

AUTISM SPECTRUM DISORDERS IN AN ADULT PSYCHIATRIC POPULATION.
A NATURALISTIC CROSS-SECTIONAL CONTROLLED STUDY

Eleonore Rydén and Susanne Bejerot

Abstract

Object: Autism spectrum disorders (ASD) e.g. autism, Asperger syndrome, and Pervasive developmental disorder not otherwise specified, have yet to become a focus of attention in clinical adult psychiatry. The aims of the present study were firstly to characterize psychiatric patients with ASD in regard to demographical factors, psychiatric comorbidity and personality traits and compare the ASD group with a psychiatric control group in these respects. Secondly, we wanted to compare differences of personality traits between females and males in the ASD group.

Method: Adult psychiatric patients where ASD or attention deficit hyperactivity disorder (ADHD) was suspected were referred to a tertiary unit in Stockholm 2001-2006. All patients diagnosed at the unit with ASD (n=84; 39 females and 45 males) were consecutively included and compared to all 46 identically interviewed and assessed patients who did not receive an ASD or ADHD diagnosis. Among scales used were the Global Assessment of Functioning (GAF), SCID II Screen, and Swedish universities Scales of Personality (SSP).

Results: ASD patients had an equal educational level but a lower social and occupational functioning. Their GAF scores were significantly lower compared to the control group. Prior to referral, major depressive disorder and obsessive-compulsive disorders were the most common psychiatric diagnoses. In the assessment approximately 1/3 fulfilled diagnostic criteria for comorbid ADHD. The patients with ASD also had significantly more schizotypal and avoidant personality traits according to SCID II screen. In SSP, patients with ASD rated themselves significantly higher on Stress-susceptibility, Embitterment, Detachment, Trait irritability and Lack of assertiveness than controls. Females with ASD scored significantly higher than males on borderline and passive-aggressive traits according to the SCID II Screen and on Embitterment and Trait irritability in the SSP.

Conclusions: We could show that psychiatric patients with ASD have a low level of functioning and a personality profile which is gender specific. This may contribute to the identification and understanding of patients with ASD in adult psychiatry.

Key words: Adult – Asperger syndrome – Attention Deficit Disorder with Hyperactivity – Autistic disorder – Depressive Disorder – Personality Disorders – Psychiatric Status Rating Scales

Declaration of interests: none

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Introduction

Autism spectrum disorders (ASD), e.g. autistic disorder, Asperger disorder, and Pervasive developmental disorder not otherwise specified (PDD-NOS), are well-known disorders, but have yet to become a focus of attention in clinical adult psychiatry. According to DSM-IV criteria, persons with these disorders have a qualitative impairment in social interaction, restricted repetitive and stereotyped patterns of behaviour, and interests and activities causing clinically significant impairment in social, occupational

or other important areas (American Psychiatric Association 1994). ASD affects at least half a percent of the general population, and boys are identified more often than girls in epidemiological studies (Ellefsen et al. 2006).

Although the prevalence of ASD in adult outpatient psychiatric populations has been reported to be low (Chang et al. 2003, Nylander and Gillberg 2001), psychiatric disorders in adults with ASD are perceived as common by initiated clinicians. In a follow-up study of 187 young adults with autism, of whom a quarter were of normal intelligence, 47% were reported to be

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moody at least to some degree; nervousness was reported in 66% of the cases and 35% were described as fearful and anxious (Kobayashi and Murata 1998).

Obsessive compulsive symptoms in persons with autism were reported to be similar to those typical of obsessive compulsive disorder (OCD), although repetitive ordering, hoarding, touching, tapping or rubbing, and self-damaging or self-mutilating behaviours occurred more frequently in autism than in OCD (McDougle et al. 1995). Moreover, in children with ASD, not only OCD, but also specific phobias and ADHD have been reported as common (Leyfer et al. 2006). According to a review article, ASD could be expected to be comorbid with various psychiatric disorders as those mentioned above, in addition to childhood schizophrenia, adolescent onset psychosis, catatonia, selective mutism, development coordination disorder, and personality disorders (Gillberg and Billstedt 2000).

In the Gothenburg Neuropsychiatric genetics project, psychiatric comorbidity was investigated in 129 adults with ASD. Bipolar disorder with psychotic features was present in 7%, schizophrenia or other psychotic disorders in 8%, and ADHD was found in 38% of the sample (Stahlberg et al. 2004). Personality disorders were assessed according to the SCID II interview in a subgroup of 47 patients. Almost half of these patients fulfilled the diagnostic criteria for obsessive-compulsive personality disorder, also paranoid, schizotypal, schizoid and avoidant personality disorders were prevalent (Anckarsäter et al. 2006).

We performed a cross-sectional controlled study on all psychiatric patients assessed by us for possible ASD or ADHD.

Our primary aim was to compare demographical factors, psychiatric comorbidity and personality traits in patients with ASD to a psychiatric control group (see Figure 1). We also wanted to determine if this was gender specific in the ASD group.

Methods

The Neuropsychiatry Unit is a tertiary psychiatric clinic located at St Görans hospital, in the city of Stockholm. It offers specialized assessment and care of adults with a probable ADHD, ASD, learning disorders or tic disorder. It serves thirteen specialized psychiatric outpatient units located in the centre and western parts of Stockholm. Approximately 320 000 inhabitants from both high and low socio-economic regions live in the catchment area.

Referrals

Consecutive admissions (N=325) were investigated from January 2001 to the 31st of December 2006. Almost all were tertiary referrals from licensed psychiatrists, but some were referred by psychologists working on specialized psychiatric out-patient units, school doctors and general practitioners, while a handful were referred directly from psychiatric wards. Self-referrals were not accepted.

Investigation procedure

The patients were initially informed about the purpose of the investigation and asked to participate. Exclusion criteria for the investigation were an ongoing affective episode, psychotic episode, or alcohol or drug abuse. Previous medical charts were scrutinized. The patients were asked to fill in various self-reports and a parent filled in questionnaires covering childhood symptoms prior to the first visit. A senior psychiatrist trained in diagnosing ASD and ADHD performed all assessments and interviews. A semi-structured protocol covering social factors, educational level, employment status, previous suicide attempt and alcohol and drug use was administered. Parental reports were recaptured from one or both parents. If the parents were not available, a close relative who knew the patient as a child was interviewed. Neuropsychological testing was done by trained psychologists. The diagnosis was made in consensus between the psychiatrist and psychologist and was based on all available information. The diagnostic criteria from DSM-IV were applied for all diagnoses, but the DSM criterion that limits the possibility of assigning other comorbid psychiatric diagnoses was disregarded to allow a comprehensive recording of the pattern of comorbidity.

The assessment procedure took 12-18 hours to complete, and was carried out during a period of approximately two weeks for each patient.

Measures

Five – to – fifteen (FTF) describes problems when the child was 5-15 years of age, noted by a parent. FTF was developed in Scandinavia by specialists in child psychiatry, representing expertise in the area. The FTF comprises 181 statements related to behavioural or developmental problems. It covers eight different domains: memory, learning, language, executive functions, motor skills, perception, social skills, and emotional/behavioural problems (Kadesjo et al. 2004).

Autism Spectrum Screening Questionnaire (ASSQ) is a 27-item screening tool for detecting high functioning children with ASD and is completed by the parent (Ehlers et al. 1999). The items closely resemble the features first described by Hans Asperger in his original paper (Asperger 1944). Asperger Syndrome Diagnostic Interview (ASDI) is a highly structured diagnostic interview, comprising 20 different items including assessment of social impairment, narrow interests, repetitive routines, speech and language peculiarities, non-verbal communication problems and motor clumsiness (Gillberg et al. 2001).

Wechsler adult intelligent scale, neuro-psychological version, (WAIS III and WAIS III-NI) was used in part or whole. Mental retardation was excluded by a high educational level in those few cases where WAIS was not administrated.

Montgomery Asberg Depression Rating Scale (MADRS) is a clinical rating scale for assessment of depressive symptoms (Montgomery and Åsberg 1979).

Brief Obsessive Compulsive Scale (BOCS) is based on the Yale-Brown Obsessive Compulsive Scale (Y-BOCS), but differs from Y-BOCS in that obsessions

and compulsions are investigated together instead of separately. The time consumption associated with obsessive-compulsive problems, the interference, avoidance, distress, severity and patient's control over the symptoms are rated (Bejerot 2002).

The Global Assessment of Functioning (GAF) was used to assess the functional level ranging from 0 to 100, by the clinician (Beneke and Rasmus 1992) and in a self-administered version (Bodlund et al. 1994).

The Clinical Global Impression Severity of Illness (CGI-S) (Guy 1976) includes scores ranging from 1 to 7 (1= normal or not ill at all; 7 = extremely ill) and a CGI-S rating of 4 is considered as moderately ill and >4 as a severe disorder.

World Health Organization Adult ADHD Self-Report Scale (ASRS) is an eighteen item self-rating scale based on DSM-IV-TR-criteria for ADHD (Kessler et al. 2005).

Wender-Reimherr Adult Attention Deficit Disorder Scale (WRAADDS) is a structured interview, intended to measure the severity of the target symptoms of adults with ADHD using the Wender Utah Criteria. It measures symptoms from seven categories: attention difficulties, hyperactivity/restlessness, temper, affective liability, emotional over reactivity, disorganization and impulsivity relating to present difficulties (Stein et al. 1995).

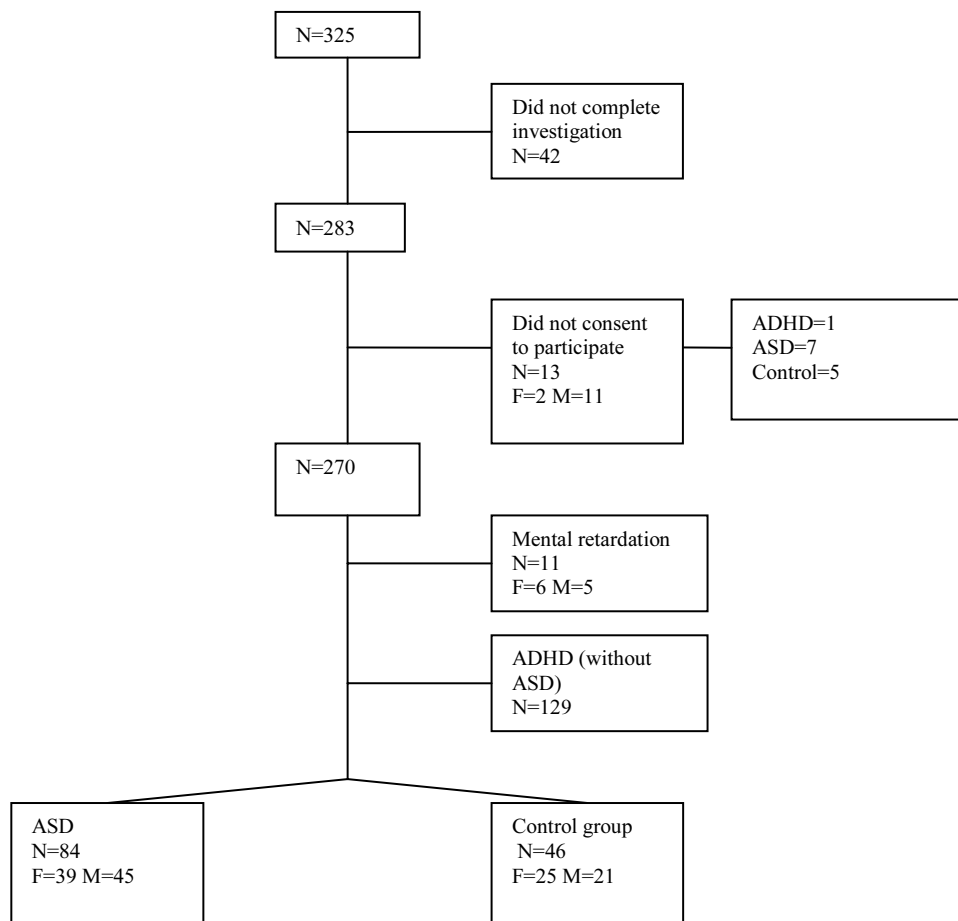
The screening version of Structured clinical interview for DSM-IV (SCID II Screen) was applied mirroring axis II traits (Beneke and Rasmus 1992). For comparison between the SCID II Screen and SCID II interview, the cut-off level in SCID II was increased by one score, which provides an acceptable agreement (Ekselius et al. 1994). Total score, representing a dimensional approach of personality traits, is also presented.

The Swedish universities Scales of Personality (SSP) is a revised version of Karolinska Scales of Personality (KSP) (Gustafsson et al. 2000, Schalling 1986). KSP intended to explore the relation between some personality traits and biological markers. The SSP includes 91 items divided into 13 scales: Mistrust, Trait irritability, Physical trait aggression, Verbal trait aggression, Social desirability, Embitterment, Detachment, Adventure seeking, Impulsivity, Lack of assertiveness, Stress susceptibility, Psychic-and Somatic trait anxiety (Table 1).

Sample

From the 325 referrals, 84 were diagnosed with ASD while 46 were neither diagnosed with ASD nor

Figure 1.



ADHD. The latter constituted the control group. The ASD group comprised 39 females and 45 males. Five were diagnosed with autism (3 males and 2 females), 51 with Asperger disorder (26 males and 25 females) and 28 with PDD-NOS (16 males and 12 females). The control group comprised 25 females and 21 males. The exclusion criteria in this study were <18 years of age, mental retardation (IQ<70), ADHD without ASD and refusal to participate in the study (Figure 1).

Ethics

The study has been reviewed by the Regional

Ethics Committee in Stockholm and was given an advisory statement (Dnr 2005/4:2). All patients were asked to give informed consent to participate in the study.

Statistics

STATISTICA release 7 was used in the statistical analysis.

Dichotomous variables were analysed with Fisher Exact test. T-test was used for continuous variables and Kruskal-Wallis was used for non-parametric data. Two-sided p-value was calculated and a p-value of 0.05 was

Table 1. Description of the subscales of Swedish universities Scales of Personality (SSP)

SSP, subscales	Description of subjects with high scores
Mistrust	Suspicious, distrusting peoples' motives
Trait irritability	Irritable, lacking patience
Physical trait aggression	Getting into fights, starts fights, hits back
Verbal trait aggression	Getting into arguments, berating people when annoyed
Social desirability	Socially conforming, friendly, helpful
Embitterment	Unsatisfied, blaming and envying others
Detachment	Avoiding involvement with others, withdrawn, "schizoid"
Adventure seeking	Avoiding routine, need for change and action
Impulsivity	Acting on the spur of the moment, non-planning, impulsive
Lack of assertiveness	Lacking ability to speak up and to be self-assertive in social situations
Stress susceptibility	Easily fatigued, feeling of unease when urged to speed up
Psychic trait anxiety	Worrying, anticipating, lacking self-confidence
Somatic trait anxiety	Autonomic disturbances, restless, tense

Gustavsson JP, Bergman H, Edman G, Ekselius L, von Knorring L, Linder J (2000). Swedish universities Scales of Personality (SSP): construction, internal consistency and normative data. *Acta Psychiatrica Scandinavica* 102, 3, 217-225.

Table 2. Comparison of clinical characteristics of 84 adult psychiatric patients with autism spectrum disorders (ASD) and 46 controls

Characteristics	ASD (n=84)	Control group (n=46)	p Value
Age, mean (SD)	30 (10)	34 (8.7)	
Gender, n (%)			
Female	39(46)	25 (54)	
Male	45 (54)	21 (47)	
Having a partner, n (%)	14 (17)	16 (36)	0.03
Having children, n (%)	7 (8.4)	12 (27)	0.009
Education, completed, n (%)			
Higher education	18 (22)	13 (31)	ns
Upper secondary school	25 (31)	14 (33)	ns
Initial vocational training	11 (14)	6 (14)	ns
Compulsory school only	20 (25)	9 (21)	ns
Not finished compulsory school	6 (7.5)	0 (0)	ns
Employment, n (%)			
100%	7 (8.6)	10 (22)	0.05
0%	70 (85)	31 (69)	0.04
Student, full time, n (%)	10 (12)	4 (8.9)	ns
Temporary disability pension, n (%)	27 (34)	13 (29)	ns
Sick leave, full time, n (%)	14 (18)	5 (11)	ns

ASD=autism spectrum disorders. Statistics: Fisher analysis, two-tailed; ns =non significant p>0.05

used as a minimum significant level. To compensate for multiple analyses, significance between 0.01 and 0.05 was denoted trend in the text. T-score is presented to compare the groups to a normal control. The expected mean for a sex-matched norm is T-score 50 (1 SD=10).

Results

Background data

The patients in the ASD group were singles and childless to a larger extent than the control group. Unemployment was high in both groups, although there was a trend towards higher unemployment in the ASD group. The educational level, the prevalence of temporary disability pension and sick leave were reported to be equally common in both groups (Table 2).

Psychiatric diagnosis prior to referral

Most patients had received psychiatric treatment and diagnosis prior to referral. Nearly half of the patients with ASD with a previous diagnosis had a history of major depressive disorder (MDD). MDD was the most common psychiatric disorder prior to the assessment in the ASD group, but there was a trend of MDD being more common in the control group. Twenty-three percent in the ASD group had previously been diagnosed with OCD, which did not differ significantly from the control group. Social phobia, anorexia nervosa and borderline personality disorder were common; however, no significant differences were noted between the groups (Table 3).

Childhood and present symptoms and function

Fifty-three percent of the patients in the ASD group and 36% in the control group had received psychiatric care in childhood (ns). In the ASD group 17% (n=14) had attempted suicide compared to 22% (n=12) in the control group. GAF was significantly lower in the ASD group compared to the control group according to the clinician's rating (median 48 vs. 55; $p<0.001$). ASD patients scored themselves significantly higher than the clinician in the self-administered version of GAF (median 60 vs. 48; $p<0.001$). The control group scored themselves with no significant difference from the clinician. The ASD group had significantly lower functioning according to CGI-S than the control group (median 5 vs. 4; $p<0.001$) and scored themselves significantly higher than the clinician in the self-rating version ($p<0.001$). Comorbid ADHD was present in 37% of the ASD group and most of them, 82%, had the inattentive ADHD subtype. Alcohol and drug abuse, depressive symptoms measured by MADRS, and obsessive-compulsive symptoms measured by BOCS, did not differ between the groups (data not shown).

Personality disorders and personality

Schizotypal and avoidant personality traits were more common in the ASD group compared to the control group according to SCID II screen. The patients with ASD had a median number of four personality disorders (range 0-10) compared to 2 (range 0-8) in the control group ($p=0.01$). More than 40% of the ASD group reached the cut-off score for avoidant, borderline and obsessive-compulsive personality disorder; more than a third had depressive, schizotypal, schizoid and

Table 3. Psychiatric diagnosis prior to assessment in 53 patients with autism spectrum disorders (ASD) and 37 controls

Characteristics	ASD n=53*n (%)	Control group n=37*n (%)	p Value
Bipolar disorder	2 (3.7)	1 (2.9)	ns
Major depressive disorder	26 (49)	23 (68)	0.03
Psychosis	5 (9.4)	5 (15.5)	ns
Social phobia	9 (17)	3 (9.0)	ns
ObsessiveCompulsiveDisorder	12 (23)	5 (16)	ns
Panic disorder	5 (9.4)	3 (9.1)	ns
GeneralizedAnxietyDisorder	3 (5.7)	1 (3.0)	ns
PostTraumaticStress Disorder	1 (1.9)	0	ns
Bulimianervosa	0	1 (3.3)	ns
Anorexianervosa	7 (13.2)	0	ns
Borderlinepersonalitydisorder	7 (13.5)	3 (9.1)	ns

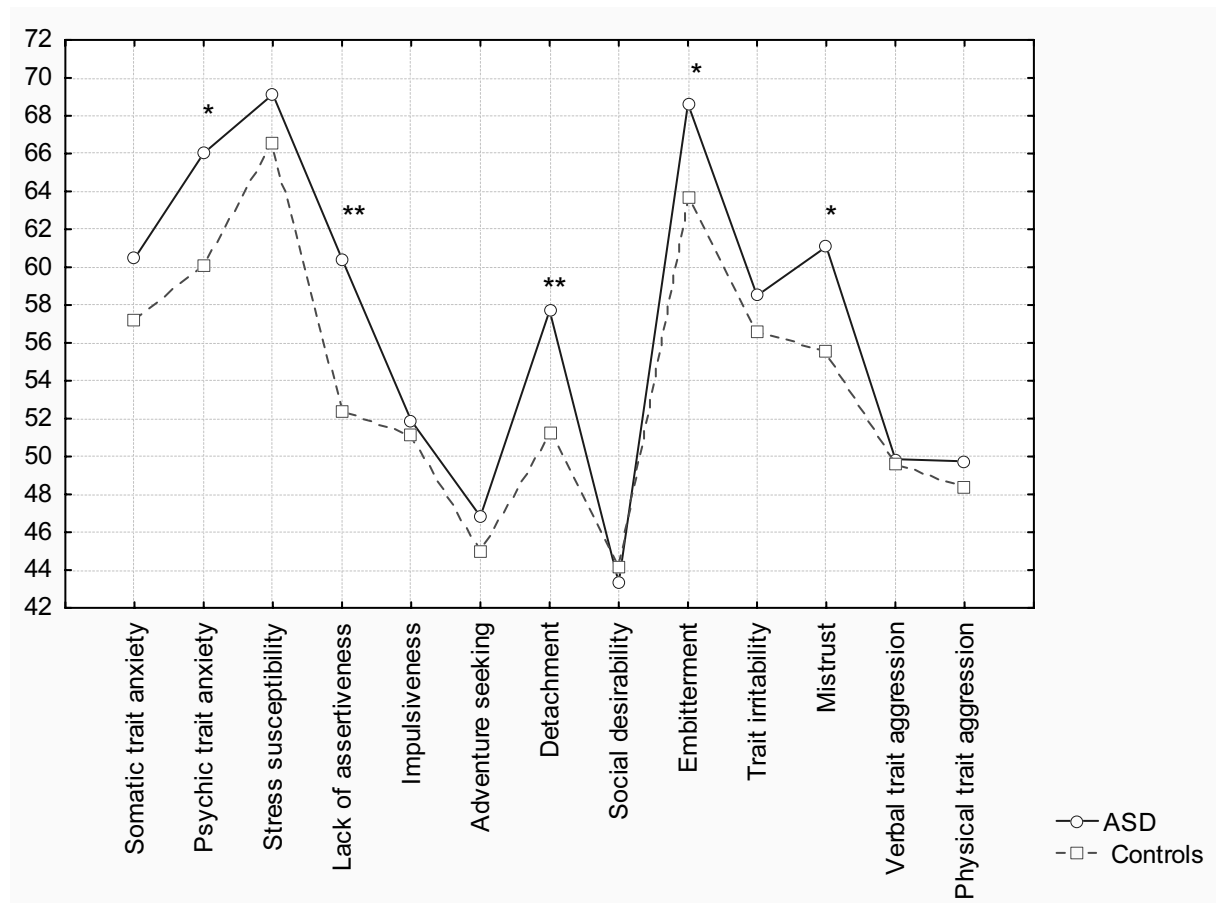
* Thirty-one (31) of 84 patients with autism spectrum disorders (ASD) and 9 of 46 patients in the control group had no specified psychiatric diagnosis prior to assessment and were hence not included. Statistics: Fisher analysis, two-tailed; ns =non significant $p>0.05$

Table 4. Personality traits according to SCID II Screen in 74 adult psychiatric patients with autism spectrum disorders (ASD) and 41 psychiatric controls, and a comparison between females and males in the ASD group

Personality traits (cut-off */number of total scores)	ASD median (range) n= 74	Control group median (range) n=41	Statistics	p Value	ASD female median (range) n=33	ASD male median (range) n=41	Statistics	p Value
Paranoid (5/7)	3.0 (7.0)	2.0 (6.0)	5.2	0.02	4.0 (7.0)	2.0 (7.0)	2.0	ns
Schizotypal (5/9)	4.0 (7.0)	3.0 (7.0)	6.8	0.009	4.5 (6.0)	3.5 (7.0)	5.2	0.02
Schizoid (4/7)	3.0 (7.0)	2.0 (6.0)	3.3	ns	3.0 (5.0)	3.0 (7.0)	2.4	ns
Histrionic (5/8)	2.0 (6.0)	2.0 (7.0)	0.6	ns	2.0 (6.0)	1.0 (4.0)	3.8	0.05
Narcissistic (6/9)	5.0 (8.0)	4.0 (8.0)	3.8	ns	4.0 (7.0)	5.0 (8.0)	0.2	ns
Borderline (6/9)	5.0 (9.0)	4.0 (9.0)	0.3	ns	6.5 (9.0)	4.0 (9.0)	16	<0.001
Antisocial (4/15)	1.0 (8.0)	1.0 (11)	0.1	ns	1.0 (8.0)	1.0 (8.0)	0.03	ns
Avoidant (5/7)	4.0 (7.0)	3.0 (7.0)	6.8	0.009	4.5 (6.0)	4.0 (7.0)	2.0	ns
Dependent (6/8)	3.0 (8.0)	2.0 (6.0)	4.4	0.04	4.0 (7.0)	3.0 (8.0)	0.9	ns
Obsessive-compulsive (5/8)	4.0 (8.0)	4.0 (5.0)	0.3	ns	4.0 (7.0)	4.0 (8.0)	1.1	ns
Depressive (6/7)	5.0 (7.0)	4.0 (7.0)	1.2	ns	5.0 (7.0)	5.0 (7.0)	0.4	ns
Passive-aggressive (5/7)	3.0 (7.0)	2.0 (7.0)	3.2	ns	4.0 (7.0)	2.5 (7.0)	9.6	0.002

* SCID II Screen cut off score +1 (Ekselius et al. 1994).
 ASD=Autism spectrum disorders; Statistics: Kruskal-Wallis; ns =non significant p >0.05

Figure 2.



narcissistic personality disorders, while at least 25% reached cut-off for paranoid and passive-aggressive personality disorders. In the control group 40% reached cut-off for obsessive-compulsive personality disorder and 37% for borderline personality disorder. More than 25% reached cut-off for avoidant and depressive personality disorder (Table 4).

Personality dimensions, according to Swedish universities Scales of Personality (SSP), are presented as T-scores in Figure 2. The ASD group scored almost 2SD higher than the norm on Stress-susceptibility and Embitterment. The ASD group scored significantly higher than the control group on Detachment ($p=0.007$) and Lack of Assertiveness ($p=0.002$) and showed trends towards more Psychic trait anxiety ($p=0.02$), Embitterment ($p=0.04$) and Mistrust ($p=0.04$).

Sex differences in the ASD group

In childhood, 69% of the males and 39% of the females had received psychiatric care ($p=0.007$). As adults, females and males had an equal level of functioning according to the GAF scores. Only one female with ASD had a child while six males had become fathers. The various axis I disorders assigned prior to our assessments were not significantly different between females and males, but anorexia nervosa was only present in females. The history of suicide attempts did not differ significantly between females and males (21% vs. 13%) (data not shown).

Females scored themselves significantly higher in borderline and passive-aggressive personality traits in SCID II Screen (Table 4). In SSP subscales, females scored higher on Embitterment ($p=0.001$) and Trait irritability ($p=0.01$) (data not shown).

Autistic features, measured by the ASDI subscales, were similar in females and males and a comorbid ADHD was equally common in both sexes (females 36% and males 38%). However, hyperactivity ($p=0.001$) and mood instability ($p=0.001$) were more prevalent in females, according to the subscales in the WRAADDS. Moreover, females scored numerically higher on stress-susceptibility, impulsivity and had a higher total score in WRAADDS than males. However, the ASRS total scores, measuring present ADHD symptoms did not differ significantly between females and males (data not shown).

Sex difference in the non- ASD group

No sex difference was noted in SSP or SCID II Screen.

Discussion

This study is to our knowledge the first naturalistic study on function, comorbid psychiatric disorders, and personality in psychiatric patients diagnosed with ASD in adulthood.

Firstly it was shown that psychiatric patients with ASD have a lower level of social and occupational functioning compared to the patients in the psychiatric

control group, although they had the same level of education. Similar results have been reported in a follow-up study on young adults with Asperger syndrome and with normal intelligence: A good outcome, defined as holding a job or having an IQ appropriate education and living independently from the age of 23, was reported in only 27% while the vast majority was characterized as having a poor or restrictive outcome. The best outcomes seemed to be in those with an early childhood diagnosis (Cederlund et al. 2007). The participants in our study had by definition "poor outcome" since they were psychiatric patients. We don't know whether the outcome would have benefited from an early diagnosis.

Secondly, persons with ASD may show a lack of insight into their own problems, which was clearly illustrated by the divergence in the clinician versus self-ratings in GAF and CGI-S scales. This finding emphasizes the importance of the relatives' participation in the assessments.

Thirdly, our results suggest that a history of major depressive disorder is the most common psychiatric disorder in patients with ASD. Depression in ASD has been reported to be common, but the prevalence remains unclear (Stewart et al. 2006). It is worth mentioning that depression can be difficult to recognize in persons with ASD, which suggests that the prevalence of depression could in fact be underestimated. The rates of other comorbid axis I diagnoses in our study were very similar to those reported in the Gothenburg Neuropsychiatric genetics project (Stahlberg et al. 2004): bipolar disorder (3.7% vs. 7%), psychosis (9.4 % vs. 8.0 %) and ADHD (38% vs. 37%). In a Finnish study of persons with ASD, high scores of self-reported ADHD symptoms were reported, but the authors questioned whether this finding really reflected a "true diagnosis" of a comorbid ADHD (Tani et al. 2006). In our study the ASD group with comorbid ADHD was less prone, or able, to create routines, measured by ASDI. If this is not taken into consideration in the diagnostic procedure, ASD may go unrecognized and the person may be wrongly diagnosed with ADHD. Executive problems should be expected in both ASD and ADHD but the lack of common sense and social disinhibition in ASD could be mistaken for impulsiveness, suggesting ADHD. Attention problems are to be expected in ASD according to our findings, but we agree that it is disputable whether this is truly ADHD.

Social phobia was frequently diagnosed in the patients with ASD prior to our assessment. Social anxiety in ASD is common since persons with ASD are either socially withdrawn because of a lack of interest in social interaction or tend to be socially anxious due to a self-awareness of limited social skills. Social phobia may hence be overestimated.

Comorbid OCD was common in ASD, but the prevalence was not significantly different from the control group. Nevertheless, OCD in our ASD group was 40 times more common than in the general population (Crino et al. 2005). In a controlled study of OCD in persons with ASD, 25% fulfilled the diagnostic criteria for OCD and more than 50% reported at least moderate levels of interference from proper obsessive-compulsive symptoms (Russell et al. 2005). OCD has

also been reported to be over-represented in relatives of persons with autism suggesting a genetic link (Bolton et al. 1998). Also, ASD is overrepresented in patients with OCD (Bejerot 2007). Anorexia nervosa was relatively common among the patients with ASD but non-existent in the control group. The comorbidity between ASD and anorexia nervosa is substantial according to previous studies, for review see (Råstam 2008).

Seventeen percent of the patients with ASD in our sample had previously attempted suicide. Three of the patients assessed and diagnosed with ASD at our clinic later committed suicide. To our knowledge high rates of suicide attempts and suicide have not previously been reported in patients with ASD.

Fourthly, avoidant and schizotypal personality traits and detachment and stress-susceptibility were common in patients with ASD. These findings are in line with those reported in the Gothenburg Neuropsychiatric genetics project (Anckarsäter et al. 2006). The concept of personality disorders and abnormal personality traits become entangled with ASD, suggesting different models for explaining certain types of "odd personality". According to the definition of personality disorders in DSM-IV we can assume that if ASD is not diagnosed in childhood it can be perceived as a personality disorder in adulthood. Similar thoughts have been proposed by others (Anckarsäter et al. 2006).

Finally, we could show that although the presentation of ASD features, according to the rating scales, were equal in males and females, other symptoms differed. Females showed more attention and emotional problems, and borderline personality traits were significantly more common in females than in males. Interestingly, similar findings have previously been reported in children with ASD (Holtmann et al. 2007). Females with ASD are, according to our clinical impression, more successful in mimicking normal social behaviour and rarely fit the original description of "Asperger's syndrome". Hence, the majority of females with ASD may go undiagnosed in childhood and come to our attention only if they have additional psychiatric problems. This could account for the relatively large proportion of females found in this study and to the fact that females in general are more prone to seek psychiatric care. In accordance with these findings, undetected ASD could be found in a subgroup of females with borderline personality disorder (Rydén et al. 2008).

Limitations

We did not administer ADOS (Lord et al. 2000) and ADI-R (Lord et al. 1994) which is now regarded as the "Golden standard" for assessing ASD, nor was Brown ADD Scale (Rucklidge and Tannock 2002) used for assigning ADHD. In the procedure used to diagnose ASD and other psychiatric conditions we have relied on structured interviews with patients and relatives, various rating scales and assessments, but most of all used our clinical judgment. This approach has limitations, but was the most plausible at the time.

Naturalistic studies have both advantages and limitations. This study presents a specific clinical psychiatric population and the results could therefore not be generalised to account for other populations with ASD. The control group constituted a heterogeneous group of psychiatric referrals who were assessed for ASD or ADHD without having been diagnosed as such. However, the high prevalence of OCD in this group suggests that this group has symptoms resembling core features of ASD. This could account for the unexpected small differences found in Axis I disorders. The clinicians who referred the patients for assessment were not well trained in detecting ASD or ADHD initially. Since 2001 the majority of these clinicians have participated in an educational program for identifying neuropsychiatric disorders; this resulted in a higher proportion of patients with ASD or ADHD among the referrals to this study as well as decreasing recruitment to the control group over the years.

There are several reasons for missing data in this study. Although only a few patients did not consent to participate, some were unable to fill in the rating scales or respond to all questions. Also, some new questionnaires were introduced during the course of the sample collection.

There are several limitations to the way measurements were administered; Five-to-Fifteen and Autism Spectrum Screening Questionnaire were not designed for retrospective analysis, thus the reliability and validity in the present setting is uncertain. The DSM-IV SCID I and II interviews are time-consuming and were therefore substituted with the screening versions in this study. Unfortunately, this circumscribes precise comparisons with other studies.

Since persons with ASD may have problems in expressing emotions and symptoms, the prevalence of psychiatric diagnoses could be underestimated. In fact we don't know whether self-rating scales are reliable and valid in persons with ASD. Conversely, when patients with ASD report more psychiatric symptoms than the controls, this probably reflects a true overrepresentation.

Conclusion

Many persons with ASD, especially females, remain undiagnosed until adulthood. This study might contribute to how adults with ASD and normal intelligence present themselves in an adult psychiatric setting and how they can be distinguished from other psychiatric patients. Mostly this study can contribute to generating further hypotheses in the research of ASD.

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