

# Best Evidence Summaries of Topics in Mental Healthcare

**BEST** *in* **MH** *clinical question-answering service*

## Question

“What is the validity of current diagnostic criteria for adult attention deficit hyperactivity disorder (ADHD) and how accurate are they for distinguishing ADHD from other disorders?”

## Clarification of question using *PICTRO* structure:

|                            |                                 |
|----------------------------|---------------------------------|
| <i>Patients:</i>           | Adults with suspected ADHD.     |
| <i>Index Test:</i>         | Any diagnostic tool/criteria    |
| <i>Comparator:</i>         | Any/no comparator               |
| <i>Target condition:</i>   | ADHD                            |
| <i>Reference Standard:</i> | Any reported reference standard |
| <i>Outcome:</i>            | Sensitivity & specificity       |

## **Clinical and research implications**

Six diagnostic accuracy studies suggested variable accuracy of the ASRS v1.1 in diagnosing ADHD. A key strength of this tool is that it is short (6 questions) and simple to complete. The majority of studies found reasonable sensitivity (>84%) with specificity reported to be lower. However, this finding was not consistent with two studies reporting considerably lower sensitivity. The majority of studies (4/6) were conducted in substance abuse populations, the applicability of results from these studies to a more general population is unclear; one study conducted in primary care reported similar accuracy to most studies conducted in this focused population but a study in a US managed care plan was one of the studies to report lower sensitivity. Overall, the evidence suggests that the ASRS v1.1 may be useful in ruling out ADHD but further studies are needed to confirm this, especially in more general populations. Evidence on the accuracy of other scales (CAARS, WURS and ADSA) was limited with single studies evaluating these. The limited evidence suggested that ADSA may be less accurate than the ASRS v1.1. The study that evaluated the CAARS and WURS scales, both of which are more complex scales than the ASRS v1.1., also provided data on the ASRS v1.1. This study found that when evaluated alone CAARS had the highest sensitivity and specificity but that combining scores from two or more of these tools could maximise sensitivity or specificity. The diagnostic accuracy studies were generally well conducted; the main limitation was not reported whether the reference standard (DSM-IV criteria) was interpreted blind to the results of the scale being evaluated.

A systematic review provided an evaluation of the validity of the DSM-IV criteria; it not provide accuracy data. This review was generally well conducted but the quality of the included studies was not formally assessed. It found that DSM-IV criteria for ADHD identify individuals with significant functional impairment, that DSM-IV inattention and hyperactivity-impulsivity symptom dimensions are valid and that evidence is mixed regarding the discriminant validity of DSM-IV ADHD subtypes.

## **What does the evidence say?**

### ***Number of included studies/reviews (number of participants)***

Seven primary DTA (n=2121) studies were included. One study (n=200) was conducted in primary care in the UK(5), one was conducted in a convenience sample based on a US reimbursement population (n=218)(6), all other studies were conducted in substance use populations.

An additional SR (n=546 studies) provided a detailed evaluation of the validity of DSM-IV criteria and the three nominal subtypes of these criteria (ADHD-H, ADHD-I, and ADHD-C). This review did not strictly meet inclusion criteria as it did not report on the diagnostic accuracy of the DSM-IV criteria but was included as it was considered to provide relevant information to address the research question.

### ***Main Findings***

#### ***Adult ADHD Self-Report Scale (ASRS v1.1).***

Six studies evaluated the ASRS v1.1. All studies used a threshold of  $\geq 4$  out of a maximum of 6 to define a positive result on this tool. In all studies the reference standard was based on DSM-IV criteria. One study used a psychiatrist's evaluation based on DSM-IV and discussion with the clinical team (2), four studies used Conners Adults ADHD Diagnostic Interview for DSM-IV (CAADID) (3)(4)(5)(7), and one used Adult ADHD Clinician Diagnostic Scale (ACDS v1.2)(6).

Estimates of accuracy varied widely across studies. Sensitivity ranged from 39% to 100% but was greater than 84% in all but two studies (3; 6). Specificity ranged from 66% to 82%. One of the studies with the lowest sensitivity (67%) was conducted in a group of patients seeking outpatient treatment for cocaine dependence; the other (sensitivity 39%) was conducted in a convenience sample of adults in a managed care plan in the US. This study also reported a separate evaluation at a different threshold based on summing scores for each of the 6 questions (which are rated out of 4) rather than scoring each question out of 1 point. Based on this scoring method accuracy improved with a sensitivity of 65% and specificity of 94% (6).

#### *Other Scales*

Other scales were each evaluated in single studies. One study evaluated the Attention Deficit Scales for Adults (ADSA) tool in a substance use population against a reference standard consisting of DSM-IV based ADHD diagnosis (8). The results were inconsistently reported in this study with reported 2x2 data not matching reported estimates of sensitivity and specificity. We assumed that the 2x2 data were the accurate figures. At a threshold of  $\geq 161$  sensitivity was 60% and specificity was 78%. At a threshold of  $\geq 181$  sensitivity was 29% and specificity was 94%.

One study (3), which also evaluated the ASRS v1.1, assessed the Conners Adults ADHD Rating Scale (CAARS) and the Wender Utah Rating Scale (WURS). This study reported data on the sensitivity and specificity of each of the three scales alone and combined. The CAARS was found to have a sensitivity of 94% and specificity of 86%, WURS a sensitivity of 93% and specificity of 69%, and ASRS-v1.1 a sensitivity of 67% and specificity of 82%. When the tools were combined, sensitivity increased when a positive result on one or more of the tests was considered as a positive result but specificity decreased; in contrast a positive result on all tests was required for a positive result then specificity increased but specificity decreased. The best result in terms of sensitivity was obtained when either WURS or CAARS were positive: this gave a sensitivity of 100% and specificity of 65%. The best results in terms of specificity whilst still providing reasonable sensitivity were obtained when both CAARS and ASRS-v1.1 were positive: this gave a sensitivity of 67% and specificity of 92%.

#### *DSM-IV criteria*

No data on the accuracy of these criteria or any of the interviews used as the reference standard based on these criteria were found. The systematic review found that symptoms of inattention and hyperactivity-impulsivity were distinct from symptoms of other related disorders (oppositional defiant disorder, conduct disorder or internalizing disorders) but that a subset of hyperactivity-impulsivity symptoms sometimes cross-over with symptoms of oppositional defiant disorder. However, no data on the accuracy of DSM-IV were reported.

#### **Authors Conclusions**

One DTA study concluded that the *“ASRS-v1.1 reports low specificity in detecting ADHD among SUD populations”* (2). Other DTA studies generally concluded that the ASRS-v1.1 was a simple tool with acceptable sensitivity for screening for ADHD. Concluding statement included: *“the ASRS-v1.1 is a simple screening tool that is useful and has acceptable sensitivity and specificity for the identification of ADHD among addicted patients”*(4); *“because of its ease of use, short time to administer, high sensitivity, and moderate specificity, the ASRS-V1.1 is an effective adult ADHD screening to guide further evaluations for ADHD”*(5); *“the brevity and ability to discriminate DSM-IV cases from non-cases make the six-question ASRS screener attractive for use both in community epidemiological surveys and in clinical outreach and case-finding initiatives”*(6), and that *“the ASRS is a sensitive*

*screener for identifying possible ADHD cases with very few missed cases among those screening negative in this population.”(7). The study that evaluated three different tools concluded that all of the screening instruments were found to have adequate sensitivity and specificity, but that the CAARS outperformed the other instruments.(3) It suggested that the WURS, may be the single best instrument for preliminary screening purposes but because the ASRS-v1.1 is the simplest instrument, that it may have advantages when a large number of patients need to be screened.(3)*

The study of the ADSA tool concluded that it had *“strong reliability and correlated well with DSM-IV diagnostic criteria. Sensitivity and specificity of the device were relatively strong at both cut-off levels, as were the positive and negative predictive values.”*

The author of the systematic review (1) concluded that *“DSM\_IV criteria for ADHD identify individuals with significant functional impairment; DSM-IV inattention and hyperactivity-impulsivity symptom dimensions are valid; evidence is mixed regarding the discriminant validity of DSM-IV ADHD subtypes; correlates of the nominal subtypes are consistent with the differential elevations of the subtypes on the two symptom dimensions; and DSM-IV subtype classification are unstable over time.”*

### ***Reliability of conclusions/Strength of evidence***

The DTA studies all had some methodological limitations and were graded as high or unclear risk of bias overall. The main limitation in all studies was associated with the reference standard; none of the studies reported whether the reference standard was interpreted blind to the results of the index test. All but one of the studies included an appropriate patient spectrum. One study was considered at high risk of bias for this domain because it enrolled a convenience sample and selected convenience samples for further analyses, which could have lead to biased selection of participants.(6) All studies were considered as low risk of bias for the index test as all pre-specified the definition for a positive test result and in all cases the index test was performed before the reference standard and so possible lack of blinding was not considered an issue. One study reported that some of the patients did not receive the index test and or reference standard and so there was potential bias due to withdrawals and verification bias (5). All other studies were considered at low risk of bias for this domain.

The systematic review was generally well conducted and was rated as “low” risk of bias for all domains with the exception of “quality assessment” which was rated as “high” risk of bias as the quality of the included studies was not formally assessed.

### **What do guidelines say?**

NICE guidelines regarding ADHD (2008, updated 2013 CG72) state the following regarding diagnosis of ADHD in adults;

*“ADHD is a valid clinical disorder that can be distinguished from coexisting conditions (although it is most commonly comorbid) and the normal spectrum. ADHD differs from the normal spectrum because there are high levels of hyperactivity/impulsivity and/or inattention that result in significant psychological, social and/or educational or occupational impairment that occurs across multiple domains and settings and persists over time.”*

“A diagnosis of ADHD should only be made by a specialist psychiatrist, paediatrician or other appropriately qualified healthcare professional with training and expertise in the diagnosis of ADHD, on the basis of:

- a full clinical and psychosocial assessment of the person; this should include discussion about behaviour and symptoms in the different domains and settings of the person's everyday life
- a full developmental and psychiatric history
- observer reports and assessment of the person's mental state.”

“A diagnosis of ADHD should not be made solely on the basis of rating scale or observational data. However rating scales such as the Conners' rating scales and the Strengths and Difficulties questionnaire are valuable adjuncts, and observations (for example, at school) are useful when there is doubt about symptoms.”

“For a diagnosis of ADHD, symptoms of hyperactivity/impulsivity and/or inattention should:

- meet the diagnostic criteria in DSM-IV or ICD-10 (hyperkinetic disorder)
- be associated with at least moderate psychological, social and/or educational or occupational impairment based on interview and/or direct observation in multiple settings
- be pervasive, occurring in two or more important settings including social, familial, educational and/or occupational settings.”

“As part of the diagnostic process, include an assessment of the person's needs, coexisting conditions, social, familial and educational or occupational circumstances and physical health. For children and young people, there should also be an assessment of their parents' or carers' mental health.”

**Date question received:** 18/11/2013  
**Date searches conducted:** 21/11/2013  
**Date answer completed:** 17/12/2013

## References

### **Systematic reviews**

1. Willcutt, E.G., Nigg, J.T., Pennington, B.F., Solanto, M.V., Rohde, L.A., Tannock, R., Loo, S.K., Carlson, C.L., McBurnett, K. and Lahey, B.B. (2012) Validity of DSM-IV attention-deficit/hyperactivity disorder symptom dimensions and subtypes. *Journal of Abnormal Psychology* 121 (4) pp.991-1010.

### **Primary Studies**

2. Chiasson, J-P., Stavro, K., Rizkallah, E., Lapierre, L., Dussault, M., Legault, L. and Potvin, S. (2012) Questioning the Specificity of ASRS-v1.1 to Accurately Detect ADHD in Substance Abusing Populations. *Journal of Attention Disorders* 16 (8) pp.661-663.
3. Dakwar, E., Mahony, A., Pavlicova, M., Glass, A., Brooks, D., Mariani, J., Grabowski, J. and Levin, F.R. (2012) The Utility of Attention-Deficit/Hyperactivity Disorder Screening Instruments in Individuals Seeking Treatment for Substance Use Disorders. *Journal of Clinical Psychiatry* 73 (11) e1372-1378.

4. Diagre, C., Ramos-Quiroga, J.A., Valero, S., Bosch, R., Roncero, C., Gonzalvo, B., Nogueira, M. and Casas, M. (2009) Adult ADHD Self-Report Scale (ASRS-v1.1) symptom checklist in patients with substance use disorders. *Actas Esp Psiquiatr* 37 (6) pp.299-305.
5. Hines, J.L., King, T.S. and Curry, W.J. (2012) The Adults ADHD Self-Report Scale for Screening for Adult Attention Deficit-Hyperactivity Disorder (ADHD) *Journal of the American Board of Family Medicine* 25 (6) pp.847-853.
6. Kessler, R., Adler, L.A., Gruber, M.J., Sarawate, C.A., Spencer, T. and Van Brunt, D.L. (2007) Validity of the World Health Organisation Adult ADHD Self-Report Scale (ASRS) Screener in a representative sample of health plan members. *International Journal of Methods in Psychiatric Research* 16 (2) pp.52-65.
7. Van de Glind, G., van den Brink, W., Koeter, M.W.J., Carpentier, P-J., van Emmerik-van Oortmerssen, K., Kaye, S., Skutle, A., Bu, E-T.H., Franck, J., Konstenius, M., Moggi, F., Dom, G., Verspreet, S., Demetrovics, Z., Kapitany-Foveny, M., Fateas, M., Auriacombe, M., Schillinger, A., Seitz, A., Johnson, B., Faraone, S.V., Ramos-Quiroga, J.A., Casas, M., Allsop, A., Carruthers, S., Barta, C., Schoevers, R.A., and Levin, F.R. (2013) Validity of the Adult ADHD Self-Report Scale (ASRS) as a screener for adult ADHD in treatment seeking substance use disorder patients. *Drug and Alcohol Dependence* 132 pp.587-596.
8. West, S.L., Mulsow, M. and Arrendondo, R. (2007) An Examination of the Psychometric Properties of the Attention Deficit Scales for Adults with Outpatient Substance Abusers. *The American Journal of Drug and Alcohol Use* 33 pp.755-764.

## Results

### Systematic Reviews

| Author (year)              | Search Date | Inclusion criteria   | Number of included studies | Summary of results   | Risk of bias |
|----------------------------|-------------|--|----------------------------|--|--------------|
| Willcutt et al. (2012) (1) | 2010        | <p>P: No restriction on population</p> <p>I: DMS-IV criteria for ADHD and the three nominal subtypes: predominantly hyperactive-impulsive type (ADHD-H), predominantly inattentive type (ADHD-I), and combined type (ADHD-C). Alternative approaches to subtype classification were also considered.</p> <p>T: ADHD</p> <p>R: No restriction on reference standard; studies were not required to include a reference standard</p> <p>O: Internal validity, reliability, symptom utility, temporal stability, developmental course, functional impairment, comorbidity, neurocognitive correlates, aetiology, treatment response.</p> | 546                        | <p>The authors stated that studies consistently indicated that symptoms of inattention and hyperactivity-impulsivity load on factors separate from symptoms of other related disorders (oppositional defiant disorder, conduct disorder or internalizing disorders) but that a subset of hyperactivity-impulsivity symptoms sometimes cross-load with symptoms of oppositional defiant disorder. No numerical data on accuracy of DSM-IV were reported.</p> <p>Key conclusions from the report were:</p> <ol style="list-style-type: none"><li>1. DSM_IV criteria for ADHD identify individuals with significant functional impairment</li><li>2. The DSM-IV inattention and hyperactivity-impulsivity symptom dimensions are valid</li><li>3. Evidence is mixed regarding the discriminant validity of DSM-IV ADHD subtypes</li><li>4. Correlates of the nominal subtypes are consistent with the differential elevations of the subtypes on the two symptom dimensions</li><li>5. DSM-IV subtype classification are unstable over time</li></ol> | High         |

**Diagnostic test accuracy studies**

| <b>Author (year)</b>       | <b>Inclusion criteria</b>   | <b>Number of participants</b> | <b>Summary of results</b>  | <b>Risk of bias</b> |             |             |        |     |     |       |     |     |           |     |     |              |     |     |                  |     |     |                   |     |     |                          |     |     |               |      |     |                   |      |     |                    |     |     |                        |      |     |         |
|----------------------------|---|-------------------------------|--|---------------------|-------------|-------------|--------|-----|-----|-------|-----|-----|-----------|-----|-----|--------------|-----|-----|------------------|-----|-----|-------------------|-----|-----|--------------------------|-----|-----|---------------|------|-----|-------------------|------|-----|--------------------|-----|-----|------------------------|------|-----|---------|
| Chiasson et al. (2012) (2) | <p>P: Treatment seeking substance use disorder adults.</p> <p>I: Adults ADHD Self-Report Scale (ASRS-v1.1) – 6 questions of part A of the scale; ≥4 considered positive</p> <p>T: ADHD</p> <p>R: Psychiatrist’s evaluation based on DSM-IV and discussion with clinical team.</p> <p>O: Sensitivity and PPV which allowed calculation of specificity.</p> <p>Retrospective analysis of patient records.</p>   | N = 183                       | <p>43 scored positive on ASRS-v1.1, 11 found to have ADHD</p> <p>Sensitivity: 11/11 = 100%</p> <p>Specificity: 140/172 = 81%</p>   | High                |             |             |        |     |     |       |     |     |           |     |     |              |     |     |                  |     |     |                   |     |     |                          |     |     |               |      |     |                   |      |     |                    |     |     |                        |      |     |         |
| Dakwar et al. (2012)(3)    | <p>P: Adults seeking outpatient treatment for cocaine dependence</p> <p>I: Conners Adults ADHD Rating Scale self report version (CAARS; ≥23 considered positive), Wender Utah Rating Scale (WURS; ≥ 36 considered positive) and Adult ADHD Self-Report Scale Version 1.1 - 6 questions (ASRS-v1.1; ≥4 considered positive).</p> <p>T: ADHD</p> <p>R: Conners Adults ADHD Diagnostic Interview for DSM-IV (CAADID).</p> <p>O: Sensitivity and PPV.</p> | N = 102                       | <p>25 fulfilled DSM-IV criteria for ADHD</p> <table border="1"> <thead> <tr> <th></th> <th>Sensitivity</th> <th>Specificity</th> </tr> </thead> <tbody> <tr> <td>CAARS:</td> <td>94%</td> <td>86%</td> </tr> <tr> <td>WURS:</td> <td>93%</td> <td>69%</td> </tr> <tr> <td>ASRS-v1.1</td> <td>67%</td> <td>82%</td> </tr> <tr> <td>WURS &amp; CAARS</td> <td>87%</td> <td>90%</td> </tr> <tr> <td>WURS &amp; ASRS-v1.1</td> <td>57%</td> <td>91%</td> </tr> <tr> <td>CAARS &amp; ASRS-v1.1</td> <td>67%</td> <td>92%</td> </tr> <tr> <td>CAARS &amp; WURS &amp; ASRS-v1.1</td> <td>50%</td> <td>96%</td> </tr> <tr> <td>WURS or CAARS</td> <td>100%</td> <td>65%</td> </tr> <tr> <td>WURS or ASRS-v1.1</td> <td>100%</td> <td>62%</td> </tr> <tr> <td>CAARS or ASRS-v1.1</td> <td>94%</td> <td>76%</td> </tr> <tr> <td>CAARS or WURS or ASRS-</td> <td>100%</td> <td>59%</td> </tr> </tbody> </table> |                     | Sensitivity | Specificity | CAARS: | 94% | 86% | WURS: | 93% | 69% | ASRS-v1.1 | 67% | 82% | WURS & CAARS | 87% | 90% | WURS & ASRS-v1.1 | 57% | 91% | CAARS & ASRS-v1.1 | 67% | 92% | CAARS & WURS & ASRS-v1.1 | 50% | 96% | WURS or CAARS | 100% | 65% | WURS or ASRS-v1.1 | 100% | 62% | CAARS or ASRS-v1.1 | 94% | 76% | CAARS or WURS or ASRS- | 100% | 59% | Unclear |
|                            | Sensitivity   | Specificity                   |  |                     |             |             |        |     |     |       |     |     |           |     |     |              |     |     |                  |     |     |                   |     |     |                          |     |     |               |      |     |                   |      |     |                    |     |     |                        |      |     |         |
| CAARS:                     | 94%   | 86%                           |  |                     |             |             |        |     |     |       |     |     |           |     |     |              |     |     |                  |     |     |                   |     |     |                          |     |     |               |      |     |                   |      |     |                    |     |     |                        |      |     |         |
| WURS:                      | 93%   | 69%                           |  |                     |             |             |        |     |     |       |     |     |           |     |     |              |     |     |                  |     |     |                   |     |     |                          |     |     |               |      |     |                   |      |     |                    |     |     |                        |      |     |         |
| ASRS-v1.1                  | 67%   | 82%                           |  |                     |             |             |        |     |     |       |     |     |           |     |     |              |     |     |                  |     |     |                   |     |     |                          |     |     |               |      |     |                   |      |     |                    |     |     |                        |      |     |         |
| WURS & CAARS               | 87%   | 90%                           |  |                     |             |             |        |     |     |       |     |     |           |     |     |              |     |     |                  |     |     |                   |     |     |                          |     |     |               |      |     |                   |      |     |                    |     |     |                        |      |     |         |
| WURS & ASRS-v1.1           | 57%   | 91%                           |  |                     |             |             |        |     |     |       |     |     |           |     |     |              |     |     |                  |     |     |                   |     |     |                          |     |     |               |      |     |                   |      |     |                    |     |     |                        |      |     |         |
| CAARS & ASRS-v1.1          | 67%   | 92%                           |  |                     |             |             |        |     |     |       |     |     |           |     |     |              |     |     |                  |     |     |                   |     |     |                          |     |     |               |      |     |                   |      |     |                    |     |     |                        |      |     |         |
| CAARS & WURS & ASRS-v1.1   | 50%   | 96%                           |  |                     |             |             |        |     |     |       |     |     |           |     |     |              |     |     |                  |     |     |                   |     |     |                          |     |     |               |      |     |                   |      |     |                    |     |     |                        |      |     |         |
| WURS or CAARS              | 100%  | 65%                           |  |                     |             |             |        |     |     |       |     |     |           |     |     |              |     |     |                  |     |     |                   |     |     |                          |     |     |               |      |     |                   |      |     |                    |     |     |                        |      |     |         |
| WURS or ASRS-v1.1          | 100%  | 62%                           |  |                     |             |             |        |     |     |       |     |     |           |     |     |              |     |     |                  |     |     |                   |     |     |                          |     |     |               |      |     |                   |      |     |                    |     |     |                        |      |     |         |
| CAARS or ASRS-v1.1         | 94%   | 76%                           |  |                     |             |             |        |     |     |       |     |     |           |     |     |              |     |     |                  |     |     |                   |     |     |                          |     |     |               |      |     |                   |      |     |                    |     |     |                        |      |     |         |
| CAARS or WURS or ASRS-     | 100%  | 59%                           |  |                     |             |             |        |     |     |       |     |     |           |     |     |              |     |     |                  |     |     |                   |     |     |                          |     |     |               |      |     |                   |      |     |                    |     |     |                        |      |     |         |

|                          |   |  | v1.1   |         |
|--------------------------|---|--|--|---------|
| Diagre et al. (2009)(4)  | <p>P: Adults with substance (opiate, cocaine, amphetamine, alcohol or cannabis) use disorders.</p> <p>I: Adult ADHD Self-Report Scale Version 1.1 (ASRS-v1.1), 6 items; <math>\geq 4</math> considered positive</p> <p>T: ADHD</p> <p>R: Conners Adults ADHD Diagnostic Interview for DSM-IV (CAADID)</p> <p>O: Sensitivity and specificity.</p>  | N = 80   | <p>Sensitivity: 88% (95% CI 64%, 97%)</p> <p>Specificity: 69% (95% CI 57%, 79%)</p>  | Unclear |
| Hines et al. (2012)(5)   | <p>P: Adults (18-65) without current ADHD diagnosis who presented for primary care appointment</p> <p>I: Adult ADHD Self-Report Scale Version 1.1 (ASRS-v1.1), 6 items; <math>\geq 4</math> considered positive</p> <p>T: ADHD</p> <p>R: Conners Adults ADHD Rating Scale (CAARS).</p> <p>O: Sensitivity and specificity.</p>   | N = 200  | <p>Sensitivity: 92%</p> <p>Specificity: 69%</p>  | High    |
| Kessler et al. (2007)(6) | <p>P: Convenience sample of adults in managed care plan in California and Georgia; patients with ADHD excluded</p> <p>I: World Health Organisation Adult ADHD Self-Report Scale Screener (ASRS-screener) – 6 item, score 6 (<math>\geq 4</math> considered positive) and score 24 (based on summing 6 items which are scored 0-4) (<math>\geq 14</math> considered positive) approach</p> | N = 218 (155 screen positives and 63 screen negatives) | <p>6-score:</p> <p>Sensitivity: 39%</p> <p>Specificity: 88%</p> <p>24-score:</p> <p>Sensitivity: 65%</p> <p>Specificity: 94%</p> | High    |

|                                      |  |                 |   |                |
|--------------------------------------|--|-----------------|---|----------------|
|                                      | <p>T: ADHD</p> <p>R: Adult ADHD Clinician Diagnostic Scale (ACDS v1.2) (semi-structured interview based on DSM-IV criteria).</p> <p>O: Sensitivity, specificity and total classification accuracy.</p>   |                 |   |                |
| <p>Van de Glind et al. (2013)(7)</p> | <p>P: Treatment seeking substance use disorder adults starting a new treatment episode.</p> <p>I: Adult ADHD Self-Report Scale Version 1.1 (ASRS-v1.1) – 6 item (≥4 considered positive)</p> <p>T: ADHD</p> <p>R: Conners Adults ADHD Diagnostic Interview for DSM-IV (CAADID).</p> <p>O: Sensitivity and specificity.</p> | <p>N = 1138</p> | <p>ADHD prevalence 13%</p> <p>Sensitivity: 84% (95% CI 76%, 88%)</p> <p>Specificity: 66% (95% CI 64%, 70%)</p> <p>Analysis stratified by gender and primary drug of abuse and by setting found no effects of gender or treatment setting. However, specificity in patients with alcohol use disorders (AUD) was better (76%) than in patients with other primary drugs of abuse (56%), while sensitivity was similar.</p> | <p>Unclear</p> |
| <p>West et al. (2007)(8)</p>         | <p>P: Adult substance (alcohol, sedatives, cocaine, amphetamines and cannabis) users in an outpatient treatment program</p> <p>I: Attention Deficit Scales for Adults (ADSA) (≥161 and 181 considered positive)</p> <p>T: ADHD</p> <p>R: DSM-IV based ADHD diagnosis.</p> <p>O: Sensitivity and specificity.</p>           | <p>N = 200</p>  | <p>Threshold ≥161</p> <p>Sensitivity: 60% based on raw numbers, 71% reported in text</p> <p>Specificity: 78% based on raw numbers, 82% reported in text</p> <p>Threshold ≥181:</p> <p>Sensitivity: 29% based on raw numbers, 58% reported in text</p> <p>Specificity: 94%</p>   |                |

## Risk of Bias

### Systematic reviews

| Author (year)          | Risk of Bias  |  |   |   |   |
|------------------------|---|--|---|---|---|
|                        | Inclusion criteria  | Searches   | Review Process  | Quality assessment  | Synthesis   |
| Willcutt et al. (2012) |  |  |  |  |  |

### Diagnostic test accuracy studies

| Study                         | RISK OF BIAS  |   |   |   |
|-------------------------------|---|---|---|---|
|                               | PATIENT SELECTION   | INDEX TEST  | REFERENCE STANDARD  | FLOW AND TIMING   |
| Chiasson et al. (2012) (2)    |    |    |    |    |
| Dakwar et al. (2012)(3)       |    |    |    |    |
| Diagre et al. (2009)(4)       |    |    |    |    |
| Hines et al. (2012)(5)        |    |    |    |    |
| Kessler et al. (2007)(6)      |    |    |    |    |
| Van de Glind et al. (2013)(7) |    |    |    |    |
| West et al. (2007)(8)         |  |  |  |  |

 Low Risk

 High Risk

 Unclear Risk

## Search Details

| Source                           | Search Strategy  | Number of hits | Relevant evidence identified |
|----------------------------------|--|----------------|------------------------------|
| <b><i>SRs and Guidelines</i></b> |  |                |                              |
| NICE                             | adhd AND adult   | 191            | 1                            |
| DARE                             | (intellect* adj3 disabil*) IN DARE 67 Delete<br>2 (adhd OR addh) IN DARE 79 Delete<br>3 (attention adj3 deficit) IN DARE 140 Delete<br>4 (hyperactiv* OR hyperkinesis*) IN DARE 155 Delete<br>5 ('minimal brain' adj3 (disorder OR damage OR dysfunction))<br>IN DARE 0 Delete<br>6 (minimal adj2 brain adj3 (disorder OR damage OR<br>dysfunction)) IN DARE 2 Delete<br>7 (minimal adj3 brain adj3 (disorder OR damage OR<br>dysfunction)) IN DARE 2 Delete<br>8 MeSH DESCRIPTOR Attention Deficit Disorder with<br>Hyperactivity EXPLODE ALL TREES 149 Delete<br>9 MeSH DESCRIPTOR Hyperkinesis EXPLODE ALL TREES 1<br>Delete<br>10 MeSH DESCRIPTOR Attention Deficit and Disruptive<br>Behavior Disorders EXPLODE ALL TREES 178 Delete<br>11 #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR<br>#10 322 Delete<br>12 (sensitivity OR specificity) IN DARE 5082 Delete<br>13 ((pre-test OR pretest) adj3 probability) IN DARE 79 Delete<br>14 (post-test adj2 probability) IN DARE 50 Delete<br>15 (predictive adj2 value) IN DARE 0 Delete<br>16 (likelihood adj2 ratio) IN DARE 206 Delete<br>17 (diagnostic adj3 test) IN DARE 249 Delete | 114            | 1                            |

|                        |   |    |  |
|------------------------|---|----|--|
|                        | 18 (diagnos* adj3 accurac*) IN DARE 980 Delete<br>19 (diagnos*) IN DARE 6747 Delete<br>20 MeSH DESCRIPTOR Sensitivity and Specificity EXPLODE ALL TREES 3380 Delete<br>21 MeSH DESCRIPTOR Predictive Value of Tests EXPLODE ALL TREES 869 Delete<br>22 #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 11264 Delete<br>23 #11 AND #22  |    |  |
| <b>Primary studies</b> |   |    |  |
| CENTRAL                | #1 Enter terms for search<br>"test accuracy""test accuracy" 837<br>#2 Enter terms for search<br>sensitivitysensitivity 43750<br>#3 Enter terms for search<br>specificityspecificity 14976<br>#4 Enter terms for search<br>pre-test or pretest probabilitypre-test or pretest probability 1559<br>#5 Enter terms for search<br>post-test probabilitypost-test probability 245<br>#6 Enter terms for search<br>"predictive value""predictive value" 7352<br>#7 Enter terms for search<br>"Likelihood ratio""Likelihood ratio" 408<br>#8 Enter terms for search<br>"diagnostic test accuracy""diagnostic test accuracy" 565<br>#9 Enter terms for search<br>#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 51234<br>#10 MeSH descriptor: [Attention Deficit Disorder with Hyperactivity] explode all trees | 18 |  |

|          |   |     |  |
|----------|---|-----|--|
|          | 1470<br>#11Enter terms for searcADHD1433<br>#12Enter terms for searc#10 or #111894<br>#13Enter terms for searc#9 and #12170<br>#14Enter terms for searcadult300883<br>#15Enter terms for searc#13 and #14 94<br>Central only 18   |     |  |
| PsycINFO | PsycINFO exp "SENSITIVITY AND SPECIFICITY"/ 0 Apply Limits<br>20 PsycINFO sensitivity.tw. 62876<br>Apply Limits<br>21 PsycINFO specificity.tw. 24366<br>Apply Limits<br>22 PsycINFO pre-test OR pretest ADJ probability.tw. 2815<br>Apply Limits<br>23 PsycINFO post-test ADJ probability.tw. 17<br>Apply Limits<br>24 PsycINFO "predictive value*".tw 5520<br>Apply Limits<br>25 PsycINFO "likelihood ratio*".tw 1255<br>Apply Limits<br>26 PsycINFO *DIAGNOSTIC ACCURACY/ 0 Apply Limits<br>27 PsycINFO 19 OR 20 OR 21 OR 22 OR 23 OR 24 OR 25 OR 26<br>86759<br>Apply Limits<br>28 PsycINFO DIAGNOSTIC PROCEDURE/ OR DIAGNOSTIC TEST<br>[+NT]/ 0 Apply Limits<br>29 PsycINFO "diagnostic test".ti,ab 871<br>Apply Limits<br>30 PsycINFO (test adj3 accuracy).ti,ab 624<br>Apply Limits<br>31 PsycINFO 27 OR 28 OR 29 OR 30 88029<br>Apply Limits<br>32 PsycINFO ATTENTION DEFICIT DISORDER/ OR ATTENTION | 239 |  |

|        |   |    |  |
|--------|---|----|--|
|        | <p>DEFICIT DISORDER WITH HYPERACTIVITY/ OR ATTENTION DEFICIT HYPERACTIVITY DISORDER/ 17763</p> <p>Apply Limits</p> <p>33 PsycINFO ADHD.ti,ab 16543</p> <p>Apply Limits</p> <p>34 PsycINFO "attention deficit hyperactivity disorder".ti,ab 15690</p> <p>Apply Limits</p> <p>35 PsycINFO 32 OR 33 OR 34 21919</p> <p>Apply Limits</p> <p>36 PsycINFO 31 AND 35 826</p> <p>Apply Limits</p> <p>37 PsycINFO 36 [Limit to: (Age Groups 300 Adulthood age 18 yrs and older or 320 Young Adulthood age 18 to 29 yrs or 340 Thirties age 30 to 39 yrs or 360 Middle Age age 40 to 64 yrs or 380 Aged age 65 yrs and older or 390 Very Old age 85 yrs and older)] 239</p> <p>Apply Limits</p> |    |  |
| Embase | <p>1 EMBASE exp "SENSITIVITY AND SPECIFICITY"/ 203865</p> <p>Apply Limits</p> <p>2 EMBASE sensitivity.tw. 613420</p> <p>Apply Limits</p> <p>3 EMBASE specificity.tw. 369920</p> <p>Apply Limits</p> <p>4 EMBASE pre-test OR pretest ADJ probability.tw. 6017</p> <p>Apply Limits</p> <p>5 EMBASE post-test ADJ probability.tw. 445</p> <p>Apply Limits</p> <p>6 EMBASE "predictive value*".tw 87978</p> <p>Apply Limits</p> <p>7 EMBASE "likelihood ratio*".tw 10660</p> <p>Apply Limits</p>  | 37 |  |

|         |   |     |  |
|---------|---|-----|--|
|         | <p>8 EMBASE *DIAGNOSTIC ACCURACY/ 4337<br/>Apply Limits</p> <p>9 EMBASE 1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7 OR 8 964034<br/>Apply Limits</p> <p>10 EMBASE DIAGNOSTIC PROCEDURE/ OR DIAGNOSTIC TEST<br/>[+NT]/ 125990<br/>Apply Limits</p> <p>11 EMBASE "diagnostic test".ti,ab 13462<br/>Apply Limits</p> <p>12 EMBASE (test adj3 accuracy).ti,ab 4263<br/>Apply Limits</p> <p>13 EMBASE 9 OR 10 OR 11 OR 12 1076086<br/>Apply Limits</p> <p>14 EMBASE ATTENTION DEFICIT DISORDER/ OR ATTENTION<br/>DEFICIT DISORDER WITH HYPERACTIVITY/ OR ATTENTION<br/>DEFICIT HYPERACTIVITY DISORDER/ 35753<br/>Apply Limits</p> <p>15 EMBASE ADHD.ti,ab 18115<br/>Apply Limits</p> <p>16 EMBASE "attention deficit hyperactivity disorder".ti,ab<br/>17264<br/>Apply Limits</p> <p>17 EMBASE 14 OR 15 OR 16 37924<br/>Apply Limits</p> <p>18 EMBASE 13 AND 17 1937<br/>Apply Limits</p> <p>19 EMBASE 18 [Limit to: Exclude MEDLINE Journals and<br/>(Human Age Groups Adult 18 to 64 years or Aged 65+ years)<br/>37</p> |     |  |
| Medline | 2. MEDLINE; exp "SENSITIVITY AND SPECIFICITY"/; 426024  | 358 |  |

|                |   |           |  |
|----------------|---|-----------|--|
|                | <p>results.</p> <p>3. MEDLINE; exp "SENSITIVITY AND SPECIFICITY"/; 426024 results.</p> <p>4. MEDLINE; specificity.tw.; 336468 results.</p> <p>5. MEDLINE; pre-test OR pretest ADJ probability.tw.; 4369 results.</p> <p>6. MEDLINE; pre-test OR pretest ADJ probability.tw.; 4369 results.</p> <p>7. MEDLINE; "predictive value*".tw; 69221 results.</p> <p>8. MEDLINE; "likelihood ratio*".tw; 9124 results.</p> <p>9. MEDLINE; 1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7; 1066754 results.</p> <p>10. MEDLINE; 1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7; 1066754 results.</p> <p>11. MEDLINE; DIAGNOSTIC TECHNIQUES AND PROCEDURES/; 2360 results.</p> <p>12. MEDLINE; DIAGNOSTIC TECHNIQUES AND PROCEDURES/; 2360 results.</p> <p>13. MEDLINE; ADHD.ti,ab; 14260 results.</p> <p>14. MEDLINE; "attention deficit hyperactivity disorder".ti,ab; 14856 results.</p> <p>15. MEDLINE; "attention deficit hyperactivity disorder".ti,ab; 14856 results.</p> <p>16. MEDLINE; 8 OR 9 OR 10 OR 14; 1094118 results.</p> <p>17. MEDLINE; 8 OR 9 OR 10 OR 14; 1094118 results.</p> <p>18. MEDLINE; 8 OR 9 OR 10 OR 14; 1094118 results.</p> <p>19. MEDLINE; 8 OR 9 OR 10 OR 14; 1094118 results.</p> <p>20. MEDLINE; 18 [Limit to: (Age Groups Adult 19 to 44 years or Young Adult and Adult 19-24 and 19-44 or Middle Age 45 to 64 years or Middle Aged 45 plus years or All Aged 65 and Over)]; 358 results.</p> |           |  |
| <b>Summary</b> | <b>NA</b>   | <b>NA</b> |  |

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