11	1	1

6.3 Table 3: SES demographic data.

	% unemployed	% Education			% in social housing	% single carer	% any contact with social service	% any Child Protection concerns	% any contact with CAMHS
		GCSE	FE	University					
Excluded (*N* = 26)	62	77	15	8	81	58	77	58	42
Comparisons (*N*= 22)	22	18	46	36	77	41	5	0	0

6.4 Table 4: CCC subtest descriptions, means and *SD*.

Subscale	Description Gilmour et al. (2004)	Mean (*SD*) Bishop & Baird (2001)
A. Speech	Intelligibility and fluency.	35.13 (1.52)
B. Syntax	Whether the child can produce developmentally appropriate sentences in terms of length and grammar.	31.72 (0.68)
C. Inappropriate Initiation	A measure of impulsivity in language, such as interrupting conversations.	27.16 (2.11)
D. Coherence	Whether the child can talk about past or future events in the relevant time context to increase listener understanding.	35.16 (1.32)
E. Stereotyped Language	The extent to which a child engages in conversations geared to their interests, and produces stereotyped and/or inappropriate phrases.	28.03 (2.14)
F. Use of Context	A measure of the use of context to aid understanding, including understanding of sarcasm and metaphor.	30.48 (1.88)
G. Rapport	The child's ability to start a conversation, use gestures, interpret non-verbal communication and use eye contact appropriately.	32.84 (1.39)
H. Social Relationships	A measure of the child's ability to make and maintain friendships.	32.7 4(1.91)
I. Interests	A measure of the child's tendency to have overriding specific interests.	31.54 (2.11)
PC. Pragmatic Composite	Sum of subtests C-G	153.68 (6.49)

6.5 Table 5: Excluded + ASD group: Performance on neurocognitive measures.

Excluded + ASD	ICD-10 diagnoses	Age (months)	Gender	VIQ	PIQ	Emotion recognition z-scores		Eye Gaze (% correct)	Face recognition (% correct)	Total no. appropriate mentalising responses	Pragmatic Composite	SCI
						Fear	Happy					
Case 1	Atypical autism *	123	Male	87	99	-0.62	-1.51	43.33	71.40	1	125	170.53
Case 9	PDD-NOS *‡	104	Male	107	88	-0.90	0.52	33.33	76.00	1	138	173.53
Case 10	PDD-NOS *	160	Male	80	83	0.69	-0.99	50.00	53.10	1	131	183.60
Case 11	PDD-NOS *	116	Female	99	93	-2.69	0.67	50.00	72.00	2	137	190.10
Case 12	AS * †	88	Male	106	97	-1.66	-0.10	43.33	78.00	0	119	163.22
Case 16	Atypical autism*‡	142	Male	109	107	1.25	-0.34	56.67	86.00	2	130	190.47
Case 18	AS *	126	Male	142	136	-0.31	-3.44	36.67	66.00	2	120	159.87
Case 19	Atypical autism *	124	Male	100	72	-0.62	-1.51	50.00	80.00	3	151	205.20
Case 22	AS *	131	Male	125	109	-1.57	-1.51	63.33	74.00	0	113	177.23
M(*SD*) N = 9	-	**123.78 (20.71)**	-	**106.11 (18.67)**	**98.22 (18.28)**	**-0.71 (1.20)**	**-0.91 (1.27)**	**47.41 (9.40)**	**72.94 (9.38)**	**1.33 (1.00)**	**129.33 (11.65)**	**179.31 (14.50)**
M(*SD*) comparisons N = 22	-	**113.23 (20.23)**	-	**105.73 (16.21)**	**104.68 (16.31)**	**-0.12 (1.05)**	**0.08 (0.82)**	**52.82 (9.66)**	**70.80 (11.26)**	**2.18 (1.71)**	**153.86 (7.13)**	**210.328 (15.12)**

Note. * Also meets criteria for Conduct Disorder † Also meets criteria for Hyperkinesis ‡ Also meets cut-off for attachment concern

6.6 Table 6: TEA-Ch means and *SD* for subtests and factor scores.

		N	Mean (*SD*)
SUBTEST SCORES			
Sky Search Target	excluded	25	8.52 (3.47)
	comparisons	22	10.82 (2.53)
Sky Search Timing Score	excluded	25	6.64 (3.17)
	comparisons	22	7.64 (2.92)
Sky Search Attention Score	excluded	25	6.48 (3.32)
	comparisons	22	7.64 (2.92)
Score!	excluded	25	8.76 (3.30)
	comparisons	22	10.27 (3.48)
Creature Counting- Total	excluded	25	6.48 (3.29)
	comparisons	22	8.91 (3.56)
Creature Counting- Timing	excluded	14	8.50 (4.59)
	comparisons	18	8.61 (3.11)
Sky Search DT	excluded	23	6.83 (5.73)
	comparisons	22	8.00 (4.68)
Map Mission	excluded	24	9.54 (3.24)
	comparisons	22	9.09 (3.49)
Score DT	excluded	24	7.75 (4.40)
	comparisons	22	10.32 (3.41)
Walk, Don't Walk	excluded	23	8.04 (4.13)
	comparisons	22	9.68 (3.33)
Same World Total	excluded	24	7.25 (3.11)
	comparisons	22	9.09 (3.10)
Opposite World Total *	excluded	24	6.88 (3.15)
	comparisons	22	10.00 (3.55)
Code Transmission	excluded	22	7.36 (3.55)
	comparisons	21	7.33 (3.71)
FACTOR SCORES			
Selective Attention	excluded	24	16.13 (6.00)
	comparisons	22	16.73 (5.20)
Attentional Control / Switching	excluded	14	16.21 (6.51)
	comparisons	18	18.83 (5.73)
Sustained Attention	excluded	20	38.20 (13.47)
	comparisons	21	45.62 (11.71)

* significant difference at $p < .05$.

6.7 Table 7: Means and *SD* for Parent CCC ratings.

Scale	Case (*N* = 26)	Control (*N* = 22)
Intelligibility / fluency Mean (*SD*)	33.38 (4.73)	34.73 (1.75)
% in clinical range	23	0
Syntax Mean (*SD*)	30.58 (1.58)	31.45 (0.86)
% in clinical range	19	0
Inappropriate initiation Mean (*SD*)*	24.15 (2.54)	27.77 (2.58)
% in clinical range	8	5
Coherence Mean (*SD*)*	31.35 (2.86)	34.91 (1.41)
% in clinical range †	50	0
Stereotyped Language Mean (*SD*)	24.69 (2.92)	27.45 (2.70)
% in clinical range	12	5
Use of Context Mean (*SD*)*	25.38 (2.94)	30.55 (1.50)
% in clinical range †	50	0
Rapport Mean (*SD*)*	29.12 (3.15)	33.18 (1.33)
% in clinical range	31	0
Social Relationships Mean (*SD*)*	27.69 (3.67)	33.00 (1.20)
% in clinical range †	46	0
Interests Mean (*SD*)	30.69 (3.72)	32.23 (1.93)
% in clinical range	12	0
Pragmatic Composite Mean (*SD*)*	134.69 (10.26)	153.86 (7.13)
% in clinical range †	42	0

Note. Clinically significant impairment is defined as scores falling more than 3*SD* below population means established by Bishop & Baird (2001).

* significant at $p < .001$.

† significant at $p < .001$.

6.8 Table 8: Means, *SD* and z-scores for proportion of correct responses on emotion recognition task.

		Excluded group (*N* = 26)	**Comparison group (*N* = 22)**
Happy	Mean (*SD*)	88.4 2 (15.67)	94.55 (8.58)
	Mean z-score	-0.78 (1.61)	0.08 (0.82)
Surprise	Mean (*SD*)	65.00 (35.36)	65.00 (33.49)
	Mean z-score	-0.76 (2.38)	-0.44 (1.66)
Fear	Mean (*SD*)	41.41 (32.22)	46.82 (24.18)
	Mean z-score	-0.39 (1.28)	-0.12 (1.05)
Sad	Mean (*SD*)	75.77 (14.47)	81.26 (14.91)
	Mean z-score	-0.18 (0.88)	0.29 (0.91)
Disgust	Mean (*SD*)	41.92 (38.58)	43.18 (27.15)
	Mean z-score	0.22 (1.48)	-0.13 (1.17)
Anger	Mean (*SD*)	67.69 (20.46)	74.09 (18.69)
	Mean z-score	-0.46 (1.35)	0.16 (1.03)

Note. Z-scores derived from population data in Lawrence, Bernstein et al. (2006)- see Appendix C.

6.9 Table 9. Means and *SD* for performance on the eye gaze, face recognition memory and mentalising tasks.

		Mean (*SD*)
Eye Gaze Task	Excluded (n = 26)	45.90 (8.45)
	Comparisons (n = 22)	52.82 (9.66)
Face Recognition Memory	Excluded (n = 25)	67.12 (11.28)
	Comparisons (n = 21)	70.81 (11.28)
Appropriate Mentalising Responses *	Excluded (n = 26)	1.27 (1.19)
	Comparisons (n = 22)	2.18 (1.71)

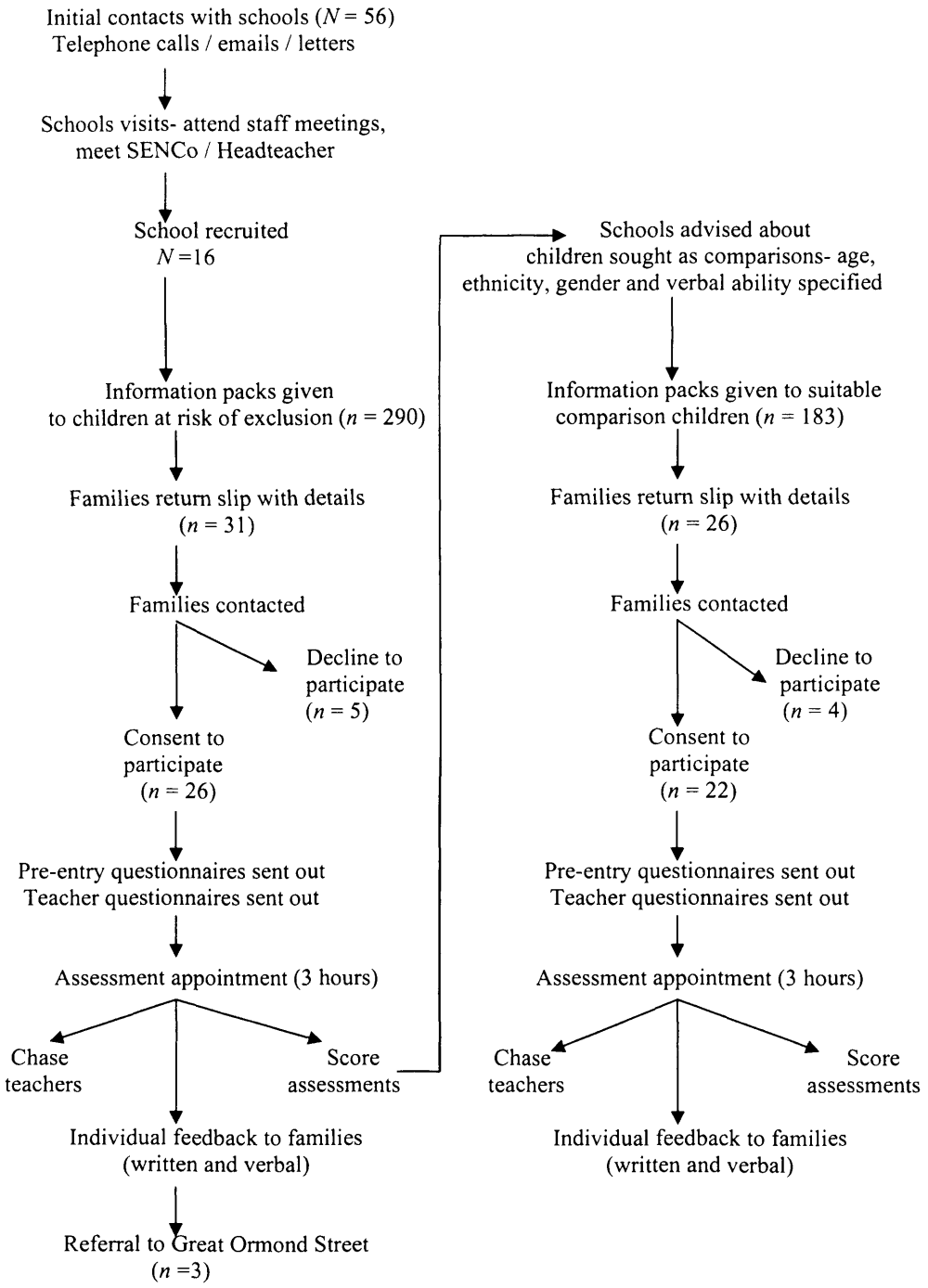
Note. The SASI automatically generates scores for Face Recognition Memory reflecting the number number of correct responses, adjusted for the number presented. This automatically corrects for fewer items being presented or answered by a respondent. Scores shown here have been converted to percentages.

6.10 Table 10: Means and *SD* for the Social Communication Index.

	Excluded group (*N* = 26)	**Comparison group (*N* = 22)**
SCI Mean (*SD*) *	183.16 (12.24)	210.28 (15.12)

* significant difference at $p < .001$.

6.11 Figure 1: Recruitment process.



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Critical Appraisal

1.0 Introduction.

This appraisal uses examples from our meetings with families to draw out central themes arising from the research, reflecting on clinical issues raised by the home visits before considering the implications of the research for clinical and educational practice. It concludes by focusing on how clinical psychology and educational services might work together to meet the needs of excluded children, and sets out some key questions for future research.

2.0 Issues raised by the home visits.

At the outset of the project I naively thought I was relatively experienced in working in deprived areas following 18 months working in very deprived and ethnically diverse boroughs of London. Conscious of my own social and cultural background (White, middle-class, university-educated female) I anticipated noticing differences between my own experiences, opinions and expectations, and those of the families we would meet through the research. This section aims to distil and reflect on those experiences as I approach a career in clinical psychology.

2.1 Managing risk.

The home visits raised issues of risk in many ways. Firstly, many of the participants lived in extremely deprived and run-down council estates with high rates of crime. Although all home visits were completed in pairs, it was not always possible to be sure of a safe location to meet beforehand. Carrying laptops and other expensive equipment for the visits, we were potentially a target for crime. On entering participants' homes, we encountered a number of situations giving cause to consider our own safety (e.g., family members buying illicit drugs during the assessment; reports of family members convicted of violent assault or murder). It was striking that there was rarely any acknowledgement from the families that drug taking or violence were unusual. Such experiences were very much normative in their sub-cultures. For example, one mother calmly stated that her child's father was in prison for "putting a machete in someone's head". The challenge for me was to separate my own thoughts and feelings about such statements from assessing the risk of the

situation. On reflection I do not think we encountered any situations in which either researcher was at significant risk; however, there were several occasions when I was verbally abused or hit by child participants. These experiences led me to more explicitly define how the assessments were conducted in order to reduce this risk. For example, I quickly became clearer about my expectations of the child and took greater care to ensure that the testing environment permitted a quick exit when required. Assessing the personal risk of situations is not covered extensively during clinical training, and, with the exception of forensic settings, is also rarely covered during placements. Considering the increasing shift to community-based mental health services, there may be an increased need for training courses to address this.

Secondly, the home visits raised issues of risk to participating children. Many of the children we assessed had been, or were currently, on the Child Protection Register. We encountered several situations giving cause for concern about child mental health, in particular, one child presented with behaviours associated with emotional and sexual abuse (e.g., faecal smearing- Stower, 2000). Any concerns were raised immediately in supervision, and children referred to services as appropriate. As members of society, and as health professionals, we have a moral and legal responsibility to raise concerns about child safety regardless of how we become aware of them (Children Act; England & Wales Statutes, 2004). This was a sobering reminder of the need to be alert to issues of risk at all times. However, it also challenged my assumptions about what is considered an acceptable and safe environment for a child. Many of the homes we visited were extremely poorly maintained, and it was very common for the child not to have eaten on the day of the assessment. Several children slept on the floor. However, Social Services and the

housing association apparently considered these to be acceptable conditions for a child. I often found myself feeling a combination of anger and sadness on leaving such homes- anger that our society allows children to grow up in such conditions, and sadness at being unable to directly improve the situation.

These experiences provoked one of the most important changes for me personally, a change I both welcomed and found sad: learning not to express shock. Whether the shock was the environment or the experiences of the families, I rapidly learned not to show it. For example, on entering one home we learned that the child's grandfather would have been present, but had gone to his country of origin to bury an elderly sibling, who had been raped and ritually murdered. In another home we heard how a father had left the family to form a new relationship with the underage sister of his partner. Learning not to automatically assume that an experience is perceived negatively by another person taught me a great deal about my own assumptions and prejudices. I found that one of the most helpful responses in these situations was simply to ask 'What was that like for you?' This not only allowed the speaker the opportunity to explain their perspective, but also gave me time to identify, and set aside, my own reactions and assumptions before responding.

2.2 Brief intervention / consultation skills.

Although we completed the visits as researchers, families were aware that we were completing training in clinical psychology. Many families sought advice from us about a range of mental health and behavioural needs: how to access adult counselling; how to set boundaries for children about bedtimes and television; how

to talk to a child about terminal illness, and so on. The question in my mind was always how to provide input given that I would not meet with the family again or provide any tangible support. I was struck by the similarity of this experience to brief consultation on in-patient wards or drop-in centres, and considered what skills might transfer from these situations.

Focusing on strengths proved to be a vital component of these brief interventions. Exploring what resources a person has available and what helps or has helped in the past are key interventions in solution-focused therapy (de Shazer, 1982). Many of the parents we spoke with seemed hopeless about their ability to effect change, despite evidence that they had managed to make substantial changes in their lives. Drawing attention to this often freed the person to think more creatively about current problems. This increase in self-efficacy and self-esteem, however transitory, may have been beneficial to both caregiver and child.

Validating constraints and challenges also proved crucial. Many families commented how helpful it had been for their child to have a youth mentor. However, these projects last for a year at most, and then the positive relationship the child has developed with their mentor is lost. Many parents expressed frustration at this, reflecting on the importance of consistency for their children. One parent commented how unusual it was to have her frustrations simply listened to, not judged or brushed aside. This re-affirms the importance of generic therapeutic process factors over and above particular interventions or strategies (e.g., Martin, Garske, & Davis, 2000).

These brief interventions often helped the caregiver find an alternative explanation or story for struggles in their life. Many of the children in the excluded group had a long history of negative interactions with other individuals and systems. For example, one child angrily told me "You've only come to see me because I'm special needs" betraying a painful view of himself as a 'problem child'. Another child was considered at risk of exclusion because she would seek reassurance from teachers in a way that caused perpetual disruption to classroom management. Providing an alternative interpretation of her behaviour (as an anxiety management strategy) was felt to be helpful by her parents.

I often found myself battling against the urge to refer families to other services. Many of the families were currently in contact with Social Services and had a history of contact with Child and Adolescent Mental Health Services (CAMHS). Some families were involved with many more services, including community policing, the Youth Inclusion Social Project (YISP), Educational Psychology and so on. However, it was far from clear that this was helpful. One parent commented that there were so many people "watching" her, but no-one to help when her son was excluded from school on his first day simply for not having the right uniform. Her experience was not unique. Systemic and psychodynamic models highlight that professionals will often refer families on to other services almost endlessly, as a way of managing or tolerating the anxiety of not being able to help (Miller & Rice, 1967). Although there were often situations in which onward referrals were appropriate, it was always important to reflect on my own motivation for wanting to do so.

2.3 Psychological thinking in deprived environments- resources and goals.

At times I found myself feeling rather cynical about the value of psychological intervention given the levels of deprivation experienced by the families; this prompted me to consider the impact of disadvantage on progress in therapy.

2.3.1 Tangible resources.

Many of the behavioural strategies we might recommend as psychologists presuppose financial and environmental resources- for example, providing rewards for good behaviour or introducing time out. Even recommending to a parent that they remove themselves from aggressive interactions with their child assumes there is somewhere else to go- many of the homes we visited had no internal doors. In contrast, when we met with comparison families, it became clear that these families were coping well despite living in equally deprived circumstances. We characterised the difference between these families in terms of the degree of emotional containment provided by the parent for the child (Bion, 1970) apparent through our own countertransference.

2.3.2 Psychological resources.

As psychologists working with children it is crucial to attend to the personal resources of the parent. My thinking about this issue developed through hearing the experiences of some inspiring individuals. For example, we met with one mother with several children at risk of exclusion. She was a single parent following domestic

violence and the consequent imprisonment of her partner. Despite the challenging behaviour presented by her children, she continued to hold a positive view of her family, describing herself as "blessed to have these children". Another parent told us of how she had overcome her addiction to heroin and felt she had battled for years to demonstrate her competence as a parent before eventually regaining custody of her children. These humbling stories stood in contrast to other, less hopeful stories. One child with markedly hostile and aggressive behaviour was almost obsessively concerned that we should leave the room tidy after the assessment. We subsequently learned that his mother experienced severe Obsessive Compulsive Disorder and had declined all offers of help. His hostile and aggressive behaviour could be understood as a way of managing the anxiety associated with his mother's mental health difficulties.

2.3.3 Models of service provision.

Our experiences indicate there is a need for psychologists to consider financial, environmental and psychological obstacles to change. It is very difficult to get a sense of how difficult a person's everyday life is from the comfort of a consulting room. There are advantages to consulting rooms- they define a safe space in which to think, for example- but there are other models of working that may need to be considered when working in deprived areas. Sure Start initiatives (e.g., Tunstill, Allnock, Meadows, & McLeod, 2002) take a community-based approach to intervention. However, there is evidence that such interventions still fail to reach those families most in need of help (Wiggins, Rosato, Austerberry, Sawtell, & Oliver, 2005). Assertive Outreach models are becoming more common when

working with people with psychosis. Such models argue for the importance of ensuring people's basic needs are met before attempting psychological work- this also helps to build rapport and trust before dealing with more challenging or painful issues. They also emphasise the importance of longer-term, consistent relationships between services and clients- something that many parents were keen for their child to experience. This may well be a more appropriate service model for working with children and families in very deprived areas.

2.4 Remaining conscious of difference.

The children and families who participated in this research were very diverse- in ethnicity, religion and socio-economic status. This impacted on our assessments in many ways.

2.4.1 Cultural differences.

There were marked cultural differences in the extent to which caregivers recalled details about developmental milestones. We found that European and Caribbean families tended to recall this information, whereas West and Central African families tended to be somewhat bemused by these questions and indicated only whether the child's development was 'normal' or 'not normal'. This had an impact on how the psychiatric interviews proceeded, with particular care needed to elicit evidence for typical or atypical development. Similarly, we found differences in how particular child behaviours are perceived in different cultures. West and Central African families tended to be more tolerant of rough play in boys, frequently commenting on

how this is helpful for boys in developing strength and "toughness". In such families, there tended to be disagreement between caregivers and schools about their child's behaviour, with schools usually stating that the child behaved aggressively during free play.

2.4.2 Gender differences.

There were also differences apparent between male and female caregivers. It was our experience that fathers tended to provide less detail about their child than mothers, tended to be more definitive in their response style, and tended to be more tolerant of aggression and rough play. It was difficult to disentangle these differences from the cultural differences described above. Some fathers also seemed to identify with the difficulties their child experienced- for example, one father who commented "but that's just how I am" when describing his son's autistic behaviours. This may have affected how they rated their child's behaviour, through the value placed on particular behaviours and expectations about the consequences of the behaviour.

2.4.3 Capturing difference in research.

Our sample was relatively small, and there is clearly a need to be mindful that such differences are generalisations. As such, it is always important to attend to how each individual describes their experiences. However, it is not always possible to capture these subtleties, particularly when using standardised instruments and quantitative analyses. I was reminded of the importance of triangulation (e.g., Elliott, Fisher, & Rennie, 1999) in assessment- attempting to capture the same concept or phenomenon

from different perspectives or using different measures. This was built into the design of the study, assessing social communication skills through parent report, teacher report, and through direct assessment of the child. However, the value of triangulation presupposes good reliability and validity of measures. Many psychological measures are developed using exclusively white, middle-class participants, and care is needed when interpreting findings from other populations. Although there is increasing recognition of this Western bias in psychology (e.g., Sue, 1999) there is a need for more sustained efforts at redressing the balance and attending to the similarities and differences between cultures. This will require greater creativity and effort to engage people from different cultures in research, to convey the value attached to their participation and the wider impact that this will have on issues of discrimination.

2.5 Recruiting 'hard-to-reach' populations.

We found a number of strategies helpful in recruiting participants from other cultures and from deprived backgrounds. Uptake from information packs was very low- just 8% in the excluded group and 12% in the comparison group. Schools provided us with some of the most helpful ideas about why this might be. For example, many caregivers had extremely low literacy levels. One school managed this issue by meeting individually with parents to explain the project. This highlights the importance of building positive contacts with members of the community being recruited. Schools also suggested that many families thought the project was interesting but were intimidated at the prospect of someone visiting their home and asking complicated questions. This emphasised the value of visibility and

approachability in recruiting hard-to-reach groups. We started spending time in school playgrounds at the end of the day, talking to parents and handing out information packs to interested families. It was our experience that once families gave us their contact details, they were very likely to participate (just 9 of 57 families later declined to participate). We were initially concerned that this strategy could be experienced as coercive, considering the differences in social power (e.g., SES, education) between ourselves and participating families. As a result, we never arranged appointments in playgrounds but instead provided more information and called a few days later to find out if families were interested. On reflection I feel that this strategy was successful because it offered families the opportunity to judge whether we were trustworthy and approachable people. Similar processes have been described in Sure Start initiatives, in which psychologists spend time in community settings partly to demystify and destigmatise psychology (Tunstill et al., 2002).

3.0 Implications for clinical and educational policy and practice.

Data from the current study suggest that over 40% of children with disruptive behaviour, at risk of exclusion from school, have clinically significant difficulties with pragmatic language. Furthermore, over 34% meet ICD-10 criteria for ASD. These startling findings have significant implications for the role of clinical psychology in working with children at risk of exclusion, as well as for educational policy and practice.

3.1 Screening for ASD.

Based on these findings, one obvious recommendation might be to introduce routine screening in primary schools. Screening may be defined as a "public health service offered to a defined population, where the participants or those around them do not necessarily perceive that they have a disorder" (Williams & Brayne, 2006). The aim is to identify those likely to benefit from further investigation and / or intervention.

3.1.1 Criteria for evaluating screening programmes.

The National Screening Committee (2000) sets out four criteria against which any potential screening programme should be evaluated: the nature of the condition; the measures used to evaluate it; what interventions are available and whether they are effective; and whether the screening programme is effective in reducing the negative impact of the condition. Several recent reviews have concluded that screening for ASD is not currently justified (e.g., Gray, 2004; Williams & Brayne, 2006). These

reviews focus on the lack of conceptual clarity about ASD, lack of a suitable measure and lack of evidence for effective interventions.

3.1.2 Conceptual issues in ASD.

There is ongoing debate regarding whether a categorical or dimensional classification approach is appropriate for ASD. Some reviews suggest that it may not be possible to screen for a dimensional disorder, since capturing the heterogeneity might mean reducing specificity (Williams & Brayne, 2006).

3.1.3 Screening measures.

Identifying a suitable screening tool is a central and unresolved issue. The National Screening Committee (2000) state that a measure must be (1) designed for use in educational / primary care setting, (2) have a cut-off score and be validated against standard diagnostic tools or clinical diagnosis, and (3) possess good sensitivity, specificity and positive predictive value, as evaluated in the general population. Williams and Brayne (2006) argue that there is currently no screening tool for ASD meeting these criteria. The current study found that combining scores from pragmatic language assessments and measures of social cognition to form the Social Communication Index (SCI) discriminated well between excluded and non-excluded children, and between ASD and typically developing children. However, this index would require considerably greater investigation to determine appropriate cut-off scores before considering whether it might function as a screening tool.

3.1.4 Interventions.

There is little conclusive evidence for effective intervention for ASD (e.g., Bassett, Green & Kazanjian, 2000; Hwang & Hughes, 2000; Williams & Brayne, 2006), although adaptations in environment and interactions may be helpful in managing behaviour. Furthermore, there is very little research exploring the effectiveness of educational interventions for disruptive behaviour (Fletcher-Campbell & Wilkin, 2003). Both literatures are dominated by clinical opinion and anecdotal evidence, rather than on methodologically sound research studies. The research studies that are available focus on short term, often subjective, outcomes. Short-term improvements in behaviour are clearly crucial for teachers; however, longer-term improvements in social inclusion (e.g., likelihood of gaining and maintaining employment) are likely to be of greater value to the child and family.

Most educational interventions for primary age children focus on maintaining the child within mainstream settings, although some children will eventually be placed in Pupil Referral Units (PRU). One widely practiced intervention is 'Circle Time' (Mosely & Tew, 1999), regular sessions when children have the opportunity to reflect on their experiences in smaller groups. The aim is to increase empathy and combat bullying by increasing understanding of different perspectives (Fletcher-Campbell & Wilkin, 2003). Observational studies suggest that introducing circle time can reduce the incidence of severely disruptive behaviour and improve pupils' self-confidence (Kelly, 1999). It is self-evident that the needs of a child with deficits in mentalising and / or attentional control would be very different from the needs of a typically developing child in such a group. These deficits are commonly found in

children with ASD, and, as this study suggests, in a sub-group of children with conduct problems. Children with mentalising deficits are likely to require additional supports to think about the mental states of others- for example, using 'thought bubbles' helps to promote perspective taking in children with ASD (Kerr & Durkin, 2004). With such supports in place, circle time interventions have the potential to help support the development of children with social communication deficits in mainstream education.

Assertive discipline, a package of behavioural management strategies, focuses on teacher behaviour that increases time spent on-task and decreases time spent on disruptive behaviour (Canter & Canter, 1976). It emphasises the importance of clearly specified codes of conduct, unambiguous positive feedback for following rules, and a hierarchy of sanctions for rule-breaking which are implemented consistently. The approach needs to be adopted by the entire school so that children are always clear about what is expected from them. Implementing this approach increases on task behaviour, increases the frequency of praise, and decreases frequency of disruption (Swinson & Melling, 1995). The emphasis on consistency and clear boundaries is in agreement with many behavioural approaches for ASD (DfES, 2002). However, the challenge for schools is to ensure that expectations and consequences are always consistent; children with ASD may not be able to respond appropriately to one-off lapses in implementation of rules, and indeed may find such apparently inexplicable changes highly anxiety-provoking and distressing. Challenging behaviour is far more likely under such circumstances.

PRUs provide education for pupils on permanent and fixed term exclusions, with an emphasis on basic literacy, numeracy and life skills. The central aim is to prepare children and schools for re-integration back to the mainstream. Provision in PRUs has been the subject of considerable criticism in the past decade (e.g., Office for Standards in Education, 1995; Parsons, 1996). Despite this, there continues to be very little independent evaluation of services and effectiveness for primary age children. Studies focusing on children's experiences of PRUs highlight increased awareness of appropriate behaviour and optimism about returning to school as key indicators of successful reintegration (Hayden & Ward, 1996). There is currently no evidence available to help understand what aspects of PRU provision might be helpful or unhelpful to children with social communication difficulties. However, it seems plausible that smaller group teaching, with an emphasis on one-to-one relationships and regulating behaviour, would be crucial. Due to pragmatic language difficulties, many children with social communication difficulties require one-to-one support in order to ensure that instructions are understood and followed appropriately. Furthermore, such children may need external support to remain on-task, rather than being distracted by rituals or specific interests, and to form positive peer relationships. The value of this support for all excluded pupils has been repeatedly emphasised, however, such individualised support systems are not always easy to accommodate in mainstream schools (GEST Programme, 1999). This issue is highlighted by Kinder et al. (2000), who note that the success of PRU interventions should be judged by the number of children who remain in school following reintegration, rather than just the numbers reintegrated per se. It appears that if children with conduct problems and ASD are to be meaningfully included in the

mainstream, then services may need to be more flexible and creative in their approach.

3.1.5 Outcome measurement.

It may also be helpful to consider alternative outcome measures when evaluating the usefulness of screening and interventions. Recent reviews consider only how interventions affect aspects of social functioning, and do not consider the impact of diagnosis on likelihood of negative social outcomes, such as exclusion (e.g., Gray, 2004; Williams & Brayne, 2006) Since exclusion from school is associated with a host of other negative outcomes (e.g., imprisonment), there seems little justification for not considering likelihood of exclusion as an outcome.

3.1.6 What kind of screening programme?

Most reviews (e.g., Gray, 2004; Williams & Brayne, 2006) focus on primary screening- universal screening for a particular disorder- and do not address the validity of secondary screening, where only groups known to be at higher risk for a disorder are screened. Our data suggest that children excluded from school are significantly more likely than peers to meet ICD-10 criteria for ASD. Furthermore, they are also significantly more likely to demonstrate clinically significant impairments in pragmatic language skills- this replicates several existing studies (e.g., Geurts et al., 2004; Gilmour, Hill, Place, & Skuse, 2004). As such, they represent a group at higher risk for ASD, and secondary screening may be appropriate. Furthermore, concerns about reduced specificity due to the dimensional

nature of ASD (Williams & Brayne, 2006) are less applicable when screening at-risk groups, compared to general population screening (O'Toole, 2000).

3.2 Raising awareness of ASD.

Alternative approaches to screening emphasise increasing awareness in educational and healthcare services, such that individuals exhibiting behaviours associated with ASD would be more readily referred for detailed specialist assessment. It is argued that this approach avoids potential negative outcomes associated with false positives- that is, wrongly identifying children as having ASD- such as increased parental anxiety and social stigma (Williams & Brayne, 2006). It was our experience that there was little awareness amongst many teachers about how a high-functioning child with ASD would present in the classroom. Interventions focusing on increasing awareness are likely to be helpful whether or not routine screening is adopted. There are now specialist materials available to help teachers understand the behaviour of children with ASD in classroom settings (Skuse & Chilvers, 2006).

3.3 Developing links between clinical psychology and educational services.

Promoting links between clinical psychology and educational services will be helpful in increasing awareness of ASD and the impact on education. Community Mental Health Nurses (CMHN) now provide input to Pupil Referral Units in some London boroughs. This is a positive development that recognises the complex interaction between mental health and academic attainment. Such CMHNs are also uniquely placed to promote links between education and mental health services; however,

there is a need for outreach services to mainstream schools. Fostering a greater understanding of the impact of mental health in mainstream education has the potential to reduce the number of exclusions: evidence suggests that children whose Special Educational Needs (SEN) are recognised are less likely to be excluded than those children with unrecognised SEN (DfES, 2005).

There is also a need to promote better understanding of neuro-developmental disorders. A recent campaign by the National Autistic Society (Barnard, Prior & Potter, 2000) highlights that children with autism are significantly more likely to be excluded from school than their peers. It is likely that the rates of exclusion are far higher for those children with social communication difficulties, but without a formal diagnosis of ASD, such as the children identified in this study. However, promoting understanding of developmental disorders will require far more than providing education and information. Traditionally, child mental health and child development are viewed as separate specialities, manifest in the division of services between CAMHS and Child Development Teams (CDT). This separation is also apparent in the child psychology literature, and in clinical psychology training. Insufficient attention has been paid to the interaction between the two specialities. Our experience with the children in this study suggests that this may lead to a number of inappropriate consequences and unmet needs. A child's psychological needs may lead to their developmental needs being overlooked. For example, one child at risk of exclusion had experienced severe neglect in his early years, and showed a number of attachment-disordered behaviours (e.g., over-familiarity with strangers) as well as low self-esteem (e.g., tearing up all his school work). However, he also displayed marked speech articulation difficulties that were only identified at seven years of age.

Alternatively, a child's developmental needs may lead to their psychological needs being overlooked. One boy whose educational attainment was poor also showed evidence of anxiety and depression associated with his mother's terminal illness, and yet was not receiving any psychological support around these issues. Many children displaying the most extreme challenging behaviour showed a combination of developmental and mental health difficulties. For example, one child who showed extremely violent behaviour in school was found to meet criteria for Asperger Syndrome and also evidenced low self-esteem and depression associated with reduced contact with a non-resident parent.

Many of these families had long histories of contact with CAMHS services, and yet as far as we were able to ascertain had never been assessed for developmental or neurocognitive difficulties. It seems unlikely that clinical psychology will be able to raise awareness of the interaction between developmental and mental health disorders unless the division in services and literatures is addressed within the profession first. There are encouraging signs that this may be beginning- for example, there is increasing interest in the links between neuropsychology, neuroscience and education (Goswami, 2006). Although this literature is in its infancy, it is likely to promote more individualised understanding of the links between neuropsychological profiles, psychological well-being and educational attainment. Such work may also help to refine interventions for children with ASD, based on their very differing needs and abilities. In turn, this may help to address some of the concerns regarding screening programmes, by providing evidence that identifying difficulties can help promote better outcomes.

4.0 Developing a screening process.

This appraisal has argued for greater integration between clinical psychology and educational services, drawing on mental health, developmental and educational models of practice to help meet the needs of this challenging group. In this concluding section I outline how this might work in practice, and what further work is required to refine this process.

Children excluded from primary school are a highly heterogeneous group- in age, ability, ethnicity, and crucially in their social communication and social cognition. A sub-group of these children may have previously unidentified ASD. Many also present with complex mental health and social care needs. This means that a 'one-size-fits all' approach to assessment and / or intervention is unlikely to be helpful. Furthermore, the range of outcomes measured will need to be equal to the variation within the group in order to begin evaluating the long-term impact of interventions.

4.1 A secondary screening strategy.

Children considered at risk of exclusion, and / or showing significant disruptive behaviour, and / or meeting criteria for Conduct Disorder, could be screened routinely either in school or in healthcare settings. If the measures used in this study proved to reliably discriminate between groups, screening might simply consist of questionnaires completed by parents, and brief computerised measures of mentalising / social cognition. Such a battery would take no more than 30 minutes to complete, and could be administered by any suitably trained healthcare or education

worker. Interpretation would ideally be provided by clinical psychology in conjunction with educational psychology services to determine whether further, more detailed evaluation of social communication abilities was warranted. If so, such an evaluation could then proceed jointly, with clinical psychology / psychiatry assessing for the presence of ASD, whilst educational psychology services explored attainments and considered what support might be available locally. This might mean that children with social communication difficulties, but without a diagnosis of ASD, could have access to the specialist educational support available to children with a diagnosis (DfES, 2002).

4.2 Taking it forward: directions for research.

This is an ambitious process, and clearly extrapolates ahead of the data currently available. Nonetheless, it could be viewed as a framework within which to target future research, namely:

1. Can the finding that over 34% of children excluded from school meet criteria for ASD be replicated: in other areas of the country, by other researchers?
2. Can these children be reliably distinguished from the wider conduct disordered population, to such an extent that the risks of screening programmes (e.g., parental anxiety from false positives) are outweighed by the potential benefits?
3. Can early identification of ASD be shown to reduce the likelihood of exclusions? Can it also be shown to have other positive benefits, such as improved self-esteem or improved educational attainment?

4. Can the benefits to the child, and to society as a whole, justify the increased costs of such multi-agency processes?

5. 0 Conclusion.

This research has had a significant impact on me, both personally and professionally. Meeting with these families and having the opportunity to reflect on the struggles they face has been invaluable. I am grateful to them for the willingness with which they shared their experiences. Furthermore, the findings of the research suggest that there may be new ways to approach the challenges posed by children excluded from primary school, and exciting possibilities to think differently about how services meet their needs. The contribution of these families therefore has the potential to help many more children facing similar difficulties. It is to be hoped that the findings of the research can be taken forward so that their contribution can be valued by others outside the project: perhaps even by those with the power to effect change.

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Appendix A: Ethics.

A1. Ethical approval letter.

Institute of Child Health
and Great Ormond Street Hospital for Children NHS Trust
UNIVERSITY COLLEGE LONDON

30 Guilford Street, London, WC1N 1EH. Telephone: 020 7242 9789 Fax: 020 7905 2201

The child first and always

3rd September 2003

Dr J Gilmour
Behavioural and Brain Sciences Unit
ICH

Dear Dr Gilmour,

Title: **The detection, measurement and treatment of social communication disorders among children excluded from school**

R&D registration number:
Protocol number/version: **N/A**

Notification of ethical approval

The above research has been given ethical approval after review by the Great Ormond Street Hospital for Children NHS Trust / Institute of Child Health Research Ethics Committee subject to the following conditions.

1. Your research must commence within twelve months of the date of this letter and ethical approval is given for a period of thirty-six months from the commencement of the project. If you wish to start the research more than twelve months from the date of this letter or extend the duration of your approval you should seek Chairman's approval.
2. You must seek Chairman's approval for proposed amendments to the research for which this approval has been given. Ethical approval is specific to this project and must not be treated as applicable to research of a similar nature, eg. using the same procedure(s) or medicinal product(s). Each research project is reviewed separately and if there are significant changes to the research protocol, for example in response to a grant giving body's requirements you should seek confirmation of continued ethical approval.
3. Researchers are reminded that REC approval does not imply approval by the GOS Trust. Researchers should confirm with the R&D office that all necessary permissions have been obtained before proceeding.

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4. It is your responsibility to notify the Committee immediately of any information which would raise questions about the safety and continued conduct of the research.
5. On completion of the research, you must submit a report of your findings to the Research Ethics Committee. You may also be required to submit annual reports.
6. Specific conditions pertaining to the approval of this project are:
   - The use of the enclosed standard consent forms for the research. A copy of the signed consent form must be placed in the patient's clinical records and a copy must be kept by you with the research records.

Yours sincerely

Laura Howe

A2: Consent form.

REC No. 01BS09 Version 1, dated 3-Sep-03

Great Ormond Street Hospital for Children NHS Trust and Institute of Child Health Research Ethics Committee

Consent Form for PARENTS OR GUARDIANS of Children Participating in Research Studies

Title: The detection, measurement and treatment of social communication disorders among children excluded from school

NOTES FOR PARENTS OR GUARDIANS

1. Your child has been asked to take part in a research study. The person organising that study is responsible for explaining the project to you before you give consent.

2. Please ask the researcher any questions you may have about this project, before you decide whether you wish to participate.

3. If you decide, now or at any other stage, that you do not wish your child to participate in the research project, that is entirely your right, and if your child is a patient it will not in any way prejudice any present or future treatment.

4. You will be given an information sheet which describes the research project. This information sheet is for you to keep and refer to. ***Please read it carefully.***

5. If you have any complaints about the way in which this research project has been or is being conducted, please, in the first instance, discuss them with the researcher. If the problems are not resolved, or you wish to comment in any other way, please contact the Chairman of the Research Ethics Committee, by post via The Research and Development Office, Institute of Child Health, 30 Guilford Street, London WC1N 1EH or if urgent, by telephone on 020 7905 2620 and the committee administration will put you in contact with him.

CONSENT

I/We _____, being the parent(s)/guardian(s) of _____ agree that the Research Project named above has been explained to me to my/our satisfaction, and I/We give permission for our child to take part in this study. I/We have read both the notes written above and the Information Sheet provided, and understand what the research study involves.

SIGNED (Parent (s)/Guardian (s))	**PRINTED**	**DATE**
SIGNED (Researcher)	**PRINTED**	**DATE**

REC No. 01BS09 Version 1, dated 3-Sep-03

A3: Assent form.

Great Ormond Street Hospital for Children NHS Trust and Institute of Child Health Research Ethics Committee

Assent Form for CHILDREN Participating in Research Studies

Title: The detection, measurement and treatment of social communication disorders among children excluded from school

NOTES FOR CHILDREN

1. You have been asked to take part in some research. The person organising that study must explain the project to you before you agree to take part.

2. Please ask the researcher any questions you like about this project, before you decide whether to join in.

3. If you decide, now or at any other time, that you do not wish to be involved in the research project, just tell us and we will stop the research. If you are a patient your treatment will carry on as it would normally.

4. You will be given an information sheet which describes the research. This information is for you to keep and refer to at any time. *Please read it carefully.*

5. If you have any complaints about the research project, discuss them with the researcher. If the problems are not resolved, or you wish to comment in any other way, please contact the Chairman of the Research Ethics Committee, by post via The Research and Development Office, Institute of Child Health, 30 Guilford Street, London WC1N 1EH or if urgent, by telephone on 020 7905 2620 and the committee administration will put you in contact with him.

ASSENT

I _____ agree that the Research Project named above has been explained to me to my satisfaction, and I agree to take part in this study.

I have read both the notes written above and the Information Sheet about the project, and understand what the research study involves.

SIGNED	**PRINTED**	**DATE**
---	---	---
SIGNED (Researcher)	**PRINTED**	**DATE**
---	---	---

A4: Information sheet for caregivers.

Parent Information Sheet.

The detection, measurement and treatment of social communication disorders among children excluded from school.

Aim.
We think that some children who get into trouble at school may have a previously unidentified social communication disorder. The disorder means they have difficulty using and understanding language and getting along with people. Some of these children may have been excluded or are at risk of exclusion from school.

Why is the study being done?
We want to screen children who are at risk of exclusion or have been excluded from school. We think some of these children may have features of the disorder we are investigating. We will offer children and their families who we identify as being affected in the course of this study, specialised support and treatment. We will also help teachers in school understand the sort of problems that these children have. The support and treatment we have in mind is specialised. The treatment for children with *general* behavioural difficulties is unlikely to be as helpful to the particular children we identify.

How is the study to be done?
Two research workers will visit you at home. If you prefer you can come to the hospital for a few hours. If you choose to come to the hospital, we will pay your and your child's travel expenses. We will set up the appointment at a time that suits you. It will last a few hours and usually only one appointment will be necessary.

During the appointment one research worker will talk to you about how your child is getting along. In particular we will want to discuss language and social relationships. At the same time, the other research worker will do a number of different games and puzzles with your child.

We will also ask your permission to contact your child's school (even if your child has been permanently excluded from school). We will ask school teachers to complete questionnaire about similar topics to the ones you discussed with the research worker during your appointment.

What are the risks and discomforts?
There are no discomforts associated with the assessments we are doing. Children usually enjoy doing the games and puzzles.

There is a chance that in the course of the assessment, we will find that your child has a previously unidentified disorder. If we think your child is affected, we will offer specialised treatment and support.

Who will have access to the case/research records?
Only the researchers and a representative of the Research Ethics Committee will have access to the data collected during this study.

The use of some types of personal information is safeguarded by the Data Protection Act 1998 (DPA). The DPA places an obligation on those who record or use personal information, but also gives rights to people about whom information is held. If you have any questions about data protection, contact the Data Protection officer via the switchboard on 020 7405 9200 extension 5217.

What are the arrangements for compensation?
This research has been approved by an independent Research Ethics Committee who believe that it is of minimal risk to your child. However, research can carry unforeseen risks and we want you to be informed of your rights in the unlikely event that any harm should occur as a result of taking part in this study.

No special compensation arrangements have been made for this project but you have the right to claim damages in a court of law. This will require you to prove a fault on the part of the Hospital and/or any manufacturer involved.

What are the potential benefits?
In time, more excluded children may be screened as a matter of course, to assess for the disorders we are investigating. Specialised treatment and support is available in the NHS, if a child is properly identified as having the disorder in the first place. Ultimately some of these children may be able to stay in mainstream school, rather than attend schools for children with special educational needs which are more expensive to run.

Do I have to take part in this study?
If you decide, now or at a later stage, that you do not wish to participate in this research project, that is entirely your right and will not in any way prejudice any present or future treatment.

Who do I speak to if problems arise?
If you have any complaints about the way in which this research project has been, or is being conducted, please, in the first instance, discuss them with Dr Jane Gilmour. If the problems are not resolved, or you wish to comment in any other way, please contact the Chairman of the Research Ethics Committee, by post via the Research and Development Office, Institute of Child Health, 30 Guilford Street, London WC1N 1EH, or if urgent, by telephone on 020 7905 2620 and the Committee administration will put you in contact with him.

Details of how to contact the Researcher.
Dr Jane Gilmour can be contacted by telephone (020 7831 0975) or by post at: The Brain and Behavioural Sciences Unit, The Institute of Child Health.

A5: Information sheet for excluded children.

Child Information Sheet

The detection, measurement and treatment of social communication disorders among children excluded from school.

Aim.

We think that some children who are getting into trouble with their teacher and classmates at school might have a special type of problem. The problem means that might find it difficult to talk to other children or understand what they are saying. They may also have problems getting along with other people. Children with this type of problem can't help it, but nobody may know yet that they have these difficulties.

Why is the study being done?

There are special ways to help children with these types of difficulties. If we can find out which children have the problems in the first place, we may be able to help them keep out of trouble.

What will happen?

If you take part, we will come and see you at home or you will be invited to come to see us for a morning or afternoon.

You will be asked to do lots of different games and puzzles. Children usually enjoy doing them.

A6. Information sheet for comparison children.

Child Information Sheet

The detection, measurement and treatment of social communication disorders among children excluded from school.

Aim.

We want to talk to children, like you, who are getting along well in school.

We know that you are not getting into trouble at school but we think that some children who *are* getting into trouble might have a special type of problem. The problem means that might find it difficult to talk to other children or understand what they are saying. They may also have problems getting along with other people. Children with this type of problem can't help it, but nobody may know yet that they have these difficulties.

Why is the study being done?

There are special ways to help children with these types of difficulties. If we can find out which children have the problems in the first place, we may be able to help them keep out of trouble.

What will happen?

If you take part, we will come and see you at home or you will be invited to come to see us for a morning or afternoon. You will be asked to do lots of different games and puzzles. Children usually enjoy doing them.

We need to know how children who are getting along well at school, do in these games and puzzles. That is why we have asked you to take part.

Appendix B: Teacher CCC data.

	Excluded (N = 25)	Comparisons (N = 21)
Intelligibility / fluency Mean (*SD*)	33.32 (4.39)	34.24 (1.89)
% in clinical range	16	5
Syntax Mean (*SD*)	30.76 (1.62)	31.67 (0.66)
% in clinical range	16	0
Inappropriate initiation Mean (*SD*)*	25.32 (2.69)	28.24 (1.09)
% in clinical range	8	0
Coherence Mean (*SD*)	33.32 (3.33)	34.38 (2.25)
% in clinical range	24	19
Stereotyped Language Mean (*SD*)	26.04 (3.45)	28.62 (1.86)
% in clinical range	16	0
Use of Context Mean (*SD*)*	27.24 (2.74)	30.19 (2.34)
% in clinical range	20	5
Rapport Mean (*SD*)	30.28 (2.99)	31.52 (2.40)
% in clinical range	20	19
Social Relationships Mean (*SD*)*	26.76 (3.85)	31.86 (2.92)
% in clinical range	56	14
Interests Mean (*SD*)	30.84 (2.10)	30.71 (1.88)
% in clinical range	0	0
Pragmatic Composite Mean (*SD*)*	142.20 (11.84)	152.95 (7.28)
% in clinical range	20	0

Note. Clinically significant impairment was defined as scores falling more than 3 *SD* below population means provided by Bishop & Baird (2001).No significant group differences were observed between parent and teacher ratings on CCC subscales or on the pragmatic composite for both mean and percentage in clinical range ($p < 0.01$). Furthermore, the pragmatic composite scores are highly correlated ($r = 0.45$, $p < 0.01$).

* significant at $p < 0.001$

Appendix C: Normative data for SASI emotion recognition task.

Age (Years, months)		Happy (% accuracy) Mean (*SD*)	Surprised (% accuracy) Mean (*SD*)	Fearful (% accuracy) Mean (*SD*)	Sad (% accuracy) Mean (*SD*)	Disgusted (% accuracy) Mean (*SD*)	Angry (% accuracy) Mean (*SD*)
6,0-6,11	Males (n = 24)	83.33 (16.06)	56.67 (33.19)	39.68 (22.47)	75.83 (15.01)	30.00 (27.35)	70.42 (24.40)
	Females (n = 25)	95.60 (8.70)	64.80 (33.31)	40.40 (29.65)	82.80 (18.15)	34.80 (32.03)	82.40 (17.86)
7,0-7,11	Males (n = 19)	90.53 (15.08)	48.95 (36.65)	50.47 (30.38)	85.26 (16.11)	24.21 (27.55)	78.42 (17.08)
	Females (n = 24)	95.00 (7.80)	71.94 (32.58)	50.00 (25.02)	83.33 (13.41)	33.38 (29.10)	78.75 (19.41)
8,0-8,11	Males (n = 20)	88.50 (22.31)	73.50 (30.83)	46.00 (28.73)	69.00 (23.15)	38.00 (19.08)	66.00 (25.63)
	Females (n = 25)	98.40 (3.74)	72.00 (24.66)	50.22 (22.39)	79.20 (18.01)	42.40 (24.71)	73.49 (20.48)
9,0-9,11	Males (n = 23)	96.09 (7.83)	70.43 (34.44)	53.43 (22.20)	76.09 (16.99)	40.00 (25.94)	75.65 (13.08)
	Females (n = 25)	96.76 (4.83)	83.38 (16.30)	54.00 (16.33)	77.20 (13.70)	56.40 (30.40)	73.20 (19.30)
10,0-10,11	Males (n = 24)	97.83 (5.18)	83.48 (10.71)	49.86 (31.82)	76.96 (20.10)	42.37 (25.58)	70.87 (15.35)
	Females (n = 25)	96.80 (7.48)	89.60 (12.41)	52.62 (26.97)	72.80 (15.42)	62.00 (25.66)	75.20 (17.59)
11,0-11,11	Males (n = 27)	92.96 (8.69)	79.63 (18.70)	65.56 (19.48)	72.96 (19.38)	52.59 (26.97)	72.22 (20.06)
	Females (n = 25)	96.25 (6.47)	91.25 (15.69)	55.83 (27.33)	74.58 (15.03)	67.82 (26.66)	71.62 (15.17)
12,0-12,11	Males (n = 25)	96.40 (6.38)	80.80 (19.56)	55.20 (23.30)	78.40 (16.75)	61.60 (26.56)	67.20 (20.11)
	Females (n = 17)	99.41 (2.43)	82.35 (12.51)	64.31 (22.07)	80.00 (10.61)	61.18 (23.15)	78.82 (15.76)
13,0-13,11	Males (n = 25)	96.80 (6.90)	85.60 (13.25)	56.80 (19.09)	77.60 (17.86)	61.20 (24.55)	72.80 (16.96)
	Females (n = 20)	94.62 (8.64)	87.53 (14.86)	62.63 (23.30)	71.99 (13.51)	73.23 (19.88)	76.32 (17.07)

Note. From *Age, gender and puberty influence the development of facial emotion recognition,* by K. Lawrence, D. Bernstein , et al., 2006, manuscript submitted for publication. Adapted with permission. Normative data for ages 14-16 years are omitted for brevity.