

BEYOND CHILDHOOD: PSYCHIATRIC COMORBIDITIES AND SOCIAL BACKGROUND OF ADULTS WITH ASPERGER SYNDROME

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SUMMARY

Background: Over the past few years, our knowledge about Asperger syndrome (AS) has increased enormously. Although it used to be a syndrome mainly encountered in childhood and adolescent psychiatry, it is now increasingly recognized in adult psychiatry. Nevertheless, little is known about psychiatric comorbidities and life course of adults with AS. The current study aimed to gain an insight into comorbidities and the development of the social situation of adults with AS.

Subjects and methods: We investigated psychiatric comorbidities, psychiatric history, professional background, partnerships, and children in 50 adults with AS (34 men and 16 women) over a broad age range (20–62 years).

Results: Seventy percent of adults with AS had at least one psychiatric comorbidity. Most frequent comorbidities were depression and anxiety disorders. Obsessive–compulsive disorder and alcohol abuse/dependence were also observed. Many adults had previously been treated with psychopharmacological or psychotherapeutic interventions. Although most adults had a high-level school leaving certificate and had gone on to complete training/university studies, less than half were currently in employment. Fourteen adults were living in a partnership and 10 had children.

Conclusions: Adults with AS often have psychiatric comorbidities, indicating lower levels of mental health. Additionally, they seem to have severe limitations concerning professional success, despite having a good school education. Their family situation is also impaired with regard to starting a family. These considerable limitations in the life of adults with AS may help to understand their specific problems, and emphasize the importance of developing specific treatments for improving their mental health and social integration.

Key words: autism - Asperger syndrome – adult – comorbidity - social background

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INTRODUCTION

Asperger syndrome (AS) belongs to the spectrum of autism disorders. Its prevalence is currently estimated to be approximately 0.06% (Fombonne 2005), but an underestimation seems probable because nearly 50% of persons with AS reach adulthood without being diagnosed (Arora et al. 2011). A hallmark symptom of AS is an impairment in social interactions. Individuals with AS have difficulties in intuitive recognizing non-verbal body language and in understanding or applying social rules. Furthermore, individuals with AS rarely develop deep relationships with peers at an appropriate developmental level. They also show a lack of social and emotional reciprocity. Other core symptoms of AS include adherence to stereotypical behaviors, nonfunctional routines or repetitive motor mannerisms as well as special interests, abnormal in intensity or focus (e.g., timetables or computer science) (American Psychiatric Association 1994, Bishop et al. 2007, Mosconi et al. 2009, Chen et al. 2009, Jordan & Caldwell-Harris 2012, Tanidir & Mukaddes 2014, Volkmar & Pauls 2003). In contrast to childhood autism, in which first symptoms have an onset prior to the age of 3, there is usually no clinically significant delay in language and cognitive

development or in the development of adaptive behavior (other than in social interaction) in AS.

Beyond these core symptoms there can be other characteristics. Adults with AS have reported that they often experience “unpredictable mood swings” and that “some days they struggle” with anxiety and mood swings. Some individuals with AS develop strategies to cope with social interactions in everyday situations, but doing so requires considerable mental effort. Interestingly, some adults with AS feel at an advantage because of “a sense of intellectual ability” that fosters thinking beyond “normal” thinking processes (Griffith et al. 2012). Müller et al. (2008) interviewed 18 adults with AS regarding social challenges; the adults described feelings of isolation, difficulties in initiating social interactions and communication, and a desire to contribute to the community.

Over the past ten years, interest in AS by practitioners of adult psychiatry, as well as neuroscientists, has dramatically increased; however, insight into what this disorder really means for adults has rarely been achieved. Many individuals with AS are not diagnosed until adulthood. One reason could be that they were not conspicuous enough to be diagnosed previously. But there may be further causes such as other problems like

ADHD or learning disabilities that could have “covered” autistic symptoms. Moreover, in the past, awareness towards psychiatric disorders in childhood was not as common as today, so possibly individuals with AS were simply not recognized.

It remains unclear how often adults with AS have co-existing psychiatric disorders and how they succeed in life in terms of “traditional human aims,” such as occupation and partnership/children. To understand adults with AS and to provide a good basis for developing effective treatments, it is essential to gain insight into the course of life of adults with AS. Few studies have investigated this issue and most data have been collected in children and adolescents. Indeed, anxiety, mood disorders (depression and bipolar disease), and obsessive-compulsive disorder (OCD) are common comorbidities in children with autism (Ghaziuddin et al. 1998, Skokauskas & Gallagher 2010, Mukaddes et al. 2010, Mazzone et al. 2012). Externalizing disorders, such as attention deficit hyperactivity disorder (ADHD), disruptive behaviors, conduct disorders, tic disorders, and Tourette syndrome, have been reported as comorbidities in children with AS (Mazzone et al. 2012).

Evaluation of 26 male adolescents and young adults (age range, 17-28 years) with autism spectrum disorder revealed a reduced self-reported health-related quality of life compared to healthy individuals (Kamp-Becker et al. 2010). Lugnagard et al. (2011) investigated young adults with AS for psychiatric comorbidities and found that mood and anxiety disorders were common, whereas psychotic and substance-induced disorders were uncommon.

Tani et al. (2003) also noted mood and anxiety disorders in a sample of 20 adults with AS, but they excluded individuals receiving medication. Joshi et al. (2012) studied 63 adults with autism spectrum disorders in comparison to a general psychiatric control sample and found higher rates of depression and anxiety disorders, and higher functional impairment in the sample with autism spectrum disorders, but patients with AS and other autism disorders were not specifically identified.

In a sample of individuals with high-functioning autism disorders, Lai et al. (2011) conducted a behavioral comparison between females and males, and found significant symptoms of anxiety, depression, and OCD on the basis of significantly increased scores on the Beck Anxiety/Beck Depression Inventory and the Obsessive Compulsive Inventory-Revised without gender differences; however, that study excluded individuals with comorbid psychotic and substance-use disorders.

In another study, 122 adults with autism spectrum disorders had mood, anxiety, and psychotic disorders, ADHD, and OCD. Two-thirds of the adults were high school graduates, while 43% were regularly employed or students; there was no distinction between patients with AS and other autism spectrum disorders (Hofvander et al. 2009).

Balfe & Tantam (2010) examined the health and social circumstances of 42 adolescents and adults with AS. Most individuals were living with their parents and were socially isolated; 35% of the participants reported symptoms of depression and 51% reported anxiety on a forced-choice questionnaire. These results were limited because AS was confirmed based on a systematic interview by investigators in only 14 patients and psychiatric comorbidity was not included by DSM-IV or ICD-10 criteria. Arora et al. (2011) reported on three adults with AS who developed manic and psychotic symptoms, such as auditory hallucinations and persecutory delusions, but who responded well to anti-psychotic medications.

The aim of this investigation was to determine which psychiatric comorbidities occur in adults (age range, 20-62 years) with AS. We also made note of accompanying psychiatric circumstances, such as past and current psychotherapy and drug therapy. Additionally, we described the natural history of AS, how patients with AS succeed in professional and family spheres, and the extent to which patients with AS are able to compensate for special deficits. Thus, we hoped to gain a better understanding of the problems and needs of adults with AS.

SUBJECTS AND METHODS

Subjects

The study was conducted in Germany. Fifty consecutive adults who sought evaluation in our outpatient clinic to establish a diagnosis of AS for the first time were included. The impetus for consulting our clinic was that the diagnosis of AS was suspected by the adults themselves, or by their relatives or legal guardians. There were 34 men and 16 women with AS enrolled in the current study (age range, 20–62 years; mean age, 36.46 years).

Diagnosis of AS

AS in adulthood was diagnosed using a self-developed, semi-structured interview (Diagnostic interview: Asperger syndrome in adulthood) that thoroughly assessed the patients according to DSM-IV criteria. After a general section focusing on medical anamnesis (somatic, psychiatric, and social histories, including childhood development), the interview continues with a special section involving AS that includes the following items with respect to childhood and adulthood: social interaction and communication (e.g. friendships with/relationship to/interest in peers, and being a loner and suffering from loneliness); special interests (e.g. spending leisure time, and interest in specific objects/topics); stereotypic behavior (e.g. rituals, and reaction towards disturbances of rituals); and other characteristics (e.g. clumsiness, and sensitivity towards noises/smells/tactile stimuli). Additionally, eye contact,

mimicking expressions, speech melody, “mirroring” of affections, and clumsiness were observed during the interview. The duration of the interview was approximately 90 minutes. The interview was conducted by the same experienced investigator. Because in some cases individuals with AS have poor insight or may not report events accurately or fully, the diagnosis of AS, if available, was complemented by information from personal/telephone interviews, or in written form from observers during childhood and/or adulthood, such as partners, friends, parents, or siblings. In some cases, school reports were consulted. The diagnosis of AS was only confirmed if DSM-IV criteria were clearly fulfilled based on clinical judgment and available information during the interview.

A standardized interview or test for diagnosing AS in adults according to DSM-IV criteria that is based on information obtained from sources other than parents is not available. Even if the parents are available, adults often do not wish them to be consulted.

Additionally, we used the two self-rating scales by Baron Cohen (autism-spectrum quotient (AQ; (Baron-Cohen et al. 2001)) and empathy quotient (EQ; (Baron-Cohen & Wheelwright 2004))). The AQ is an instrument used for quantification, in which the score of an individual is assessed on a continuum from normality to autism; a higher score indicates more pronounced autistic traits. The AQ is comprised of 50 items which are divided into the following five subscales: social skill; attention switching; attention to detail; communication; and imagination. The EQ is an instrument for estimating an individual’s ability to empathize, in which a higher score indicates stronger empathy. The EQ consists of 40 items concerning empathy and 20 filler items. Baron-Cohen suggested a cut-off of ≥ 32 points for the AQ and ≤ 30 points for the EQ; 80% and 81% of individuals with AS/high-functioning autism scored according to the AQ and EQ cut-offs, respectively. However, 20% of the participants in the Baron-Cohen studies scored outside these cut-offs, which served as the basis for our including those adults who scored outside the cut-off for AQ or EQ, but fulfilled the DSM-IV criteria for AS. Thus, achieving the cut-off for AQ and EQ can be a hint for the diagnosis of AS, but was not a requirement for the diagnosis of AS.

Psychiatric comorbidity

Each participant was evaluated for an axis I comorbidity in the past and present using the German version of the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I; (Wittchen et al. 1997)). Accordingly, we considered the following disorders: affective; psychotic; substance abuse and dependence; anxiety; OCD; somatoform; eating; and post-traumatic stress.

We also looked out for the gender-distribution of comorbidity and differences concerning the age.

Psychiatric history

Each participant was interviewed regarding previous psychiatric treatment, such as medication use, psychotherapy, and psychiatric inpatient stays.

Professional and social status

We determined the level of education completed, professional education, current employment, and financial situation for each participant, and recorded information pertaining to current partnerships/marriages and children, as well as the current housing situation.

Finally we looked out for any associations between comorbidity and educational-/ job-status.

RESULTS

Diagnosis of AS

All included individuals fulfilled the DSM-IV criteria for AS: For our study group it was representative that individuals did not develop peer relationships to developmental level. They were able to visit normal schools – only two had to visit a special school – and could interact with other persons on a rational level, but they all were loners and had no typical interests in friendships with sharing social and emotional reciprocity. They all had avoided eye contact in childhood, majority had trained it during youth and adulthood, but still felt stressed by using it. Most of them had further impairments in nonverbal behaviors such as reduced facial expressions and all had problems in intuitively decoding body language in others and in interacting in an empathic way. Summarized our study group was able to basically interact with their social environment (e.g. going to supermarket or to the doctor on their own) and could manage their everyday life without substantial support, they could speak in full sentences and engage in communication but their suffered from the problems described above, they were loners and they were unsuccessful in interacting with others on a more personal and social level.

All of them had clear patterns of restrictive and stereotyped behavior. For our study group it was representative that they were adherent to specific routines and rituals and showed inflexibility towards changes in some but not in a variety of contexts or all spheres. All had patterns of special interests whether in focus or intensity. For none of our individuals stereotyped behavior required substantial support.

No individual showed a significant delay of language or cognitive development.

Thus in our study group AS was of lower severity in summary. All of our individuals correspond to “level 1” of autism spectrum disorders of DSM-5 (American Psychiatric Association 2013).

Psychiatric comorbidity

Fifteen adults (30%) did not exhibit any current or previous psychiatric comorbidities, whereas 35 (70%) had at least one comorbid psychiatric disorder in their lifetime. Most of the comorbidities involved depressive affective disorders in the form of major depression and dysthymia. In seven participants (14%) a combination of dysthymia and major depression was observed (double depression). Manic and bipolar disorders were not noted in the adults with AS. Anxiety disorders, such as panic disorder, agoraphobia, and social phobia, as well as OCD with obsessive thoughts and behavior, were also frequent comorbidities. Dependency and abuse of psychotropic substances were frequent comorbidities, as follows: six adults (12%) were cannabis abusers; and five (10%) and four adults (8%) were diagnosed with alcohol abuse or dependence, respectively. Eating disorders, such as binge eating and bulimia nervosa, as well as somatoform disorders, appeared less frequently. There was one adult each with schizophrenia, post-traumatic stress disorder, and somatoform pain disorder. No adults had anorexia nervosa or drug dependency. An overview of the comorbidities is shown in Figure 1. Table 1 gives a comparison of lifetime prevalence of psychiatric disorders in the German population (Jacobi et al. 2004) and our study group.

Twenty-two adults (44%) had more than one psychiatric comorbidity, without any tendency towards a specific combination of comorbidities, as follows: eight (16%) had two comorbidities; six (12%) had three comorbidities; and eight (16%) had \geq four comorbidities.

Major depression was observed in female patients as often as in males (50% of females versus 48% of males), Dysthymia was diagnosed more often in males (6% of females versus 32% of males). Males (53% of them) were more often affected by anxiety disorders than females (12% of them). Alcohol abuse/dependence was more frequent in men (20% of males versus 12% of females) whereas 19% of females had a drug abuse versus 9% of males. Obsessive disorders were about equally present in both genders (13% of females, 15% of males). Eating disorders only appeared in females (19% of them).

Relevant differences between younger (<40 years; n=26) and elderly individuals (\geq 40 years, n=24) were observed concerning dysthymia (3 cases in younger versus 9 cases in elderly individuals), panic disorder (2 versus 5 cases) and alcohol dependence (only in elderly individuals). Drug abuse occurred predominantly in younger individuals (5 versus 1 cases). Younger individuals showed more often no comorbidity (10 versus 5 individuals) and less often at least one comorbidity (16 versus 19 cases; 9 younger individuals showed more than one comorbidity versus 13 of elderly).

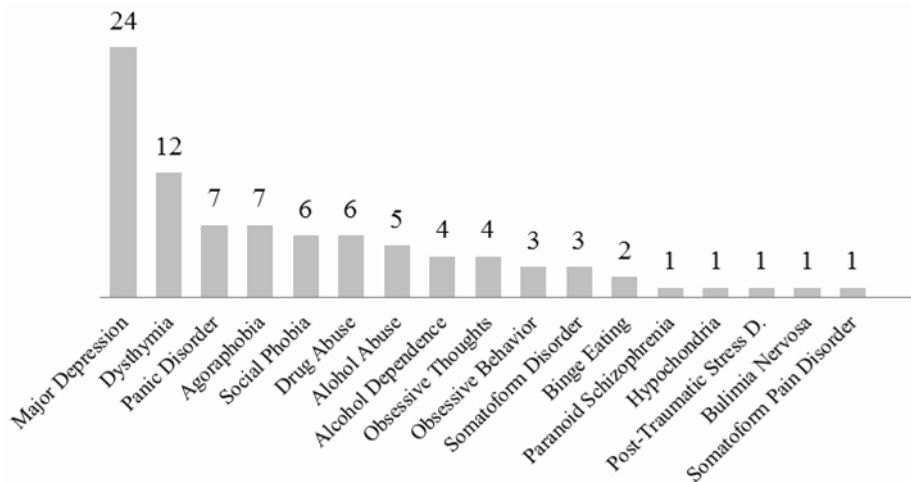


Figure 1. Number of adults with AS and the lifetime comorbidities. The most frequent comorbidity was major depression

Table 1. Comparison of prevalence of psychiatric disorders in German population (Jacobi et al. 2004) and adults with Asperger syndrome

German population (n=4181; age 18-65 years)	Adults with AS (n=50; age: 20-62 years)
Depression: 8.8%	Depression: 48%
Dysthymia: 4.5%	Dysthymia: 24%
Panic disorder: 2.3%	Panic disorder: 14%
Phobias (not specified): 12.6%	Phobias (social and agoraphobia): 26%
Alcohol dependence: 6.3%	Alcohol dependence: 8%
OCD: 0.7%	OCD: 14%
Somatoform disorder: 11.0%	Somatoform disorder: 6%
Eating disorders: 0.3%	Eating disorders: 6%
Psychotic disorders: 2.6%	Schizophrenia: 2%

Psychiatric history

Nineteen adults (38%) had received psychopharmacotherapy in the past, and 15 (30%) were currently taking psychiatric medications. In most cases, psychopharmacotherapy involved anti-depressants. Overall, 20 adults (40%) had taken anti-depressant medications at least once in their lifetime. Approximately two-thirds of these adults had affective disorders, whereas psychiatric comorbidities were not identified in the other adults. Six adults (12%) had received atypical anti-psychotics in the past, including three adults without identifiable psychiatric comorbidities. One adult was treated with clozapine for schizophrenia, two received atypical anti-psychotics for combined comorbidities (affective and anxiety disorders), one was treated for OCD, and major depression and cannabis abuse in the other two. Five adults (10%) had previously taken anxiolytics (benzodiazepines and opipramol), they have been suffering from schizophrenia, affective and anxiety disorders, or

substance abuse, and in one of these adults, no comorbidity was identified.

Twenty-one adults (42%) were treated with psychotherapy before and eight (16%) were currently receiving psychotherapy. The majority of adults receiving psychotherapy also had several psychiatric comorbidities, especially affective disorders, substance abuse/dependence, and anxiety disorders. Twenty-four adults (48%) previously had a psychiatric inpatient stay, particularly for affective disorders or life crises. An overview of the psychiatric histories is given in Table 2.

Professional and social status

Forty-eight adults (96%) received a high school-leaving certificate; the majority (29%) were awarded a university entrance diploma; 17 (34%) received a general certificate of secondary education or certificate of secondary education, and two (4%) received a certificate from a special school. Among the adults with

Table 2. Characteristics, psychiatric history and professional education of adults with Asperger syndrome

Sex	Female: 16 adults Male: 34 adults	
Age	Range: 20-62 years Average: 36.46 years	
Past and current psychotropic medication	Antidepressants: 20 adults Antipsychotics: 7 adults Anxiolytics: 5 adults Others: promethazine 1 adult mood-stabilizer (agent not known) 1 adult	
Psychotherapy	Past: 18 adults	Present: 8 adults
Psychiatric inpatient stay	24 adults	
Professional education	With current employment: bank clerk chemical technical assistant clerk computer scientist industrial clerk IT specialist librarian media spokesperson medical assistant motor mechanic office worker physician physicist police commissioner engineer technical draftsman	Without current employment: economic scientist electrician goldsmith historian industrial clerk industrial mechanic IT specialist landscaper office worker postman social education worker American studies engineering studies media studies sociology studies
Financial situation	Own income: 21 adults Financial support parents/ state: 25 adults Disability pension: 4 adults	
Housing situation	Living alone: 24 adults Living with partner/children: 11 adults Living with parents: 14 adults Psychiatric nursing home: 1 adult	

Overview of psychotropic medication, treatment with psychotherapy, professional education, and social circumstances

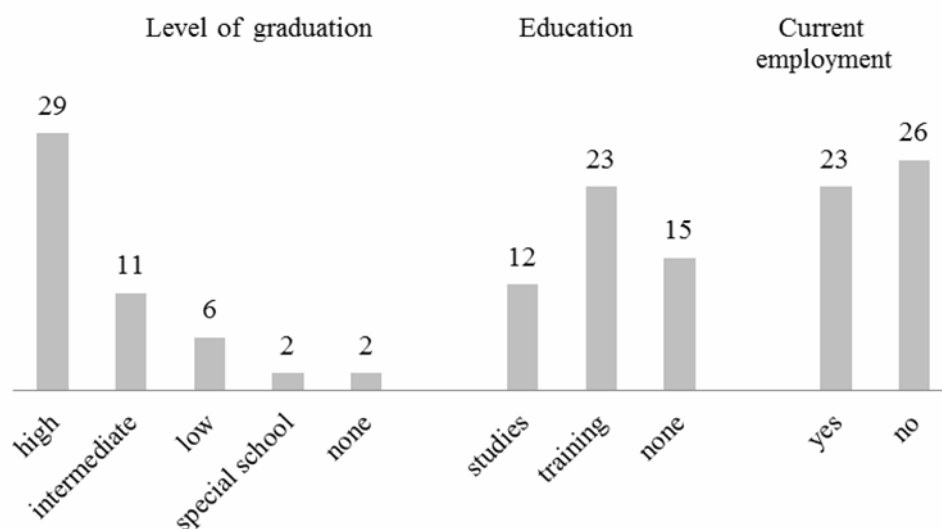


Figure 2. Professional development of adults with AS. Most individuals left school with a university entrance diploma (high). A minority of students had a general certificate of secondary education (intermediate), certificate of secondary education (low), or completed a special school. Thirty-five adults succeeded in completing studies or training, 23 were currently employed, 26 had no job, and one was in early retirement

a university entrance diploma, 24 (48%) completed training or studies, including three (6%) who received doctoral degrees. Thirteen adults (26%) were currently employed and 15 (30%) were not employed. Among the adults with a general certificate of secondary education or certificate of secondary education, five (10%) had no training and were unemployed, four (8%) had completed training but were unemployed, and seven (14%) had completed training and were currently employed. Two adults (4%) had no school-leaving certificate, one of whom was employed in a car factory without any specialized training. Two adults (4%) had left a special school, one of whom was currently employed in the secondary labor market. An overview of the occupational status is shown in Figure 2 and Table 2 (general quote of unemployment in Germany in 2011: 7.1%) (statista.com).

The financial status of the adults corresponded to the employment status, as follows: 21 adults (42%) had their own income; 25 (50%) were living with financial support from their parents or the state; and four received a disability pension.

Fourteen adults (28%) had partners, four (8%) of whom were married (in the German population in 2011, 61.3% of women and 55.1% of men were married) (Statistisches Bundesamt 2012). Ten adults (20%) had children and six (12%) had minor children (<18 years of age) (in 2011, approximately 21% of German adults had minor children) (Bundesministerium für Bildung und Forschung, Bundeszentrale für politische Bildung). Three adults (6%) with children did not have a partner or spouse, and two (4%) were divorced. Twenty-four adults (48%) were living alone, 11 (22%) were living with their partner or children, 14 (28%) were living with their parents, and one was living in a psychiatric nursing home. These results are presented in Table 2.

Finally we investigated association between specific comorbidities and educational-/ job-situation and partnerships. The only association that could be found was an unemployment of all adults with a panic disorder or agoraphobia except one individual respectively. No other associations were found.

DISCUSSION

Diagnosis of AS

Our study group comprised adults with an AS of a lower severity that didn't require substantial support. This may be an effect of the procedure of our ambulance: usually it is consulted by individuals who never got a diagnosis of autism before and who consult it on their own engagement. Both factors may indicate a certain level of functioning of these individuals.

Psychiatric comorbidity

The aim of this study was to gain insight into the psychosocial state of adults with AS over a broad age range by exploring their comorbidities, past and current psychopharmacotherapy and psychotherapy, as well as professional and family backgrounds.

Seventy percent of the adults with AS had at least one comorbid psychiatric disorder. Thus AS is often accompanied by other psychiatric disorders, indicating that mental health in adults with AS is considerably impaired. Furthermore these results show that adults with AS should be investigated for psychiatric comorbidities and therapy should incorporate them.

The most frequent comorbidities in our adults with AS were depressive affective disorders; major depression occurred in 48% of the adults. In the German population the lifetime prevalence of unipolar depression is 17.1%

(Jacobi et al. 2004), thus the rate of depressive mood disorders seems to be increased in adults with AS.

In our study group the second most common comorbidities were anxiety disorders. This is in accordance with the findings in children and adolescents (Mukaddes et al. 2010); as Mukaddes et al. reported anxiety disorders to be the most frequent comorbidity in children.

According to interpersonal theories, factors such as social isolation, lack of social skills, and unemployment are important for the onset and development of depression (Brakemeier et al. 2008). Non-specific stressors, such as experiences of loss of control, may contribute to the pathogenesis of anxiety disorders (Zwanzger & Deckert 2007). It is well known that individuals with AS have a lack of social skills (Stichter et al. 2012, Rutherford et al. 2002). Moreover, our results showed that individuals with AS often fail to gain employment, which may lead to a feeling of reduced control. These factors may contribute to the high comorbidity of depression and anxiety disorders.

In our sample, alcohol abuse/dependence occurred in nine adults. These disorders have not been reported as frequent comorbid disorders in other investigations of individuals with autism.

However, Miles et al. (2003) studied 167 families with a child with autism for neuropsychiatric disorders and reported a high incidence of alcoholism. Miles et al. discussed the genetic reasons for this co-existence because both disorders are highly heritable and share genetic predisposition.

It may also be that alcohol abuse and dependence results from the excessive demands of and frustration with social and business life. Whatever the cause, alcohol abuse and dependence should be noted in adults with AS.

It is particularly interesting that OCD often occurs in individuals with AS because repetitive behavior is typical for autistic disorders (American Psychiatric Association 1994); however, repetitive behavior in the context of AS is more ego-syntonic, whereas rituals of an OCD are more ego-dystonic (Bejerot et al. 2001) and cause suffering. The phenotypic similarities and frequent co-occurrence of OCD and AS can lead to the hypothesis that there may be a smooth transition to OCD.

It might be possible that autistic disorders predispose to OCD because there is an overlap of serotonergic candidate genes in autism spectrum disorder and OCD (Jacob et al. 2009).

In our investigation not all gender differences as they are typically known in susceptibility to psychiatric disorders were present. Usually women are more often affected by affective and anxiety disorders as well as by eating disorders. Men are more likely to suffer from alcohol-/drug abuse and addiction (Möller-Leimkühler 2005). Major depression showed no gender differences in our study group. Our results showed men to be more often affected by dysthymia and anxiety disorders. Drug abuse was more often among women. However, just like typical for non-autistic persons, eating disorders

were more frequent among women, alcohol disorder among men.

As discussed above, deficits of individuals with AS per se may make them more susceptible to these comorbidities, resulting in a repeal of typical gender differences. But it must be emphasized that small sample size is limiting our results of gender differences and their interpretation.

As described in the "Results", elderly individuals (≥ 40 years) showed more comorbidities than younger ones. It may be one explanation that the mental health in elderly may be compromised in a stronger way, irrespective to the diagnosis of AS. It could also be possible that as longer as difficulties of AS are accumulating across the lifespan, the stronger mental health may be affected.

Psychiatric history

A large number of adults with AS have been and continue to be treated with psychotropic drugs and psychotherapy. Several adults in our sample were treated with medications or psychotherapy, although we were unable to diagnose an appropriate psychiatric disorder in the past or present according to the SCID-I. In most cases, this medication was an anti-depressant.

One explanation might be that this medication was for minor depression. Another reason might be that the prescribing physicians misdiagnosed AS for depression because the diagnosis of autism in adulthood is not as common for most physicians as mood disorders, and symptoms of social withdrawal, reduced facial expressions, and body language might be confused with depression.

This interpretation is limited because we do not have detailed information about the indications for the previous medication; however, past treatment is indicative of the need for therapeutic support of adults with AS. This might also be considered as an indication for the mental health impairment in these individuals.

Professional status

Most of the adults with AS in the current study left school with a diploma, with 58% earning a university entrance diploma. Only two adults did not hold a leaving certificate.

The educational situation was shown to be in contrast to the rate of employment; only 23 adults were employed (<50%). There was a downward trend concerning professional life after school. Although 96% of the adults in the current study completed school, only 70% completed training/studies and only 46% were currently employed.

Overall, the majority of adults with AS were not successful professionally, with cut-offs after school and after training/studies. We hypothesize that requirements for flexibility, autonomy, and social competence increase as one passes from school to training/studies to

employment. In the present day business world, abilities, such as flexibility and social competence, are essential for success, which are abilities that most people with AS typically do not have. Therefore, failure in professional life may be a reflection of this discrepancy between the personality of individuals with AS and the needs of the contemporary business world. The special abilities of individuals with AS often may not compensate for their deficits in professional areas. It is conceivable that professional failure could be experienced as disappointment and contribute to social isolation.

It is also important to emphasize that school- and professional career might be influenced by other factors. Socio-economic status and general background of primary family have effects on educational situation as well as the stimulating situation and the motivating environment individuals are exposed during critical periods in adolescence and young adulthood have.

Additionally employment situation is influenced by regional factors (e.g. small villages versus big cities) and also by epochal differences – as the range of age of the study sample is broad.

Professional failure may not be necessarily a single result of AS and its characteristics but could also be influenced by these external factors. We didn't collect detail relevant information about these factors, thus it remains unclear which factors in which extent are contributing to professional failure.

Social status

Of the 50 adults with AS, 14 were in a relationship; specifically, four (8%) were married and 10 (20%) were not married. In comparison with the general German population in 2011, 61.3% of women and 55.1% of men were married (Statistisches Bundesamt 2012). Thus, rate of marriages seems to be reduced in adult AS.

Based on our own clinical experience, individuals with AS often have ambivalent feelings regarding partnerships. While adults with AS long for a partner, they have problems with close relationships because they need a lot of space and time for themselves. However, few adults with AS have successful partnerships and being single may contribute to social isolation.

Only 10 adults (20%) had children, and six (12%) had minor children. In 2011, approximately 21% of German adults had minor children (Bundesministerium für Bildung und Forschung, Bundeszentrale für politische Bildung).

Nevertheless, most adults with AS succeed in living alone or with their partner/family, with only 25% living with their parents.

The results of our study were limited by the small number of participants. Our method of selecting the participants could have resulted in bias because we only included adults that were not diagnosed with AS in childhood, although many had psychiatric anamnesis. One explanation for the missed earlier diagnosis could

be that the diagnosis of autism is uncommon for many physicians. In this context, it is conceivable that symptoms of autism are not sufficient to consider a diagnosis of AS, so it may be that our study population represents those with milder forms of AS - this is according to our diagnoses of AS of a lower severity - and may not be representative of all adults with AS.

Another general problem that extended to the current study is the lack of a gold standard in the diagnosis of AS in adulthood. Various interviews are available, but there exist several disadvantages because the interviews are not consistent with DSM-IV criteria or the interviews are based on information obtained from parents concerning the childhood of the individuals. In many cases, parents were not available or adults did not wish to involve their parents. Therefore, the development of a standard for diagnosing autism in adulthood is an important issue for the future. In agreement with Joshi et al. (2012), we gave priority to consideration of the DSM-IV criteria via interview and clinical observation. Thus, we can clearly state that all of the adults included in the current study fulfilled the DSM-IV criteria for AS; however, the lack of a standard may lead to inhomogeneity among the populations in different studies.

Little is known about the connection between AS and other psychiatric disorders, thus we gave priority to DSM-IV Axis-I comorbidities in this investigation. Further investigations in adult AS should also address neurodevelopmental disorders, such as ADHD, tic disorders, and learning disabilities, because there is a high rate of comorbidity in childhood. This is of high meaning because these comorbidities may also have a significant impact on daily functioning.

Another limiting factor concerning social status was that we did not systematically determine whether or not adults with AS really do suffer from being without employment or a partnership. A systematic investigation about the aims and wishes of adults with AS is not available, and it is possible that they do not experience this as an impairment in quality of life.

However, we do know from individual adults that they do indeed suffer as a result of professional failure and social isolation. Furthermore, in the case of employment and partnership, we did not systematically ascertain how successful adults are in these areas and whether or not they contribute to the quality of life. Further studies concerning the wishes and needs of adults with AS are needed.

CONCLUSIONS

In summary, AS has enormous consequences for adults - even when severity of AS is lower - and adults with AS often suffer from frequent comorbidities, such as mood and anxiety disorders. Furthermore, adults with AS seem to be at a disadvantage concerning traditional values, such as partnership/family and profession, despite being successful at school. Indeed, there may even

be a connection between social situation and depression because low social status may be frustrating in adulthood. Our results show that many adults with AS ideally should be given specific comprehensive treatment with psychotherapeutic and possibly psychopharmacologic elements. Psychiatric comorbidities should be explored and included in the concept of treatment. In addition, support concerning professional integration would be helpful and important; however, such therapy is rarely available to adults with AS. It would be appropriate for mental health services to focus more strongly on adults with AS and their needs in relation to mental health status and social integration.

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