Criteria and Concurrent Validity of DIVA 2.0: A Semi-Structured Diagnostic Interview for Adult ADHD

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Abstract

Objective: The aim of this study was to assess for the first time the criterion validity of the semi-structured Diagnostic Interview for ADHD in adults (DIVA 2.0), and its concurrent validity in comparison with the Conners' Adult ADHD Diagnostic Interview for *DSM-IV* (CAADID) and other ADHD severity scales, following the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM-IV*) criteria. **Method:** A transversal study was performed on 40 out-patients with ADHD to check the criteria and concurrent validity of the DIVA 2.0 compared with the CAADID. **Results:** The DIVA 2.0 interview showed a diagnostic accuracy of 100% when compared with the diagnoses obtained with the CAADID interview. The concurrent validity demonstrated good correlations with three self-reported rating scales: the Wender Utah Rating Scale (WURS; $r = .544$, $p < .0001$), the ADHD-Rating Scale ($r = .720$, $p < .0001$), and Sheehan's Dysfunction Inventory ($r = .674$, $p < .0001$). **Conclusion:** The DIVA 2.0 is a reliable tool for assessing and diagnosing Adult ADHD and is the only one that offers free online access for clinical and research purposes. *(J. of Att. Dis. 2019; 23(10) 1126-1135)*

Introduction

ADHD is a neurodevelopmental disorder with a strong biological basis (Biederman, 2005). ADHD has an onset in childhood and may persist through adolescence and continue until old age (Michielsen et al., 2012). Its prevalence during childhood is estimated to be between 5% and 6% (Polanczyk, de Lima, Horta, Biederman, & Rohde, 2007). Subsequently, up to 60% to 80% of affected children continue to present with attentional problems and impulsivity during adolescence and adulthood. ADHD in adulthood goes along with several other psychiatric disorders (Kooij et al., 2010).

ADHD in children and adolescents is a chronic condition, with varying degrees of inattention, impulsivity, and/or hyperactivity (Biederman & Faraone, 2005). In most cases, this disorder tends to interfere seriously with the individual's school achievement and relationships (family and social). Due to high levels of impulsivity, behavioral disturbances may evolve (misdeeds, aggressiveness, substance abuse, shoplifting, risky behavior in traffic resulting in accidents, and early death; Barkley, Murphy, & Fischer, 2008; Dalsgaard, Østergaard, Leckman, Mortensen, & Pedersen, 2015).

In adulthood, these problems may be aggravated, affecting the achievement of personal goals and interfering in the establishment and maintenance of interpersonal relationships. The resulting problems may include academic failure, underachievement, unemployment, behavioral disorders, alcoholism, and drug addiction. The latter may increase the risk for sexually transmitted diseases.

ADHD may be related to antisocial and criminal behavior when accompanied with antisocial personality and oppositional behavior disorders (Biederman et al., 2006; Fischer & Barkley, 2003; Küpper et al., 2012; Spencer, Biederman, & Mick, 2007).

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Early diagnosis has become a main priority in meeting the current recommendations for improvement of ADHD symptoms and to minimize its adverse consequences (Ramos-Quiroga, Chalita, et al., 2012). Early diagnosis facilitates early intervention and the prevention of comorbidities, or damage associated with the core symptoms of the disorder, such as academic failure; development of comorbid, psychiatric, and substance use disorders; and entry into the criminal justice system.

Despite the high prevalence of this disorder, until recently, there was only one validated semi-structured interview available for the accurate diagnostic assessment of ADHD based on the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM-IV*; American Psychiatric Association [APA], 1994) criteria in the adult population. The Conners' Adult ADHD Diagnostic Interview for *DSM-IV* (CAADID) provides clinicians and researchers with a categorical diagnosis of the disorder via an interview including information about the patient's personal history, the developmental course of ADHD symptoms, and the level of impairment. The Spanish version of this instrument (Ramos-Quiroga, Bosch, et al., 2012) has been shown to be a reliable tool for the diagnosis of ADHD in clinical and research settings. However, an important limitation of the CAADID that needs to be highlighted is the costs that come with its administration.

However, the DIVA 2.0 interview (Diagnostic Interview for ADHD in adults, DIVA 2.0, for its acronym in Dutch) is a semi-structured instrument which is freely available as a PDF on the website of the DIVA Foundation (Kooij, 2012; www.DIVAcenter.eu) and via a small one-off charge as a downloadable app. This semi-structured interview allows a thorough evaluation of the diagnostic criteria of *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.; *DSM-IV-TR*; APA, 2000) for ADHD in adulthood, as well as in childhood. It is divided into two domains, each applicable for childhood (before age 12) and for adulthood: the *DSM-IV* criteria for inattention, and for hyperactivity/impulsivity. The third part deals with the impairment caused by the ADHD symptoms in five areas of functioning (including work and education, relationships and family life, social contacts, free time and hobbies, self-confidence and self-image). For each criterion and age period, the DIVA 2.0 provides a list of specific and realistic examples of current or retrospective behaviors throughout life, that simplify the assessment of each of the 18 *DSM-IV* criteria required for the diagnosis of ADHD. The examples are based on common descriptions provided by the patients themselves. DIVA 2.0 also provides examples of the types of impairment commonly associated with the symptoms in five areas of daily life mentioned above. Whenever possible, the adult is interviewed in the presence of the partner or close relative who is familiar with the patient's childhood, to evaluate simultaneously collateral and retrospective information (hetero-anamnesis).

DIVA 2.0 explores only the core symptoms of ADHD required for the diagnosis according to the *DSM-IV*. It does not assess other symptoms, syndromes or psychiatric disorders. As ADHD is highly comorbid with other psychiatric disorders, the diagnosis of ADHD cannot be made without psychiatric evaluation of other possible symptoms or comorbid psychiatric disorders. This is in accordance with the exclusion criteria of *DSM-IV* for ADHD, stating that the symptoms cannot be better explained by the presence of another psychiatric or physical disorder.

The aim of the current study was to analyze the criterion validity of the DIVA 2.0 in the Spanish language in an adult sample. The second objective was to examine the concurrent validity of the DIVA 2.0 interview comparing the diagnostic rate with the CAADID interview and with several other severity scales used in ADHD patients. Finally, we aimed to identify the most commonly reported impairments by patients evaluated for ADHD.

Method

Participants

An observational comparison of the two diagnostic interviews was designed in 2013 to carry out this piece of research. In March 2013, a sample of 47 participants was invited to participate in the study during an initial interview. A total of 40 finally agreed to participate. Our out-patient clinic at the Department of Psychiatry receives referrals from primary care centers, childhood psychiatric services, and from mental health or addiction centers. Our service offers a specialized program for Adult ADHD at a university hospital in Spain. The Adult ADHD Program of our center is a reference program for the city of Barcelona. The reasons for referral are diverse: difficulties at work or with relationships, poor academic performance, among others. The program performs diagnostic assessments and provides multimodal treatment for adult patients with ADHD. All the participants participated voluntarily and did not receive any financial or other type of compensation. After the study, the participants with ADHD continued the standard treatment in the Adult ADHD Program. Participants without ADHD were referred to other more appropriate services.

The inclusion criteria for this study included age between 18 and 65 years, being treatment-naive for ADHD medications, and an ability to understand and sign the informed consent for the study. The exclusion criteria were an IQ lower than 70 or being under the influence of psychotropic substances at the time of evaluation. The criterion "treatment-naive for ADHD medications" was introduced to increase the blindness to the ADHD diagnosis. All the participants included in this study had never received a diagnosis of ADHD in childhood. The diagnosis of ADHD was made for the first time during the clinical assessment in this study.

The study was approved by the hospital Ethics' Committee; all participants were informed about the study and their rights before signing the informed consent form.

Materials

The DIVA 2.0 interview is originally developed by Kooij and Francken (Kooij, 2012) in Dutch, and is currently available online in 18 languages (www.DIVAcenter.eu). More translations are underway. To evaluate its criterion validity, the results of the diagnostic assessment using DIVA 2.0 were compared with those obtained by using the CAADID interview in the same patients. During the interviews, the presence of symptoms according to the *DSM-IV* criteria (Criterion A), the age at onset of symptoms (Criterion B), the presence of symptoms in two or more areas (Criterion C), clinically significant impairment caused by the symptoms during childhood and adulthood (Criterion D), and the symptoms not being better explained by another disorder (Criterion E) were recorded. During the administration of the instrument, the psychiatrist must clinically determine the presence or absence of each symptom and the other *DSM-IV* criteria for ADHD, according to the information provided by the patient and informant(s) who know the patient currently and from childhood. For each *DSM-IV* criterion, DIVA 2.0 provides examples of typical related behaviors, which the interviewer can use to decide about presence or absence of symptoms.

The CAADID (Epstein, Johnson, Conners, 199) is a semi-structured interview based on *DSM-IV* and therefore very similar to the DIVA 2.0 regarding its application, scoring, and item structure. The main difference between the two instruments is that DIVA 2.0 investigates five areas of impairment, compared with three areas in the CAADID. Furthermore, the CAADID is only available in English and Spanish and comes with a charge for its use, while DIVA 2.0 is available online for free and in many languages. The prior in Spanish validated translation of CAADID was used for the purpose of this study (Ramos-Quiroga, Bosch, et al., 2012).

To examine the concurrent validity of the DIVA 2.0 interview, diagnostic results were compared with the scores obtained from the following self-report scales:

- Wender Utah Rating Scale (WURS; Ward, Wender, & Reimherr, 1993): A self-administered scale comprised of 61 items, with good internal consistency and test–retest reliability. Adults need to recall their own childhood symptoms retrospectively. Each symptom is scored from 1 to 4. Of the 61 items, a score of 25 is used as cutoff indicating greater validity to discriminate ADHD versus no ADHD. The Spanish version has also been shown to have good psychometric properties (Rodriguez et al., 2001).

- ADHD-Rating Scale (DuPaul, Anastopoulus, & Reid, 1998): An 18-item scale that assesses the criteria for the diagnosis of ADHD according to *DSM-IV*. Each item is scored from 0 (*never or almost never*) to 3 (*very often*). The total score is used to determine the presence and severity of the symptoms. This questionnaire can be administered to both the patient and direct relatives.

- Sheehan Disability Scale (SDS; 1983): There are three items which measure the impact of the symptoms in three different areas (work, social, and family). The scale is from 0 (*not at all*) to 10 (*extremely*).

The assessment of other psychiatric disorders was performed using the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I) and Structured Clinical Interview for DSM-IV Axis II Disorders (SCID-II). Finally, the neuropsychological assessment was made according to the test battery of the Adult ADHD Program of our Department (Ribasés et al., 2009). Full-Scale IQ was estimated with the Vocabulary and Block Design subtests of the Wechsler Adult Intelligence Scale, 3rd Edition (WAIS-III). Patients also completed the digit span, arithmetic, Letter-Number Sequencing, and Symbol Search subtests of the WAIS-III; the Conners' Continuous Performance Test (CPT); the California Verbal Learning Test (CVLT); the Logical Memory I–II and Visual Memory I–II of the Wechsler Memory Scale-R; and the trail-making test (Parts A and B).

Procedure

The translation of the Dutch version of DIVA 2.0 into Spanish, as well as the reverse translation, was carried out according to the standards designed and approved by the DIVA Foundation. Once the reverse translation was compared with the original Dutch interview, adjustments were made to ensure that the meaning of items had not been altered.

Finally, 40 patients referred to the Adult ADHD Program of the Department of Psychiatry participated in the study. The participants were interviewed by psychiatrists and psychologists. The psychiatrists administered the semi-structured interviews (CAADID or DIVA 2.0). The psychologists administered SCID-I and SCID-II, the rating scales (ADHD-RS, WURS, and SDS), and the neuropsychological assessment battery. The psychiatrist responsible for the patients reviewed all the information and communicated the final diagnosis to the patient at the end of the study.

During the first visit, the CAADID (used in the study as the gold standard measure) was at random administered to the first 20 participants out of the 40 originally recruited. The remaining 20 were first administered the DIVA 2.0. At the second visit, a different psychiatrist, blinded to the first visit results, administered the second interview to all 20

participants, that is, the DIVA 2.0 to those to whom the CAADID was administered at the first visit, and vice versa. The psychologist interviews were with the same professional. When the patient concluded the first visit with the psychiatrist, the administrator of the department scheduled a second visit with a different psychiatrist and included a note to communicate what interview was to be administered for the second visit (CAADID or DIVA 2.0). This second psychiatrist had no access to the clinical history of the patient, to guarantee the blind. The patients were not informed about the results of the interviews to maintain the blindness of ADHD diagnosis until the end of the protocol, to avoid potential bias in the diagnosis. All 40 patients were evaluated by psychiatrists and clinical psychologists with expertise in diagnosing ADHD in adults and in the administration of the various instruments. We compared the diagnoses of the DIVA 2.0 with the clinical diagnoses obtained with the CAADID (gold standard). The participants were informed about the objective of the study and they received educational material approved by the ethics board of the hospital. We informed the participants that two interviews were necessary. The participants were informed about the results of the tests when they had finalized the two visits and the psychometric assessment.

All of the participants included in the study completed the rest of the assessment protocol that is part of the Adult ADHD Program at the Psychiatry Department, which included the WURS scale, ADHD-Rating scale, SDS, SCID-I and II, and a neuropsychological battery, that is, WAIS-III (Table 2). Together, these instruments provided information regarding symptom severity, level of impairment as a result of ADHD, and the intelligence quotient via the use of WAIS-III (Wechsler, 1997).

Participants included in this study received treatment only at the end of the study under the surveillance of a psychiatrist, after the CAADID results, scales administered and clinical history of the patient had been reviewed. The information was contrasted with collateral information received about the patient (from partner or parents). If the participants met ADHD criteria (*DSM-IV-TR*), they received treatment according to the National Institute for Health and Clinical Excellence (NICE; 2008) guidelines for ADHD in adults. The only drug licensed in Spain for adults with ADHD with first diagnosis at adulthood is atomoxetine. The patients were included in cognitive-behavioral treatment if they preferred non-pharmacological treatment and had contraindications for it or, in case, the severity of ADHD was mild.

Statistical Analysis

To assess the criterion validity of DIVA 2.0, an analysis was performed of sensitivity (percentage of affected cases identified by the test), specificity (percentage of unaffected cases identified by the test), positive predictive value (PPV; percentage of affected cases obtaining a positive test), and negative predictive value (NPV; percentage of unaffected cases obtaining a negative test), accompanied by confidence intervals (CI). This information was supplemented by calculating the Kappa value as a general measure of agreement between instruments. For the analysis of concurrent validity, we conducted bivariate correlations. For all of the cases, statistical hypotheses were bivariate with a CI of 95%. Independent-samples *t* tests with 95% CI were used to investigate differences between the ADHD group and the group without ADHD on neuropsychological measures. Where Levene's test for equality of variances was statistically significant, the *t* value corresponding to an analysis in which equal variances are not assumed was adopted.

Results

The sociodemographic characteristics of the participants in the study showed a slightly greater proportion of males (*n* = 21, 52.5%) and an average age between 19 and 58 years (*M* = 39.60, *SD* = 9.70). The majority was married (50%), followed by single (37.5%) or separated status (12.5%). There were no statistically significant differences with regard to academic level and employment status between participants diagnosed with ADHD and those without ADHD (Table 1). The results of the assessment of ADHD are presented in Table 2. All the participants included in this study had a normal range of IQ scores, without neuropsychological impairment. No differences on neuropsychological tests were found between the participants with the diagnosis of ADHD (according DIVA 2.0 and CAADID) and the participants without ADHD. Table 3 describes the results of the neuropsychological assessment.

Criterion Validity

Regarding the criterion validity, the DIVA 2.0 interview showed an excellent diagnostic reliability of 100% between raters and board-certified psychiatrists. The Kappa between DIVA 2.0 and CAADID was 1.0. Of the 40 participants included in this study, 31 finally received a diagnosis of ADHD according to the CAADID. The participants diagnosed with ADHD using the DIVA 2.0 were the same. However, of the 40 participants in the sample, nine participants were not diagnosed with ADHD using CAADID, nor when using DIVA 2.0. The concordance between CAADID and DIVA 2.0 was 100%. For this reason, it was not possible to calculate the PPV, NPV, sensitivity, and specificity.

Concurrent Validity

Attention deficit/hyperactivity symptoms in childhood

WURS. ADHD symptoms during childhood assessed using the DIVA 2.0 were correlated, using non-parametric

Table 1. Sample Sociodemographic and Clinical Characteristics (*N* = 40).

	Number	Percentage
Age		
M (*SD*) = 39.6 (9.7); range = 19-58		
Marital status		
Single	15	37.5
Married	20	50
Separated/divorced	5	12.5
Education		
Primary school	2	5
High school	13	32.5
Professional training	19	47.5
University degree	6	15
Employment		
Studying	3	7.5
Employed	18	45
Self-employed	11	27.5
Unemployed	8	20
Comorbid disorders		
Mood disorders	15	37.5
Anxiety disorders	17	42.5
Substance use disorders	11	27.5
Personality disorders	6	15
Treatments		
Antidepressants	14	35
Benzodiazepines	8	20
Antiepileptic drugs	10	25
Atypical antipsychotics	5	12.5
Psychological treatment (CBT, DBT)	7	17.5

Note. CBT = cognitive-behavioral therapy; DBT = dialectical behavioral therapy.

Table 2. Descriptive Statistics of ADHD Assessment Instruments.

Self-report scales	ADHD (*n* = 31)	Non-ADHD (*n* = 9)	*p*
WURS[a]	47.67 (11.29)	28.67 (12.19)	.000
ADHD-Rating Scale[a]	31.81 (9.34)	17.33 (5.95)	.000
SDS[a]			
SDS-1	6.33 (2.24)	1.67 (2.06)	.000
SDS-2	7.23 (5.69)	1.89 (2.47)	.010
SDS-3	6.00 (2.22)	2.00 (1.87)	.000
CAADID[b]			
Inattentive symptoms	8	3	
Hyperactive-impulsive symptoms	7	3	
DIVA 2.0[b]			
Inattentive symptoms	8	3	
Hyperactive-impulsive symptoms	7	3	

Note. WURS = Wender Utah Rating Scale; SDS = Sheehan Disability Scale; CAADID = Conners Adult ADHD Diagnostic Interview for *DSM-IV*;
DIVA = Diagnostic Interview for ADHD in adult; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders (4th ed.).
[a]*M* and (*SDs*).
[b]Number of ADHD symptoms according to *DSM-IV* criteria.

Table 3. Results of the Neuropsychological Assessment.

Test	ADHD (n = 31)	Non-ADHD (n = 9)	t	p
WAIS-III[a]				
Vocabulary	10.97 (2.34)	10.44 (2.60)	−0.572	.570
Block design	11.33 (2.56)	10.11 (1.76)	−1.332	.191
Arithmetic	9.47 (3.36)	9.0 (2.12)	−0.392	.697
Direct digits	9.83 (2.32)	9.33 (2.73)	−0.544	.590
Search for symbols	11.00 (2.27)	10.67 (2.34)	−0.377	.713
Numbers and letters	10.13 (2.22)	9.89 (3.65)	−0.247	.806
CVLT[b]				
Total trials 1-5	50.1 (1.93)	47.78 (2.14)	−2.32	.883
Short-delay free recall	11.19 (3.68)	10.44 (2.83)	−0.562	.577
Short-delay cued recall	12.32 (2.96)	11.44 (2.18)	−0.824	.415
Long-delay free recall	11.71 (3.35)	10.89 (2.93)	−0.662	.512
Long-delay cued recall	12.35 (2.95)	14.56 (10.89)	1.029	.310
Total recognition discrimination	2.32 (2.40)	3.11 (3.06)	0.816	.420
WMS-R verbal memory[c]				
Verbal memory 1	21.65 (5.87)	21.22 (7.37)	−0.181	.858
Verbal memory 2	15.88 (6.57)	20.44 (9.88)	1.619	.114
WMS-R visual memory[d]				
Verbal memory 1	35.28 (4.06)	33.44 (3.97)	−1.189	.243
Verbal memory 2	30.60 (6.49)	30.55 (3.28)	−0.023	.982
Trail making test[e]				
A	33.10 (13.53)	41.89 (19.11)	1.560	.127
B	80.81 (27.69)	82.44 (30.71)	0.153	.880
CPT-II[f]				
Omissions	52.19 (16.81)	50.93 (12.66)	−0.242	.812
Comissions	52.37 (10.74)	54.77 (8.75)	0.609	.546
Hit-RT	48.94 (9.66)	48.42 (9.09)	−0.150	.883
Hit-RT Standard Error	51.42 (11.40)	49.20 (8.29)	−0.541	.592
Variability	51.99 (10.12)	46.50 (11.25)	−1.39	.172
d′	52.59 (9.50)	55.15 (6.60)	0.753	.456
B	47.38 (6.02)	47.30 (5.88)	−0.035	.972
Perseverations	53.41 (13.07)	47.80 (6.90)	−1.230	.227
Hit-RT Block Change	49.76 (10.70)	51.03 (9.67)	0.337	.741
Hit-SE Block Change	55.12 (12.34)	45.33 (11.76)	−2.109	.042
Hit-RT ISI Change	49.15 (14.75)	45.15 (9.18)	−0.767	.448
Hit-SE ISI Change	49.79 (11.10)	47.13 (7.44)	−0.670	.507

Note. t= t-test results; WAIS-III = Wechsler Adult Intelligence Scale, 3rd edition; CVLT = California Verbal Learning Test; CPT = Continuous Performance Test; WMS = Wechsler Memory Scale; RT = Reaction Time; SE = Standard Error; ISI = Inter-Stimulus Interval.
[a]Scalar score.
[b]CVLT, direct score.
[c]Wechsler Memory Scale-R Verbal Memory, direct score.
[d]Wechsler Memory Scale-R Visual Memory, direct score.
[e]Direct score.
[f]Conners' Continuous Performance Test-II, direct score.

tests, based on the scores obtained with the self-reported WURS scale in childhood. The correlation between the results of the WURS and symptoms of inattention and hyperactivity in childhood according to the DIVA 2.0 interview was significant for both groups of symptoms (symptoms of inattention, $r = .461$, $p < .003$; symptoms of hyperactivity/impulsivity, $r = .364$, $p < .023$). For total symptoms and the WURS scale, the correlation was $r = .544$, $p < .0001$.

ADHD-Rating Scale symptoms at present time. ADHD symptoms in adulthood were assessed using the DIVA 2.0 interview and correlated with the results of the self-administered scales to patients—the *DSM-IV* based ADHD-Rating Scale: The correlation between the self-reported ADHD symptoms using either the ADHD-Rating Scale or the DIVA 2.0 interview was significant for the cluster of symptoms of inattention and hyperactivity/impulsivity (symptoms of inattention,

Table 4. Diagnostic Accuracy Between DIVA 2.0 and Scales for ADHD.

Questionnaire	ADHD (*n* = 31)	Non-ADHD (*n* = 9)
WURS		
Above cutoff	26 (83.9%)	1
Below cutoff	5	8 (88.8%)
ADHD-RS		
Above cutoff	28 (90.3%)	0
Below cutoff	3	9 (100%)

Note. WURS cutoff: 39 points; ADHD-RS cutoff: 24 points. DIVA = Diagnostic Interview for ADHD in adult; WURS = Wender Utah Rating Scale; RS = rating-scale.

$r = .573$, $p < .0001$; symptoms of hyperactivity/impulsivity, $r = .625$, $p < .0001$; and total symptoms, $r = .720$, $p < .0001$.

SDS. The self-reported dysfunctional items and symptoms of ADHD obtained using the DIVA 2.0 interview were statistically significantly correlated ($r = .674$, $p < .0001$), indicating that having ADHD symptoms interferes in the social, employment, and family life of the individual.

The diagnostic accuracy of WURS cutoff with DIVA 2.0 and CAADID was 83.9% for the ADHD group, whereas it was 88.8% for the group without ADHD. With respect to the ADHD-RS cutoff with DIVA 2.0 and CAADID, diagnostic accuracy was 90.3% for the ADHD group. The diagnostic accuracy was 100% for the group without ADHD (Table 4).

Comorbidity

The presence of comorbid disorders was assessed with the SCID-I and SCID-II. The comorbidity of the full sample was described in Table 1. The proportion of participants with a comorbid disorder was higher in the ADHD group (74.1%) compared with the non-ADHD group (55.5%). Among the 31 ADHD cases, 16 (51.6%) had two additional psychiatric disorders, and seven (22.5%) had three additional disorders. The non-ADHD group had four participants (44.5%) with only one psychiatric disorder (two major depression and two anxiety disorders), four participants (44.5%) with two psychiatric disorders, and one participant (11.1%) with three disorders. The concordance between CAADID and DIVA 2.0 was exactly the same in the ADHD participants with comorbidity and the ADHD participants without comorbidity.

Functional Impairment in ADHD From Childhood to Adulthood

For each area of functioning, impairment was explored during the interview, both at current time (adulthood) and retrospectively (childhood). Our results show that patients diagnosed with ADHD report difficulties in several areas in daily life. During childhood, patients reported having great difficulties keeping up with school and homework (50%), and getting into trouble and having arguments with siblings and family (37.5%). More than half reported problems with self-confidence and self-image (52.5%), that is, uncertainty due to negative comments of others; this was also reported by 45% of the participants at present time. Moreover, having ADHD in adulthood has a substantial effect on work and interpersonal relationships (difficulty with administrative work/planning and relationship problems, lots of arguments, lack of intimacy, 47.5% for each item). Table 5 displays the lifetime impairments most frequently reported by our patient sample.

Discussion

This study investigates criterion and concurrent validity of the DIVA 2.0, a diagnostic semi-structured interview for ADHD in adults, based on the *DSM-IV-TR* criteria. Given that only one other study has investigated the validity of this interview, this is one of the first studies to carry forward the appropriate statistical analysis to explore the psychometric properties of the diagnostic tool in Spanish (Pettersson et al., 2015). Nevertheless, the study of Pettersson et al. compared DIVA 2.0 with an open clinical interview and in our study DIVA 2.0 was correlated with a semi-structured interview (CAADID).

The validation of this diagnostic interview provides us with an accurate and free diagnostic tool for assessing ADHD in the adult population, which can be useful in daily clinical practice and research settings. Findings from this piece of research provide support for the good reliability of this interview for the diagnosis of ADHD within the adult population. The findings demonstrate that DIVA 2.0 has a diagnostic accuracy for ADHD in adults of 100% when compared with the diagnosis obtained using the current gold standard diagnostic interview, the CAADID. Moreover, DIVA 2.0 appears to have similar psychometric properties as the CAADID as a diagnostic tool for adult ADHD (Ramos-Quiroga, Bosch, et al., 2012).

Regarding the validity of the interview, the results show a good correlation with the WURS scale when assessing

Table 5. Dysfunction in ADHD From Childhood to Adulthood According to the DIVA 2.0 Interview.

	Statement[a]	%
Childhood		
Education	Difficulty doing homework	50
Family	Frequent arguments with brothers or sisters	37.5
	Frequent punishment or hiding	
Social	Difficulty maintaining social contacts	17.5
Leisure	Unable to finish a book/watch a film all the way through	20
	Tired quickly of hobbies	
Self-confidence and self-image	Uncertainty of negative comments of others	52.5
Adulthood		
Work	Difficulty with administrative work/planning	47.5
Interpersonal relationships	Relationship problems, lots of arguments, lack of intimacy	47.5
Social	Low self-assertiveness as a result of negative experiences	25
Leisure	Unable to relax properly during free time	40
Self-confidence and self-image	Uncertainty of negative comments of others	45

Note. DIVA = Diagnostic Interview for ADHD in adult.
[a]Most frequently reported impairments during lifetime by patients with ADHD.

ADHD symptoms for inattention, hyperactivity/impulsivity, and total symptoms (R-P) during childhood. Along the same lines, fair results for concurrent validity were obtained for the assessment of symptoms during adulthood using the ADHD-Rating Scale and DIVA 2.0. Our results concur with a recent study that showed that the DIVA 2.0 interview proved to be the best predictor of the clinical diagnosis, and was superior to neuropsychological tests (Pettersson et al., 2015).

As already known from the literature (Ramos-Quiroga, Chalita, et al., 2012), ADHD has a significant impact on the individual's day-to-day life. According to our findings, the participants in this study reported a significant level of impairment when completing the Sheehan's Dysfunction Inventory. Moreover, this impairment was found to correlate significantly with the ADHD symptoms recorded during the DIVA 2.0 interview, suggesting that experiencing symptoms of ADHD interferes greatly with social, employment, and family life of the individual. The extensive assessment of lifetime impairment is one of the strongest aspects of the DIVA 2.0 in comparison with other diagnostic tools. Even though our findings are not representative of the general population, they show that ADHD has a negative impact on the social, academic, and work areas in these patients. Negative self-confidence and self-image seem to be a main area commonly reported throughout the individual's life span (Kooij et al., 2010). This is important to take into account when designing treatment plans for this group.

The results obtained comparing the DIVA 2.0 interview with the CAADID and several self-report scales for ADHD in adults may be a support for the worldwide use of the interview in other countries, given that it is currently available in 18 different languages (http://www.DIVAcenter. eu/). All evidence demonstrates DIVA 2.0 to be a reliable diagnostic tool with good predictive value for diagnoses obtained, using a semi-structured interview tool, and for those obtained using other tools like self-report measures of symptoms during childhood and adulthood. At the moment, the DIVA Foundation is adapting the next version to meet *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*; APA, 2013) criteria for adult ADHD (DIVA-5).

One of the main advantages of the DIVA 2.0 interview is that it comprehensively assesses symptoms of ADHD not only during adulthood, but it also allows the clinician to explore symptoms retrospectively, during the patient's childhood. Furthermore, each symptom is explored via the use of behavioral examples related to childhood and adulthood, respectively. Finally, unlike other instruments available for the diagnosis of ADHD in the adult population, the DIVA 2.0 is the only instrument available free of charge to all researchers and clinicians. The importance of having a semi-structured interview that extensively assesses symptoms and impairment of ADHD in adults, available in many languages, is that it allows clinicians and researchers to diagnose adult ADHD in a cross-cultural perspective. For example, ADHD should be consistently diagnosed in epidemiological and genetic studies to facilitate multi-cultural clinical trials evaluating effectiveness of new treatments for ADHD.

Limitations

Findings obtained in this study should be interpreted cautiously by taking into account a number of limitations that have been identified. Patients who participated in the study were referred to the Psychiatry Department at Vall d'Hebron University Hospital for assessment of ADHD. Therefore, in

this sample, the probability of detecting ADHD was increased. A next step could be to explore the properties and functionality of the DIVA 2.0 interview further within a general adult population sample, to be able to generalize results and support its psychometric properties. DIVA 2.0 has already been used in an epidemiological study in older adults (age range = 60-95; Michielsen et al., 2012). Moreover, the DIVA 2.0 is a semi-structured interview which requires time to apply (approximately 1 hr), possibly making it time-consuming for the clinician. However, other interviews for ADHD in adults like the CAADID are also time-consuming, while self-report scales are not specific enough to detect or reject the disorder properly. Finally, ADHD is a disorder with a high rate of comorbidity, and some symptoms of ADHD can mimic the psychopathology of other disorders. In the future, it will be useful to assess specifically the psychometric properties of DIVA 2.0 in samples of patients with borderline personality disorders, mood disorders, and anxiety or substance use disorders. These types of studies could better assess the capacity of DIVA 2.0, to discriminate ADHD from these other disorders. Nevertheless, in our study, we used a representative clinical sample of adults with ADHD. Moreover, our results regarding the criterion validity of DIVA 2.0 were similar to the results obtained by Pettersson et al. (2015) in a clinical psychiatric population. Despite the limitations that this study and the DIVA 2.0 itself may present, the instrument has shown to be reliable, having acceptable psychometric properties for the assessment of ADHD in adults.

Declaration of Conflicting Interests

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