Article

Disregarding Impairment in ADHD Diagnosis Inflates Its Prevalence

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Abstract

Diagnostic and Statistical Manual of Mental Disorders–fifth edition (*DSM-V*) diagnostic criteria for attention-deficit hyperactivity disorder (ADHD) has reemphasized impairment although many studies have demonstrated that such approach may inflate prevalence rates. However, there is no consensus on how impairment should be measured and a myriad of approaches in different studies make comparisons difficult. **Objective:** To investigate whether impairment measured using a previous validate quantitative measure modifies prevalence rates in a sample of Brazilian children and adolescents. **Method:** Of 109 children (72 males, 37 females), mean age of 12.4 years, 68 were with ADHD (according to *DSM* criteria, except for impairment) and 41 were typically developing children. All were evaluated with semi-structured interviews and completed the Functional Impairment Scale (FIS). **Results:** Thirty-five percent of ADHD cases had impairment in one single domain or no impairment at all (among school performance, social life, family life, and self-perception) in the FIS. **Conclusion:** Disregarding impairment clearly inflates ADHD diagnosis (*J. of Att. Dis. XXXX; XX*[X] *XX-XX*).

Keywords

functional impairment, family impairment, life impairments, ADHD, ADHD impairment

Introduction

Attention-deficit hyperactivity disorder (ADHD), has a worldwide prevalence of 5% among children and adolescents (Polanczyk et al., 2007). Even though its recognition and treatment date from the second half of the 20th century (Swanson et al., 1998), ADHD clinical definition can still be challenging. Terminology and diagnostic criteria have changed several times since it was introduced as hyperkinetic reaction of childhood in the *Diagnostic and Statistical Manual of Mental Disorders–second edition* (*DSM-II*). It was only in *Diagnostic and Statistical Manual of Mental Disorders–third edition* (*DSM*-III; American Psychiatric Association [APA], 1980) it became attention deficit disorder, where impairment was mentioned to be expected for the first time, although not as a requirement.

Diagnostic and Statistical Manual of Mental Disorders–fourth edition (*DSM-IV*; APA, 1994) had previously defined mental disorder "as a clinically significant behavioral or psychological syndrome associated with present distress (a painful symptom) or with disability (impairment in one or more important areas of functioning)." Significant changes regarding impairment in ADHD followed the publication of *DSM-IV*. The disorder was renamed as ADHD, and presence of functional impairment became mandatory. Since then, new changes occur in the current *DSM* version with a different demand of the impairment required for the diagnosis.

Inattention, hyperactivity, and impulsivity are expected in the general population and they are not exclusive of ADHD. For this reason, it is necessary to distinguish frequency, intensity, and the impact of those symptoms to separate ADHD patients from general population. Overlooking impairment can lead to false positive diagnoses and overestimates of prevalence rates.

Even though the impact of ADHD has been extensively documented in the literature, how to measure it and how much impairment is required remain a challenge both in research and clinical settings.

To address these questions, in a previous study, our group developed a quantitative impairment scale named the Functional Impairment Scale (FIS; Fortes et al., 2014). FIS is a quantitative instrument designed to elicit impairments likely to be associated with ADHD in different domains (academic performance, family life, social life, and self-perception).

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This study had two goals. The first was to define FIS cutoff point for impairment in each life domain. The second was to investigate the impact on ADHD diagnosis frequency when impairment is investigated using a scale (FIS) with quantitative criteria. To our knowledge, this is the first study to investigate this specific diagnostic aspect in a Brazilian sample of children and adolescents.

Method

This study was part of a wider research project at the Institute of Psychiatry of the Federal University of Rio de Janeiro, Brazil (detailed information can be found in Segenreich et al., 2015). The study was approved by the Ethics Committee of the Institute of Psychiatry of the Federal University of Rio de Janeiro and an informed consent was signed in all cases. Children and adolescents, accompanied by at least one biological parent, were interviewed about their ADHD symptoms using a semi-structured interview (Kiddie Schedule for Affective Disorders and Schizophrenia [K-SADS]). Immediately after this interview and before the investigation of comorbid psychiatric conditions, the impairment scale (FIS) was administered to assure that the interviewed answered the impairment questions based on the ADHD symptoms just reported. Comorbid psychiatric conditions were also investigated using a semi-structured interview (K-SADS).

Our sample included 109 children and adolescents referred to the university outpatient unit from various sources who were interviewed, with either one of their parents, by trained psychologists and psychiatrists. Of the 109 children and adolescents included, were 72 males and 37 females with a mean age of 12.4 years. The total sample was divided either as ADHD (n = 68, 62.4%) or typically developing children (TDC [n = 41, 37.6%]), according to the semi-structured interviews with K-SADS.

Children and adolescents were administered the Block design and Vocabulary subtests of the Wechsler Intelligence Battery to obtain an estimated IQ. Inclusion criteria were IQ above 80 and absence of any neurological disorder. ADHD diagnoses were made using semi-structured interview K-SADS (K-SADS PL). ADHD-related impairments were evaluated using FIS. Comorbid psychiatric conditions were also measured using the semi-structured interview (K-SADS).

The FIS consists of 12 questions; the first one addressing impairment in general and being an introduction to impairment in specific domains in the questions that followed. There are two questions concerning academic performance, three questions about family life, three questions about social life, and three questions about self-perception (self-esteem). A score for each domain is calculated using the sum of its items divided by their number (either two or three questions). All questions about impairment in FIS are posed by the examiner to the examinee and includes the following options: not at all, a little, more or less, a lot and extremely.

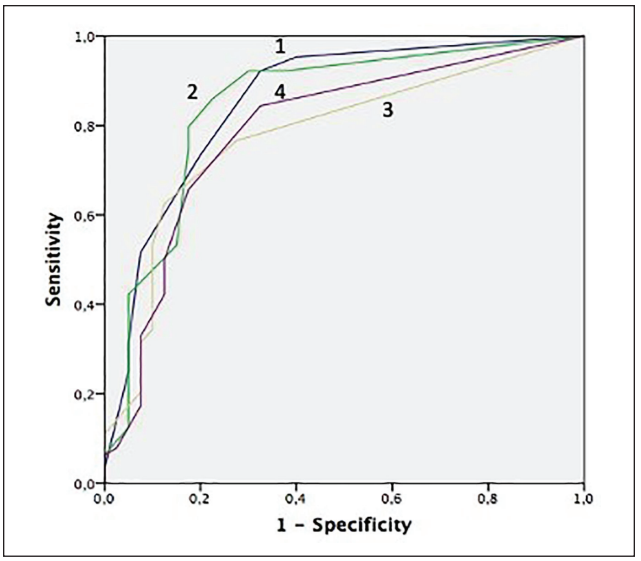

Figure 1. ROC curves for cutoff points of the FIS. 1 = performance domain; 2 = family domain; 3 = social domain; 4 = self-perception domain.
Note. ROC = receiver operating characteristic; FIS = Functional Impairment Scale.

The cutoff point for impairment for each domain was defined targeting two goals: a higher specificity (based on receiver operating characteristic [ROC] curves) and a single score/cutoff point that could be used for all domains to make the scale more user-friendly. As we did not aim to use this tool as a screening scale, sensitivity was not considered a relevant criterion in the decision.

After the domain cutoff point of impairment was determined, each domain could be used categorially as either impaired or nonimpaired. A clinical impairment criterion of two or more domains impaired was defined in accordance to *DSM-IV*. The FIS clinical criterion was applied to the sample to evaluate the impact of a quantitative scale-based impairment measure in the ADHD frequency.

Results

A cutoff point of 2 (Figure 1) gave all domains a specificity of above 85% (with performance and family domain above 90%). Considering the total sample (children and adolescents with and without ADHD), and using 2 as the cutoff point, 36.1% had the performance domain impaired; 37.6% had the family domain impaired; 24.8% had the social domain, and 30.5% had the self-domain impaired. When total sample was sorted into ADHD (n = 68) and non-ADHD (n = 41), results showed a significant impairment in the ADHD group compared with controls (Table 1).

Table 1. Impairment Domains Profile evaluated in FIS.

FIS Domains	ADHD ($n = 68$)	Non-ADHD ($n = 41$)	Total ($N = 109$)
Performance	36 (52.94%)	3 (7.32%)	39 (26.1%)
Family	35 (51.47%)	6 (14.63%)	41(37.6%)
Social life	23 (33.82%)	4 (9.76%)	27 (24.8%)
Self-perception	27 (39.71%)	5 (12.2%)	32 (30.5%)

Table 2. Clinical Impairment in ADHD and Non-ADHD.

Subjects	No clinical impairment	Clinical impairment	Total
Non-ADHD	36 (87.8%)	5 (12.2%)	41 (100%)
ADHD	24 (35.3%)	44 (64.7%)	68 (100%)
Total	60 (55.05%)	49 (44.95%)	109 (100%)

Only 44 (64.7%) of the 68 patients with ADHD (K-SADS criteria) had at least two impaired domains (FIS clinical criteria). Twenty-four subjects who had previously been considered as having ADHD did not meet FIS clinical impairment criteria. Only five individuals of the non-ADHD group were considered impaired by FIS. Of the 44 patients with ADHD and clinical impairment, the performance domain was impaired in 63.3% of them; family domain in 79.6%; social domain in 55.1%, and self-perception domain in 58.3%. Thirteen of the 24 patients with ADHD did not have any impaired domain (Table 2).

Discussion

There is a vast amount of data supporting that individuals with ADHD, independent of their age, experience functional impairments in many different areas of their lives, (Kuriyan et al., 2013; Spencer et al., 2007). Although it is well documented in the literature and of high importance in ADHD diagnosis and outcome (Van Lieshout et al., 2017), there is a lack of a consensus of what the impairment is and how to measure it. These difficulties may underlie in the inconsistent use of impairment measures (Barkley et al., 2006; Gathje et al., 2008), which poses a risk as overlooking impairment can lead to false-positive diagnoses and overestimates of prevalence rates. In the same pattern, there seems to be no consensus on how to evaluate impairment in clinical practice.

There are two main ways used to evaluate impairment. The first strategy is to ask about impairment using open questions as "How much impairment your ADHD symptoms cause to your life?" The reason for such methodology is that it would bear similarity to what happens in clinical settings (Matte et al., 2015). The second approach is the use of impairment scales that can be specific to ADHD like the Weiss Impairment Scale (Canadian ADHD Resource Alliance, 2000) or unspecific like the Child Behavior Checklist (CBCL) (like CBCL competency score (Achenbach, 1991) or the Children's Global Assessment Scale (Schaffer et al., 1983)). However, the use of Weiss can be a challenge due to its length and copyright protection, limiting its use, especially in clinical settings and in low-income countries. To address this issue, in a previous study, our group developed a quantitative impairment scale named FIS (Fortes et al., 2014), which we applied in this study to evaluate impairment.

The primary goal of FIS is to identify impairments likely to be associated with ADHD in different domains and to be clinician-friendly (i.e., brief). FIS addresses the impact of ADHD symptoms on performance (academic), family life, social life, and self-perception. To properly investigate impairment, each domain is scored independently to define if it is impaired or not.

The first goal of this study was to define FIS's cutoff point for impairment in each domain. Aiming a more conservative analysis, a domain was considered to be impaired when its score was equal to or higher than 2. A cutoff point of 2 gave all domains specificity of above 85%. Of note, although a score of 2 corresponds to a severity degree of "more or less" in the original scale (indicating a less significant degree in Portuguese language) *DSM-IV* impairment criterion also indicates that symptoms have to be associated with "some impairment"; for this reason, we opted to use a score of 2 as the cutoff point.

The separate analysis of each domain allows for patients with different profiles to be adequately investigated. Deficits in performance, for example, are very often related to ADHD; one could expect that the performance domain would be the most frequently impaired which was not the case in our study where performance and family were equally impaired. The frequency of impairment in the self-perception and social domains were also high. Self-perception is seldom discussed as a separate construct when ADHD is evaluated. Even though self-perception and self-esteem are not the same definition, we might consider that they share major common aspects. In Lerdpaisanskul et al. (2017) study, ADHD patients had significantly lower self-esteem scores than controls. In this study, the Five Scale Test of Self-Esteem for Children was used as the self-esteem measurement, the scale measures self-esteem-specific domains (social, academic, family, body image, and global). Although ADHD had lower global scores, there were no differences in subscales addressing academic self-esteem. This supports the need to investigate impairment beyond school performance and in different domains. The application of multidomain functional impairment scale, as FIS, could increase the knowledge of ADHD life impact.

The second aim of this study was to investigate the impact on ADHD diagnosis frequency when using of a brief scale (FIS) with a formal clinical impairment criterion. FIS

clinical impairment criterion requires two or more impaired domains. This criterion was based on *DSM* concept that impairment should be present in two or more settings to be considered significant.

The two domains impairment criterion was chosen instead of a cutoff point for the entire FIS global score because of the following reasons: (a) ADHD symptoms do not affect areas (domains) of life equally; an impairment scale should be able to demonstrate any of these possible combinations; (b) a single score can easily dilute the information, for example, if family and social domains are impaired but performance and self-perception are spared, the total score of all 4 can be lower than the cutoff point, even with two impaired domains; and (c) using 1 score for each domain provides more specific information that can be used to evaluate treatment response.

Asking about different areas of life potentially allows the patients to present more complaints than they would do spontaneously. One could argue that searching for more possible complaints would increase impairment rate. However, in our sample, around 35% of the patients, previously diagnosed with ADHD, did not have two affected domains and, for this reason, would not fulfill clinical criteria for functional clinical impairment. This one third reduction in the frequency of ADHD diagnosis endorses that a formal instrument may help to decrease ADHD false-positive cases. In accordance with our results, a previous metaregression (Polanczyk et al., 2007) showed that studies in which impairment was a requirement for ADHD diagnosis had significantly lower prevalence rates of ADHD compared with those with no definition of impairment.

This finding can contribute to the current discussion of changes in impairment criteria from *DSM-IV* to *Diagnostic and Statistical Manual of Mental Disorders*–fifth edition (*DSM-V*) (APA, 2013). Criterion C (symptoms pervasiveness) required at least two different settings to be impaired. Criterion D demanded "clear evidence" of clinical impairment in social, academic, and occupational functioning. *DSM-V* modifications on ADHD impairment appear in criteria B, C, and D. Criteria C from *DSM-V*, state that symptoms must be present, there is no more the need for symptoms causing impairment as a requirement. In criterion D, "clear evidence of clinical impairment" was replaced by "symptoms should either 'interfere' or 'reduce' the quality of social, academic, or occupational functioning."

As described above, *DSM-V* presented no changes in symptoms description, but the requirement of impairment diminished significantly in comparison to *DSM-IV*. A national epidemiological study of child of mental disorders in Taiwan based on *DSM-V* criteria showed an increase in ADHD prevalence rates (Lin & Gau, 2019) when compared with previous *DSM-IV* prevalence (Steel et al., 2014).

Most of the results regarding these changes in the prevalence of ADHD came from adult studies. In a sample of adults with ADHD, Matte et al. (2015) reported an increase of 27% on the prevalence rate of ADHD diagnosis when using *DSM-V*, compared with *DSM-IV* (3.55% vs 2.8%). According to the authors, a more "moderate" impairment criterion alone would increase the endorsement rate to 15.1% (95% CI [13.99, 16.21]). A multinational cross-sectional study of outpatient psychiatric care in Europe (Deberdt et al., 2015) also found an increased prevalence, but with a lower rate (prevalence 15.8% vs 17.4%). Addressing the relation of *DSM-V* impairment criterion and age onset criterion, Lin and Gau (2015) compared ADHD adults with *DSM-IV* and *DSM-V* age-onset criteria (7 and 12 years old, respectively) and found no differences in quality of life and functional impairment ratings between the groups. This result suggests that the new *DSM-V* age criteria did not overinclude individuals without significant impairment.

In conclusion, our study addressed the unsettled question of the importance of functional impairment in ADHD diagnosis, which had been de-emphasized in the current *DSM* edition. Our results indicate that the use of a short impairment scale specific to ADHD profile may be a useful tool and that disregarding impairment inflates ADHD diagnoses in children and adolescents.

Limitations

We did not use other impairment scales or inventories to investigate the concurrent validity of FIS; for this reason, more specific comparisons to other data sets could not be performed in this study. However, we have considered that the use of quantitative data regarding impairment on different domains was an adequate strategy to address our main hypothesis.

Declaration of Conflicting Interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: Dr. P.M. and Dr. D.S. were on the speakers' bureau and/or acted as consultants for Shire/Takeda for the past 5 years.

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