Research Article

APPLICATION OF TWO QUESTIONNAIRES FOR ATTENTION DEFICIT HYPERACTIVITY DISORDER SCREENING IN SCHOOL CHILDREN

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Abstract

Objective: Apply two questionnaires to screen attention deficit hyperactivity disorder (ADHD) and their subtypes in students with academic underachievement to evaluate the agreement between them for screening for hyperactivity and attention deficit. **Methods:** Application of questionnaires SNAP-IV and Conner´s Scale Brazilian version in students enrolled in publics schools in Cascavel City, PR, Brazil. Another analyzed variables were gender, age, grade, and body mass index. **Results:** The mean age was 8.9 years, 69.2% of the participants were male, most had normal weight and were concentrated between the 3rd and 5th grades. Association was observed in the relationship between age and attention deficit by the Conner's Scale, with higher prevalence in older children. The agreement between the Conner's Scale and the SNAP-IV questionnaire for the diagnosis of hyperactivity and attention deficit disorder was low. **Conclusion:** ADHD symptoms occur in childhood, and most children with ADHD will continue to have symptoms and impairments throughout their lives. Pediatricians should be prepared to manage mild to moderate grades of ADHD, considering the restricted access to mental health services in Brazil.

Keywords: Attention Deficit Disorder with Hyperactivity, Academic Underachievement, Child, Adolescent, Questionnaires.

INTRODUCTION

Attention deficit hyperactivity disorder (ADHD) is a neurodevelopmental disorder common in early childhood, with an overall prevalence of approximately 3.4% in the school-age population. This condition is characterized by generalized and harmful symptoms of inattention, hyperactivity and impulsivity, as established by the Diagnostic and Statistical Manual of Mental Diseases (DSM-V) (1–3). Assessment scales are the screening tools for ADHD commonly applied to parents and/or teachers for symptoms analysis, since their use is simpler and has high efficiency for screening, aid in diagnosis and follow-up of children with such diagnosis. Thus, the aim of this study was to apply two questionnaires - Swanson, Nolan and Pelham version IV (SNAP-IV) and Conner's Scale - to screen for ADHD and its subtypes in students with low academic performance, in order to evaluate the agreement between them for screening for hyperactivity and attention deficit.

METHODS

This was a retrospective, observational, cross-sectional study of the diagnostic test type to compare the Conner's Scale, Brazilian version by Francisco Rosa Neto and SNAP-IV in ADHD screening. This research was carried out between March 2021 and December 2022 in an outpatient clinic of

academic underachievement (AUA) of an university hospital in the Western of Paraná, Brazil. The Conner's Scale was completed by parents or guardians with the help of a psychology student. The SNAP scale was completed by the child's teacher. The following variables were also analyzed: gender, age, grade and body mass index (BMI), and their relationship with the two questionnaires. The Conner's Scale is a screening instrument that assesses the predominance of the following symptoms: hyperactivity, attention deficit, conduct disorder, hyperactivity with attention deficit (combined type) or symptoms of attention-deficit/hyperactivity disorder associated with conduct disorder (global ADHD). This tool is composed of twenty closed questions, with answers ranging from zero to three points, to which the parents or legal representative respond according to the child's conduct in two or more different environments during the last six months. For each item of the questionnaire there are four answer options: "Never/nothing", "sometimes/a little", "often/enough" and "much/always". For application and correction of the scale, the answers to the questions corresponding to the items of each one of them are added. The result consists of the sum of the responses related to each subtype, being ≥ 10 to fill predominance for hyperactivity with impulsivity, ≥ 10 to fill predominance for attention deficit, ≥ 11 to meet the isolated criteria for Conduct Disorder, ≥ 18 to fill the combined type Hyperactive/Impulsive with Inattentive and ≥ 30 to consider global ADHD. The SNAP-IV, in turn, is a questionnaire that includes 18 items corresponding to the symptoms of DSM-V criterion A, which describes a "persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with

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functioning or development". The answers to be marked must be completed by at least three observers who have frequent and regular contact with the child, in this research it was filled only by teacher. For each item there are four answer options: "Not even a little", "Just a little", "Quite" and "Too much". The result is organized as follows: if at least 6 items "Quite" or "Too much" are scored (characteristics from 1 to 9), it is considered that there are more symptoms of inattention than expected in a child; if at least 6 items marked as "Enough" or "Too Much" (questions 10 to 18) are scored, it is considered that there are more symptoms of hyperactivity/impulsivity than expected in a child. The results of the tests were tabulated in an Excel® spreadsheet and analyzed by the SPSS 25.0 program (United States, 2017). Absolute (n) and relative (%) frequencies were used to describe the data. The Chi-square test, with Yates continuity correction, was used to verify the association between gender, age, grade and BMI with hyperactivity and attention deficit. Cross-reference tables (2x2) were used to analyze the agreement between the Conner's Scale and the SNAP-IV questionnaire for the screening of hyperactivity and attention deficit. The agreement indicators used were sensitivity, specificity, positive predictive value, negative predictive value and accuracy. In addition, the Kappa Index was used, being classified as: 0.40 - weak agreement; values between 0.40 and 0.75 - moderate to good agreement; values above 0.75 - excellent agreement. P value < 0.05 indicated statistical significance.

RESULTS

A total of 73 Conner's questionnaires were completed by parents and/or guardians and 85 SNAP-IV questionnaires were completed by teachers for consultations at the AUA outpatient clinic. Of these, 26 Conner's questionnaires and 26 SNAP-IV questionnaires constituted the study sample, since five were excluded due to duplicity, 41 due to incomplete completion and 60 due to the absence of both completed questionnaires.

The mean age was 8.9 years ($\pm$1.6) and 69.2% of the participants were male. Most of them had normal weight (n = 18; 69.2%) and were concentrated between the 3rd and 5th grades (n = 20; 76.9%). Both instruments identified the same prevalence of hyperactivity and difference of 11.5 percentage points for the estimate of attention deficit, which is shown in Table 1.

Table 1. General characteristics of the participants (n = 26)

	n	%
Hyperactivity– SNAP-IV		
Yes	4	15.4
No	22	84.6
Hyperactivity – Conner's Scale		
Yes	4	15.4
No	22	84.6
AD[1] – SNAP-IV		
Yes	16	61.5
No	10	38.5
DA[1] – Conner's Scale		
Yes	13	50.0
No	13	50.0

[1] Attention Deficit

The association between gender, age, grade and BMI with hyperactivity and attention deficit estimated by both instruments is presented in Table 2. Despite the descriptive differences, statistical association was observed only in the relationship between age and attention deficit estimated by the

Conner's Scale, which found a higher prevalence in older children (9 to 12 years).

Table 2. Factors associated with hyperactivity and attention deficit estimated by the Conner's Scale and the SNAP-IV questionnaire

	Hyperactivity		Attention deficit	
	Conner's Scale	SNAP-IV	Conner's Scale	SNAP-IV
Sex				
Female	1 (12.5%)	0 (0.0%)	4 (50.0%)	3 (37.5%)
Male	3 (16.7%)	4 (22.2%)	9 (50.0%)	13 (72.2%)
p value	1.000	0.389	1.000	0.214
Age				
6-8 years	2 (14.3%)	3 (21.4%)	4 (28.6%)	11 (78.6%)
9-12 years	2 (16.7%)	1 (8.3%)	9 (75.0%)	5 (41.7%)
p value	1.000	0.706	0.049	0.128
Grade				
1st-3rd years	1 (10.0%)	2 (20.0%)	3 (30.0%)	7 (70.0%)
4th-8th grades	3 (18.8%)	2 (12.5%)	10 (62.5%)	9 (56.3%)
p value	0.966	1.000	0.227	0.774
BMI*				
Adequate	2 (10.5%)	2 (10.5%)	8 (42.1%)	10 (52.6%)
Overweight	2 (28.6%)	2 (28.6%)	5 (71.4%)	6 (85.7%)
p value	0.604	0.604	0.377	0.279

*Body Mass Index

The agreement between the Conner's Scale and the SNAP-IV questionnaire for the diagnosis of hyperactivity is presented in Table 3. There was a low agreement between the instruments. The agreement between the tests for the diagnosis of attention deficit, also presented in Table 3, indicated lower accuracy and low values for all indicators.

Table 3. Agreement between the Conner's scale and the SNAP-IV questionnaire for the diagnosis of hyperactivity and attention deficit

Hyperactivity		
	SNAP-IV	
Conner's Scale	Yes	No
Yes	1 (25.0%)	3 (75.0%)
No	3 (13.6%)	19 (86.4%)
Indicators		
Kappa	0.114	
Sensitivity	25.0%	
Specificity	86.4%	
PPV	25.0%	
NPV	86.4%	
Accuracy	90.9%	
Attention Deficit		
	SNAP-IV	
Conner's Scale	Yes	No
Yes	8 (61.5%)	5 (38.5%)
No	8 (61.5%)	5 (38.5%)
Indicators		
Kappa	0.000	
Sensitivity	50.0%	
Specificity	50.0%	
PPV	61.5%	
NPV	38.5%	
Accuracy	50.0%	

Note: PPV = Positive Predictive Value; NPV = Negative Predictive Value.

DISCUSSION

ADHD is a clinically heterogeneous neurodevelopmental syndrome that encompasses features of inattention, hyperactivity, and impulsivity. It is the most common psychiatric disorder in childhood, with an important impact on several aspects and stages of life, and may result in educational failure, unemployment, unsuccessful marriage and criminality(4,5). The analyses of the diagnostic subtypes indicated that the predominantly inattentive type is the most

common in the population, but individuals with the combined type are more likely to be referred to clinical services(6). In this study, carried out in a tertiary service, diverging from the literature, all subjects with at least one disorder had attention deficit. This finding may be related to the fact that symptoms of inattention generate worst consequences to the school performance of the child/adolescent, so the outpatient clinic in which the questionnaires were placed is a source of a selection bias. In 2013, the DSM-V changed the age of onset of ADHD symptoms to "before the age of twelve" due to the fact that the seven-year limit is not appropriate (7). Furthermore, the symptoms of inattention remain relatively stable throughout development, while the symptoms of hyperactivity-impulsivity decrease with age(6).

In the present analysis, an association was observed between age and attention deficit, in which a higher prevalence was found in older children. This finding may be worrisome, since individuals with late initiation of treatment for ADHD (>9 years) are more prone to the use of illicit drugs and, consequently, disorders related to their use(8), evidencing the importance of early diagnosis and management.

The research of Cortese and Vicenzi (2011) demonstrated significant association between ADHD and obesity. According to the authors, the impulsivity and inattention of ADHD contribute to weight gain through dysregulated eating patterns(9), although this relationship was not found in this research.

In a Chinese study, conducted by Luo *et al.* (2022), the SNAP-IV scale had a sensitivity of 76.36% and specificity of 80.36%(10). However, in the study conducted by Hall *et al.* (2019), in the United Kingdom, it was defined that SNAP-IV has high sensitivity, but low specificity for clinical diagnosis, representing a tool with better use for screening than for the diagnosis of ADHD, since this is a very complex neurodevelopmental disorder (11). The Conner's Scale, in turn, is a broad-spectrum tool, allowing a more detailed approach to some specific symptoms(12). According to a study conducted in the United States, it was found that Conner's Scale has a sensitivity of 75%, positive predictive value of 81% and negative predictive value of 69% (13). In this study, when comparing the Conner's Scale with the SNAP-IV test, a low agreement between these instruments was observed. This reinforces the fact that the use of scales is considered a viable option to obtain significant information, but that they depend on the answers and the subjective perception of family members/guardians or teachers. In this sense, it is clear that clinical evaluation through objective criteria is the most important diagnostic resource (12).

This research had some limitations: it should be considered that the fact that the study was conducted in an outpatient clinic of low school performance corroborates the high rate of positive screening for diagnoses related to ADHD. The SNAP-IV questionnaire was completed on only one occasion by the responsible teachers. Moreover, the sample was composed mostly of boys, which may explain the predominance of this gender in most of the disorders analyzed.

Conclusion

ADHD symptoms occur in childhood, but most will continue to have symptoms and impairments during adolescence and adulthood(14). Therefore, pediatricians should be prepared to diagnose and treat mild to moderate grades of ADHD, considering the restricted access to mental health services in Brazil. In this sense, it is essential to note that the use of tests for diagnostic screening is an adjuvant auxiliary tool in the diagnosis and follow up of these children.

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