

ASPERGER SYNDROME: A FREQUENT COMORBIDITY IN FIRST DIAGNOSED ADULT ADHD PATIENTS?

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SUMMARY

Background: Because adult ADHD is often accompanied by psychiatric comorbidities, the diagnostic process should include a thorough investigation for comorbid disorders. Asperger-Syndrome is rarely reported in adult ADHD and commonly little attention is paid to this possible comorbidity.

Subjects and methods: We investigated 53 adult ADHD-patients which visited our out patient clinic for first ADHD-diagnosis (17 females, 36 males; range of age: 18-56 years) for the frequency of a comorbid Asperger-Syndrome. Diagnosis of this autism-spectrum disorder was confirmed by applying the appropriate DSM-IV-criteria. Additionally we tested the power of the two screening-instruments "Autism-spectrum quotient" (AQ) and "Empathy quotient" (EQ) by Baron-Cohen for screening Asperger-Syndrome in adult ADHD.

Results: Eight ADHD-patients were diagnosed with a comorbid Asperger-Syndrome (15.1%). The difference in AQ- and EQ-scores between pure ADHD-patients and comorbid patients was analysed, showing significantly higher scores in AQ and significant lower scores in EQ in comorbid patients.

Conclusions: Results show that the frequency of Asperger-Syndrome seems to be substantially increased in adult ADHD (versus the prevalence of 0.06% in the general population), indicating that investigators of adult ADHD should also be attentive to autism-spectrum disorders. Especially the AQ seems to be a potential screening instrument for Asperger-Syndrome in adult ADHD-patients.

Key words: ADHD - Asperger syndrome – comorbidity – autism-spectrum quotient AQ - empathy quotient EQ

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INTRODUCTION

With a prevalence of about 5-20% attention deficit/hyperactivity disorder (ADHD) is one of the most frequent psychiatric diseases in childhood (Faraone et al. 2003). Nowadays it is understood as a genetically determined dysfunction of the dopamine-system (Ernst et al. 1998, Faraone & Biederman 1998, Dougherty et al. 1999, Dresel et al. 1999, Krause et al. 2003). Concentrations of dopamine-transporter in the striatum and in the caudate nucleus seem to be increased, leading to a reduced concentration of effective dopamine in the synaptic cleft (Dougherty et al. 1999, Krause et al. 2000, Spencer et al. 2007). According to this finding, in several studies a change in the dopamine transporter gene-locus (DAT1) was proven (Gizer et al. 2009). Methylphenidate leads to an inhibition of the dopamine transporter and thereby to a blocking of dopamine reuptake (Masellis et al. 2002). By using imaging techniques it was also shown that the volume of the prefrontal cortex and its activity during reaction tasks is diminished (Rubia et al. 1999, Sowell et al. 2003). The prefrontal cortex is known to subserve the "executive functions" (Weinberg 1993) which comprise the ability to plan and supervise their own action and to react flexibly towards changes – abilities that are often limited in ADHD. Further symptoms of ADHD comprise a reduced ability of holding attention, an

increased distractibility as well as a psychomotor hyperactivity, impatience and impulsiveness. In 50% of cases symptoms persist until adulthood (Lara et al. 2009), emphasizing its meaning for clinical psychiatry in adulthood. In about 70% it occurs with comorbid diseases (Biederman et al. 1992, Kahl 2006) such as depression or addiction (Biederman 1993, Butler et al. 1995, Ohlmeier 2007, Ohlmeier et al. 2008), complicating the clinical outcome. Diagnosis of comorbidities is not only important for a complete understanding of the patient's individual psychopathology, it also has a great impact on the treatment.

In child psychiatry it is known that ADHD may be encountered in combination with Asperger-Syndrome (Ghazziuddin et al. 1998), an autism-spectrum disorder with a prevalence of 0.06% in the general population (Fombonne 2009). But little attention is paid to the possible combination of ADHD and Asperger-Syndrome in adulthood; especially during the process of first ADHD-diagnosis in adults, a comorbid Asperger-Syndrome is scarcely taken into account. According to DSM-IV (American Psychiatric association 1994), Asperger-Syndrome includes impairments in social interactions, unusual and limited interests as well as stereotypic behaviour, all remaining until adulthood. Patients have difficulties with an intuitive interpreting of body language. They need the content of the spoken word to communicate sufficiently. Patients regularly

focus on interests that are either unusual in extension or in topic (Roy et al. 2009). For example, persons with Asperger-Syndrome can be extremely interested in meteorology or in technical data of trains (Attwood 2005). Most patients prefer repetitive daily routines and avoid spontaneous activities (Attwood 2005). The aetiology of Asperger-Syndrome is not completely clarified yet and there exists no all-embracing disease concept, but several different theories. One contributing factor may be a dysfunction in the system of mirror-neurons. Mirror-neurons lead to activation not only by doing a certain action, but also by observing this action in other persons. They are placed in the inferior frontal, the precentral and in the inferior parietal cortex (Rizzolatti & Craghero 2004). Several studies showed a reduced activation in the mirror-neuron system during tasks of imitation and empathy in autistic persons (Dapretto et al. 2006, Williams et al. 2006) which could lead to their impairment in empathy and understanding of non-verbal signals. Furthermore imaging-studies have given hints that the face-sensitive fusiform gyrus is less activated in autistic persons (Williams & Minshew 2007). Another pathogenetic factor in autism seems to be an underconnectivity of neuronal networks within the brain in combination with a reduced synchronization of neuronal activity, what is suspected of leading to an impairment in global perception. An underconnectivity between parietal and frontal regions was also observed during studies of cognitive flexibility and planning, as an impairment of executive functions is well known in autistic patients (Dziobek & Köhne 2011).

There are several overlapping symptoms in ADHD and Asperger-Syndrome. Both disorders can cause a reduced level of attention: ADHD because of an increased external distractibility, Asperger-Syndrome because of a low flexibility in focusing from one subject to another (Remschmidt & Kamp-Becker 2006). Problems in interpersonal relationships can be a result of impatience and impulsiveness in ADHD, whereas in Asperger-Syndrome the lack of empathy may lead to complications in social interaction (Remschmidt & Kamp-Becker 2006, Attwood 2005). Patients of both disorders often show the special ability to engage in their interests very deeply: it is typical for persons with an Asperger-Syndrome to develop “special-interests” such as in trains, timetables or informatics (Remschmidt & Kamp-Becker 2006) whereas patients with ADHD tend to “hyperfocus” on topics they are interested in (Krause & Krause 2005).

Baron-Cohen and colleagues developed two self-assessment instruments for screening autism-disorders in adults: the “Autism-spectrum quotient” (AQ) and the “Empathy quotient” (EQ) (Baron-Cohen et al. 2001, Baron-Cohen & Wheelwright 2004). The AQ is an instrument for quantifying where an individual is placed on the continuum from normality to autism, whereas a higher score indicates more pronounced autistic traits. Its 50 items are divided into five subscales: “social skill”, “attention switching”, “attention to detail”,

“communication” and “imagination”. It has reasonable face and construct validity and an excellent test-retest reliability. 32 points were chosen as cut-off as 80% of tested patients with Asperger-Syndrome or high functioning autism scored above 32 points, whereas only 2% of controls did so. The AQ has been shown to strongly predict Asperger-Syndrome in a clinical sample (Baron-Cohen et al. 2001).

The EQ is an instrument for estimating the ability of empathy of an individual, whereas a higher score indicates a stronger empathy. It consists of 40 items concerning empathy and 20 filler items. 81% of tested persons with Asperger-Syndrome or high functioning autism scored equal to or fewer than 30 points in comparison with 12% of controls, so 30 points was chosen as the cut-off. Test-retest reliability is highly significant, with reasonable construct and external validity. Scores of the AQ and the EQ correlate inversely (Baron-Cohen & Wheelwright 2004).

So far it has not been tested whether both the AQ and EQ are suited for a screening for Asperger-Syndrome in adult ADHD-patients – because of the symptom-overlap of both disorders, suitability may be decreased.

There were two aims of this investigation: firstly we wanted to find out how many adult ADHD-patients can be diagnosed with a comorbid Asperger-Syndrome during the diagnostic process. Secondly, the suitability of the AQ and EQ for screening for Asperger-Syndrome in adult ADHD was tested, as they may be helpful instruments in the diagnostic process.

SUBJECTS AND METHODS

We included 53 adult patients who attended our ADHD-clinic for first ADHD-diagnosis (17 females, 36 males; range of age: 18-56 years, average age: 33.2 years). Cognitive intelligence was at least average in all patients, verified by the German “Mehrfachwahl-Wortschatz-Intelligenztest MWT-B” (Lehrl 1993) a multiple-choice word-test. All patients reached a score of at least 21 points in this test, indicating an at least average intelligence. Each patient gave informed consent after the procedure had been explained, no one failed to give consent. Approval for this study was given by the Ethics Committee of Hannover Medical School.

Fourteen (14) patients had a current psychotropic medication (Table 1): 7 patients were prescribed anti such as citalopram, venlafaxine, duloxetine and sertraline for improvement of mood. Both patients who were treated with venlafaxine described also a little increase in concentration. One patient with sertraline observed an improvement in sociableness. Two patients were prescribed an opiate-substitution with buprenorphine and polamidone. Six (6) patients received a medication for calming and inducing sleep such as valerian, zopiclone, promethazine and lorazepam, diazepam as well as doxepin. One subject was medicated with olanzapine because of a psychotic

disorder. Because of his impulsiveness one patient was medicated with lamotrigine, but the effects were only minor.

As also listed in Table 1, 5 patients had a current abuse/dependency of alcohol, 3 patients had an opiate-dependency and 4 patients abused cannabis. In one case amphetamines, in two cases cocaine and in one case benzodiazepines were abused.

Procedure

All steps of the diagnostic process of ADHD and Asperger-Syndrome were made by the same psychiatric physician who was experienced in diagnosing adult ADHD and Asperger-Syndrome. Diagnosis of ADHD was made according to the DSM-IV criteria (American Psychiatric Association 1994) for inattention or/ and hyperactivity-impulsivity with childhood onset and persistence of symptoms into adulthood. The diagnostic process included an interview according to the DSM-IV criteria, the clinical observation of patients during the interview, Conners Adult ADHD Rating Scales

(CAARS) (Conners et al. 1999) and, if available, information from a third party, such as school-records or information from parents, older siblings or the patient's partner. The diagnosis was confirmed if the patient met the DSM-IV criteria for ADHD with onset in childhood and persistence into adulthood. Characteristics on the 53 patients including demographic data, symptoms according to the DSM-IV and the CAARS are shown in Table 1. All patients completed the AQ and the EQ and were asked and observed for problems in social interaction. If there were hints of an autistic disorder in these tests or in the clinical investigation, a diagnostic interview according to the DSM-IV criteria of Asperger-Syndrome in child- and adulthood was conducted. Additional information from parents or siblings was recorded. The diagnosis of Asperger-Syndrome was confirmed if the patient met the DSM-IV criteria for child- and adulthood and this was also confirmed by parents or siblings.

It was then ascertained, how many patients had a combination of ADHD and Asperger-Syndrome.

Table 1. Characteristics and scores of the patients: CAARS (Conners Adult ADHD Rating Scales): the analysis is conducted separately with respect to sex and age and gives a hint of the subject's current state; A score of >32 points in AQ and a score ≤30 points in EQ are hints for an autistic-disorder. Additionally present psychotropic medication and abuse/dependency of drugs are listed; "comorbid patient" is related to comorbidity of ADHD and Asperger-Syndrome

Sex	female: 17 patients male: 36 patients
Age	range: 18-56 years average: 33.2 years
DSM-IV ADHD inattentional symptoms	53 patients
DSM-IV ADHD hyperactivity/impulsivity symptoms	23 patients
CAARS	positive for all 53 patients
AQ	>32 points: 10 patients
EQ	≤30 points: 26 patients
Comorbidity Asperger-Syndrome	8 patients (2 female, 6 male)
Current psychotropic medication	1 patient: citalopram 1 patient: occasionally valerian 1 patient: buprenorphine 1 patient: venlafaxine, zopiclone 1 patient: venlafaxine 1 patient: olanzapine, promethazine, lorazepam, duloxetine 1 patient: polamidone 1 patient: duloxetine 1 patient: lamotrigine 2 patients: diazepam occasionally 1 patient: doxepin (comorbid patient) 2 patients: sertraline (1 comorbid patient)
Current abuse of drugs	2 patients: dependency opiate 3 patients: abuse cannabis (1 comorbid patient) 2 patients: abuse alcohol (1 comorbid patient) 1 patient: dependency alcohol (comorbid patient) 1 patient: abuse alcohol, cocaine and benzodiazepines and dependency alcohol 1 patient: dependency alcohol, abuse cannabis, cocaine, amphetamines

Suitability of the AQ and EQ for screening

The Wilcoxon rank sum test was used to evaluate the suitability of the AQ and the EQ by comparing the scores of patients with sole ADHD to comorbid patients. It was ascertained, if ADHD- and comorbid patients scored above or below the cut-off of the AQ and EQ as specified by Baron-Cohen et al. 2001 and Baron-Cohen & Wheelwright 2004 respectively.

RESULTS

Comorbidity of Asperger-Syndrome in adult ADHD

Eight of the 53 ADHD patients (two female, six male patients) were diagnosed with a comorbid Asperger-Syndrome, equivalent to a frequency of 15.1% in this investigated sample (Table 1, Figure 1).

AQ and EQ as screening-instruments

Scores of the AQ and EQ are described in Table 1 as well as in Figure 2 and Figure 3.

AQ-scores of comorbid patients (Mdn=40) were significantly higher than those of patients with sole ADHD (Mdn=21), $W_s=4$, $p<0.0001$. Only two of the 45 patients with sole ADHD showed a score above the cut-off of 32 points specified by Baron-Cohen et al. 2001,

whereas all comorbid patients scored above this cut-off (Figure 2).

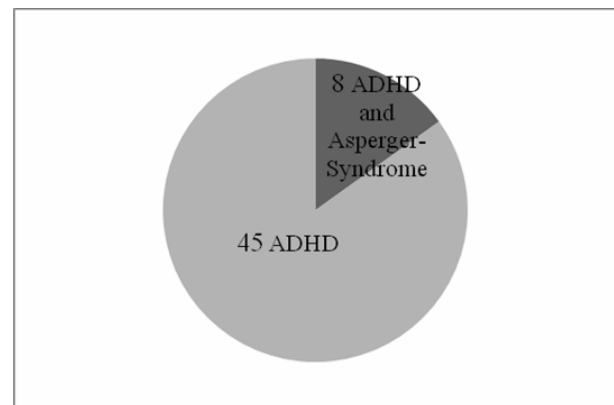


Figure 1. Frequency of comorbidity: Eight of the 53 ADHD-patients had a comorbid Asperger-Syndrome, equivalent to a frequency of 15.1%.

EQ-scores of comorbid patients (Mdn=12) were significantly lower than those of patients with sole ADHD (Mdn=34), $W_s=339.5$ $p<0.0001$. All comorbid patients scored under the cut-off of 30 points specified by Baron-Cohen & Wheelwright 2004, 18 patients with sole ADHD also scored equal to or lower than 30 points (Figure 3).

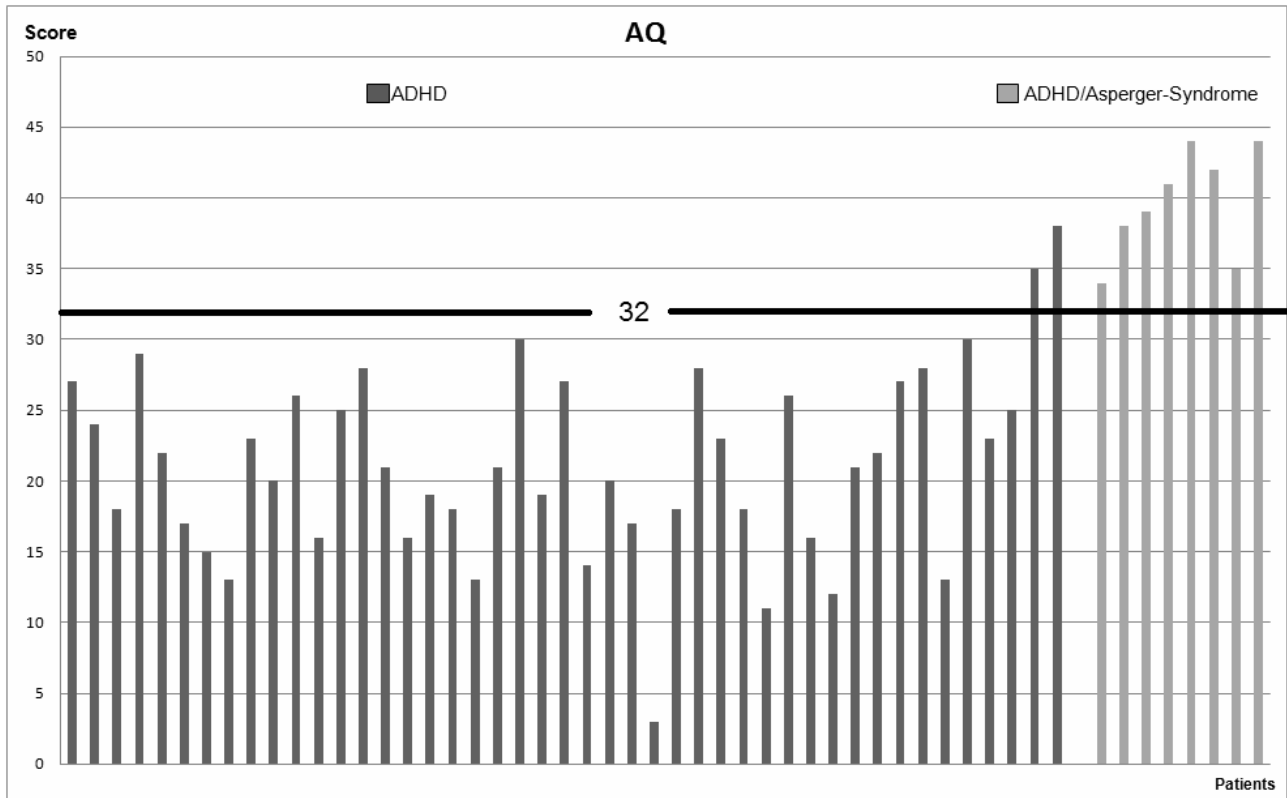


Figure 2. Scores in AQ: All comorbid ADHD/Asperger-patients had a score above the AQ's cut-off of 32 points, whereas only two ADHD-patients scored above this cut-off

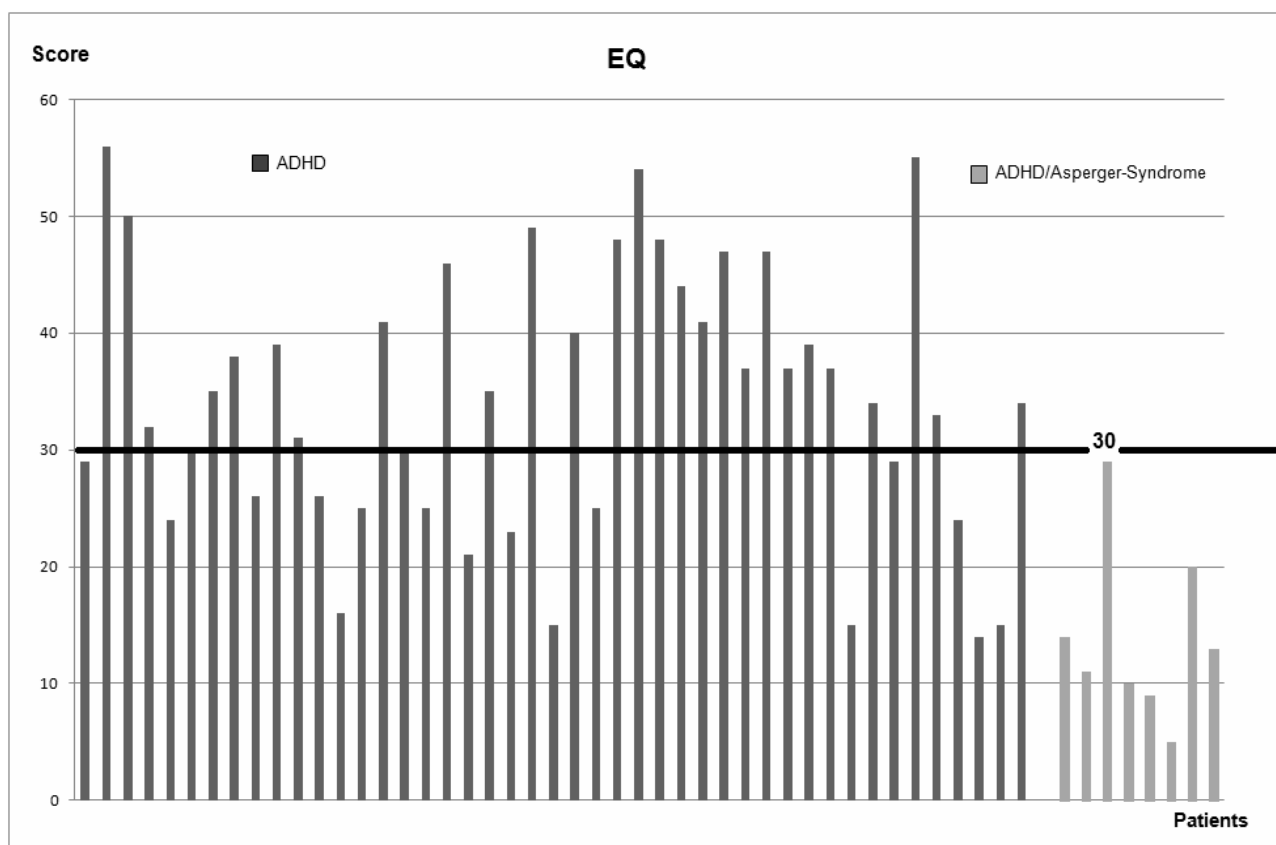


Figure 3. Scores in EQ: All comorbid ADHD/Asperger-patients had a score under the EQ’s cut-off of 30 points, 18 ADHD-patients scored equal to or below this cut-off, too

DISCUSSION

Clinical importance

Over the past ten years, the impact and knowledge of ADHD in adulthood has increased enormously. It is well known that this disorder is often accompanied by comorbid disorders such as addiction or depression. Therefore, the diagnostic standard in adult ADHD-patients should include a screening for comorbidities, because the therapy has to be adapted accordingly. Although the investigated sample of 53 patients is small and the results are therefore limited, the frequency of this autistic disorder appears to be considerably increased in adult ADHD (15.1% in our adult ADHD-patients versus the prevalence of 0.06% in the general population) - this is a meaningful finding for the clinical practice of diagnosing and treating adult ADHD-patients. Asperger-Syndrome should thus be included into a screening for comorbid disorders. Investigators should also be aware of this comorbidity, because autistic disorders are rarely diagnosed in adult patients if not already detected in childhood – symptoms of Asperger-Syndrome are often not as distinct as in early childhood autism. In our sample none of the eight comorbid patients of this study was diagnosed with ADHD or Asperger-Syndrome in childhood or young adulthood.

Suitability of the AQ and the EQ

As there are several clinical overlaps between ADHD and Asperger-Syndrome, such as reduced attention, problems in social interaction and the tendency to strongly immerse themselves in their interests, the suitability of AQ and EQ as screening-instruments for Asperger-Syndrome in ADHD was tested. In the AQ all of our comorbid patients scored above the cut-off of 32 points, whereas only two of the 45 patients with ADHD scored above this cut-off. The difference between patients with ADHD and patients with both disorders was statistically significant. These results show that the AQ seems to be a suitable screening-instrument for Asperger-Syndrome in adult ADHD and could be well used in the diagnostic-process.

In the EQ all comorbid ADHD/Asperger-patients scored under the cut-off of 30 points, whereas 18 ADHD-patients also scored equal to or lower than 30 points. The specificity of the EQ with a cut-off of 30 points thus seems to be reduced in the case of comorbidity of Asperger-Syndrome with ADHD. If patients are very impulsive or too inattentive towards other persons, ADHD can also be accompanied by non-empathic behaviour. So the suitability of the EQ with the cut-off of 30 points as a screening instrument for Asperger-Syndrome in adult ADHD is limited. In our

sample of patients an EQ's cut-off of <21 points would have the best correlation between specificity (0.88) and sensitivity (0.875) (Table 2) - however, a larger sample of patients would be necessary if an adapted cut-off should be determined.

Psychosocial impact of comorbidity

Comorbidities usually complicate the clinical outcome of ADHD. One special problem of the comorbidity of ADHD and Asperger-Syndrome is that both disorders have their beginning in the early childhood, so the symptoms can enhance each other in the whole development of the individual. So the autism-specific lack of empathy can be aggravated by an inattentive and hyperactive behaviour that may complicate the learning of interpretation of mimicry, for example. Our comorbid patients were considerably impaired in their social and professional outcome: seven of the eight patients had never had any partnership or only for the very short period of a few weeks. Five patients were without employment after several failures in their jobs. These difficulties may result from the overlapping symptoms of both disorders (Figure 4), for instance attention is reduced by distractibility in ADHD, whereas Asperger-Syndrome leads to reduced attention because of low

flexibility in focusing from one item to another. For example this can cause a more serious problem when attempting to follow the course of a conference or lecture than is the case with pure ADHD. Furthermore the ability to perform tasks flexibly, efficiently and fast may be impaired enormously in the case of both disorders and reduce success in business life. The autism-typical genuine lack of empathy can be aggravated by an ADHD-typical impatient behaviour and problems in concentration. So within a private conversation, patients with ADHD and Asperger-Syndrome may not listen to their dialog-partners and do not react to their emotions. The result can be a very low acceptance and incomprehension by fellow men. A comparison of the scores of the AQ and EQ of our comorbid patients with the scores of the original Asperger/high-functioning-autism patients of Baron-Cohen and colleagues (Baron-Cohen et al. 2001, Baron-Cohen & Wheelwright 2004) also indicates a stronger expression of autistic traits in the case of comorbidity of Asperger-Syndrome with ADHD (higher AQ in our comorbid sample versus the sample of Baron-Cohen: on average 39.6 versus 35.8 points; lower EQ: on average 13.9 versus 20.4). But of course this comparison of the AQ and the EQ between patient-samples of different investigators and investigations is very limited.

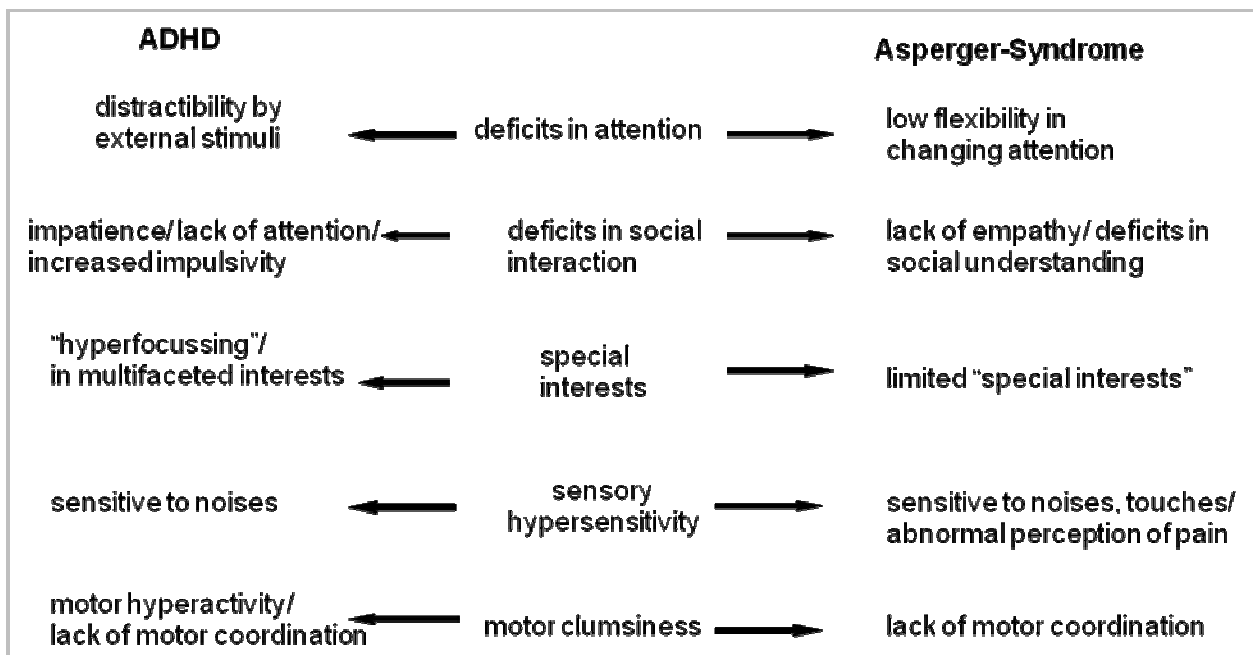


Figure 4. Overlapping symptoms: Similarities in ADHD and Asperger-Syndrome, their causes and appearance

Table 2. Analysis of cut-off scores: With a specificity of 0.88 and a sensitivity of 0.875 an EQ's cut-off score of <21 points seems to be the best in our investigated sample of patients

Specificity and sensitivity of the EQ		
right positive (rp): 7	false positive (fp): 5	rp+fp: 12
false negative (fn): 1	right negative (rn): 40	fn+rn: 41
rp+fn: 8	fp+rn: 45	rp+fn+fp+rn: 53
specificity $rn/(rn+fp)$: 0.88		sensitivity: $rp/(rp+fn)$: 0.875

Therapeutic consequences

In the case of comorbidity patients require an adequate therapy beyond the treatment of “simple” ADHD. A specific ADHD-medication, for example methylphenidate, may be helpful in patients with ADHD and Asperger-Syndrome (Roy et al. 2009). The use of such medication should therefore be thoroughly weighed up considering the whole quality of life of the patient. An improvement in holding attention and impatience could lead to better skills in social situations and professional performance and can thereby enhance the chances for success in these areas in comorbid patients (Roy et al. 2009). But there exists no specific medication for the Asperger-Syndrome itself - especially not for the lack of empathy. If the typical stereotypical behaviour develops into an obsessive-compulsive disorder medication with a selective serotonin reuptake inhibitor could be helpful. As there exists no specific medication for Asperger-Syndrome, psychotherapy seems to be of great importance in the case of ADHD and Asperger-Syndrome. Thereby both disorders should be treated, including behaviour therapy addressing ADHD-problems, such as problems in organisation of everyday life and impulsivity on the one hand and on the other hand psychotherapeutic elements for Asperger-Syndrome. A specific, empirically tested concept of psychotherapy for adult Asperger-Syndrome alone or in combination with ADHD has not been developed yet. It appears reasonable to combine elements for improving the so called “executive functions” – such as organization and planning of everyday life, holding and switching attention or reducing impulsivity – with the following principles for therapy of Asperger-patients (Klin & Volkmar 2000): practising and discussing social perception, practising social behaviour in unfamiliar situations, practising the transfer of certain insights to other situations, promoting a concrete development of identity that is based on everyday behaviours and analysing situations that trigger frustrations. Furthermore psychodynamic elements may be useful, especially with respect to the common problem of low self-esteem in both disorders. Fangmeier et al. (2011) are developing a group-psychotherapy for adult Asperger-patients with one focus on the abilities of social interaction. For example they use role playing and record them on a video camera, so all patients can analyse and discuss the performance. They practice elements of communication, such as holding the eye-contact, prosody or initiating and keeping up a conversation. Additionally patients get support in typical problematic situations, for example mobbing in the workplace and therapists help in contacting special professional aid. The involvement of related persons, for example partners or employers is suggested. Fangmeier et al. (2011) also emphasize that specifics in the communication and way of thinking of Asperger-patients must be attended to, because their very concrete speech comprehension can easily cause

misunderstandings. In case of ADHD and Asperger-Syndrome a medication, for example with methylphenidate, can provide the basis for the necessary concentration and attention in psychotherapy. A non-observance of autistic symptoms would be likely to reduce success of therapy because all the mentioned autism-typical problems will not improve. But there remains the question, how psychotherapy for ADHD and Asperger-Syndrome can be combined in the practice. It would be desirable to develop a therapeutic concept, for example for a group therapy that combines the mentioned ADHD- and Asperger-specific treating-elements. But as such concepts are still missing, for the presence it is very important that therapists and diagnosticians for ADHD have knowledge about Asperger-symptoms and therapeutic needs of such patients. Explaining and practising social rules, practising of transfer of certain insights to other situations and the understanding of biographical difficulties in the context of the Asperger-Syndrome should be topics in the therapy.

Neuropathologic impact

The high rate of comorbidity of ADHD and Asperger-Syndrome and the overlapping symptoms could be hints for similarities in neuropathology. As already mentioned above, the “executive functions” are disturbed in both disorders. A region related to attentional problems is the prefrontal cortex. In Asperger-Syndrome there are metabolic abnormalities, like a higher concentration of choline and creatine in prefrontal regions (Murphy et al. 2002). In the medial prefrontal cortex a reduced activation during a task of social attribution has been observed in autistic patients (Castelli et al. 2002). As described in the introduction, several imaging studies also indicate that ADHD is associated with abnormalities in the prefrontal cortex (Rubia et al. 1999, Sowell et al. 2003) and its connections to the striatum and cerebellum (Brennan & Arnsten 2008). The inferior parietal lobe seems to be involved in pathogenesis, too, structural abnormalities, such as higher grey matter volumes, have been found in ADHD as well as in Asperger-Syndrome (Brieber et al. 2007). Additionally, abnormalities in the dopaminergic system are found in ADHD (Ernst et al. 1998, Faraone & Biederman 1998, Dougherty et al. 1999, Dresel et al. 1999, Krause et al. 2000, Krause et al. 2003, Spencer et al. 2007) as well as in Asperger-Syndrome, as in a PET study an increased presynaptic dopamine function in the striatum and frontal cortex was found in Asperger-patients (Nieminen-von Wendt et al. 2004). It remains unclear whether this enhanced function indicates an increase of dopamine nerve terminals or an enhanced dopamine synthesis. The role of dopamine transporters in Asperger-Syndrome should be investigated, as it is known that their activity is altered in ADHD (Dougherty et al. 1999, Krause et al. 2003). Maybe a dysfunction in the prefrontal cortex and a dopaminergic

dysfunction are important overlaps in the pathogenesis of ADHD and Asperger-Syndrome, explaining the high rate of comorbidity.

Limitations of the study

As already mentioned above, a first limit of this study is the number of patients. Especially the determination of a cut-off of the EQ in case of ADHD and comorbid Asperger-Syndrome would require a larger sample of patients. Another limitation is, that diagnosis concerning ADHD and Asperger-Syndrome in childhood could only be made retrospectively by using information of the patients themselves and information of third parties, such as school-records or information of family members. Finally it must be emphasized that this study addresses the frequency of comorbid Asperger-Syndrome in adult ADHD, but to enlarge the understanding of the meaning of comorbidity, further studies could systematically investigate the interaction between both disorders in detail.

CONCLUSIONS

The most important result of this study is that Asperger-Syndrome seems to be a frequent comorbidity in adult ADHD, therefore adult ADHD-patients should be screened for this autism-spectrum disorder. As there are several clinical overlaps between ADHD and Asperger-Syndrome, the suitability of AQ and EQ as screening-instruments for Asperger-Syndrome in ADHD had to be tested. Results show that especially the AQ can be well used in the diagnostic process, whereas the specificity of EQ seems to be limited for screening.

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Conflict of interest : None to declare.

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