Exploring DSM-IV ADHD number of symptoms criterion: preliminary findings in adolescents

*Luis A. Rohde**
*Joseph Biederman***
*Marcia P. Knijnik****
*Carla Ketzer*****
*Eduardo Chachamovich******
*Guilherme M. Vieira******
*Vanesa Pinzon*******

Introduction

Since the publication of the DSM-IV (American Psychiatric Association, 1994) and the DSM-IV Field Trials for ADHD (Lahey et al., 1994), there is a strong and crescent debate about some of the DSM-IV ADHD criteria (Applegate et al., 1997; Barkley & Biederman, 1997; Murphy & Barkley, 1996; Shaffer, 1994).

DSM-IV emphasizes the necessity of 6 symptoms of inattention and/or the equal number of hyperactive/impulse symptoms (criterion A) to diagnose the disorder, although it allows an ADHD partial remission diagnoses for adolescents and adults that had the full criteria in the past but do not meet all of them at the evaluation (American Psychiatric Association, 1994). Some ADHD children can mature, then as adolescents or adults their number of symptoms can be reduced, but they can remain impaired. Thus, the DSM-IV ADHD diagnostic threshold of 6 symptoms would be too restrictive for this population (Murphy & Barkley, 1996; Shaffer, 1994). Fergusson and Horwood (1995) demonstrated that inattention and hyperactive symptoms were better predictors of outcome when analyzed dimensionally than categorically (using DSM-III-R threshold). Recently, Levy et al. (1997) also suggested that ADHD seems much more a dimensional disorder, instead of a categorical one.

The aim of this study was to evaluate the diagnostic performance of the DSM-IV number of symptoms criterion for the diagnoses of ADHD in a sample of Brazilian young adolescents. Based on the literature, we hypothesized that young adolescents who have a subthreshold number of inattentive or hyperactive/impulsive symptoms (5 symptoms), but fulfill all other DSM-IV ADHD criteria will present the same clinical features as ADHD adolescents, but significantly different features than non-ADHD adolescents.

Method

The sample was ascertained from state schools in Porto Alegre, Brazil. Porto Alegre is the capital of Brazil's southernmost state with a population of 1,400,000 inhabitants. In 1995, there were 246 state schools in the city with an estimate total number of students aged 12 to 14 years around 45,400.

ABSTRACT

Objective: To explore DSM-IV number of symptoms criterion for the diagnoses of Attention Deficit Hyperactivity Disorder (ADHD) in a non-referred sample of young Brazilian adolescents. Methods: 170 students aged 12 to 14 year-old were evaluated using DSM-IV ADHD criteria, measures of ADHD symptoms, global and school impairment. Results: ADHD adolescents (n = 30) had significantly higher scores on Attention Problems scale of Child Behavior Checklist (CBCL) and higher rates of school repetition than both non-ADHD adolescents (n = 128) and adolescents who had a subthreshold number of inattentive or hyperactive/impulse symptoms (5 symptoms), but fulfilled all other DSM-IV ADHD criteria (n = 12). The two last groups did not differe significantly in any measure assessed. Conclusion: These preliminary results support the appropriateness of DSM-IV number of symptoms criterion for the diagnoses of ADHD in young adolescents.

KEYWORDS

Attention Deficit Hyperactivity Disorder. Inattention. Hyperactivity. ADHD.

* Clinical instructor in Child Psychiatry.
** Chief of the Pediatric Psychopharmacology Unit, Massachusetts General Hospital, and Professor of Psychiatry, Harvard Medical School, Boston.
*** Psychologist.
**** Medical students, Federal University of Rio Grande do Sul, Brazil. Reprint Requests to Dr. Luis Augusto Rohde, Serviço de Psiquiatria da Infância e Adolescência, Hospital de Clínicas de Porto Alegre, Rua Ramiro Barcelos, 2350, Porto Alegre, Rio Grande do Sul, Brazil. Zip code: 90035-003.

ROHDE, L.A.; BIEDERMAN, J.; KNIJNIK , M.P.; KETZER, C. CHACHAMOVICH, E.; VIEIRA, G.M.; PINZON, V. – Exploring DSM-IV ADHD number of symptoms criterion: preliminary findings in adolescents

Infanto – Rev. Neuropsiq. da Inf. e Adol. 6(3) 114-118, 1998

Sampling procedures

The adolescents of this study were part of a large sample of 1,013 adolescents obtained through a proportional random cluster sampling from the whole population of Porto Alegre state school adolescents aged 12 to 14 years. This large sample of adolescents was used in a study to evaluate DSM-IV ADHD prevalence, comorbidities and impairments in young adolescents. The design of the study is reported elsewhere (Rohde et al., unpublished manuscript). Briefly, a screening instrument, based on the 18 DSM-IV ADHD symptoms, was applied to 1,013 adolescents randomly selected at 64 state schools. All adolescents with a positive screening (98 students) and a random sample of youths with a negative screening (93 students) were invited to participate with their parents in the subsequent diagnostic stage of the study.

Diagnostic procedures

All diagnostic assessments were carried out by the first author (L.A.R.) who is an experienced child and adolescent psychiatrist in Brazil and was blind to the results of the screening instrument. Separate interviews with the adolescent and the parents were conducted at the University hospital, or at the subjects' home. Written consent was obtained from all parents and adolescents. The diagnostic assessment used DSM-IV criteria for ADHD. For an adolescent to satisfy diagnostic criteria for ADHD, he/she had to fully fulfill all DSM-IV criteria by the adolescent or the parents report. This approach has been widely used in epidemiological studies (Offord et al., 1996).

In addition to the psychiatric evaluation, parents completed the Children's Global Assessment Scale – CGAS (Shaffer et al., 1983) and the Child Behavior Checklist (CBCL), parent report form (Achenbach, 1991). The CGAS is a widely accepted measure of children and adolecents global functioning with an adequate evaluation of its psychometric properties (test-retest and inter-rater reliability/concurrent and discriminative validity) (Shaffer et al., 1983). The scale allows scores from 0 to 100. The higher the scores, the better the global functioning. The CBCL is a largely used behavior symptom measure that records 112 child behavior problems and 3 areas of competency as reported by parents. The CBCL shows good convergence with structured interviews for psychiatric diagnosis in ADHD children (Biederman et al., 1993) and its Attention Problems scale has a high discriminating power for ADHD (Chen et al., 1994). All scales and instruments used had previous translation to Portuguese, except CGAS that was translated by us.

Information about socio-demographic data and grade repetitions were systematically collected from both the adolescents and the parents. The project was approved by the City Educational Committee and by the Ethical Committee of our University hospital.

Cognitive evaluation relied on the vocabulary and block design subtests of the Wescheler Intelligence Scale – Third edition (WISC – III) administered by a trained psychologist to estimate the adolescents overall IQ (Faraone et al., 1996; Greene et al., 1996). Adolescents with an estimated IQ ≤ 70 (probable mental retardation) were excluded from data analysis.

Data analysis

The comparison of all categorical variables among the three groups was performed using chi-square test. Sources of difference among groups were localized by partitioning the overall chi-square table in a sequence of 2 X 2 tables using a method described by Everitt (1992). As the great majority of continuous data didn't show a normal distribution, non-parametric tests were used in these analyses (Kruskal-Wallis 1-Way Anova). When a difference was found among the three groups, non-parametric minimal significant difference test was performed to detect which groups were different (Zar, 1984). Scores on Attention Problems scale of CBCL were compared among groups using the raw data (Achenbach, 1991). A significance level of 5% was accepted. Levels between 5 and 10% were reported as borderline significance. Levels higher than 10% were reported as not-significant (N.S.).
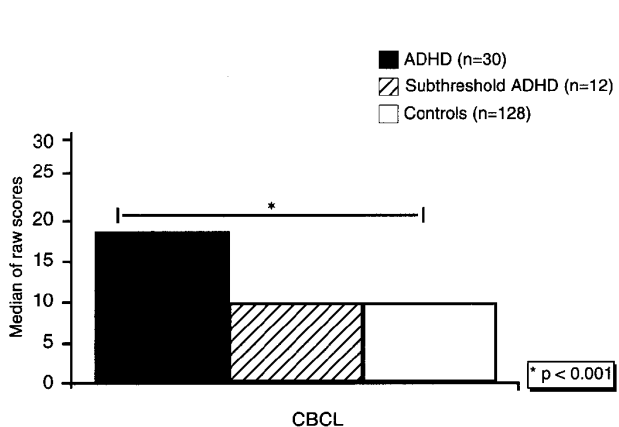
Results

Although the initial sample comprised 191 adolescents, 21 youths were excluded of the data analysis, because they had an estimate IQ ≤ 70. Then, the study sample consisted of 170 adolescents.

A group of adolescents that had 5 symptoms of inattention and/or 5 symptoms of hyperactivity/impulsivity, but fulfilled all other DSM-IV ADHD criteria (subthreshold ADHD) was identified. Among the 170 adolescents used in the data analyses, 30 met all DSM-IV ADHD criteria and 12 met subthreshold ADHD criteria. Thus, 128 adolescents without ADHD were used as controls. The demographic characteristics of the three groups can be seen in table 1. The only significant difference among the three groups was found in education level (170 cases; d.f. = 2; p < 0.01). Significant differences were found between ADHD adolescents and controls (Q = 2.51; p < 0.05) and

ROHDE, L.A.; BIEDERMAN, J.; KNIJNIK, M.P.; KETZER, C. CHACHAMOVICK, E.; VIEIRA, G.M.; PINZON, V. - Exploring DSM-IV ADHD number of symptoms criterion: preliminary findings in adolescents

Infanto – Rev. Neuropsiq. da Inf. e Adol. 6(3) 114-118, 1998

TABLE 1

Demographic data and IQ in ADHD adolescents, subthreshold ADHD youths and controls

Characteristics		ADHD (n = 30)		Subthreshold ADHD (n = 12)		Controls (n = 128)		p Value
		N	%	N	%	N	%	
Age	•12 years	7	23.3	3	25	33	25.8	
	•13 years	11	36.7	2	16.7	48	37.5	N.S.
	•14 years	12	40	7	58.3	47	36.7	
Sex	•male	14	46.7	6	50	77	45.3	N.S.
	•female	16	53.3	6	50	93	54.7	
Race	•Caucasian	22	73.3	9	75	92	71.1	N.S.
	•Non Caucasian	8	26.7	3	25	36	28.1	
Education (median elementary grade)[b]		5th		7th		6th		< .01
Monthly family income (per family member)								
≥ U$ 90		22	73.6	10	83.3	108	84.4	N.S.
< U$ 90[a]		8	26.7	2	16.7	20	15.6	
Estimated IQ (median)		85		93.8		90		N.S.

a: Cut-off point frequently used to define poverty in Brazil; b: significant difference between ADHD x controls and ADHD x subthreshold ADHD.

Figure 1. Scores on Attention Problems scale of CBCL in ADHD adolescents, subthreshold ADHD youths and controls

The difference found was due to the differences between ADHD x controls (p<0.05) and between ADHD x subthreshould ADHD (p<0.05)

Figure 2. CGAS scores in ADHD adolescents, subthreshold ADHD youths and controls
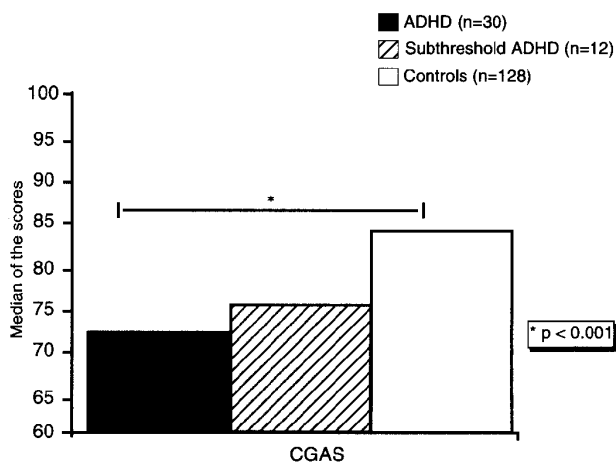
Difference found between ADHD x Controls (p < 0.05)

between ADHD adolescents and subthreshold ADHD adolescents (Q = 3; p < 0.05).

The median scores on CBCL Attention Problems scale of the three groups can be seen in figure 1. There was a significant difference among the three groups (170 cases; d.f. = 2; p < 0.001). The difference was due to the significant differences between ADHD adolescents and controls (Q = 5.56; p < 0.05), and between ADHD adolescents and subthreshold ADHD (Q = 2.4; p < 0.05). There was not found significant difference between subthreshold ADHD and controls (Q = 1.03; N.S.).

The median scores on CGAS of the three groups can be seen in figure 2. There was a significant difference among the groups in CGAS (170 cases; d.f. = 2; p < 0.001). The difference was found only between ADHD adolescents and controls (Q = 4.45; p < 0.05).

As one grade repetition is a very common problem in state schools of Porto Alegre, the three groups were divided into two categories: a) up to one grade repetition; b) more than one grade repetition. Regarding school failure, 70% (21/30) of ADHD adolescents, 8.3% (1/12) of subthreshold ADHD youths and 25% (32/128) of the controls had more than one grade repetition (x^2 = 25.98; d.f. = 2; p < 0.001). The differences were between ADHD adolescents and controls (x^2 = 20.1; p < 0.001) and between ADHD adolescents and subthreshold ADHD youths (x^2 = 10.71; p < 0.001).

Discussion

In a non-referred sample of young Brazilian adolescents, we found that ADHD youths show significantly higher scores on Attention Problems scale of CBCL and higher rates of grade repetition than subthreshold ADHD adolescents. The latter group did not differ from controls in any measure assessed. As far as we are aware, this is one of the first studies carried out to explore DSM-IV ADHD number of symptoms criterion in a non-referred sample of young adolescents.

In this study, significant differences were found between ADHD adolescents and subthreshold ADHD adolescents on scores of CBCL Attention Problems scale and on the rate of school repetitions. In contrast, subthreshold ADHD adolescents did not differ from controls in these measures. Considering that the Attention Problems scale of the CBCL has been shown to have a high discriminating power for ADHD (Chen et al., 1994), and that grade repetition is a clinical marker of school failure, these findings suggest that the differences observed are clinically meaningful.

In this sample, the CGAS median score of the ADHD adolescents was relatively high, indicating mild impairment. It is important to note, however, that CGAS scores were based on parental reports and parents tend to score their ADHD children functioning in a more conservative way than trained clinicians (Applegate et al., 1997). Additionally, community studies tend to find milder impairments of global functioning in adolescents, compared with clinical studies.

Although our results seem to suggest that DSM-IV ADHD number of symptoms threshold is adequate at least for young adolescents, they are not consistent with the scarce literature on the number of symptoms criterion. Murphy and Barkley (1996) evaluated DSM-IV ADHD symptoms in a community sample of 720 adults. Their findings seem to indicate that the threshold of 6 symptoms of inattention and/or hyperactivity/impulsivity was too restrictive for this population. Despite the reasons for the discrepant results remain unknown, they could be related at the age range assessed (young adolescents versus adults) or to the fact that Murphy and Barkley's study relied only on data gathered from a self-report questionnaire, instead of data from a clinical evaluation. Clearly, more work is needed to further evaluate these isues.

Some limitations of the study must be emphasized. First, the small sample size of subthreshold ADHD group could have resulted in a Type II error in some analyses and may not have allowed adequate comparisons among the groups. However the median of almost all measures used were very close between control and subthreshold ADHD groups, suggesting more similarities than differences between controls and subthreshold adolescents. Second, since ours was a community sample, our findings may not be generalized to reffered samples. Finally, since our subjects were gathered from a sample of Brazilian adolescents, the findings may not be generalized to other geographic or ethnic groups. However, the ADHD prevalence and pattern of comorbidity of the study sample were very similar to those found in epidemiological studies in the US (Rohde et al., unpublished manuscript).

This study must be seen as an initial exploration of DSM-IV ADHD number of symptoms criterion. Despite the caveats discussed, our results seem to suggest that DSM-IV ADHD number of symptoms threshold is adequate at least for young adolescents. More studies, specially with referred late adolescents and adults, are needed.

References

1. Achenbach TM, **Manual for the Child Behavior Checklist.** Burlington: University of Vermont/Department of Psychiatry, 1991.

ROHDE, L.A.; BIEDERMAN, J.; KNIJNIK , M.P.; KETZER, C. CHACHAMOVICK, E.; VIEIRA, G.M.; PINZON, V. - Exploring DSM-IV ADHD number of symptoms criterion: preliminary findings in adolescents

Infanto – Rev. Neuropsiq. da Inf. e Adol. 6(3) 114-118, 1998

2. American Psychiatric Association, **Diagnostic and Statistical Manual of Mental Diseases,** fourth edition. Washington, DC: American Psychiatric Association, 1994.

3. Applegate B, Lahey BB, Hart EL et al., Validity of Age-of-Onset Criterion for ADHD: A Report from the DSM-IV Field Trials. **J Am Acad Child Adolesc Psychiatry** 36 (9): 1211-1221, 1997.

5. Barkley RA, Biederman J, Toward a Broader Definition of the Age-of-Onset Criterion for Attention-Deficit Hyperactivity Disorder. **J Am Acad Child Adolesc Psychiatry** 36 (9): 1204-1210, 1997.

5. Biederman J, Faraone S, Doyle A et al., Convergence of the Child Behavior Checklist with structured interview-based psychiatric diagnoses of ADHD children with and without comorbidity. **J Child Psychol Psychiatry** 34: 1241-1251, 1993.

6. Chen WJ, Faraone SV, Biederman J, Tsuang MT, Diagnostic Accuracy of the Child Behavior Checklist Scales for Attention-Deficit Hyperactivity Disorder: A Receiver-Operating Characteristic Analysis. **J Consult Clin Psychol** 62: 1017-1025, 1994.

7. Everit, BS, **The Analysis of Contingence Tables.** London: Chapman & Hall, 1992.

8. Faraone SV, Biederman J, Mennin D et al., A Prospective Four-Year Follow-up Study of Children at Risk for ADHD: Psychiatric, Neuropsychological, and Psychosocial Outcome. **J Am Acad Child Adolesc Psychiatry** 35 (11): 1449-1459, 1996.

9. Fergusson DM, Horwood LJ, Predictive Validity of Categorically and Dimensionally Scored Measures of Disruptive Childhood Behaviors. **J Am Acad Child Adolesc Psychiatry** 34 (4): 477-485, 1995.

10. Greene RW, Biederman J, Faraone SV et al., Toward a New Psychometric Definition of Social Disability in Children with Attention-Deficit Hyperactivity Disorder. **J Am Acad Child Adolesc Psychiatry** 35 (5): 571-578, 1996.

11. Lahey BB, Applegate B, McBurnett K, et al., DSM-IV Field Trials for Attention Deficit Hyperactivity Disorder in Children and Adolescents. **Am J Psychiatry** 151 (11): 1673-1685, 1994.

12. Levy F, Hay DA, Mcstephen M, Wood C, Waldman I, Attention-Deficit Hyperactivity Disorder: A Category or a Continuum? Genetic Analysis of a Large-Scale Twin Study. **J Am Acad Child Adolesc Psychiatry** 36 (6): 737-744, 1997.

13. Murphy K, Barkley RA, Prevalence of DSM-IV Symptoms of ADHD in Adult Licensed Drivers: Implications for Clinical Diagnosis. **J Attention Disorders** 1 (3): 147-161, 1996.

14. Offord DR, Boyle MH, Racine Y et al., Integrating Assessment Data from Multiple Informants. **J Am Acad Child Adolesc Psychiatry** 35 (8): 1078-1085, 1996.

15. Shaffer D, Attention Deficit Hyperactive Disorder in Adults. **Am J Psychiatry** 151 (5): 633-638, 1994.

16. Shaffer D, Gould M, Brasic J et al., A Children's Global Assessment Scale (CGAS). **Arch Gen Psychiatry** 40: 1228-1231, 1983.

17. Zar JH (1984), **Biostatistical Analysis.** New Jersey: Prentice Hall, Inc, 1984.

ROHDE, L.A.; BIEDERMAN, J.; KNIJNIK , M.P.; KETZER, C. CHACHAMOVICK, E.; VIEIRA, G.M.; PINZON, V. - Exploring DSM-IV ADHD number of symptoms criterion: preliminary findings in adolescents

Infanto – Rev. Neuropsiq. da Inf. e Adol. 6(3) 114-118, 1998