Self-Reported Symptoms of Attention-Deficit/Hyperactivity Disorder: Rate of Endorsement and Association with Neuropsychological Performance in an Adult Psychiatric Sample

Brooke C. Schneider*, Teresa Thoering, Barbara Cludius, Steffen Moritz

Department of Psychiatry and Psychotherapy, University Medical Center Hamburg-Eppendorf, Hamburg, Germany

*Corresponding author at: Department of Psychiatry and Psychotherapy, University Medical Center Hamburg-Eppendorf, Martinistr. 52, 20246 Hamburg, Germany. Tel.: +49-40-7410-57549; fax: +49-40-7410-57566 E-mail address: b.schneider@uke.de (B. C. Schneider).

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Abstract

The lack of specificity of attention-deficit/hyperactivity disorder (ADHD) symptoms represents a diagnostic challenge, especially when assessing psychiatric patients reporting a wide range of complaints. Rate of endorsement of ADHD symptoms, and their association with neuropsychological performance, was examined in a psychiatric sample of 71 adults, who had been referred for a neuropsychological evaluation. Patients completed two self-report measures of ADHD symptoms, the ADHD Self-Report Scale (ADHD-SR) and the Wender Utah Rating Scale-Short Form, as well as measures of attention, executive functioning, visuoconstructional ability, and verbal learning and memory. On the ADHD-SR, 74.6% of the sample met the cutoff for inattention or hyperactivity, while 81.7% met the cutoff for impulsivity. Neuropsychological performance was weakly associated with self-reported symptoms. Our results suggest that psychiatric patients commonly report symptoms of inattention, hyperactivity, and impulsivity. Assessment utilizing multiple sources is necessary to confirm whether self-reported symptoms are indicative of ADHD or reflect other causes.

Keywords: ADHD; Differential diagnosis; Comorbidity; Assessment; Prevalence

Introduction

Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder characterized by attentional problems, poor impulse control, and motor activity or restlessness, as well as psychosocial difficulties (APA, 2000). ADHD is associated with significant psychiatric comorbidity, and the prevalence of ADHD among adults with psychiatric disorders ranges from 6.5% to 25.4% (Kessler et al., 2006). However, symptoms such as inattention, hyperactivity, and impulsivity are not specific to ADHD, and are reported by patients with various psychiatric difficulties (e.g., low self-esteem and difficulty concentrating may also be related to depression or post-traumatic stress disorder; Goodman, Surman, Scherer, Salinas, & Brown 2012). The lack of specificity of ADHD symptoms, and the subsequent difficulty clinicians experience in differentiating ADHD from other disorders, represents a major challenge to diagnosis and treatment (Goodman et al., 2012).

To help improve diagnostic accuracy, the European Consensus Statement on Diagnosis and Treatment of Adult ADHD recently recommended that a thorough semi-structured clinical interview, including both self- and informant reports, serve as the foundation for ADHD assessment, while neuropsychological, neurophysiological, and neuroimaging data are considered supplementary (Kooij et al., 2010). Diagnostic interviews should ideally be accompanied by school records, and family and medical history, as well as possible consultation with other clinicians (Kooij et al., 2008). Despite these recommendations, diagnosis of ADHD is often based largely on self-reported symptoms, especially in primary care settings (Goodman et al., 2012). Several studies have demonstrated that symptoms of ADHD occur relatively frequently in adults drawn from a variety of populations, and, therefore, lack specificity. For example, Lewandowski, Lovett, and Gordon (2008) reported that none of the items on a questionnaire based on the Diagnostic and Statistical Manual of Mental Disorders—IV (APA, 2000) were both specific and sensitive to ADHD in...
a college sample. In college students with psychological diagnoses or symptoms, Suhr, Zimak, Below, and Fox (2009) found a high false positive rate according to self-reported childhood symptoms on the Wender Utah Rating Scale (WURS). In a study by Hill, Pella, Singh, Jones, and Gouvier (2009), the WURS was strongly associated with dysfunctional personality traits. Therefore, use of self-report alone may result in misdiagnoses and even negative consequences (e.g., unnecessary medication, loss of licensing or certification that required an absence of ADHD).

Although impaired attention is a diagnostic requirement of ADHD (APA, 2000), and executive functioning has been shown to be a “cardinal” feature of adult ADHD (Kessler et al., 2010), weak associations between neuropsychological performance and both self-reported symptoms and cognitive difficulties have been reported in studies assessing adults with ADHD (Barkley & Fischer, 2011; Barkley & Murphy, 2010, 2011), as well as from trials with psychiatric patients (Moritz, Ferahli, & Naber, 2004). In contrast, rating scales of executive dysfunction are more sensitive to functional impairment (Barkley & Fischer, 2011; Barkley & Murphy, 2010, 2011), and it has been proposed that neuropsychological measures may be less helpful in confirming the presence of ADHD symptoms and impairments in adults, as these tasks are unable to tap the complex processes required for everyday functioning (Barkley & Fischer, 2011).

In the present study, we sought to examine the prevalence of self-reported ADHD symptoms in a sample of psychiatric inpatients referred for neuropsychological testing. Given that neuropsychological assessment may be used as supplementary data to corroborate self-reported symptoms, we further sought to examine the association of self-reported symptoms with neuropsychological performance. Based on previous work in adults with and without ADHD (Barkley & Fischer, 2011; Barkley & Murphy, 2010, 2011), as well as those presenting with psychological problems (Hill et al., 2009; Moritz et al., 2004), we expected only weak associations between self-reported symptoms and neuropsychological performance.

Methods

Participants

Permission to access archival data was obtained from the Institutional Review Board at the University Hospital Hamburg-Eppendorf (Germany). The sample was comprised of 122 patients, between 18 and 69 years of age, consecutively referred to the Department of Psychiatry and Psychotherapy over a period of 30 months for an outpatient neuropsychological evaluation. Participants were excluded if they had a primary diagnosis of a psychotic disorder (n = 38), a history of a neurological disorder (n = 12; e.g., stroke, epilepsy, dementia), or if they were currently taking medication for ADHD (n = 1; methylphenidate). Primary diagnoses in the final sample (n = 71) included depression (n = 35), substance abuse/dependence (n = 11), anxiety disorder (n = 9), borderline personality disorder (n = 9), adjustment disorder (n = 3), personality disorder not otherwise specified (n = 1), narcissistic personality disorder (n = 1), histrionic personality disorder (n = 1) and other (n = 1). No specific referral question was given for 24 patients. Comments provided with the referral for the remaining 47 patients included: ADHD assessment (n = 22), memory problems (n = 2), attentional problems (n = 10), tenseness (n = 2), symptoms consistent with psychosis (n = 3), limited ability to work under pressure (n = 1), anger difficulties (n = 3), depression (n = 1), mood swings (n = 1), social phobia (n = 1), and guarded presentation (n = 2). Patients were referred by psychiatrists (n = 24), psychologists (n = 17), neurologists (n = 7), internists (n = 9), nurses or nursing assistants (n = 5), occupational or recreational therapists (n = 3) and psychologists in training (n = 5). Occupational information for one referring clinician was not available.

Procedures

All patients were referred for testing through an internal system, Soarian Clinicians© (Siemens Medical Solutions, 2007). Prior to neuropsychological testing, each patient, regardless of the reason for the referral, was asked to complete the ADHD Self Report Scale (ADHD-SR; Rössler, Retzt-Junginger, Retzt, & Stieglitz, 2008). Patients, who were specifically referred for an ADHD assessment (n = 22) were additionally asked to complete the WURS-Short Form (WURS-SF; Retzt-Junginger et al., 2002). Graduate students, who were completing their final clinical training experience before ending their graduate program, performed neuropsychological testing. Two clinical neuropsychologists with at least 10 years of experience supervised all students.

Measures

The ADHD-SR is a 22-item self-report scale that is based on ADHD diagnostic criteria from the ICD-10 and DSM-IV. The reliability and internal consistency of the ADHD-SR are good, and have been demonstrated in a psychiatric sample that included patients both with and without ADHD diagnoses (test-retest = 0.78–0.89; Cronbach’s α = 0.72–0.90; Rössler et al., 2004). Item-total correlations for the entire test range from 0.33 to 0.61, and the scale is considered valid by the authors to screen for
adult ADHD (for further psychometric data see Rösler et al. 2008). The ADHD-SR correlates strongly with the Conners’ Adult ADHD Rating Scale (for corresponding subscales, \( r = .72–.77 \)) and the Wender-Reihm herr Interview (for corresponding subscales, \( r = .52–.70 \)) (Rösler et al., 2008). According to the authors, based on ICD-10 criteria, a possible ADHD diagnosis should be considered when at least six items from the Inattention subscale, three items from the Hyperactivity subscale and one item from the Impulsivity subscale are endorsed as greater than 0 (i.e., no symptoms) on a 4-point Likert scale (Rösler et al., 2008). Sensitivity for a cutoff score of 10 is 0.88, while specificity is 0.67. At a cutoff score of 15, a sensitivity of 0.77 and a specificity of 0.75 were reported. At a cutoff score of 10, there were 17 patients who endorsed at least ten items, but did not endorse the needed items from each specific subscale to meet ICD-10 criteria. At a cutoff score of 15, all patients who met the cutoff score endorsed the necessary number of items for each subscale.

The WURS-SF was also administered to patients initially referred for an ADHD assessment. The 21-item measure queries about the severity of the ADHD symptoms present between the ages of 8 and 10 years using a 5-point Likert scale, but does not specifically assess DSM-IV ADHD symptoms. A total score \( \geq 30 \) suggests that symptoms are consistent with ADHD. The reliability of the short-form version is excellent (test-retest reliability = 0.90; Cronbach’s \( \alpha = 0.91 \)), and it correlates highly with the original version (\( r = .94 \), Rösler et al., 2008). Gender-specific norms have been reported, such that at a cutoff score of 30, sensitivity is 0.85 and 0.93, and specificity is 0.76 and 0.92 for men and women, respectively (Retz-Junginger et al., 2002).

A neuropsychological battery was administered to all patients as part of a clinical neuropsychological evaluation that included measures of speeded processing and psychomotor speed (Trail Making Test, Part A [TMT-A], Reitan, 1992; d2 Test, Brickenkamp, 1978), divided attention (Test of Attentional Performance [TAP] Divided Attention subtest Visual and Auditory reaction time [RT] and errors, Zimmerman & Fimm, 1994), selective attention/inhibition (TAP Go/NoGo subtest RT and errors), verbal learning and memory (Auditory Verbal Learning Test [AVLT], Rey, 1964; Logical Memory subtest of the Wechsler Memory Scale—Fourth Edition [WMS-IV], Wechsler, 2008), nonverbal (Wechsler Adult Intelligence Test—Third Edition [WAIS-III] Matrix Reasoning, von Aster, Neubauer, & Horn, 2006) and verbal reasoning (WAIS-III Similarities), set-shifting (Trail Making Test, Part B [TMT-B], Reitan, 1992; Wisconsin Card Sorting Test [WCST], Grant & Berg, 1948), planning (Behavioural Assessment of Dysexecutive Syndrome [BADS] Zoo test, Wilson, Alderman, Burgess, and Emslie, 1996), and visuoconstructural ability (WAIS-III Block Design). The battery was completed in a single testing session, and participants were given one 10-min break. Administration of all tests adhered to the standardized procedures provided in the respective test manuals.

**Analyses**

Initial examination of variables revealed significant skew (z-score > 2.58 when comparing the skew statistic to its standard deviation; Field, 2009) on the following tests and subtests: TAP Divided Attention omissions, TAP Go/NoGo RT and errors, TMT-A, TMT-B, AVLT Trials 1-5, and the Zoo test total score. Logarithmic transformations were performed to correct for significant skew. T-tests were used to examine mean differences in demographic characteristics and neuropsychological test performances. Groups for t-test analyses were defined as patients who endorsed items consistent with ADHD according to the 10-item cutoff on the ADHD-SR and also endorsed the required number of items within each symptom domain (ADHD Sx+), and patients who endorsed fewer than 10 symptoms and/or did not endorsed enough items in each symptom domain (ADHD Sx−). To investigate relationships between neuropsychological test performance and the ADHD-SR, Pearson correlations were obtained. All analyses were conducted with SPSS v22.0.

**Results**

There were no significant differences in demographic characteristics or neuropsychological performance between the ADHD Sx+ and ADHD Sx− groups (Table 1). Internal consistency for the ADHD-SR (Cronbach’s \( \alpha = 0.94 \)) and WURS-SF (Cronbach’s \( \alpha = 0.95 \)) was excellent. Among the total sample, 74.6% endorsed at least six symptoms of inattention, 74.6% endorsed least three symptoms of hyperactivity, and 81.7% endorsed at least one symptom of impulsivity. When a cutoff score of 10 on the ADHD-SR was applied, 35 patients (49.3%) were classified as having symptoms consistent with ADHD, while at a cutoff score of 15, 20 patients (28.2%) were classified as having symptoms consistent with ADHD. Total scores on the ADHD-SR and WURS-SF were significantly correlated (\( r = .72, p < .001 \)). All three ADHD-SR subscales were significantly associated with the WURS-SF total score (Inattention \( r = .59, p < .001 \); Hyperactivity \( r = .58, p < .001 \); Impulsivity \( r = .47, p = .03 \)). Of the 22 patients who were administered the WURS-SF, seven (9.86% of the total sample) endorsed symptoms consistent with ADHD on both the ADHD-SR (10-item cutoff) and the WURS-SF.

Most correlations with neuropsychological performance (15 out of 17 for the ADHD-SR) were not significant (see Supplementary material online, Table S1). A significant association was found only between the ADHD-SR total score, and
Discussion

Associated with poorer neuropsychological functioning.

Gender, male,
Age, mean (SD)

Education, mean (SD)

ADHD ratings

ADHD-SR, mean (SD)

WURS-SF, mean (SD)

Cognitive functioning

TAP

Go/NoGo

RT, mean, ms (SD)

Errors, n (SD)

Divided Attention

Auditory RT, mean, ms, (SD)

Visual RT, mean, ms, (SD)

Omissions, n (SD)

Trail Making Test, Part A, mean, s (SD)

Part B, s (SD)

d2 Test, mean, s (SD)

AVLT

Trials 1-5, mean (SD)

Trial 7, mean (SD)

WMS-IV Logical Memory

Immediate Recall, mean (SD)

Delayed Recall, mean (SD)

WCST categories completed, mean (SD)

BADS Zoo Test total score, mean (SD)

WAIS-III

Block design, mean (SD)

Matrix reasoning, mean (SD)

Similarities, mean (SD)

Notes:

*ADHD Sx− = Patients did not endorse at least 10 symptoms of ADHD and/or they did not endorse the required number of symptoms in each category; ADHD Sx+ = Patients endorsed at least 10 symptoms of ADHD and the required number of symptoms in each category as greater than “0” (i.e., six symptoms of inattention, three symptoms of hyperactivity and one symptom of impulsivity); ADHD-SR = Attention Deficit Hyperactivity Disorder - Self Report Scale; AVLT = Auditory Verbal Learning Test; BADS = Behavioural Assessment of the Dysexecutive Syndrome; RT = reaction time; TAP = Test of Attentional Performance; WAIS-III = Wechsler Adult Intelligence Scale – Third Edition; WCST = Wisconsin Card Sorting Test; WMS-IV = Wechsler Memory Scale – Fourth Edition; WURS-SF = Wender Utah Rating Scale – Short Form.

TMT-B (r = .27, p = .02) and WAIS-III Similarities (r = − .35, p = .02), indicating that endorsement of ADHD symptoms was associated with poorer neuropsychological functioning.

Discussion

These findings support previous work suggesting that ADHD symptoms are common in adults (Lewandowski et al., 2008; Suhr et al., 2009), and provide further evidence of the high rate of endorsement in a psychiatric sample. A large majority of patients endorsed symptoms of inattention, hyperactivity and/or impulsivity, and approximately half endorsed symptoms consistent with ADHD according to a liberal cutoff criterion on a self-report scale of ADHD. Although it should be emphasized that meeting the cutoff criterion on a single self-report scale of ADHD should in no way be considered diagnostic, this percentage is far greater than the rates of ADHD reported among adults with co-occurring disorders (Kessler et al., 2006). Fewer patients (i.e., approximately one-fourth) endorsed symptoms consistent with ADHD according to a conservative cutoff, suggesting that a higher cutoff criterion on the ADHD-SR may be needed when assessing patients with known psychological difficulties. Most importantly, our findings underscore that caution is necessary when interpreting the complaints and self-reports of patients with co-occurring psychiatric disorders, who are presenting for an assessment of ADHD, as these symptoms appear to be broadly reported, and not specific to ADHD. As indicated by Kooij and colleagues (2008, 2010), using multiple sources of information (e.g., semi-/structured interview, informant report, school reports, etc.) is essential to improving diagnostic accuracy and reducing risk for misdiagnosis.
Secondly, performances on most neuropsychological measures were not significantly associated with ADHD symptoms. Findings of significant associations between self-reported ADHD symptoms, and select measures requiring speeded processing and set-shifting, as well as verbal reasoning, should be considered tentative, as they were small, indicating little shared variance (e.g., shared variance with WAIS-III Similarities was 9%). These findings are in line with previous work (Barkley & Fischer, 2011; Barkley & Murphy, 2010, 2011), which posited that neuropsychological tests of executive functioning are not able to capture the complex interactions of cognitive functions that manifest as deficits in daily life among individuals with ADHD. These arguments may also be extended to patients with general psychiatric problems (Moritz et al., 2004). Patients likely develop strategies that help them to compensate for cognitive weaknesses, and thus, despite functional difficulties, they perform within normal limits on formalized cognitive tests, which are relatively short and may have varying real-world relevance (Barkley & Murphy, 2011).

Our ability to draw firmer conclusions from this study was limited by the fact that no measure of psychiatric symptoms was included. Therefore, it is unclear whether symptoms endorsed on the ADHD scales may be a manifestation of elevated general psychiatric distress, as previously found with the WURS (Hill et al., 2009; Suhr et al., 2009). It would be of interest to longitudinally examine whether the number of symptoms of ADHD endorsed might decrease when other psychiatric symptoms are resolved. Measures of performance and symptom validity would also help to identify to what extent participants may have responded honestly on the ADHD self-report measures, and provided their best effort on neuropsychological measures (Larabee, 2012). It would have also been optimal to administer the WURS-SF to all participants. Additionally, our sample size was relatively small and was a sample of convenience.

Taken together, our data provide further evidence that psychiatric patients broadly report symptoms of ADHD, and that these symptoms are only weakly associated with neuropsychological functioning. Caution is warranted when assessing patients with co-occurring psychiatric disorders for ADHD, and utilizing multiple sources of information is necessary.

Supplementary Material

Supplementary material online material is available at Archives of Clinical Neuropsychology online.

Conflict of Interest

None declared.

References
