Associations Between Childhood ADHD and Other Mental Disorders in Young Women

Uwe Ruhl1, Anke Rentsch2, Cornelia Bernardi1, Veneta Türke-Teubner3, Eni Becker4, Wilhelm Kirch5, Jürgen Margraf6, Isabel Hach7

1Department of Clinical Psychology, University of Göttingen, FR Germany
2University Cancer Center, TU Dresden, FR Germany
3Psychotherapist, Aue, FR Germany
4Department of Clinical Psychology, Catholic University of Nijmegen, The Netherlands
5Institute of Clinical Pharmacology, TU Dresden, FR Germany
6Department of Clinical Psychology and Psychotherapy, University of Basel, Switzerland
7Klinikum Nürnberg, Department of Psychiatry and Psychotherapy, FR Germany

Corresponding author: Dr. Uwe Ruhl, Georg-Elias-Müller Institut of Psychology, Center of Therapy and Counseling, Goßlerstraße 14, 37073 Göttingen, Germany, Email: uruhl@uni-goettingen.de

Abstract

Objective: To evaluate the prevalence rates of Attention-Deficit Disorder (ADHD) and comorbidity in a representative sample of young women.

Methods: 2064 young women, aged 18–25 years, living in Dresden (Germany), were interviewed with a structured psychological interview, F-DIPS, for diagnosing axis-I disorders according to DSM-IV (Diagnostic and Statistical Manual of Mental Disorders 4th Ed.).

Results: The lifetime prevalence of ADHD was 1.5% (31 women), with only 0.14% still suffering from ADHD since childhood. Since ADHD affects boys 3–4 times more often than girls, the prevalence rate found in this sample is approximately in accordance with overall prevalence rates of about 3–10% in children. Lifetime prevalence of conduct disorders, somatoform disorders, and PTSD was significantly higher in women fulfilling once the diagnosis of ADHD than in other women. Moreover, women with (past or current) ADHD were almost twice as likely to suffer from depressive disorders and specific phobic disorders as compared with women without ADHD.

Conclusion: ADHD in childhood might lead to an increased prevalence of other psychiatric disorders in adolescence and adulthood, even if diagnostic criteria of ADHD are no longer fulfilled (German J Psychiatry 2009; 12: 8-13).

Keywords: ADHD; comorbidity; lifetime and point prevalence; young women

Received: 14.4.2008
Revised version: 12.5.2008
Published: 21.1.2009

Acknowledgements: This work was supported by a grant from the German Ministry of Science (Bundesministerium für Bildung und Forschung, BMBF, project A4 C4/C7, TU Dresden)

Introduction

Attention Deficit Disorder with or without hyperactivity (AD(H)D) is the most extensively studied mental disorder in childhood. ADHD affects an estimated 3–10% of school-age children. However, ADHD does not only occur in childhood and adolescence. Approximately 30–60% of children with ADHD have symptoms that persist into adulthood (Krause et al., 1998; Wender et al., 2001). Different types of rating scales are used to diagnose ADHD in adult-
ADHD counterparts (Biedermann, 1994; Biedermann, 2001; et al., 1998). Both the epidemiological and the clinical (ther-
cence of adult ADHD is almost ignored in Germany (Krause
ermann, 1995; Pliszka, 1998; Sobanski, 2006). Still, the exis-
tances of anxiety and depression, as compared with their non
are at greater risk for psychiatric problems, including higher
risks for conduct/oppositional disorders. Adults with ADHD
externalizing behaviours (Gaub, 1997). Inattention symp-
toms include failure to pay close attention to detail, to listen
when spoken to, to follow through on instructions or to
finish tasks; difficulty in sustaining attention and in organizing;
reluctance to engage inactivities that require sustained
mental effort; losing of things; easy distraction; and forget-
fulness (APA, 1994). Age of onset is also an important adult
ADHD diagnostic criterion. Symptoms must date back to
the age of 7 or younger. Individuals with ADHD show an
increased risk for comorbid disorders (Marks et al., 2000;
Sobanski, 2006). The presence of ADHD is an important
risk factor for psychoactive substance abuse disorders (Dis-
ney et al., 1999; Mannuzza et al., 2001; Sobanski, 2006). A
high proportion of ADHD among children also meets crite-
ria for conduct/oppositional disorders. Adults with ADHD
are at greater risk for psychiatric problems, including higher
rates of anxiety and depression, as compared with their non
ADHD counterparts (Biedermann, 1994; Biedermann, 2001;
Cuffe et al., 2001; Kessler et al., 2006; Milberger and Bied-
ermann, 1995; Pliszka, 1998; Sobanski, 2006). Still, the exist-
ence of adult ADHD is almost ignored in Germany (Krause
et al., 1998). Both the epidemiological and the clinical (ther-
apy, comorbidity) research have not sufficiently considered
the question of the persistence of ADHD or ADHD symp-
toms so far. Psychostimulants, e.g., methylphenidate, still do
not meet with approval for treating adults with ADHD (e.g.,
Novartis Pharma, 2003). Women with the predominantly
inattentive type have a higher risk of being underdiagnosed
than their male counterparts (Rucklidge and Kaplan, 2000).
There is a lack of gender-specific studies about ADHD.
Most longitudinal investigations about the course of ADHD
are based on male samples (Manuzza et al., 1993; Weiss and
Hechtmann, 1993).

This study was initiated with the aim to evaluate the preva-
lence rates of ADHD in a representative sample of young
female adults. Moreover, the point- and lifetime prevalences
of co-occurring mental disorders are investigated. A strength
of this study is that the interviewers did not focus on specific
mental disorders. One of the questions we will concentrate
on is whether comorbid diagnoses might represent inde-
pendent diagnostic entities or if comorbid diagnoses might be
direct consequences of ADHD.

Material and Methods

Sample

In the course of two projects supported by the German
Federal Ministry of Education and Research [project A4:
predictors of mental health in young women; project C4:
investigation of the application of medicines in the region of
Dresden (Germany)], a prospective epidemiological study
was performed to evaluate prevalence rates, incidences,
development, and risk factors of mental disorders (DSM-IV)
in young women. The baseline study was conducted from
July 1996 to September 1997 (T1), and a follow-up investiga-
tion (T2) from December 1997 to February 1999 (standard-
ized interview F-DIPS). As a random sample, 9000 young
women (between 18 and 24 years of age) were chosen from
the persons registered in the City of Dresden. 37% of the
addresses found were no longer valid at the time of the
investigation; of the remaining 5204 people, 2064 partici-
pated in this study. The majority of the women were not
married (94.9%), but did have a partner (66.5%). About half
of the women were living with their parents, about a third
with a partner, and about 14% alone. Very few dropped out
of school without a degree (3.3%), consistent with manda-
tory-school law. The minority went to a "Hauptschule"
(6.5%), the lowest level of school education. About one third
attended the medium level of schooling ("Realschule" and
"Polytechnische Schule") and about half ended schooling
with a degree allowing them to enter university ("Abitur").
Almost half of the young women were working: 31.5% of
the whole sample full-time, 15.3% part-time. A few women
were still at school (4.3%), about 40% were university stu-
dents, and about 5% were currently unemployed.

Diagnostic assessment

The women were interviewed twice (T1: lifetime prevalence
and point prevalence of mental disorders; T2: one-year
prevalence and point prevalence) by using the research ver-
sion of the Diagnostic Interview for Mental Disorders (Mar-
graf et al., 1996). The F-DIPS is a structured interview to
obtain Axis I diagnoses according to DSM-IV, to investigate
lifetime prevalences as well as point prevalences. However, it
is not able to detect schizophrenias and personality disor-
ders. It is a modified version of the DIPS (Margraf et al.,
1991) and the ADIS-IV (Brown et al., 1994). The retest-
and inter-rater reliability of the DIPS was tested in an unselected
sample of 201 patients, mostly of an internal medicine-
psychosomatic clinic (Schneider et al., 1992). The retest
reliabilities across the groups of disorders were between .68
and .79 (Kappa coefficient) and .67 and 1.0 (Yule's Y-
coefficient). Besides a few exceptions, the single diagnoses
also reach satisfactory values (Kappa-coefficient between .68
and .73 and Yule's Y between .71 and 1.0). Interviewers were
either medical doctors or psychology students in their last
year of training. All had undergone extensive training lasting
about one week and received bi-weekly supervision. Spe-
A diagnostically trained supervisor proofread every interview. Information regarding the origins of the disorder in childhood and adolescence was given in retrospect; the age (in years) at the beginning of the disease is quoted.

Statistical Analyses

Data was analysed using the Statistical Package for Social Sciences (SPSS, German Windows Versions 8.0) and a relational database (Paradox 7.0, Borland). Between-group comparisons were done with a statistical procedure on the basis of the comparison of likelihoods of two binomial distributions.

Results

Retrospectively, 31 women (life-time prevalence: 1.5%) fulfilled diagnostic criteria of ADHD in childhood (0–12 years of age). In adolescence (13–17 years of age), 9 women (29%) were still suffering from ADHD. However, only 3 (= 10%) of formerly affected women were showing ADHD at T1 (point prevalence) (Fig. 1). Those women with ADHD were examined concerning other mental disorders. Tab. 1 shows the point and lifetime prevalence rates of all diagnosed psychiatric disorders at T1.

Conduct/oppositional disorders were highly frequent lifetime diagnoses. Almost 40% of women with ADHD showed these disorders. Specific phobias, depressive disorders and posttraumatic stress disorders were also highly prevalent. More than 40% of women with ADHD had psychiatric disorders at T1. Phobic anxiety disorders were mostly prevalent. Every 6th of these women had already experienced a depressive episode during lifetime. The frequency of major depression between T1 and T2 (1-year prevalence) was significantly higher in women with ADHD (18%) in comparison to women without ADHD (p<0.01) (not shown in table). In all cases ADHD was diagnosed earlier than the other mental disorders.

Differences in lifetime prevalence rates between women with and those without ADHD are shown in Tab. 2. Only mental disorders which affected at least 9.7% of women with ADHD (>3 women) were chosen for those comparisons, because the expected cell frequencies should not be neither smaller than 5 nor blank to estimate the probabilities with sufficient precision (Everitt, 1977; Hays, 1988).

Women with ADHD suffer twice as much from the mentioned mental disorders. There are significant differences in the prevalence of conduct/oppositional disorders, PTSD, and somatoform disorders. Because of performing multiple statistical significance tests on the same data, the Bonferroni adjustment was applied to test statistically significance (Abdi et al., 2007). Even after the Bonferroni adjustment every test results in a p-value of less than .01 and can be considered statistically significant.

| Tab. 1. Point and lifetime prevalence rates of mental disorders* in women with ADHD (n=31) |
|---------------------------------|-----------------|-----------------|
| Diagnosis                      | Point prevalence (T1) % w | Lifetime prevalence % w |
| Alcohol dependence syndrome    | -                | 3.2             |
| Sedatives or hypnotics dependence syndromes | 3.2             | -               |
| Bipolar affective disorders    | 3.2              | 6.4             |
| Eating disorders               | 6.4              | 3.2             |
| Depressive episodes            | -                | 16.1            |
| Cyclothymia                    | -                | 3.2             |
| Phobic anxiety disorders       | 35.5             | 19.7            |
| Other anxiety disorders        | -                | 3.2             |
| Posttraumatic stress disorders | 3.2              | 16.1            |
| Somatoform disorders           | 9.7              | 6.4             |
| ADHD                           | 9.7              | 100             |
| Conduct/oppositional disorders | 3.2              | 38.7            |
| Enuresis                       | -                | 3.2             |

* without personality disorders and schizophrenia
Discussion

This study was started with the goal to evaluate prevalence rates of ADHD and other mental disorders in a representative sample of German females in young adult age.

One limitation of this study is its methodology: The diagnosing of ADHD was done retrospectively relying on the accurate recall of women. Moreover, a prospective study would yield lower rates of comorbidity. A second limitation is that no reports from parents or teachers were available. Murphy and Schachar (2000) stated that adults are more able to give a true account of their current symptoms of ADHD than are children. By examining adults, their partners, and their parents about ADHD symptoms, the authors found remarkable correlations between subject and observer scores. Although no ADHD-specific diagnostic instrument (e.g., Wender Utah Rating Scale; Retz-Junginger, 2002) was used in our study, the F-DIPS is a structured interview, strictly following DSM-IV criteria for ADHD. Hence, the authors conclude that the diagnostic instrument is valid to detect ADHD.

ADHD occurs rather rarely in adult German women, with lifetime prevalence being low. ADHD affects 1.5% of females in childhood. In about a third of affected women ADHD persists into adolescence. Only 10% of affected females fulfill diagnostic criteria in adulthood. These results differ from other studies. Research indicates that ADHD persists into adulthood in 30–60% of affected individuals (Krause et al., 1998; Manuzza et al., 1993; Weiss and Hechtman, 1993). Non-gender-specific lifetime prevalence is estimated to be between 3-10% (Wender et al., 2001), and in a community sample of adolescents and young adults a prevalence of only 1.5% for ADHD was found. Males were 4-5 times more affected than females (0.54%) (Cuffe et al., 2001). Nevertheless, our results show less prevalence in adulthood than expected. Is the full dimension of the gender-specific bias still unknown? Andersen and Teicher (2000) named differences in the dopamine system between male and female rats which might attribute to gender differences in ADHD. Male D2 receptor density shows a sharp decrease (minus 55%) during transition from adolescence to adulthood. The D4 and D2 receptor genes have been implicated in increasing the susceptibility of subjects to ADHD (Suno-hara et al., 2000; Swanson et al., 2000; Swanson, 2000). The possible influence and neuroprotective effects of hormones and their role in psychiatric disorders was sometimes discussed in recent reviews (Arnold, 1996; Kölsch & Rao, 2002; Savada and Shimohama, 2000), but never proved. Savada and Shimohama (2000) showed that estradiol provides neuroprotection in mesencephalic dopaminergic neurons. They suggested that this neuroprotective effect might lead to lower prevalence rates of ADHD in women. Hence, the strong decrease in the prevalence of ADHD in adulthood in our study might be an indicator for hormonal changes. But we did not evaluate appropriate parameters to verify this assumption. Rucklidge and Kaplan (2000) found that more women with ADHD represented a learned helplessness attributional style than their female non-ADHD counterparts. They stated that repeated failure experiences of women with ADHD in childhood (caused by not being identified as ADHD subjects) lead to a learned helplessness response. In turn, the likelihood of depression and anxiety might increase, because affected women tend to exhibit more internalizing comorbid disorders: the women with ADHD in our study show significantly more other mental disorders than do women without ADHD. Almost 40% are comorbid for conduct/oppositional disorder. Conduct disorders/problems are often found in individuals with ADHD (Biederman, 2001; Dalsgaard et al., 2002; Marks et al., 2000; Rucklidge and Kaplan, 2000; Weiss and Hechtman, 1993; Weiss, 2003; Wender et al., 2001). As about 50% of children with conduct disorders later develop an antisocial behaviour disorder; an existing conduct disorder is also an important prognostic sign (Wender et al., 2001). However, F-DIPS is not able to detect personality disorders. Diagnoses on claim forms of ambulant-treating doctors did not report antisocial behaviour personality disorders at all (Hach et al., 2003), which may indicate a low prevalence of those disorders in this sample. Substance abuse, another common comorbid disorder in subjects with ADHD (Biederman, 2001; Manuzza et al., 1993; Marks et al., 2000), could not be found in our study either. One woman had suffered from an alcohol dependence syndrome (lifet ime diagnosis), and one woman reported an existing sedative dependency syndrome at T1. It is noteworthy that substance-related disorders in this study were very rare (lifetime prevalence 1.9%; point prevalence T1: 0.9%, T2: 1.2%). Hence, interpretations should be done with care (Becker et al., 2000). The likelihood of developing PTSD and a somatoform disorder was three and eight times, respectively, higher with women with ADHD than without ADHD. Even in large reviews of recent literature and studies with population-based samples, respectively (Lieb et al., 2000; Marks et al., 2000; Wender, 2001), no data is available about associations between ADHD and PTSD and somatoform disorders. As a hypothesis, somatoform disorders could be typical comorbid-

---

**Tab. 2. Differences in lifetime prevalence rates of mental disorders* between women with or without ADHD**

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>W/ADHD (n=31) % w</th>
<th>CI</th>
<th>W/o ADHD (n=2033) % w</th>
<th>CI</th>
<th>χ2 Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>16.1%</td>
<td>3.2–29.1</td>
<td>8.7%</td>
<td>7.5–9.9</td>
<td>n.s.</td>
</tr>
<tr>
<td>Conduct/Oppositional Disorder</td>
<td>38.7%</td>
<td>21.6–55.9</td>
<td>2.6%</td>
<td>1.9–3.2</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Specific phobias</td>
<td>19.7%</td>
<td>5.4–33.3</td>
<td>10.8%</td>
<td>9.4–12.1</td>
<td>n.s.</td>
</tr>
<tr>
<td>Posttraumatic Stress Disorder</td>
<td>16.1%</td>
<td>3.2–29.1</td>
<td>6.1%</td>
<td>4.2–6.1</td>
<td>p&lt;0.01</td>
</tr>
<tr>
<td>Somatoform Disorder</td>
<td>9.7%</td>
<td>0–20.1</td>
<td>1.2%</td>
<td>0.7–1.7</td>
<td>p&lt;0.001</td>
</tr>
</tbody>
</table>

* without personality disorders and schizophrenia
ities of ADHD, exhibited after internalizing processes. In cases of posttraumatic stress disorder, a higher risk for accidents and injuries (caused by inattention and hyperactivity) in combination with an existing mental disorder (ADHD) could lead to a higher vulnerability for developing a PTSD. Mostly, the reason for an acute PTSD is a sexual abuse. Affective and anxiety disorders are often associated with ADHD (Wender, 2001; Marks et al., 2000; Rucklidge and Kaplan, 2000). Similar symptoms are found in ADHD as well as depression (e.g., impaired concentration, restlessness, impulse control deficits) (APA, 1994). Moreover, both are associated with a dysfunction of similar neurotransmitters. Questions have been raised regarding the degree to which the high incidence of comorbidity is simply a by-product of overlapping symptoms (Pliska, 1998). Milberger & Biederman (1995) examined subjects with ADHD and comorbid psychiatric disorders (major depression, bipolar disorder, anxiety disorder). To determine the degree to which a possible symptom overlap influences these diagnoses, each individual was re-diagnosed on the basis of two different techniques. The results showed that both ADHD and the comorbid conditions themselves were not artefacts of symptoms shared with the other psychiatric disorder. Although the prevalence-rates of both depression and specific phobias in women with ADHD doubled the prevalence rate of non-ADHD women, no significant correlations were found in our study. An interesting fact is that, except for the conduct disorders, the disorders mostly associated with ADHD (depression and phobias) did not occur significantly more frequently than other mental disorders (PTSD, somatoform). As a consequence, all mental disorders found in this study seem to represent independent diagnostic entities. The role of neurobiological processes, maladaptive attribution styles, and perhaps hormonal changes in developing other comorbid mental disorders remains unclear, although, in young adult life, those “comorbid” disorders are highly prevalent. Regarding the fact that ADHD was always the “first” occurring mental disorder, treatment strategies should still consider its possible, existing symptoms.

Summary

The prevalence rates of ADHD in young, adult women are unexpectedly low. The prevalence of somatoform disorders, PTSD, and conduct/oppositional disorders is significantly higher in women with lifetime diagnoses of ADHD than in their counterparts without ADHD. Moreover, women with ADHD are about twice as likely to suffer from major depression and specific phobias as compared to women without ADHD. The results indicate that suffering from ADHD in childhood increases the risk of “comorbidity” in adolescence and young adulthood, even if ADHD is then no longer present.

References


Andersen SL, Teicher MH. Sex differences in dopamine receptors and their relevance to ADHD. Neurosci Biobehav Rev 2000; 24:137–141

Arcia E, Connors CK. Gender differences in ADHD: J Dev Behav Pediatr 1998;19:77-83


Biederman J. Patterns of psychiatric comorbidity, cognition, and psychosocial functioning in adults with attention deficit hyperactivity disorder. Am J Psychiat 2001; 150:1792-1798


Brown TA, DiNardo, PA, Barlow DH. Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV), Graywind Publications Inc, Albany; 1994


Everitt, BS. The analysis of contingency tables. London: Chapman & Hall; 1977


Hach I, Rentsch A, Ruhl UE, Becker E, Türcke V, Margraf J, Kirch W. Validity of diagnoses of mental disorders
by primary care physicians. Gesundheitswesen 2003; 65:359-364 (Article in German)


Krause KH, Krause J, Trott GE. Hyperkinetic syndrome (attention deficit-/hyperactivity disorder) in adulthood. Nervenarzt 1998;69:543-556 (Article in German)


Margraf J, Schneider S, Neumer S, Becker ES. F-DIPS: Diagnostisches Interview bei psychischen Störungen (Forschungsversion). Dresden: 1996 (Unpublished manuscript)


Novartis Pharma GmbH. Product-Information Ritalin®. 2003


Sobanski E. Psychiatric Comorbidity in adults with attention-deficit/hyperactivity disorder (ADHD). Eur Arch Psychiat Clin Neurosci 2006;256:26-31


Swanson JM. Dopamine-transporter density in patients with ADHD. Lancer 2000;355:1461-1462


Wender PH, Wolf LE, Wasserstein J. Adults with ADHD. An overview. Ann NY Acad Sci 2001;931:1-16