A case-control study of offenders with high functioning autistic spectrum disorders

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Abstract

Although a number of case reports have suggested that some people with autistic spectrum disorders (ASDs) commit criminal offences, and that core cognitive characteristics may be associated with this vulnerability, the possibility has not been investigated. The exploratory study described in this paper examined whether the cognitive impairments of people with ASDs are associated with their vulnerability to offending. Groups of 21 adults with ASDs and a history of offending, 23 adults with ASDs and no history of offending, and a general population group of 23 people without ASDs were compared on established measures of those aspects of cognition known to be impaired in both people with ASDs and offenders: theory of mind, executive function, and emotion recognition. Compared with their non-offending peers, the ASD offenders showed a significantly greater impairment in recognition of emotional expressions of fear, but no difference in theory of mind, executive function, and recognition of facial expressions of sadness. It is proposed that a small group of people with ASDs may be co-morbid for autism and developmental disorders of antisocial behaviour, and that this might be related to their vulnerability to criminal offending.

Keywords: *ASDs, mental disorders, offending, empathy, executive function, theory of mind*

Introduction

More than a decade ago, the *Review of Services for Mentally Disordered Offenders* (Department of Health, 1992) concluded that, in order to

develop services to meet the needs of offenders with autistic spectrum disorders (ASDs), research was required focusing on the factors contributing to their vulnerability to criminal activities. This was revisited by the Department of Health in a further report (Holland, Clare, Baron-Cohen, & Woodbury-Smith, 2000). ASDs describe a group of syndromes of behavioural development characterised by qualitative impairments of reciprocal social interaction and communication and restricted and repetitive patterns of behaviour. The group is heterogeneous but offenders are usually more able: men and women with high functioning autism or Asperger Syndrome. Unfortunately, however, the research published so far has been limited, comprising single case reports and case series (Baron-Cohen, 1988; Barry-Walsh & Mullen, 2004; Chesterman & Rutter, 1993; Chen et al., 2003; Mawson, Grounds, & Tantam, 1985; Murrie, Warren, Kristiansson, & Dietz, 2002; Palermo, 2004; Silva, Ferrari, & Leong, 2002) and investigations of the small number of men and women detained in high secure psychiatric facilities in England (the 'special hospitals'; Hare, Gould, Mills, & Wing, 1999; Scragg & Shah, 1994). These studies have been descriptive and have only been able to speculate on the possible correlates of offending. Moreover, some are limited by their design, which involves a retrospective examination of individuals and seeks to relate what is known about them to the impairments characterizing ASDs. In fact, without a detailed developmental history it is not possible to establish that this is the diagnosis. Even where the diagnosis has been established, the definition of 'offending' is often unclear (with studies mixing self-reported or informant-reported illegal behaviour and convictions by a court). A more sophisticated approach is needed.

In considering vulnerability to offending by people with ASDs, several factors may be relevant: these will include both the more general vulnerability factors identified in the criminological literature, such as low IQ, poor school achievement, truancy, aggressive behaviour, and hyperactivity-impulsivity-inattention (Farrington, 2002), and those that may be more specific to the syndrome. These include: core impairments such as poor social understanding or circumscribed interests; difficulties in adjusting to the diagnosis (Tantam, 1991); and the impact of social exclusion (Barnard, Harvey, Prior, & Potter, 2001; Barnard, Prior, & Potter, 2000). The single case reports and case series have drawn attention both to the possible impact on offending of particular interests or obsessions (Barry-Walsh & Mullen, 2004; Chesterman & Rutter, 1993; Murrie et al., 2002) and of cognitive difficulties such as limitations in theory of mind (Baron-Cohen, 1988; Kohn, Fahum, Ratzoni, & Apter, 1998) and empathy (Murrie et al., 2002) skills. In addition, Wing (1997) has noted the possible relevance to particular individuals of factors such as compliance with offending suggested by more dominant personalities or a lack of awareness of legal rules.

While the relationship between intellectual disadvantage and criminal offending is well documented (Holland, Clare, & Mukhopadhyay, 2002), more recent research has explored specific components of cognition, such as theory of mind, executive function, and empathy. Theory of mind (ToM), refers to the ability to recognise that other people have mental states such as beliefs and desires that influence their behaviour (Baron-Cohen, 1995). Executive function (EF) is now widely understood to describe the mental operations that enable an individual to perform tasks that require the generation of novel strategies, flexible thinking, and disengagement from the immediate stimulus (Baddeley, 1996; Burgess, Alderman, Evans, Emslie, & Wilson, 1998; Hughes, Russell, & Robbins, 1994; Shallice & Burgess, 1991). Finally, empathising, or the recognition of another's emotional state, is defined as a process in which the attended perception of the object's state or situation generates a state in the subject that reflects the state or situation of the object more than the subject's prior state or situation (Hoffman, 2000). Theory of mind (Baron-Cohen, 2000), EF (Hill, 2004), and empathy (Hobson, 1986a, 1986b) are all recognised as being impaired in most people with ASDs.

The relationship between these cognitive factors and offending has been studied in different groups. ToM has been investigated among men who have been detained and have a diagnosis of psychopathy (using the PCL-R; Hare, 2003), and age and IQ matched control groups without this diagnosis (Blair et al., 1996; Dolan & Fullam, 2004; Richell et al., 2003). Blair et al. (1996), using the Strange Stories Test (Happé, 1994), and Richell et al. (2003), using the Adult Eyes Test (Baron-Cohen, Wheelwright, & Hill, 2001), found no difference between the two groups, whilst Dolan and her colleagues (Dolan & Fullam, 2004), using the Faux-Pas Stories (Stone, Baron-Cohen, & Knight, 1998), found that they were both significantly impaired compared with their counterparts in the general population.

Executive function has been investigated among a broad range of offenders, including those with syndromes of pervasive antisocial behaviour, such as Anti-Social Personality Disorder (ASPD), and psychopathy (Brower & Price, 2001; Dinn & Harris, 2000; Dolan, 1994; Dolan & Anderson, 2002; Dolan & Park, 2002; Hare, 1984; Lapierre, Braun, & Hodgins, 1995; Morgan & Lilienfeld, 2000; Wolff, Waber, Bauermeister, Cohen, & Ferber, 1982; Yeudall, Fromm-Auch, & Davies, 1982). In their review, Brower and Price (2001) concluded that there is evidence of a significant association between EF impairment and antisocial and aggressive behaviour, while a meta-analysis of a large number of studies found an overall moderate to large effect size for executive function impairment among people who exhibit antisocial behaviour (Morgan & Lilienfeld, 2000).

Moving on to empathy, Jolliffe and Farrington (2004), in a meta-analysis of 35 studies comparing the performance of offenders and non-offenders on a variety of questionnaire measures, found overall effect sizes consistent with impairment among the offenders, although these were reduced when socio-economic status or intellectual ability were taken into account. Taking a different approach, other studies have investigated the relationship between empathy and offending using neuropsychological or neurophysiological measures (Blair, 1995, 1997; Blair & Coles, 2000; Blair, Colledge, Murray, & Mitchell, 2001; Blair, Jones, Clark, & Smith, 1997; Blair et al., 2004). The findings suggest that, in contrast with comparison groups, people with diagnosed psychopathy or psychopathic traits make significantly more errors in their recognition of sadness and fear (Blair & Coles, 2000; Blair et al., 2001; Blair et al., 2004), show reduced electrodermal responsiveness to aversive stimuli (Blair et al., 1997), and are less able to make a moral-conventional distinction (Blair, 1995, 1997).

While such impairments have been raised as possible vulnerability factors among some people with ASDs, only one study has examined this issue empirically. Murphy (2003) investigated the neuropsychological characteristics of all detained patients with a diagnosis of Asperger Syndrome ($n = 13$) in a maximum secure psychiatric hospital. Compared with other patients in the same setting, their EF was unimpaired. Unfortunately, the findings are undermined by methodological limitations. First, in contrast to most studies, only one EF test was used; second, because contemporaneous developmental information was unavailable, it is not clear whether all participants did, indeed, have ASDs; third, without a general population control group it was not possible to conclude whether any of the groups were actually impaired; and fourth, the influence of confounding factors such as reading ability or general intellectual ability was not considered.

The study described in this paper aimed to explore the association between ToM, EF, and empathy and offending among people with ASDs by comparing the performance on neuropsychological tests of intellectually able adults with this diagnosis who are, or are not, offenders. It was expected that, compared with their non-offending counterparts, the offenders would show a greater impairment of ToM, a greater impairment of EF, and a greater impairment of emotion recognition, particularly for the recognition of fear and sadness. In order to assess whether any of the participants with ASDs were impaired compared with their peers in the general population, a third, control, group was also recruited.

Method

Ethical approval for this study was granted by the formal ethics committees serving the areas and facilities where recruitment took place. All adults

(aged 18 years and over) who took part in the study met the diagnostic criteria for an ASD according to the *International Classification of Diseases Tenth Edition* (ICD-10; WHO, 1992) based on the Autism Diagnostic Interview Revised (ADI-R; Lord, Rutter, & Le Couteur, 1994). Only those whose intellectual ability was in the normal range, defined as a FSIQ of 70 or above, measured using the Wechsler Abbreviated Scale of Intelligence (WASI; The Psychological Corporation, 1999), were included. People for whom there was no developmental history or for whom the diagnosis of an ASD was in doubt were excluded.

Participants

There were three groups of participants, all of whom had given informed consent.

ASD offenders. This group comprised 18 men and 3 women with ASDs (mean age 35.4 years, $SD = 11.6$) who were not intellectually impaired (mean FSIQ 91.2, $SD = 14.4$) and were categorised as offenders because they had:

- a history of conviction according to the Home Office Offenders Index
- been diverted to forensic mental heath services following arrest
- received a formal caution from the police

They were recruited from the following sources in the UK:

- local NHS and independent sector medium secure psychiatric hospitals (medium secure units or MSUs)
- the Hayes Unit, a national MSU for people with ASDs
- the Cambridge Lifespan Asperger Syndrome Service, a national diagnostic clinic for adults with suspected Asperger Syndrome or high functioning autism
- from the local health district

A range of offences were represented in this group. These included manslaughter ($n = 2$), attempted murder ($n = 1$), arson ($n = 5$), indecent assault ($n = 3$), and assault ($n = 3$). A smaller number had convictions for behaviours that had not directly resulted in violence to others, namely threats to kill ($n = 5$) and harassment ($n = 1$). Only one participant had been convicted of a non-person-directed offence, namely deception.

ASD non-offenders. These 20 men and 3 women (mean age 29.7, $SD = 7.9$) with ASDs were also of average intellectual ability (mean FSIQ 104.3, $SD = 17.7$) but did not meet the criteria for offending. They were

recruited from a local health district and identified through primary care services, mental health services, specialist learning disability services, and the media.

General population comparison group. A comparison group of 17 men and 6 women (mean age 38.2, $SD = 13.0$) of average intellectual ability (mean FSIQ 115.3, $SD = 9.7$) and without ASDs or any other developmental disorder was recruited from a large engineering company based in Cambridge. As far as is known, based on self-report, none had a history of criminal convictions.

Assessments

Participants with ASDs were seen either in their own homes or, when this was not possible, in a quiet room located in the university. Participants in the comparison group were seen in a quiet room at their place of work. All people with ASDs were seen by the principal researcher (MWS), and all general population participants were seen by a research assistant with prior training in the administration of all assessments. In view of the number of assessments undertaken, participants were seen on two separate occasions for up to 90 minutes each time.

Measures

After intellectual ability was measured using the Weschler Abbreviated Scale of Intelligence (WASI; The Psychological Corporation, 1999), the following neuropsychological assessments were undertaken.

Theory of mind. The Adult Eyes Test Revised (Baron-Cohen et al., 2001) was administered. This measure of advanced theory of mind comprises 36 black and white photographs of the eye region of different male and female actors/actresses. Four complex mental state descriptions are presented for each image, with one (the target word) correctly identifying the mental state of the person in the photograph, and the three 'foil' words having the same emotional valence as the target word. One point is scored for each mental state identified correctly, giving a maximum total of 36. This task has been validated as an advanced theory of mind test with the Happé Strange Stories, an existing advanced measure of theory of mind (Happé, 1994). In addition, the task has been administered to a group of university students, providing both male and female normal scores for the task (men: mean 27.3, $SD = 3.7$; women: mean 28.6, $SD = 3.2$).

Executive function. The Behavioural Assessment of the Dysexecutive Syndrome (BADS, Wilson, Alderman, Burgess, Emslie, & Evans, 1996)

was chosen because it assesses decision making and problem solving using six different experimental paradigms: rule shift, action program, key search, temporal judgments, zoo map, and modified six elements. The BADS has been shown to have good test–retest and inter-rater reliability, and the profile score obtained can be converted to a standardised score with a mean of 100 and standard deviation of 15 (Wilson et al., 1996).

Emotion recognition. The Facial Expressions of Emotion Stimuli and Tests (FEEST; Young, Perrett, Calder, Sprengelmeyer, & Ekman, 2001) emotion hexagon test was used. This test consists of a series of six facial expressions from the Ekman and Friesen series (Ekman & Friesen, 1976), one from each of six emotional categories (happy, sad, angry, fearful, disgusted, and surprised), which have been morphed by computer manipulation to create a series of images forming a continuum along the axis happiness–surprise–fear–sadness–disgust–anger. In addition, happiness and anger are joined to create an 'emotional hexagon'. There are images formed from 90%, 70%, 50% (ambiguous and not scored), 30%, and 10% morphs along each continuum, so that the proportion of each expression gradually changes. In total, 30 morphed images have been created.

These images are presented one at a time on a computer screen for five seconds, in a random order. The task is to decode which of the six emotions best represents the image. Participants make their response by clicking the emotional label they deem to be the best description of the face on the screen. There is no time limit for responding. There are six blocks of trials with all 30 morphed images in each trial. After a practice trial, there are five blocks of trials, which, excluding ambiguous images, gives a maximum total score of 120, 20 for each emotional category.

Analysis

Data were analysed using Stata Version 8 for the PC (Stata Corporation, 2003). Means and standard deviations were calculated for each test. Where normality was demonstrated, parametric statistics were used to make group comparisons. Non-normal data were either transformed and analysed parametrically, or, where transformation was not possible, analysed non-parametrically. In view of the group differences in intellectual ability, FSIQ was entered into all group comparisons as a covariate, and ANCOVAs used to compare groups, with statistical significance set at the conventional 5% level. The small size of the groups precluded any attempt to examine whether there was a relationship between type of offence and test performance.

A logistic regression analysis was also conducted, generating a description of the exact relationship between each proposed correlate and

offending. An estimation of the degree to which ASD participants could be correctly classified into offenders and non-offenders according to their scores on the factors retained in the final model was estimated in two ways: first by calculating the area under the receiver operating characteristics (ROC) curve; and second by using a 2×2 contingency table to calculate sensitivity, specificity, and overall rate of correct classification.

Results

The scores of all three groups on each of the neuropsychological tests and their subtests are shown in Table I. Since the control group obtained significantly higher FSIQ scores than the ASD groups ($p < .05$), data adjusted for the covariate FSIQ are presented.

Theory of mind

Contrary to expectations, there was no significant difference on the Adult Eyes Test between the offenders and non-offenders with ASDs. However, while the ASD non-offenders were significantly impaired relative to the general population comparison group, the ASD offenders were not.

Executive function

Again, contrary to expectations there was no significant difference on EF between the offenders and non-offenders with ASDs. However, while the ASD non-offenders were significantly impaired relative to the general population comparison group, the ASD offenders were not. Indeed, their performance was similar; in fact, on two subtests – rule shift and action program – it was better.

Emotion recognition

For fear recognition, there was no significant difference between the two groups of participants with ASDs. However, while offenders with ASDs were significantly impaired relative to the general population comparison group, the ASD non-offenders were not. Neither of the groups with ASDs was impaired in recognition of facial expressions of sadness relative to the comparison group; all three groups performed near 'ceiling'.

   The main effect for all other emotion categories failed to reach significance, although anger only marginally so ($p = .07$). Tukey post hoc comparisons for anger recognition showed that, compared with the general population group, the ASD non-offenders were significantly impaired at the 5% level. In contrast, a similar comparison between the ASD offenders and the comparison group was not statistically significant.

Table I. Analysis of group differences on neuropsychological tests.

	ASD offenders Mean (SE)	ASD non-offenders Mean (SE)	Non-ASD comparison Mean (SE)	$F_{(2,63)}$	Post hoc (comp = comparison; non-off = non-offenders)
BADS, total	95.08 (4.08)	81.36 (3.48)	98.00 (3.85)	6.45***	Comp > non-off
Rule shift*	41.48 (3.34)	28.90 (2.87)	32.27 (3.15)	4.73**	Offend > comp; off > non-off
Action*	31.34 (3.29)	28.31 (2.82)	42.12 (3.11)	5.28***	Comp > non-off
Key search	2.74 (.28)	2.03 (.24)	2.99 (.26)	4.38**	Comp > non-off
Temporal	1.85 (.24)	2.13 (.20)	2.31 (.23)	.81	ns
Zoo map	2.60 (.25)	2.21 (.21)	2.46 (.23)	.81	ns
Six elements	3.41 (.23)	2.90 (.20)	3.29 (.22)	1.74	ns
Adult Eyes Test	23.78 (1.05)	21.16 (.89)	24.65 (.99)	4.05**	Comp > non-off
FEEST, total	96.56 (3.13)	97.37 (2.64)	104.93 (2.71)	2.71	ns
Anger*	30.98 (3.75)	29.02 (3.41)	41.73 (3.75)	3.44**	Comp > non-off
Disgust	16.68 (.88)	14.96 (.83)	16.31 (.84)	1.27	ns
Fear	13.18 (1.03)	15.80 (.73)	16.50 (.78)	3.24**	Comp > offend
Happiness*	33.95 (4.06)	32.64 (3.48)	35.41 (3.82)	.18	ns
Sadness*	31.69 (4.33)	33.87 (3.71)	36.24 (4.09)	.29	ns
Surprise*	34.59 (4.70)	30.34 (4.03)	37.12 (4.43)	.70	ns

*Variables were analysed by rank ANCOVA and mean and standard error of ranks are presented; otherwise, all other tests were analysed by parametric ANCOVA, with modified mean and standard errors of raw data reported.

**$p < .05$

***$p < .01$

The results of the regression analyses are shown in Table II. Since intellectual ability had been established as an important covariate and confounding variable it was included in each analysis. Of the four factors reaching the screening threshold of below .25 for inclusion, the regression resulted in only three that were statistically significant: FSIQ, theory of mind, and the recognition of fear.

As the odds ratios (OR) in Table II show, lower FSIQ, unimpaired theory of mind performance, and impaired fear recognition were all associated with an increased likelihood of belonging to the ASD offender group. The model correctly classified these participants (72.7% of participants correctly classified) with high sensitivity (71.4%) and specificity (73.9%). The value for the area under the ROC curve of .83 indicates a level of group discrimination described as 'excellent' (Hosmer & Lemeshow, 2000).

Discussion

This study set out to examine whether certain cognitive impairments were associated with an increased vulnerability to offending in some people with ASDs. Unlike previous studies, which have focused on descriptions of single cases, or case series, this study used a 'gold standard' diagnostic approach and a more sophisticated methodology to examine differences between offenders with ASDs and their non-offending counterparts. Consistent with the hypotheses based on the available literature, offending was associated with impaired recognition of the emotional expression of fear. In contrast, though, it was not associated with impaired theory of mind. No association was found between offending and either executive function or the recognition of facial expressions of sadness. However, the offenders with ASDs performed better than the general population comparison group on the rule shift and action planning subtests.

The main finding of this study was that, compared to their non-offending counterparts, the offenders with ASDs were significantly impaired in recognition of facial expressions of fear. How might this cognitive difference be understood? Clearly, as the sample sizes of all three groups were small, the possibility of a type II error needs to be considered. It may also be

Table II. Results of stepwise logistic regression analysis

Parameter	Odds ratio	Standard error	95% CI of OR	Wald statistic	p value	R^2
FSIQ	.92	.03	.87–.98	−2.74	.01	.18
Adult Eyes Test	1.25	.12	1.04–1.50	2.36	.02	.12
Fear recognition	.82	.07	.68–.97	−2.29	.02	.11

possible that the relationship is an artifact of the different intellectual abilities of the two groups, as previous research (Moore, 2001) has shown an association between difficulties in emotion recognition and intellectual disadvantage. Moore (2001) suggests that developmental delay results either in a failure to acquire the ability to understand more complex emotions, such as fear, or a more general impairment in ability to make decisions/problem solve, leading to difficulties with processing complex information. However, this account is rather unconvincing in the present context since there were no group differences for other complex emotions, such as disgust and surprise. Nor were there differences in executive function, a measure of problem solving skills; in fact, among the groups with ASDs, the offenders scored higher than the non-offenders. Moreover, we used an emotion recognition task that places very few demands on language, memory, and problem-solving skills, probably minimizing the effect of the IQ difference on task performance. In any case, when intellectual ability was used as a covariate, a significant group difference for the recognition of fear remained.

Another possibility that needs to be considered is that the performance of the groups on the fear recognition task reflected differences in their chronological age. It has been reported that, among adults, age has an effect on emotion recognition skills, including fear (Calder et al., 2003). While this is of theoretical relevance, the link between age and fear recognition has been made for older people; it seems unlikely, therefore, that age made any important contribution to our results.

The limitations of the cognitive tests themselves also need to be considered. For example, measuring theory of mind, executive function, and emotion recognition independent of other aspects of cognition is difficult, and the ecological validity of some of these tests may have been limited. In order to address this issue, executive function was measured by the BADS, which was designed to measure the type of problems encountered in everyday life. Clearly, it still has limitations and, in the future, the development of materials that are better able to capture real-life situations needs to be considered. There is also a possibility that measures were not of equal difficulty. This was particularly apparent with the FEEST, in which it is possible that the expected problems in the recognition of sadness were not found because all three groups performed near 'ceiling'.

Nevertheless, it seems that the demonstration of impaired recognition of fear among the offenders with ASDs reflects a real difference in their neuropsychological phenotype, independent of age and intellectual ability. Previous research on cognition and criminal offending investigating the ability to process fear or exhibit an autonomic response to the distress cues of others has consistently shown that people with a diagnosis of psychopathy on the PCL-R (Hare, 2003) are impaired in the processing of others' distress cues (Blair, 1995, 1997; Blair et al., 1997; Blair & Coles, 2000;

Blair et al., 2001; Blair et al., 2004). Although people with the difficulties that characterise psychopathy are clearly different in many ways from those with ASDs, psychopathy is also a disorder of developmental onset (Viding, 2004), is associated with amygdala dysfunction (Baron-Cohen et al., 2000; Blair, 2003), and is characterised by difficulty forming and maintaining relationships with others.

Is it possible, therefore, that the ASD offenders may have been co-morbid for psychopathy? The data generated from the current study do not allow this issue to be addressed in detail. However, co-morbidity between developmental disorders is not uncommon, and is seen, for example, with ASDs and attention deficit hyperactivity disorder (Gillberg & Billstedt, 2000) and Tourette's Syndrome (Baron-Cohen, Mortimore, Moriarty, Izaguirre, & Robertson, 1999). In addition, though we did not attempt to assess our participants using the PCL-R (Hare, 2003) and could not, therefore, establish whether they fulfilled the criteria for psychopathy, four of the offenders (19%) could reliably be diagnosed as people with ASPD based on their developmental histories. In addition, the developmental histories of several others suggested longstanding behavioural problems. We believe that the possibility of co-morbidity merits further exploration.

In terms of its implications for the management of people with ASD who offend, this study begins to address the recommendations of the *Review of Services for Mentally Disordered Offenders* (Department of Health, 1992) by informing some of the strategies and services that might be appropriate in providing treatment, support, and management. Given the impairment of their recognition of others' distress, strategies to 'teach' empathy skills might be appropriate. These include, for example, attempting to develop an understanding of the victim's feelings through individual or group treatment, as has been carried out with sexual offenders (e.g., Pithers, 1999). Alternatively, teaching empathy in a more 'concrete' way may be helpful, for example through role-playing, which is consistent with the use of visual imagery as the main channel of communication among people with ASDs (Hulburt, Happé, & Frith, 1994). At a more basic level, a software package has been developed, using lessons, quizzes, and games to help develop individuals' understanding of the emotions (University of Cambridge, 2002). As yet, though, there are no research data evaluating its clinical effectiveness. Recent research by Klin, Jones, Schultz, Volkmar, and Cohen (2002) suggests that the impairments in social and emotional understanding are evident very early in life, implying, as Howlin (2004) points out, that a developmental approach to empathy is likely to be helpful. This is consistent with Adshead's (1998) discussion of the importance of addressing emotional issues, using the theoretical framework provided by attachment, in the treatment and management of people with severe and longstanding difficulties. At present, however, there is uncertainty about the types of services within which these, and other, interventions should be

delivered, as offenders with ASDs are managed by different specialities, more often reflecting local circumstances than service user needs. The findings of the current study imply that expertise in both psychopathy and ASDs may be required, and point towards the need for closer working between forensic and other mental health services. In such an arrangement, factors such as whether the person requires detention in a secure setting and his or her level of intellectual and social functioning will influence which service takes the lead.

In order to develop these ideas further, future studies need to determine how many offenders with ASDs would also meet the criteria for psychopathy according to the PCL-R (Hare, 2003). In addition, since in this study the data were cross-sectional, collected at one point in time, it was not possible to establish the causal direction of the relationships that were found between variables. As Farrington (2003) has argued, a major problem with a cross-sectional paradigm is that it is not possible to establish which factors are causal and which are merely markers or correlates. The constraints of this study precluded us from taking a longitudinal approach, but it is clear that it would be helpful to do so, to establish whether any of the factors we identified are causally associated with, or can be shown to be predictors of, offending in people with ASDs.

Acknowledgements

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