# Attention Deficit Hyperactivity Disorder: Behavioral Report from Professors and Self-Report from University Students

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In this article, we analyze the internal consistency of the *Diagnostic and Statistical* Manual of Mental Disorders-5th ed. (DSM-5) diagnostic criteria for attention-deficit/ hyperactivity disorder (ADHD) in the adult population, in addition, we analyze the correlation between the teacher's report and the student's own, the prevalence of the disorder and the risk of presenting it according to gender. The sample was composed by 175 university students aged between 16 and 36 years old (M = 21.49, SD = 3.22) that belonged to the private higher education system of Quito, Ecuador. As measurement instruments, two scales were used based on the 18 items of the diagnostic criteria for ADHD described in the DSM-5. As a result, it was determined that the scales used present adequate internal consistency coefficients (attention deficit  $\alpha = .77 \& \alpha = .90$ ; hyperactivity/impulsivity  $\alpha = .74 \& \alpha = .91 \&$  the total scale  $\alpha = .83 \& \alpha = .92$  filled by the student and the professor, respectively), all scales correlated significantly between .15 and .88. As far as the ADHD prevalence percentage in university students, findings showed that the subtypes would be present between 7.42% and 26.85% of the time. As a risk factor, it was found that men present more probability to have ADHD than women. The article concludes pointing out the importance to implement intervention programs for university students that could present ADHD, since the condition could influence negatively the spheres in which the students with the disorder perform.

*Keywords:* attention-deficit/hyperactivity disorder, *DSM*–5, university students, psychometric proprieties, ADHD

The attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopment alteration that begins during the childhood stage and which remains until adulthood for a high percentage of cases (Kessler et al., 2005). It is in this stage that the disorder causes serious problems in academic performance, interpersonal relationships, social life, job performance, and other

areas of the life of the adult affected by this condition (Barkley & Fischer, 2011; Orrego, 2011).

ADHD research has recently considered the adult clinic context formally. In the diagnosis manuals from the American Psychiatric Association (APA), until its last version *DSM–IV* (American Psychiatric Association, 2000), only

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Table 1	
Descriptive	<b>Statistics</b>

ADHD mesures	Ν	Minimum	Maximum	Mean	SD	Skewness	Kurtosis
Student report: Attention deficit	175	.00	19.00	6.66	3.49	.39	.25
Student report: Hyperactivity and impulsivity	175	.00	17.00	5.61	3.63	.64	.03
Teacher report: Attention deficit	175	.00	16.00	4.10	3.97	.97	.26
Teacher report: Hyperactivity and impulsivity	175	.00	16.00	2.11	3.18	2.14	4.67

children were mentioned as the population affected by the disorder. This represented a limitation for the clinic care of adults that could present ADHD.

Currently, version 5 of the *DSM*, already considers the inclusion of the symptomology of ADHD in the typical performance contexts of adults, such as work or university environments (American Psychiatric Association, 2013). Additionally, the number of symptoms for adult ADHD remains the same as the one considered for children (Adler et al., 2017), which is a great contribution for the care of the adult population that may have the disorder.

Furthermore, the subtypes of ADHD in the *DSM*–5 have kept their traditional structure, (a) combined, when the symptoms of intention and hyperactivity-impulsivity are present, (b) predominant with lack of attention, when the symptoms for attention deficit are present but not the ones for hyperactivity-impulsivity, and (c) predominantly hyperactive/impulsive, when the symptoms for hyperactivity/impulsivity are present but not the ones for hyperactivity/impulsivity are present but not the ones for hyperactivity/impulsivity are present but not the ones for attention deficit (American Psychiatric Association, 2014).

As in the childhood stage, the diagnosis process for ADHD in adults is a complex one, since it includes the application of scales, tests, experimental tasks, and a deep clinical analysis. For adults, a wider range of information needs to be gathered regarding the frequency and severity of symptoms and their presence in more than two contexts, in addition to the prior existence of a significant clinical alteration caused by ADHD present during childhood (Amador-Campos, Gómez-Benito, & Ramos-Quiroga, 2014).

One of the instruments of greater utility in the clinical analysis of ADHD is the use of behavior scales that are based on the diagnosis criteria of the DSM (American Psychiatric Association, 2000, 2013) and that allow to evaluate the frequency and severity of the symptomology of the disorder thru the report of several informants close to the subject of study such as parents, teachers, caretakers, or a self-report format filled by the individual himself (Ramos & Pérez-Salas, 2016). There are various scales to evaluate ADHD based on the DSM diagnostic criteria and that have demonstrated good psychometric properties. For example, there are different self-reporting scales to evaluate ADHD in adults and teenagers such as the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2013), ADHD Rating Scale (Ramos, & Pérez-

Table 2Internal Consistency Analysis of the Attention-Deficit Scale

Item	Item-total correlation student report	Cronbach's Alpha if item deleted student report	Item-total correlation teacher report	Cronbach's Alpha if iter deleted teacher report		
1	.52	.74	.80	.88		
2	.58	.73	.76	.88		
3	.48	.74	.65	.89		
4	.43	.75	.71	.89		
5	.43	.75	.75	.88		
6	.40	.76	.59	.89		
7	.24	.78	.35	.91		
8	.60	.72	.70	.89		
9	.42	.75	.68	.89		

Item	Item-total correlation student report	Cronbach's Alpha if item deleted student report	Item-total correlation teacher report	Cronbach's Alpha if item deleted teacher report
10	.41	.71	.69	.89
11	.49	.69	.56	.90
12	.57	.68	.71	.88
13	.33	.72	.67	.89
14	.52	.68	.69	.89
15	.22	.74	.63	.90
16	.45	.70	.71	.88
17	.40	.71	.79	.88
18	.31	.72	.64	.89

 Table 3

 Internal Consistency Analysis of the Hyperactivity-Impulsivity Scale

Salas, 2016), the Conners' Adult ADHD Rating Scale (Conners, Erhardt, & Sparrow, 1999), and the Brown Attention-Deficit Disorder Scale (Brown, 1996). On the other hand, to evaluate children with ADHD, there are scales for the report of teachers or the report of a responsible adult such as ADHD Rating Scale IV (Urzúa, Domic, Ramos, Cerda, & Quiroz, 2010), ADHD Symptom Checklist-4, and German ADHD Rating Scale, among others (Collett, Ohan, & Myers, 2003).

Even if the study of ADHD constitutes a wide traditional line of research, there are still unresolved issues in their theory and methods of diagnosis and treatment (Dalsgaard, 2013). For example, for the study of diagnosis instruments for ADHD, the psychometric properties for children and teen populations have been analyzed thru the reports of parents, teachers, and self-reports (DuPaul et al., 2016; Kooji et al., 2008; Ramos & Pérez-Salas, 2016). Nevertheless, the psychometric analysis of instruments used for the ADHD diagnosis of university students is still in an early development stage and as far as we have reviewed for the case of Ecuador (country of the study), there is no prior research with this population. The current study describes a research, which object was to contribute in the ADHD diagnostic process for adults, thru the report of preliminary results of

 Table 4

 Correlation Between the Items of the Scale Reported by the Students

Items	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1																	
2	.44**	1																
3	.33**	.45**	1															
4	.32**	.30**	.34**	1														
5	.34**	.34**	.25**	.25**	1													
6	.18*	.34**	.19*	.22**	.28**	1												
7	.09	.12	.16*	.09	.09	.23**	1											
8	.39**	.58**	.33**	.31**	.39**	.31**	.19*	1										
9	.38**	.19*	.24**	.28**	.18*	.17*	.27**	.31**	1									
10	.31**	.37**	.35**	.17*	.28**	.13	.21**	.40**	.17*	1								
11	.34**	.36**	.34**	.13	.22**	.22**	.01	.36**	.20**	.36**	1							
12	.29**	.40**	.32**	.03	.25**	.15*	.16*	.37**	.09	.46**	.50**	1						
13	.30**	.40**	.24**	.26**	.18*	.19*	.14	.26**	.23**	.11	.33**	.28**	1					
14	.28**	.37**	.15	.10	.07	.17*	.02	.28**	.13	.45**	.50**	.51**	.19*	1				
15	05	.03	10	04	.01	04	.14	02	.07	.13	.06	.14	01	.15*	1			
16	.23**	.24**	.15	.08	01	.12	.19*	.20**	.23**	.17*	.13	.24**	.27**	.22**	.31**	1		
17	.17*	.35**	.23**	.12	.13	.21**	.06	.24**	.15*	.17*	.25**	.28**	.26**	.21**	.08	.32**	1	
18	.11	.27**	.06	.09	.02	.13	.15*	.24**	.16*	.04	.08	.13	.21**	.06	.20**	.46**	.35**	' 1

Note. Correlation is significant at the .01 level (2-tailed). Correlation is significant at the .05 level (2-tailed).

Items	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1																	
2	.74**	1																
3	.53**	.57**	1															
4	.63**	.62**	.57**	1														
5	.66**	.61**	.56**	.68**	1													
6	.50**	.47**	.38**	.40**	.45**	1												
7	.31**	.16*	.26**	.20**	.31**	.37**	1											
8	.63**	.64**	.47**	.49**	.51**	.60**	.25**	1										
9	.62**	.57**	.50**	.54**	.58**	.36**	.36**	.52**	1									
10	.36**	.29**	.21**	.33**	.19*	.36**	.27**	.40**	.25**	1								
11	.35**	.27**	.25**	.47**	.33**	.25**	.27**	.28**	.26**	.57**	1							
12	.40**	.40**	.34**	.42**	.29**	.30**	.28**	.44**	.34**	.60**	.49**	1						
13	.46**	.48**	.41**	.42**	.40**	.43**	.19*	.52**	.40**	.54**	.42**	.64**	1					
14	.31**	.37**	.31**	.35**	.30**	.35**	.32**	.33**	.30**	.49**	.42**	.60**	.50**	1				
15	.35**	.38**	.17*	.35**	.28**	.31**	.08	.39**	.22**	.54**	.35**	.49**	.52**	.48**	1			
16	.28**	.33**	.24**	.26**	.21**	.28**	.15*	.22**	.18*	.49**	.36**	.44**	.53**	.54**	.54**	1		
17	.26**	.30**	.20**	.31**	.17*	.25**	.17*	.23**	.18*	.62**	.56**	.55**	.48**	.61**	.50**	.76**	1	
18	.16*	.24**	.26**	.22**	.23**	.23**	.14	.18*	.21**	.37**	.33**	.52**	.42**	.57**	.42**	.66**	.71**	1

Table 5Correlation Between the Items of the Scale Reported by Teachers

Note. Correlation is significant at the .01 level (2-tailed). Correlation is significant at the .05 level (2-tailed).

the analysis of psychometric properties of the diagnosis criteria of the *DSM*–5 used to evaluate ADHD in a sample population of university students.

The proposed objectives for the research were (a) to analyze the internal consistency for the ADHD diagnosis criteria of the *DSM*–5 present in university students (b) to determine the correlation between the scales reported by professors and those self-reported by the students designed using the diagnosis criteria of the *DSM*–5 for university students ADHD, (c) to establish a prevalence percentage of possible ADHD in university students, and (d) to identify the gender with greater risk exposure to present ADHD.

#### Method

#### **Participants**

The sample population included 175 university students (37.1% male and 62.9% female) belonging to the private education system of Quito-Ecuador. The age range for the participants was 16 to 36 years old (M = 21.49, SD = 3.22). There were 35 professors from different universities of Ecuador who filed the teacher report, each one of them evaluated the behavior of 5 students. All participants signed an informed voluntary participation consent. In addition, it is important to point out that all ethical standards stated in

Table 6Correlation Analysis Between Scales

ADHD mesures	А	В	С	D	Е
A. Student report: Attention deficit	1				
B. Student report: Hyperactivity and impulsivity	.54**	1			
C. Teacher report: Attention deficit	.26**	.32**	1		
D. Teacher report: Hyperactivity and impulsivity	.15*	.21**	.53**	1	
E. Teacher report: Total scale	.25**	.30**	.86**	.88**	1
F. Student report: Total scale	.87**	.88**	.34**	.21**	.32**

\* p < .05. \*\* p < .01.



Figure 1. Dispersion diagram of the correlation between students and teachers for the attention-deficit scale.

Helsinski (World Medical Association, 2013) regarding research of human beings were met during this investigation.

#### Measures

Two scales were designed based on the DSM-5 diagnosis criteria for attention-deficit disorder with hyperactivity on adult populations (American Psychiatric Association, 2013). For the first scale, items to be reported by the subjects were considered. For the second scale, items to be reported by the professors were used. Each scale was designed with 18 items that fully coincide with the ones described in the DSM-5 (American Psychiatric Association, 2013). The process followed to determine the customization of both instruments started with the judgment from experts, where researchers with high experience in ADHD research provided their criteria to perfect both scales. Once this step was completed and the instruments were ready, a pilot study was performed to test the scales and analyze the level of comprehension the participants had of the content of these scales. Finally, we identified a Kappa of Cohen

coefficient (k = 0.87) adequate for interjudge evaluation. Then we started to apply the instruments on our study. Furthermore, a questionnaire was also used to identify sociodemographic variables of the participants.

#### Procedure

Our research began with the approval of the Ethics and Research Committee of Indoamérica University of Ecuador. Then, the invitation to university students of Quito to participate voluntarily was opened. Agreeing participants signed their informed consent immediately. Once all the forms were signed completely by the interested students, their teachers were contacted, and their voluntary participation was requested to follow up and fill the questionnaire regarding the student behavior; teachers also signed an informed consent in order to begin. All evaluations were applied by the investigators of this study, and the confidentiality of the gathered information was kept throughout the study as well as the anonymity of the participants.



*Figure 2.* Dispersion diagram of the correlation between students and teachers for the students and teachers hyperactivity/impulsivity scale.

#### **Data Analysis**

Descriptive statistics of central tendencies and dispersion were used to describe the obtained results of the scales and all sociodemographic variables. In order to evaluate the internal consistency of the scales, the Cronbach Alfa procedure was applied, and to analyze the association between items and scales a correlation analysis was done. Finally, to analyze the risk probability to present ADHD according to the participant's gender, the odds ration procedure was used.

#### **Results**

#### **Objective 1. Internal Consistency**

Table 1 shows the descriptive results of the sample. The Cronbach's Alfa coefficient for the self-report attention-deficit scale of the students was  $\alpha = .77$  and for the teachers report  $\alpha = .90$ . Table 2 shows the analysis results of the internal consistency of the attention-deficit scale.

The internal consistency coefficient of the hyperactivity-impulsivity scale found in the self-report scale of the students was  $\alpha = .74$  and

the teacher's report was  $\alpha = .91$ . Table 3 shows the results obtained in the internal consistency analyses of the hyperactivity/impulsivity scale.

The internal consistency analysis of the 18 items of the ADHD *DSM* criteria that evaluates a combined subtype, found for the student's report  $\alpha = .83$  and for the teacher's  $\alpha = .92$ . Table 4 shows the correlation analysis between each item in the student's report and Table 5 the correlation of the items in the teacher's scale.

#### **Objective 2. Correlation Between Scales**

During the correlation analysis of the scales, an important association among all the valued variables of both the subject and the professor's report was found (see Table 6).

Figures 1, 2, and 3 show graphically the directly proportional relationship between the measurements made by the university students and the one for their teachers.

### **Objective 3. Prevalence of ADHD**

A cut-off point of 9 was established for each scale, and the respective percentage of possible



*Figure 3.* Dispersion diagram of the correlation between students and teachers for the total scale.

cases of ADHD was calculated for the sample. A greater score will indicate that there is a possibility that the college student suffers from the disorder. A prevalence of 7.42% (0.74% projected population) for hyperactivity/impulsivity was found on the teachers report, and 24% result when reported by the students (2.4% projected population). In terms of attention-deficit, a prevalence of 14.28% (1.4% projected population) was found in the teacher's reports and 26.85% in the students scale (2.7% projected population). For the combined subtype, a prevalence

of 20% was found according to the student's report (2% projected population) and 4.6% (0.46% projected population) according to the teacher's report.

## **Objective 4. Risks of Presenting ADHD** According to Gender

The probability of presenting ADHD based on gender was calculated using the odds ratio test. Findings obtained showed that there is a higher risk of having ADHD for the male gender university students (see Table 7).

Table 7 Risk to Present ADHD According to Gender

	Male vs. female	Confidence
ADHD measurement	odds ratio	interval 95%
Student report: Attention deficit	$1.58^{*}$	.80-3.12
Teacher report: Attention deficit	3.74*	1.54-9.07
Student report: Hyperactivity and impulsivity	$2.07^{*}$	1.02-4.19
Teacher report: Hyperactivity and impulsivity	$1.52^{*}$	.49-4.75
Student report: Total ADHD	2.14**	1.01-4.54
Teacher report: Total ADHD	3.02*	.70-13.10

*Note.* ADHD = Attention Deficit/Hyperactivity Disorder.

#### Discussion

ADHD diagnosis is a complex process that should involve a deep clinical analysis, in which the personal anamnesis of the patient must be explored in the diverse settings pertinent to his development. Furthermore, it needs to be determined if there is in fact a significant clinical deterioration caused by ADHD symptomology and not due to other factors. Moreover, psychometrics reactants must be applied that allow to detect attention flaws, impulsivity, and excessive motor activity, which are traits enclosed in this disorder. The use of behavioral grading scales are a big contribution as well. For this study, we proposed the use of a self-report and an external source report, such as the teacher's report, which contribute the evaluation process of ADHD with reliability and are presented in a trustworthy form (Murphy & Adler, 2004).

Within the described context, this research was proposed with the purpose of analyzing the psychometric proprieties of the diagnostic criterion of the DSM-5 for the evaluation of ADHD in a sample of university students of Ecuador. First, the internal consistency was evaluated for each scale, where for the students' report acceptable results were found (0.74–0.83), and excellent results were obtained from the teachers report (0.90–0.92; Field, 2009).

These findings suggest that the reports of the ADHD DSM-5 diagnosis criteria for college students are more reliable when reported by the teacher than by the student. These results make sense since it is considered that the teacher could have a better appreciation of the behavioral dimension of the disorder, opposed to the self-report from the student where the self-concept of each individual may influence negatively their report of their behavior (Ramos & Pérez-Salas, 2016). Nevertheless, as described in prior research, selfreporting if the ADHD diagnosis criteria will have an acceptable reliability in the valuation process of this frame, making it an important contribution within the ADHD evaluation process together with the clinical criteria and the psychometric reactants application (Amador-Campos et al., 2014).

In terms of the relationship between the different scales designed based on the diagnostic and subtype criterion of ADHD described in the *DSM*–5, a statistical significant relationship between the measurements made was found by the teachers and the students. These findings are in agreement with those of prior research studies where a link has been stablished between the report of different evaluators facing a case of ADHD (Kooji et al., 2008). This means that the appreciation of the symptomology of ADHD is perceived with the same sense by both teachers and students, which corresponds with prior research made in this area (Barkley, Knouse, & Murphy, 2011).

With respect to the percentage of prevalence for each subtype of ADHD found, there is consistency with the data described in prior studies performed in Latin America(Pineda et al., 2001; Vélez, Talero, Gonzáles, & Ibáñez, 2008), which demonstrated the need to count with care areas for university students with possible ADHD. The disorder could become a negative influence in the students' academic performance, which poses an important problem for the mental health of this group of humans (Santos & Vasconselos, 2010).

As far as the probability to present ADHD during the university stage according to gender, men are at more risk to present the disorder with respect to women who show a greater neuropsychological maturity, which becomes a protective factor before ADHD. These findings are also in agreement with results of prior research (Montiel-Nava, Ortiz León, Jaimes Medrano, & González-Ávila, 2012).

A limitation of the study was the size of sample. It makes the results a preliminary report on a line of research with an excellent scientific outlook. It is key to point out the relevance of considering the possible presence of ADHD among college students, as it represents a disorder that could be affecting their cognitive and behavioral performance in the university. This leaves us with the responsibility to develop further research that aims to contribute to diminish the impact of the disorder in the life of university students.

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