Validation of Self-Report Instruments to Assess Attention Deficit Hyperactivity Disorder Symptoms in Adults Attending Community Drug and Alcohol Services

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Background: Symptoms of attention deficit disorder of predominantly inattentive, predominantly hyperactive-impulsive subtype, or combined (hereafter referred to as ADHD), may persist into adulthood, although the diagnosis in adults remains controversial. The study aimed to validate self-report instruments for assessment of adult ADHD in a sample of treatment-seeking adults attending community drug and alcohol teams.

Methods: Adult patients attending 3 National Health Service (NHS) community drug and alcohol teams in England completed several self-report instruments for assessment of adult ADHD symptoms, and a diagnosis of adult ADHD was determined using *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition criteria with an interview with both the patient and an informant.

Results: One hundred seven subjects completed the project. Thirty-nine percent of subjects had an undisputed diagnosis of adult ADHD. The most accurate self-report instrument for diagnosis of adult ADHD was the Connors Adult ADHD Rating Scale Self-report Long version—a cutoff of 91 of 198 gave a sensitivity of 97% and specificity of 83%. Analysis of the WHO Adult ADHD Self-report Screener confirmed the optimal recommended cutoff as 12 of 13 giving 89% sensitivity and 83% specificity for adult ADHD against diagnostic interview. Although the Wender Utah adult ADHD scale is designed to retrospectively assess symptoms of ADHD in childhood it gave a sensitivity of 88% and specificity of 70% for diagnosis of ADHD in adults.

Conclusion: The symptoms of ADHD in adults can be reliably assessed by self-report instruments.

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Attention deficit hyperactivity disorder (ADHD) is a well-established mental disorder in childhood with an estimate of prevalence of 3% to 5% among preadolescent children.[1,2] Diagnostic symptoms in childhood ADHD are hyperactivity, inattention, and impulsivity in several situations, such as home and classroom, with onset before the age of 7 years.[1,3]

Several studies have raised the doubt about symptoms of ADHD resolving in late adolescence.[4–7] These reports suggest that half of children with ADHD have a later disability due to at least one symptom of ADHD in adulthood. Cross-sectional studies in adults suggest prevalence rates of ADHD symptoms of 3% to 7%, declining with age.[8,9] However, much higher rates are reported in adults with mental illness especially those with substance misuse problems.[10] The symptoms of ADHD in adults may also differ from those in children with lower rates of hyperactivity although other features persist including impulsivity and inattention.[11,12] Symptoms commonly associated with ADHD in adults include the following: lack of focus, disorganization, restlessness, difficulty finishing projects, and losing things. Hence, the term "attention deficit disorder" is often used for adults although this is not an approved diagnostic term.[13]

In general, it is accepted that medications, such as methylphenidate, bupropion, and atomoxetine, are effective and safe in the treatment of childhood ADHD.[1,14] General adult psychiatry services in Britain are often reluctant to prescribe stimulants to adults for treatment of ADHD.[15–17] The aim of the study was to validate self-report instruments for the assessment of ADHD symptoms in a sample of adults attending community drug and alcohol services. This allows confirmation of putative diagnosis of adult ADHD in clinical populations such as those with substance misuse. In clinical practice, the diagnosis of ADHD is often ignored in adults

with mental health populations. Moreover, the self-completion instruments used in the study give the opportunity for screening clinical populations of adults for ADHD.

METHODS

Subjects

A convenience sample of adult patients was recruited from 3 NHS community drug and alcohol services in South East England. Subjects were excluded if they were unable to give informed consent or were unable to complete self-completion questionnaires (eg, through illiteracy or acute agitation). All patients attending out-patient clinics with the researchers were invited to take part and invitations were also distributed to other patients who attended at the reception desk.

Instruments

Subjects were asked to complete the substance misuse section of the Maudsley Addiction Profile interview,[18] the Minnesota Student Survey questionnaire for substance misuse,[19] the Wender Utah adult ADHD screening test,[20] WHO Adult ADHD Self-report Screener,[3] and the Connors Adult ADHD Rating Scale Self-report Long version[21] (CAARS-S:L). The 6-item WHO Adult ADHD Self-report Screener was scored using 5-point Likert scale (maximum score range from 0 to 24). The 66-item CAARS-S:L was scored using a 5-point Likert scale score (maximum score range from 0 to 198). No subscale or factor loading analysis was required. The working diagnosis of the multidisciplinary team was also recorded.

Diagnosis of adult ADHD was determined by interview with patient and by a second interview with one collateral informant, usually a spouse or relative. Interviews were performed by a trained psychiatrist (holding a postgraduate diploma such as the Member of the Royal College of Psychiatrists) using the *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition (DSM IV)-Multirater Evaluation Form Diagnostic Criteria for ADHD.[22] The DSM-IV diagnostic requirements for ADHD in adults include at least 6 of 9 inattention symptoms and at least 6 of 9 hyperactivity/impulsivity symptoms that persist for the previous 6 months.[22]

Statistical tests, including receiver operated curve (ROC) analysis, were performed using the Statistical Package for Social Scientists program version 10. The study had 90% power to detect a difference of 0.45 SD (medium effect size) between scores at the 0.05 significance level. Approval to undertake the study was obtained from South Essex local research ethics committees. Written informed consent was obtained from all participants.

RESULTS

Ten subjects were excluded as questionnaires were incomplete. Results are presented for 107 subjects who completed the project. The mean age was 37.8 years (SD = 11.4; SE = 1.10), 63% of them were men, and 17% were in paid employment. Subjects had been in contact with drug and alcohol services for 8.8 years (SD = 10.0; SE = 1.0). Sixty-five percent also requested further treatment for adult ADHD, 67% were being treated for opiate dependence, and 32% had a primary alcohol use disorder.

Eighty-nine percent had diagnostic agreement for adult ADHD between patients and collateral informant—10 of 11 cases of disagreement involved the patient's report being positive and the collateral reporting negative for ADHD on DSM IV interview. The ROC analysis was therefore restricted to the 96 "undisputed" cases where the diagnosis was confirmed or refuted by both patient and collateral.

Thirty-seven (39%) subjects had an undisputed diagnosis of adult ADHD. ADHD was not present in 59 (60%) cases. There was no significant difference in age and sex ratio between those subjects with and without ADHD.

The WHO Adult ADHD Self-report Screener[3] mean score was12.0 (SD = 5.96; SE = 0.57). Using the recommended cutoff of 12/13 of 24, 52% were unlikely to have ADHD. ROC analysis confirmed the optimal cutoff as 12/13 giving 89% sensitivity and 83% specificity for adult ADHD against diagnostic interview.

The Wender Utah adult ADHD scale[20] is validated in adult patients to retrospectively assess symptoms of ADHD in childhood. The mean score was 52.2 (SD = 26.2; SE = 2.66). Sixty-six percent scored >36 ("likely" to have ADHD as children) and 54% scored >46 ("highly likely" to have ADHD as children). All the 37 undisputed cases of adult ADHD scored over 36. Twenty cases without adult ADHD scored above 36. A cutoff of 36 of 37 gave a sensitivity of 88% and specificity of 70% for diagnosis of ADHD in adults (positive predictive power = 65% and negative predictive power 100%; there was no difference using the cutoff score of >46—conventionally indicating "highly likely" to have ADHD in childhood).

The most accurate self-report instrument for diagnosis of adult ADHD was the CAARS-S:L[21]—a cutoff of 91 of 198 gave a sensitivity of 97% and specificity of 83% compared with diagnostic interview with patients and collaterals. Overall, the CAARS-S:L mean score was 92.7 (SE = 46.8; SE = 4.55).

There was a close correlation between WHO screen and Connor scale reports (Spearman's rank correlation coefficient [ρ] = 0.81; two-sided $P < 0.0001$; Kendall's τ, b = 0.63; simple linear correlation coefficient [r] = 0.79).

DISCUSSION

In clinical practice, the diagnosis of ADHD is often ignored in adults with mental health populations.[15–17] The use of self-report instruments for the assessment of ADHD symptoms in a sample of adults allows confirmation of putative diagnosis of adult ADHD in clinical populations such as those with substance misuse. Moreover, the self-completion instruments used in the study give the opportunity for screening clinical populations of adults for ADHD. This will assist clinicians in practice in the diagnosis and management of patients particularly with the

introduction of nonstimulant drugs that can be used in patients with substance-use disorders.[1]

The validity of the study is supported by its confirmation of several common observations: the Wender Utah scale confirmed that adults with ADHD have symptoms as children; there is close correlation between the instruments; and the ROC analysis confirmed the published optimal cutoff score for the WHO screening instrument as 12 of 13.[3] There was also close agreement (89%) between diagnostic interviews of patients and collaterals. High rates of ADHD are commonly reported in patients with substance-use disorders and in patients with other mental illness.[22,23]

The CAARS-S:L was found to be the most accurate scale for confirming (the) diagnosis of ADHD in adults with substance-use disorder who are seeking treatment for drug/alcohol problems in an outpatient clinic, using a cutoff of 91 (with specificity of 83% and sensitivity approaching 100%—for simplicity, the same results were achieved using a cutoff of 100). There was no additional advantage of using the several subscales or factor loading of the Connor's scale as recommended by the publishers.[20] However, at 66-items, the CAARS-S:L remains quite protracted and the much shorter, 6-item WHO screening instrument also had reasonable psychometric properties (sensitivity of 88% and specificity of 70%).

Other instruments that were used in the pilot study included the 28-item Barkley Current Symptom Scale Self-report[24] and the 40-item Brown Attention-Deficit Disorder Scale.[25] However, many of these scales were discarded after 20 subjects had been interviewed as the items were also included in the Connors Adult ADHD Rating Scale.[21] Moreover, participants with ADHD found the completion of all 6 ADHD instruments too onerous.

The study confirms other reports of high rates of substance-use disorders in adults with ADHD.[7] There is a clear association between childhood ADHD and substance-use disorders in adulthood.[26,27] Around half of adults with ADHD have a history of psychoactive substance-use disorders.[27] A history of childhood ADHD have been found in 22% to 71% of substance abusing adults with an equal prevalence in men and women.[28] For example, a study of 200 hyperactive children with follow-up to age 25 years reported that children suffering from ADHD were 5 times more likely to suffer from substance misuse compared with children who did not have ADHD.[29] Both substance misuse and antisocial personality disorder were prevalent at a significant level till 26 years of age. The prevalence rates of ADHD among various populations of adults with substance-use disorders vary from 10% to 30%.[10] It is often assumed that treatment with potentially addictive stimulants, like methylphenidate, is contraindicated in people with substance-use disorders because of the risk of abuse.[30] Nonaddictive agents, such as atomoxetine, have recently been licensed for use in adult ADHD in North America while venlafaxine has also been suggested.[31] These agents could reasonably be used to treat ADHD in adults with much lower risks of abuse. However, there remains considerable controversy regarding the validity of the ADHD diagnosis in adults—even those without other mental health disorders.[13,15,17] The age criteria for ADHD has also been challenged.[32] As treatments become available, it is important that these are tested empirically to ensure that treatable symptoms are alleviated.

Strengths and Limitations

The main weakness of the study is that all subjects completed all the rating scales. There was considerable overlap and redundancy of the ADHD questionnaires and the results could be biased by repeatedly answering the same questions. A better design would have been for each subject to complete just one questionnaire and the results would then be compared between the questionnaires. However, this was not feasible due to the requirement for a significantly increased sample size.

A self-selecting sample of patients attending community drug and alcohol services is reported that may not be generalized to all clients. Moreover, some subjects were too disturbed to complete the self-report items—particularly when other instruments such as the Barkley Current Symptom Scale were included. Clearly, ADHD itself would prevent the use of protracted assessment tools. Researchers were clinicians at the clinics and were already known to the patients at the clinic. This may have introduced another bias.

One of the strengths of this study is the use of well-validated instruments such as the WHO screening instrument and the Utah's ADHD scale.[3,20] The DSM-IV interviews were based on the published Multirater Evaluation Form and there was high consistency between the reports from patients and collaterals. Moreover, the reliability was also confirmed by comparison with the self-report instruments including the WHO screening instrument.

The symptoms of adult ADHD, especially inattention, may be imitated by many other mental health disorders such as substance-use disorders, anxiety, and personality disorder.[33] However, only a minority of the patients in the study (39%) had an undisputed diagnosis of ADHD indicating that there were distinctive symptoms that suggested a subpopulation with both substance-use disorders and adult ADHD. Currently, it may be possible to treat the problematic symptoms of adult ADHD in the presence of other mental illness, and this attempt to validate self-report assessment scales could therefore facilitate treatment.

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