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REVIEW

# Attention-deficit/hyperactivity disorder (ADHD)

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**Abstract** The proposed revision of the diagnostic criteria in DSM-5 for attention-deficit/hyperactivity disorder (ADHD) will not fundamentally change the concept of ADHD. This is mainly due to the fact that, DSM-5 will retain the exact DSM-IV wording of all 18 symptoms, but will add new examples that make the criteria more appropriate for children, adolescents and adults. The age of onset will also be changed from 7 to 12 years, the subtyping of the disorder will change, and pervasive developmental disorders will no longer be an exclusion criterion. Although the main concept is unchanged, the suggested changes will most likely increase the prevalence of ADHD, especially in adults and adolescents, but maybe also in children. The added examples will also result in necessary revisions and new validations of rating scales and diagnostic interviews. This review will examine each of the proposed DSM-5 changes and the impact they may have, and in addition, the paper will make an overview of the main characteristics of some of the international and national guidelines for assessment and treatment of ADHD and how these impact the clinical practice.

**Keywords** Attention-deficit/hyperactivity disorder (ADHD) · Diagnostic classification · Pervasive developmental disorder · Clinical guidelines

## Introduction

This paper will examine each of the proposed changes in the diagnostic criteria for attention-deficit/hyperactivity disorder (ADHD) in the fifth version of the diagnostic and statistical manual of mental disorders (DSM) and will discuss for each of these proposed changes the impact they may have. In addition, the paper will make an overview of the main characteristics of some of the international and national guidelines for assessment and treatment of ADHD and how these impact the clinical practice. The criteria for ADHD proposed in DSM-5 are shown in Table 1.

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## The proposed revision of ADHD

The revision the ADHD criterion have been developed by the *ADHD and Disruptive Behavior Disorders Work Group* [1], and the latest update on the revision of the chapter on ADHD was published by APA on May 1st 2012. The four most important points in the suggested DSM-5 revision of ADHD include (1) changing the description of the examples for each symptom, (2) changing the age of onset, (3) changing the subtyping of ADHD, and (4) removing autism spectrum disorder (ASD) from the exclusion criteria.

In addition, the proposal suggests a new overall diagnostic category, namely *neurodevelopmental disorders*, under which ADHD will be listed (rather than in the DSM-IV category, *disorders usually first diagnosed in infancy, childhood, or adolescence*). In the DSM-IV, the diagnosis of ADHD-not otherwise specified (ADHD-NOS) was used for a subgroup of patients who either had below threshold symptoms of inattention or hyperactivity/impulsivity, (otherwise) fulfilled criteria for ADHD-predominantly inattentive type, but had an age of onset later than 7 years or had a behavioral pattern marked by sluggishness, daydreaming, and hypoactivity, but below diagnostic threshold for ADHD-predominantly inattentive type. DSM-5 will

**Table 1** A 06 attention-deficit/hyperactivity disorder—diagnostic criteria proposed for DSM-5

AD/HD consists of a pattern of behavior that is present in multiple settings where it gives rise to social, educational, or work performance difficulties.

**A.** Either (A1) and/or (A2).

**A1.** *Inattention*: Six (or more) of the following symptoms have persisted for at least 6 months to a degree that is inconsistent with developmental level and that impact directly on social and academic/occupational activities.

a. Often fails to give close attention to details or makes careless mistakes in schoolwork, at work, or during other activities (e.g., overlooks or misses details, work is inaccurate).

b. Often has difficulty sustaining attention in tasks or play activities (e.g., has difficulty remaining focused during lectures, conversations, or reading lengthy writings).

c. Often does not seem to listen when speaking directly (e.g., mind seems elsewhere, even in the absence of any obvious distraction).

d. Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (e.g., starts tasks but quickly loses focus and is easily sidetracked; fails to finish schoolwork, household chores, or tasks in the workplace).

e. Often has difficulty organizing tasks and activities (e.g., difficulty in managing sequential tasks; difficulty in keeping the materials and belongings in order; messy, disorganized, and work; poor time management; tends to fail to meet deadlines).

f. Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (e.g., schoolwork or homework; for older adolescents and adults, preparing reports, completing forms, or reviewing lengthy papers).

g. Often loses things necessary for tasks or activities (e.g., school materials, pencils, books, tools, wallets, keys, paperwork, eyeglasses, or mobile telephones).

h. Is often easily distracted by extraneous stimuli (for older adolescents and adults, may include unrelated thoughts).

i. Is often forgetful in daily activities (e.g., chores, running errands; for older adolescents and adults, returning calls, paying bills, and keeping appointments).

**A2.** *Hyperactivity and impulsivity*: Six (or more) of the following symptoms have persisted for at least 6 months to a degree that is inconsistent with developmental level and that impact directly on social and academic/occupational activities.

a. Often fidgets with or taps hands or feet or squirms in seat.

b. Often leaves seat in situations when remaining seated is expected (e.g., leaves his or her place in the classroom, office or other workplace, or in other situations that require remaining seated).

c. Often runs about or climbs in situations where it is inappropriate (in adolescents or adults, may be limited to feeling restless).

d. Often unable to play or engage in leisure activities quietly.

e. Is often "on the go," acting as if "driven by a motor" (e.g., is unable or uncomfortable being still for an extended time, as in restaurants, meetings, etc.; may be experienced by others as being restless and difficult to keep up with).

f. Often talks excessively.

g. Often blurts out an answer before a question has been completed (e.g., completes people's sentences and "jumps the gun" in conversations, cannot wait for next turn in conversation).

h. Often has difficulty in waiting for his or her turn (e.g., while waiting in line).

i. Often interrupts or intrudes on others (e.g., butts into conversations, games, or activities; may start using other people's things without asking or receiving permission, adolescents or adults may intrude into or take over what others are doing).

**B**. Several inattentive or hyperactive-impulsive symptoms were present prior to age 12.

**C**. Criteria for the disorder are met in two or more settings (e.g., at home, school, or work, with friends or relatives, or in other activities).

**D**. There must be clear evidence that the symptoms interfere with or reduce the quality of social, academic, or occupational functioning.

**E**. The symptoms do not occur exclusively during the course of schizophrenia or another psychotic disorder and are not better accounted for by another mental disorder (e.g., mood disorder, anxiety disorder, dissociative disorder, or a personality disorder).

Specifiy based on current presentation

*Combined presentation*: If both criterion A1 (inattention) and Criterion A2 (hyperactivity-impulsivity) are met for the past 6 months.

*Predominantly inattentive presentation*: If criterion A1 (inattention) is met, but criterion A2 (hyperactivity-impulsivity) is not met, and three or more symptoms from criterion A2 have been present for the past 6 months.

*Inattentive presentation (restrictive)*: If criterion A1 (inattention) is met, but no more than two symptoms from criterion A2 (hyperactivity-impulsivity) have been present for the past 6 months.

*Predominantly hyperactive/impulsive presentation*: If criterion A2 (hyperactivity-impulsivity) is met, and criterion A1 (inattention) is not met for the past 6 months.

*Coding note*: For individuals (especially adolescents and adults) who currently have symptoms with impairment that no longer meet full criteria, "in partial remission" should be specified.

approach this markedly different. As mentioned later in this paper, subtypes are changed into presentations and a fourth option will be available, namely the restrictive inattentive presentation. What in DSM-IV could be interpreted, as a "sluggish cognitive tempo-subtype" is no longer mentioned directly, but a specific presentation with very few hyperactive/impulsive symptoms is now described and the exact criteria for this disorder are put forward. Instead of ADHD-NOS, the proposal suggests a new disorder, namely ADHD-not elsewhere classified, which may be coded "in cases in which the individuals are below threshold for ADHD or for whom there is insufficient opportunity to verify all criteria".

## The changes from subtypes into presentations

The three DSM-IV subtypes of ADHD are changed into four different presentations:

1. *Combined presentation* requiring six inattentive and six hyperactive/impulsive symptoms (identical with DSM-IV ADHD combined type).
2. *Predominantly inattentive presentation* requiring six inattentive and 3–5 hyperactive/impulsive symptoms (all children fulfilling this new criteria would have fulfilled criteria for DSM-IV ADHD inattentive type, but not vice versa).
3. *Inattentive presentation (restrictive)* requiring six inattentive and no more than two hyperactive/impulsive symptoms (all children fulfilling this new criteria would have fulfilled criteria for DSM-IV ADHD inattentive type).
4. *Predominantly hyperactive/impulsive presentation* requiring six hyperactive/impulsive symptoms (all children fulfilling this new criteria would have fulfilled criteria for DSM-IV ADHD hyperactive/impulsive type).

Overall, this change will not include or exclude more patients fulfilling criteria for the disorder, but simply subcategorize them differently. However, it may smooth out the differences among the presentations 1, 2, and 4 and reduce heterogeneity.

## ADHD across the lifespan

One of the main concerns regarding the DSM-IV criteria for ADHD has been the fact that in the 1990s the disorder was mainly thought of as a disorder in children. As a result of this conception, the criteria in DSM-IV is not appropriate for diagnosing adolescents or adults. Numerous studies have shown that a large proportion of children with ADHD persist to have symptoms in adolescence and adulthood, to be impaired in everyday life and to have an increased risk of a number of difficulties as adults (problems with substance use, social disadvantages, and criminality) [4, 20]. In addition, population-based studies have documented a high prevalence also in adults, many of which have not been diagnosed as children [7].

In the fifth revision of the DSM, it has been a major focus and of high importance to make the criteria for the disorder life span relevant, so that they are applicable to preschoolers, children, adolescents, and adults. To achieve this objective, early suggestions from the Workgroup included adding four new symptoms, i.e., (j) *Tends to act without thinking,* (k) *Is often impatient [..] wanting to move faster than others, […] speeding, cutting into traffic to go faster than others*, (l) *Is uncomfortable doing things slowly and systematically* and (m) *Has difficulties in resisting temptations or opportunities*. However, this approach was abandoned, and instead the Workgroup decided on retaining the exact DSM-IV wording of all 18 symptoms, but adding new examples that make it easier for clinicians to apply the criteria across the lifespan. Retaining the exact wording of each symptom is of major importance, it means that the core foundation of ADHD remains unchanged. This makes it possible to compare ADHD research based on both DSM-IV and DSM-5 as long as study populations will be comparable. It will also improve the possibilities of making direct comparisons in future studies and of assessing the impact of the other changes, without a fundamental change in the core syndrome.

## New examples for some of the symptoms

A number of the added examples are seemingly not due to making the criteria more appropriate for adults. They include the items "e.g., overlooks or misses details, work is inaccurate" (to criterion A1.a., which already uses the word "work"); "e.g., mind seems elsewhere, even in the absence of any obvious distraction" (criterion A1.c.); "e.g., starts tasks but quickly loses focus and is easily sidetracked; fails to finish schoolwork, household chores, or tasks in the workplace" (to criterion A1.d. which already includes wording appropriate for adults); "e.g., completes people's sentences and "jumps the gun" in conversations, cannot wait for next turn in conversation" (criteria A2.g. the example emphasizes that this criteria focuses on impulsivity in conversations rather than in actions) and "e.g., while waiting in line" (criterion A2.h., the example emphasizes that this criteria focuses on impulsivity in actions in contrast to impulsivity in conversation). Adding these examples does not make these five criterion more appropriate for different age groups, but acts more as an explanation for the clinician by adding more versatility, and it may also broaden the interpretation of these symptoms marginally in children.

For criterion A1.b., e., f., g., h., and i. and A2.b., the examples add situations or settings appropriate for adolescents and adults, and will by this increase the number of patients fulfilling the criteria, but do not seem to expand each individual criteria otherwise, i.e., the number of children fulfilling each individual symptom may largely be unaffected.

Two of the hyperactive/impulsive criteria (namely A2.e. and A2.i.) include situations for adolescents and adults, but at the same time the examples will clearly also increase the number of children fulfilling this criteria. The criteria A2.e. (Is often "on the go," acting as if "driven by a motor") had no additional explanation in DSM-IV. Adding the example: "e.g., is unable or uncomfortable being still for an extended time, as in restaurants, meetings, etc.; may be experienced by others as being restless and difficult to keep up with" includes a typical adolescent/adult situation (meetings), but may also expand the criteria by adding that the criteria are fulfilled if the patient simply is experienced as being restless by others. For the criteria A2.i. (Often interrupts or intrudes on others), the proposal adds the example "may start using other people's things without asking or receiving permission, adolescents or adults may intrude into or take over what others are doing". This addition specifies two things, one is how adolescents or adults may act to fulfill this criteria (the last part of the example), but by adding the action of "using other people's things without permission" it may introduce problems with the distinction between this ADHD criterion (interrupting/intruding) and one of the criteria for oppositional defiant disorder (often actively defies or refuses to comply with requests from authority figures or rules). Four of the 18 criteria remain unchanged in the proposal and no examples have been added (A2.a., c., d., and f.).

### Impact of the proposed new examples

The Workgroup states that the reliability of the ADHD items was found unreduced in the field trials. However, adding the examples may change the rating of the symptoms and rating scales currently used to assess symptoms of ADHD will need to be revised accordingly. Furthermore, the psychometric properties of these scales will have to be retested. The added examples to DSM-5 will most likely increase the prevalence of ADHD.

### The impact of the change of age of onset

There is a substantial evidence indicating that the age of onset by age 7 is not valid. There is no clinical difference between children identified as onset by age 7 versus later in terms of course, severity, outcome, or treatment response [8]. Another problem is assessing the correct age of onset, especially in adults, but this may hold true whether the limit is 7 or the proposed 12 years of age. Re-analysis of data from a British birth cohort published by the age-of-onset subcommittee suggests that the majority of children who had symptoms at age 12 also had symptoms at 7 years of age [16]. However, a population-based study indicated that only 50 % of adults with ADHD recalled the onset by age 7, whereas by age 12, 95 % recalled the onset [2]. Another proposed change is in regards of *what* should be present before the age of onset. DSM-IV requires impairment due to some symptoms of ADHD by the age of onset, but the proposal for DSM-5 only requires the onset of several symptoms (no mentioning of impairment) by the age of onset. These two proposed changes in age of onset in DSM-5 will most likely increase the prevalence of ADHD, especially in adults.

### Change of the description of situational pervasiveness

Criteria for ADHD should be met in two or more settings, this requirement is unchanged. The clarification (e.g., at school [or work] and at home) from DSM-IV is changed into (e.g., at home, school or work, with friends or relatives, or in other activities). By this, symptoms at home are no longer a requirement. This change and adding more and broader examples may increase the prevalence of ADHD.

### Removal of pervasive developmental disorder (PDD) from the exclusion criteria

ADHD is one of the most frequent comorbid diagnosis in patients with PDD/ASD [11], and there is some evidence of genetic overlap between the two disorders [10]. Strictly applying the DSM-IV criteria may have prevented pharmacological treatment of some children with ASD and comorbid symptoms of ADHD who could have benefitted from this. Allowing for a diagnosis of ADHD with comorbid ASD may increase the prevalence of ADHD slightly.

### Other changes in the DSM-5 proposal

The proposal highlights that whenever possible information on symptoms and impairment should be obtained from two different informants, preferably a parent and teacher in the case of children and a third party/significant other in cases of adults. This is already a part of the text on ADHD in DSM-IV, but the Workgroup is concerned that clinicians tend to not pay sufficient attention to this requirement. Using multiple informants is more costly and time consuming, hence the Workgroup decided to recommend this rather than making it a requirement for the diagnosis.

In addition, the Workgroup still considers lowering the cut-off for adults, i.e., change the threshold of symptoms

required for a diagnosis. The Workgroup also plans to include recommendations for severity criteria for ADHD, although no suggestion for this has been published or made available online for comments as of yet (September 2012).

Possible impact of all proposed changes

Overall, the most important decision by the Workgroup was to retain the exact wording of each of the 18 symptoms, as a reformulation of the core symptoms would have had huge clinical and scientific impacts. The proposal will move ADHD away from being a disorder in children into being a neurodevelopmental disorder with a childhood onset. This corresponds very well with the overwhelming evidence of ADHD as a lifelong impairing condition and the new examples form a *uniform basis* for applying the diagnostic criteria on adults. Several rating scales and diagnostic interviews have rephrased the 18 DSM-IV diagnostic criterion into adult versions, but not in a uniform or coordinated way. DSM-5 will specify how these symptoms should be translated into difficulties in an adult everyday life. However, the majority of the suggested changes will have a tendency to increase the prevalence of ADHD, especially in adults and adolescents, but may be also in children.

## International and national guidelines

Various guidelines for assessment and treatment of children and adolescents with ADHD have been published over the last decade, based on the diagnostic criteria in DSM-IV. The American Academy for Child and Adolescent Psychiatry (AACAP) has published several practice parameters [6, 15], and the European network for hyperkinetic disorders (EUNETHYDIS) has published European clinical guidelines [17]. The National Institute for Health and Clinical Excellence, NICE, has not only made very thorough reviews of the scientific literature and published a number of guidelines for clinicians on both assessment and treatment of children, adolescents, and adults [14], but also guidelines for patients and caregivers and suggestions for organization of clinics and implementation of the guidelines. Several European countries have published national guidelines (for instance in Germany [5, 9] and Denmark [18, 19]).

These guidelines help clinicians across different countries to make standardized assessments. This is achieved by specifying how to assess the presence of current and previous symptoms of ADHD, applying a developmental perspective, including information on the most commonly seen comorbid disorders, considering differential diagnoses, and evaluating the impact of the symptoms. All guidelines stress the importance of performing multidisciplinary assessments with the following content: clinical interview with the parents, interview with the child, assessing information from teachers (in kindergarten, preschool or school), psychometric tests (including psychological testing), and a physical evaluation. The diagnosis should not be made by doing just one of these parts of the full assessment.

Just as diagnostic classifications characterizes the phenomenology of disorders, the clinical guidelines act as important extensions to the diagnostic classifications and describe uniform ways of evaluating whether the diagnostic criteria are actually fulfilled. Both are important measures in ensuring evidence-based assessments, especially during times of growing international concern regarding the increased number of patients diagnosed with ADHD.

In some countries, regulatory authorities have decided that ADHD assessment and initiation of treatment is reserved for specialists (child and adolescents psychiatrists and pediatricians) and that general practitioners are not licensed to initiate treatment [12, 13]. Such regulatory differences between European countries and North America may also affect national prevalence rates and have an impact on standards in diagnosing [3].

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