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Implications of Changes for the Field: ADHD

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Abstract

This article provides a thorough discussion of the proposed *DSM-5* changes and their implications for current and future approaches to assessment, identification, and service delivery for children and adolescents with ADHD. Educational and clinical implications are discussed with special attention to the individual impact of the changes, diagnostic prevalence rates, and associated societal costs. Developmental period is considered as an important factor in the potential impact of the *DSM-5* changes. The authors conclude that the *DSM-5* proposed revisions may improve diagnostic sensitivity and specificity; yet the overall impact of these changes remains largely unknown as many were not empirically validated. The authors suggest that the cumulative impact of the set of changes be considered when finalizing the *DSM-5* revisions.

Keywords

ADHD, diagnosis, *DSM-5*

The *DSM-5* criteria for ADHD are not yet finalized, but it is clear that all 18 *DSM-IV-TR* symptoms of the disorder will persist in the *DSM-5*. Much of the driving force behind the proposed *DSM-5* changes was to improve detection of ADHD in adult patients. Therefore, it may seem that the revisions will have little impact on assessment and treatment procedures for pediatric ADHD. However, given the lack of biological tests for the disorder, even mild alterations in diagnostic criteria likely will have an appreciable impact on diagnostic trends and service provision for children. There are three major proposals under review for the *DSM-5* (see Table 1): (a) expanding the *DSM* A criterion to include more hyperactivity–impulsivity (H/I) symptoms and longer descriptions of each symptom, (b) modifying the *DSM* B criterion to raise the maximum age of onset to 12 years old, and (c) reformulating the ADHD subtypes. In addition, several proposed semantic modifications also may have significant implications for the diagnosis of ADHD, including (a) a revision to the definition of impairment C and D criteria and (b) modification of the exclusionary E criterion. The impact of each proposed change is reviewed herein with particular attention to individual and societal impact, across developmental period.

Proposed Changes to *DSM* A Criterion

The proposed *DSM-5* modifications offer more elaborate and broader symptom descriptors that address cross-contextual manifestations of ADHD symptoms. However, the new symptom descriptors for preexisting inattention and H/I symptoms overlap appreciably with each other. For example, "often acts without thinking" provides "speaks without considering consequences" as a text example. The provided wording of this new symptom now overlaps contextually with "blurts out answers." Likewise, "is often impatient" overlaps with "difficulty waiting turn," and "rushes through activities" appears very similar to "makes careless mistakes." Therefore, a child exhibiting these three *DSM-IV-TR* symptoms would meet criteria for five impulsive symptoms and one inattentive symptom under the proposed *DSM-5* changes, falling just one H/I symptom short of diagnostic criteria.

The proposed *DSM-5* criteria also call for the addition of four new symptoms of impulsivity to the H/I symptom list. The *DSM-5*'s proposed expansion of the impulsivity criteria is significant and was designed to enhance detection of ADHD in adults, who often do not display noticeable manifestations of H/I behaviors. It is important that this modification also balances the ratio of hyperactive to impulsive ADHD symptoms. The new symptoms were derived from

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clinical observations of adults with ADHD and include "often acts without thinking," "is often impatient," "often rushes through activities or tasks, is fast paced," and "often has difficulty resisting immediate temptations or appealing opportunities while disregarding negative consequences." However, these symptoms were not empirically validated with children, adolescents, or adults. We believe the addition of these symptoms is likely to increase diagnostic prevalence rates, as the minimum symptom threshold was not increased to accommodate the increased number of listed ADHD symptoms.

Therefore, the proposed *DSM-5* changes would likely lead to a sizable increase in the number of children and adolescents who meet H/I symptom criteria. Some individuals previously diagnosed with the predominantly inattentive type would likely meet criteria for ADHD-combined, whereas some children who display subthreshold ADHD symptoms might meet criteria for ADHD-H/I. The H/I subtype is the least common in the *DSM-IV-TR* (Lahey, Pelham, Loney, Lee, & Wilcutt, 2005), and there is little controlled treatment data for this subtype. Furthermore, impulsivity is not unique to ADHD as it is seen in a number of psychiatric disorders from psychoses to mood disorders.

An increased prevalence of predominantly ADHD-H/I youth would likely lead to higher rates of diagnostic overlap, hampering differentiation between ADHD and other disorders with prominent impulsivity. For example, it is already difficult to distinguish the boundary between severe ADHD and bipolar spectrum illness in children using *DSM-IV* criteria (Carlson, 2009), and the proposed expansion of impulsivity symptoms would likely further complicate differentiation between the two. Therefore, under the *DSM-5* changes, it is crucial that clinicians carefully screen for the presence of other mental health disorders in children meeting criteria for ADHD and treat the most impairing disorder first, as recommended by the American Academy of Child and Adolescent Psychiatry (AACAP) practice parameters (Pliszka & AACAP Work Group on Quality Issues, 2007). Although stimulant medication and behavioral modification therapies are well established treatments for ADHD, they are not evidenced-based treatments for most other *DSM* disorders, which underscores the importance of accurate diagnosis. In fact, some concern exists about their potential to exacerbate or precipitate other mental health conditions. The FDA's medication guide for stimulants warns of the risk for new or worsening psychoses or mania (http://www.fda.gov/downloads/Drugs/DrugSafety/ucm089090.pdf). Although there are little controlled data addressing the actual risk, there is a clear consensus that treatment of mania or psychoses should occur prior to treatment of ADHD (Pliszka & AACAP Work Group on Quality Issues, 2007).

Proposed Changes to *DSM* B Criterion

The proposed *DSM-5* changes increase the age of onset criterion from age 7 to age 12. This modification is expected to extend the ADHD diagnosis to adults who may not have demonstrated noticeable impairment until later in childhood. However, this modification may affect pediatric populations as well. The original choice to set the age of onset criteria to age 7 was not empirically validated, and research suggests that many youth with ADHD do not show symptoms until after this age (Barkley & Biederman, 1997). This problem may be particularly prevalent for youth with ADHD–predominantly inattentive (PI) type. Applegate and colleagues (1997) found that 43% of youth with ADHD-PI did not meet the age 7 onset criterion. However, another large longitudinal study recently suggested that adjusting the age of onset to 12 would not increase the number of youth identified with ADHD (Polanczyk et al., 2010). Because of these mixed empirical results, it is unclear whether changing the age of onset criterion would increase the prevalence rate of ADHD in older children and adolescents. However, there is a clear subset of individuals with ADHD whose impairments were deferred or not noticed until late elementary or middle school because of protective factors (e.g., high intelligence, well-structured and supportive homes and classrooms). The modified age of onset criteria will include these individuals in the ADHD diagnosis. Furthermore, there will be greater opportunities for an older child or adolescent to meet diagnostic criteria for ADHD when his or her early childhood functioning is not well documented. This situation can arise in the case of a recent custody change when a parent has limited awareness of a child's past functioning. Despite the increased age of onset criteria, it remains imperative for clinicians to ascertain the temporal course of a child's ADHD symptoms. Understanding the timing of symptom onset is an important step when ruling out alternate diagnoses (e.g., depression, anxiety, seizures, substance abuse).

The revised age of onset criterion also contains a more subtle adjustment. The *DSM-IV-TR* requires "symptoms that cause impairment" before age 7, whereas *DSM-5* proposals require only the presence of symptoms, but not impairment, before age 12. This seemingly minor adjustment may increase ADHD prevalence rates. Although impairment is still required to make a diagnosis (*DSM* C criterion), the proposed *DSM-5* criteria require that impairment is documented only for current, rather than past functioning. For example, a child with chronic attention problems who performed well academically until fourth grade would be unlikely to meet criteria for ADHD under the *DSM-IV-TR*. However, under the *DSM-5*, childhood

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impairment is not necessary, as long as there was some form of symptom expression in youth. In clinical practice, this less restrictive definition of impairment may already be widely employed. For example, it is recommended that when practitioners make diagnoses, they consider that factors beyond symptom severity contribute to the onset of school impairment, such as IQ and the academic intensity of the classroom setting (Pelham, Fabiano, & Massetti, 2005).

Proposed Changes to *DSM* C and D Criteria

A less frequently mentioned proposed change to the *DSM* ADHD criteria is the reduced requirement of current impairment. A couple of subtle semantic modifications create this change. Previous editions of the *DSM* required that "some impairment from the symptoms is present in at least two settings." The revised C criterion reads that "the symptoms are apparent in two or more settings." Thus, cross-situational impairment is no longer required; the individual must simply display noticeable, but potentially unimpairing, symptoms in two settings. Previous editions of the *DSM* stipulated that "there must be clear evidence of interference with developmentally appropriate social, academic or occupational functioning." The proposed *DSM-5* revision adjusts the D criterion to read "interfere with or reduce the quality" of functioning. Functioning of reduced quality does not necessitate impairment. Therefore, if interpreted literally, these wording changes newly diagnose individuals who display symptoms of ADHD but continue to function acceptably in their daily lives.

Although both *DSM-IV-TR* and *DSM-5* proposal require cross-domain impairment, the proposed modifications also newly require separate raters for each domain. Teacher ratings of functioning must now be obtained in lieu of parental report of academic impairment. We support this increased emphasis on documenting impairment, which is consistent with literature promoting impairment as the most sensitive early marker of long-term outcome (Pelham et al., 2005). This proposed modification is also supported by ADHD practice parameters published by the American Academy of Pediatrics (AAP, 2011) and the AACAP (Pliszka & AACAP Work Group on Quality Issues, 2007). Currently, teacher ratings are obtained infrequently during the diagnostic process, especially in primary care settings. For example, Epstein and colleagues (2009) found that barely half of community pediatricians surveyed obtained teacher ratings as part of the assessment process.

The teacher rating requirement, in essence, would require mental health providers to work collaboratively with school staff when making a diagnosis. However, obtaining a teacher rating may also increase the burden on treatment providers. Neither clinicians nor teachers are typically reimbursed for communicating with each other, nor are they relieved of other duties to complete this task. Rating scales are the most practical means of communication. However, it difficult to reliably obtain teacher ratings, even in controlled trials with resources dedicated specifically to this task (Weiss et al., 2005). It is possible that primary care providers, who currently provide the majority of care for children with ADHD (Campo et al., 2005), may refrain from making initial diagnoses to avoid the burden of school communication. In addition, school districts may need to increase mental health staffing and teacher time to complete rating scales to keep pace with the increased role of schools in ADHD diagnosis. If adequate resources are made available, the accuracy of diagnostic assessments under *DSM-5* is likely to be enhanced.

Proposed Changes to *DSM* E Criterion

As discussed above, some proposed modifications to the *DSM* will likely increase comorbidity rates (i.e., broadening the impulsivity criteria). To support the need for careful differential diagnosis, the proposed *DSM-5* modifications require clinicians to document that ADHD symptoms do not extend exclusively from oppositional behavior. In *DSM-IV-TR*, the prompt to assess for oppositionality was only specified for the single inattention symptom of "does not follow through on instructions." While increasing the burden of ADHD assessments, these efforts to filter out purely oppositional behaviors will likely enhance diagnostic accuracy. However, upward of 50% of youth with ADHD also meet criteria for oppositional defiant disorder (Barkley, 2006). Therefore, it may be difficult to isolate the source of a behavior. Careful consideration of multiple informant reports will be especially useful to this end.

In contrast, the exclusionary criteria for autism or other pervasive developmental disorders were removed in the proposed *DSM-5* criteria in recognition that many children on the autism spectrum have additional impairments in attention or impulse control. Therefore, it will no longer be necessary to definitively rule out the presence of these disorders prior to making a diagnosis of ADHD. However, it is important to note that the presence of PDD moderates treatment tolerability and efficacy, especially for stimulant medication (Research Units on Pediatric Psychopharmacology Autism Network, 2005). Therefore, it is still important to assess for the presence of PDD prior to initiating ADHD treatments.

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Table 1. Proposed Changes to the *DSM-5* Diagnostic Criteria for ADHD

Current Criteria	Proposed Criteria	Changes
Either (1) or (2). 1. Six or more of the following symptoms of **inattention** have persisted for at least 6 months to a degree that is maladaptive and inconsistent with the developmental level: 2. Six or more of the following symptoms of **hyperactivity–impulsivity** have persisted for at least 6 months to a degree that is maladaptive and inconsistent with the developmental level:	**Either (1) and/or (2).** 1. **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. ***Note***: for older adolescents and adults (ages 17 and older), only 4 symptoms are required. The symptoms are not the result of oppositional behavior, defiance, hostility, or a failure to understand tasks or instructions. 2. **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. ***Note***: for older adolescents and adults (ages 17 and older), only 4 symptoms are required. The symptoms are not the result of oppositional behavior, defiance, hostility, or a failure to understand tasks or instructions.	• Broader symptom descriptors that address developmental level • Inclusion of four new impulsivity symptoms • Reduced symptom threshold of four symptoms for older adolescents and adults
Several noticeable inattentive or hyperactive–impulsive symptoms were present by age 12.	Some hyperactivity–impulsive or inattentive symptoms that cause impairment were present before the age of 7 years.	• Increased age of onset to 12 years • Eliminated need for impairment in childhood
Some impairment from the symptoms is present in more than two or more settings (e.g., at school or work or at home).	The symptoms are apparent in two or more settings (e.g., at home, school, or work, with friends or relatives, or in other activities).	• Eliminated requirement of cross-situational impairment, replacing it with cross-situational symptoms
There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning.	There must be clear evidence that the symptoms interfere with or reduce the quality of social, academic, or occupational functioning.	• Reduced threshold of impairment criteria
The symptoms do not occur exclusively during the course of a pervasive developmental disorder, schizophrenia, or other psychotic disorder, and are not better accounted for by another mental disorder (e.g., mood disorder, anxiety disorder, dissociative disorder, or a personality disorder).	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).	• Eliminated rule-out for comorbid PDD or autism spectrum disorder
Based on these criteria, three types of ADHD are identified: **ADHD, combined type**: if both Criteria 1A and 1B are met for the past 6 months **ADHD, predominantly inattentive type**: if Criterion 1A is met but Criterion 1B is not met for the past 6 months **ADHD, predominantly hyperactive–impulsive type**: if Criterion 1B is met but Criterion 1A is not met for the past 6 months.	**Specify based on current presentation:** **Combined presentation:** If both Criterion A1 (inattention) and Criterion A2 (hyperactivity–impulsivity) are met for the past 6 months. **Predominately inattentive presentation:** If Criterion A1 (inattention) is met but Criterion A2 (hyperactivity–impulsivity) is not met *and* 3 or more symptoms from Criterion A2 have been present for the past 6 months. **Predominately hyperactive/impulsive presentation:** If Criterion A2 (hyperactivity–impulsivity) is met and Criterion A1 (inattention) is not met for the past 6 months.	• Changes term *subtype* to *specifier*

Note: *DSM-5* proposed changes as noted at www.dsm5.org.

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Proposed Changes to ADHD Subtypes

A principal benefit of standardizing diagnostic terminology is to enhance recognition of the construct and provide a succinct description of clinical presentation. Therefore, the *DSM-5* proposes to replace subtypes with course specifiers that summarize clinical presentation. The term *subtype* connotes that ADHD comprises multiple distinct diseases with discrete presentations and outcomes. However, the literature on the diagnostic validity of the subtypes is mixed at best. Initial reviews labeled the combined and inattentive subtypes as distinct clinical entities based largely on differential clinical presentations (Milich, Ballentine, & Lynam, 2001). However, more recent work incorporating genetics and imaging data do not find clear evidence to support the subtypes as distinct entities (Baeyens, Roeyers, & Walle, 2006; Lubke et al., 2007). The lack of clarity on this topic is demonstrated in the evolution of the *DSM* diagnostic criteria, where the *DSM-III* and *DSM-IV* employed subtypes and the *DSM-III-R* did not. The use of the term *specifier* versus *subtype* is somewhat ambiguous. Yet it aptly indicates that those presenting solely with attention deficits still possess impairing mental health disorders.

There are important benefits to retaining a common primary diagnostic term (ADHD), rather than separating ADHD into several distinct disorders. For one, the evidence base on ADHD does not have to be reset to accommodate the emergence of several newly named disorders. For example, there is no need to defend the birth of a new disorder as occurred with constructs of disruptive mood dysregulation disorder (Leibenluft, 2011). The elimination of subtypes may also reduce the tendency to develop boiler plate treatment protocols for the three subtypes. Namely, the removal of subtypes may emphasize the need to carefully assess individual differences in ADHD presentation and customize a child's treatment according to his or her individual areas of impairment. Much like an infection, prognosis and treatment depend on an individual's presentation. Therefore, we believe the new specifiers may capture the best of both worlds: They add clarity to the heterogeneous diagnosis of ADHD without oversimplifying the heterogeneity of this disorder.

Special Considerations for Young Children

The newly released AAP practice guidelines for ADHD endorsed the assessment and treatment of ADHD in children as young as age four (AAP, 2011), representing the first professional guidelines to do so for preschool-aged children. Therefore, we give timely attention to the potential impact of the *DSM-5* changes on young children. Young children display high developmental fluctuation in H/I levels (Pauli-Pott & Becker, 2011). It is more difficult to appropriately diagnose ADHD in this age range. In the *DSM-IV-TR* and proposed *DSM-5*, a behavior meets symptom criteria if it is "inconsistent with the developmental level" of the patient. Clinicians should rely on preschools norms when determining the severity of a behavior. The proposed *DSM-5* impulsivity symptoms particularly reduce the stringency of the diagnostic threshold for young children, who already display high levels of impulsive behaviors because of their age. It is therefore possible that the added impulsivity items will particularly reduce diagnostic specificity in this age range.

Historically, scientists have voiced concerns about the diagnostic significance of inattentive behaviors in young children. Most young children are unaccustomed to a structured school setting, increasing the possibility that observed inattention is because of anxiety, defiance, or difficulty adapting to the school setting. We believe the proposed *DSM-5* modifications may improve diagnostic specificity for symptoms of inattention. First, the symptom descriptors offer more detailed descriptions of each symptom. Second, the expanded exclusionary criteria require assessment of the source of off-task behavior, promoting the practice of carefully ruling out exacerbating factors in this age range.

Another concern in the diagnosis of ADHD in young children is the validity of parent ratings. Most parents of young children do not possess frequent opportunities to compare their child's behaviors to same aged peers. Therefore, it may be difficult for parents to identify a behavior as age inappropriate. On the other hand, teachers typically work with children in structured group setting that facilitate detection of symptomatic behaviors. The proposed *DSM-5* requirement for direct assessment of school functioning may significantly improve the sensitivity and specificity of ADHD assessments in younger children by requiring teacher input in the diagnostic process. However, many young children attend school only part time. As a result, the validity of ratings from daycare workers or other noncertified staff should be carefully scrutinized. In early childhood, direct observational assessment by a clinician who is familiar with developmental norms may be an important supplement to information collected from teachers. In recognition of these difficulties of defining age appropriate behaviors in young children, the new AAP guidelines recommend that children exhibit symptoms in multiple settings for at least 9 months prior to consideration of medication (AAP, 2011). A similar recommendation might improve the diagnostic sensitivity of the proposed *DSM-5* ADHD criteria for preschoolers.

When coupled, the recent AAP recommendations supporting the diagnosis and treatment of ADHD in children as young as age 4 and the proposed *DSM-5* modifications detailed above suggest that school systems should be prepared for an influx of preschool and kindergarten students

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in need of an ADHD assessment. As with older children, *DSM-5* based assessments require greater time and resources than *DSM-IV-TR*-based assessments. Thus, school systems, clinicians, and primary care professionals should develop efficient and effective ways of communicating and collaborating.

Special Considerations for Adolescents

For years, longitudinal follow-up studies of children with ADHD reported that up to 70% of individuals "grow out of" their ADHD diagnoses during adolescence (e.g., Barkley, Fischer, Edelbrock, & Smallish, 1990). More recent work documents the impairments of adolescents with ADHD and now ADHD is almost universally regarded as a chronic lifetime disorder (Barkley et al., 2002). However, when compared to elementary-school-aged children, adolescents today are still less likely to be diagnosed with ADHD (Polanczyk, de Lima, Horta, Biederman, & Rohde, 2007). Furthermore, studies continue to illustrate a clear decline in ADHD symptom severity over the course of the teenage years (Hart et al., 1995; Molina et al., 2009), despite the fact that ADHD-related impairments appear more severe in adolescence than in childhood (Molina et al., 2009; Wolraich et al., 2005). Several factors may contribute to this counterintuitive trend.

In search of an explanation for the obvious discrepancy between diagnostic prevalence and functional impairment in adolescents with ADHD, scientists often turn to the *DSM* criteria, casting them as developmentally insensitive. Namely, many believe that the *DSM-IV-TR* symptoms inadequately capture the clinical presentation of some highly impaired adolescents with a childhood history of ADHD, resulting in fewer diagnoses. Below we discuss four proposed changes to the *DSM* ADHD criteria with specific impact on adolescents: (a) an emphasis on collecting teacher ratings for adolescents, (b) more elaborate and broader symptom descriptors that address adolescent and cross-contextual manifestations of symptoms, (c) the addition of four new symptoms of impulsivity, and (d) reducing the symptom threshold to four for older adolescents.

Because of practical barriers, teacher ratings of ADHD symptoms are often not collected for students in the middle and high school settings. Middle and high school teachers typically instruct more than 100 students per day and spend less than an hour with each student. As a result, they often do not become well acquainted with individual students and may not notice the presence of some ADHD symptoms. Ratings from secondary school teachers also can be very difficult to obtain (Evans, Allen, Moore, & Strauss, 2005), as home–school communication decreases at the secondary school level and teachers may have less time to complete rating scales. The proposed *DSM-5* criteria emphasize the importance of collecting teacher ratings, despite these practical barriers. Some of our previous work with adolescents demonstrates that secondary school teacher ratings identify symptoms of ADHD that are unreported by parents. In fact, 15% of our longitudinal sample of adolescents with a childhood ADHD diagnosis met diagnostic criteria for ADHD only after teacher reports were considered (Sibley et al., 2012). Perhaps because of reduced home-school communication in secondary school, parents may be unaware of their adolescent's school functioning. Thus, teacher reports are necessary to establish cross-situational symptoms. We anticipate that this change will lead to increased burden on parents and clinicians during the diagnostic process, as they attempt to obtain a teacher rating. However, the resulting diagnostic information will surely improve diagnostic sensitivity for teens with ADHD.

The decline in ADHD symptom severity that is displayed as an individual ages is frequently attributed to items that are inappropriately worded for adolescents. A noted improvement in the *DSM-5* is that the proposed criteria incorporate developmentally ubiquitous and adolescent and adult-specific descriptors to facilitate symptom identification in a broader age group. For example, "often leaves seat in classroom or in other situations in which remaining seated is expected" is changed to "often restless during activities when others are seated (may leave his or her place in the classroom, office or other workplace, or in other situations that require remaining seated." Modified symptoms provide age-appropriate examples that may trigger identification of a symptom in an adolescent. For this example, an informant may recognize that although the adolescent does not frequently leave his or her seat in the classroom (old wording), he or she often requests frequent breaks during homework time. Therefore, we expect this modification will increase symptom endorsement for adolescents with ADHD by refining the definition of each symptom.

The additional four impulsivity items address the discrepancy between the exaggerated decline in H/I severity in adolescence and adulthood (Molina et al., 2009) and the clearly impulse-driven nature of ADHD-related impairments in adolescence (i.e., substance misuse, risky sexual behavior, driving accidents, delinquency). There is also evidence that in adolescents, the psychometric functioning of *DSM-IV-TR* impulsivity items outperforms that of the hyperactivity items (Conners, Sitarenios, Parker, & Epstein, 1998). The new *DSM-5* impulsivity items have strong face validity, but lack empirical validation. It is not known whether these items will increase diagnostic sensitivity without inflating false positive diagnoses or whether factor analytic studies will support the addition of these items to the H/I construct for adolescents. Further work is greatly needed in this area.

For older adolescents, the proposed *DSM-5* changes reduce the symptom threshold from six to four symptoms of

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either inattention or H/I. The four-symptom reduced threshold was empirically validated for adolescents using the *DSM-IV-TR* symptoms of ADHD (Sibley et al., 2012). However, it is not known whether the diagnostic implications of other proposed *DSM-5* modifications (i.e., addition of developmentally appropriate item descriptors and four new impulsivity items) eliminate the need for a reduced symptom threshold for older adolescents. For example, increasing the number of impulsivity items and providing better descriptors of the retained *DSM-IV-TR* items may alter adolescent norms for ADHD symptoms such that the reduced symptom threshold is no longer appropriate or necessary.

Societal Impact of *DSM-5* changes

In addition to exploring the proposed *DSM-5* changes' impact on individuals and prevalence rates, it is important to consider the impact of these changes on society. Several changes, including changing age of onset, amending the requirement for documentation of impairment, and amending the symptom count criterion for adolescents and adults, may directly affect service utilization and the cost or resource consequences of this disorder.

Therefore, we use a cost-of-illness approach to consider the societal impact of the proposed *DSM-5* changes. Monetizing an illness's resource consequences involves identifying the type of cost (e.g., health-sector cost, productivity costs, and other "indirect" costs), the time frame of costs incurred, the quantity of the outcome (e.g., how many children are accessing special education services), and the per-unit cost (e.g., stimulant medication per pill; see Pelham, Foster, & Robb, 2007, for information on the cost-of-illness approach to monetizing ADHD). An increase in any per-unit cost or quantity of outcome or an increase (lengthening) of time frame typically results in an increase in the "type" of cost (i.e., sector cost, productivity cost, other cost) and ultimately the cost of illness estimate. Therefore, the cost-of-illness impact of specific *DSM-5* proposed changes are discussed below.

First, as noted above, several proposed changes may increase diagnostic prevalence rates. These changes will therefore presumably result in increased quantity of outcome (i.e., increase in the prevalence), which will directly increase the total cost of illness. In other words, holding cost constant, increasing the number of cases of ADHD in any given period will have a direct additive cost in any cost of illness figure.

However, this is not the only anticipated cost change. The proposed changes of requiring documentation of current impairment, notably requiring teacher or school staff input of functioning, increases the burden to providers. When this burden (i.e., time) is monetized, the result is an increase in per-unit cost, which results in increased cost of illness dollar estimates. As noted previously, this will increase burden on providers and propel a need to increase the amount of resources that school districts and primary care service providers devote to the diagnostic process. Recent work estimates the cost of educating a child with ADHD at approximately $5,000 annually (Robb et. al, 2011). This figure is the product of staffing cost by time frame, added with published estimates of the per-unit rate for students receiving special education. Even small changes in the calculating per-unit cost of educating a child with ADHD may have an enormous multiplicative effect. As an example, in the Robb et al. (2011) figure, the per-unit cost of educating a child in a reduced size classroom (e.g., 12:1:1) was incorporated into the total cost of educating a child with ADHD. However, as noted in that article, the costs of pre-referral services, evaluation, committee meetings, and ongoing documentation were not included in the total cost, as cost and time estimates were not available. This likely underestimates the true resources burden and cost. Presently, many schools across the country are moving to a "response-to-intervention/learning" model in which students are identified via frequent, short-cycle assessments as not making anticipated gains or adequate progress academically, socially or behaviorally. Subsequently, pre-referral (i.e., pre- referral to the committee for special education) strategies are implemented by the classroom teacher or by appointed interventionists within the schools. The staff and resource allocation for pre-referral interventions would likely increase greatly under the *DSM-5*. Any increase in per-unit cost, coupled with a likely increase in prevalence rates of youths with ADHD, may dramatically increase the overall total cost of educating students with ADHD. Add to this other anticipated per-unit costs, such as the increased burden (time) on teachers for completing ratings and primary care providers for interpreting information from multiple informants. The result is that *DSM-5* diagnostic assessments will likely alter the ADHD cost of illness landscape considerably.

It is remiss, however, to imply that increased identification and service utilization is solely burdensome. Although any increase in service utilization may pose an initial increase in burden on any sector or system, systems are typically in flux and respond to need in turn. It is indisputable that all things constant, any increase in outcome (i.e., prevalence) increases total cost via outcome × per-unit cost, and per-unit increases in cost increases total cost. Therefore, we also consider cost-effectiveness scenarios.

For example, perhaps earlier identification of symptomatic children and adolescents will yield swifter treatment provision and subsequently reduce indirect costs, such as cost of crime or school drop-out. Although the proposed diagnostic changes may result in an increase in prevalence rate of ADHD diagnosis, diagnosis may result in provision of treatment. Accessing treatment may ultimately lead to

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better societal outcomes (i.e., graduation, employment, and crime rates), which are ultimately cost saving from a societal perspective. Therefore, it is our hope that the final version of the *DSM-5* ADHD criteria will refine the diagnostic process in such a way that improves detection and treatment of individuals with ADHD.

Conclusions

As discussed above, there are clear ways through which the proposed *DSM* criteria will reduce the rate of false negative ADHD diagnoses, which we hope will lead to more accurate pediatric prevalence rates (i.e., equalizing child and adolescent prevalence rates). However, questions of false positives still arise. Most of the proposed modifications have face validity and some have empirical validity. However, the empirically validated changes have not been examined in combination. Coupled with the reduced impairment criteria, the additive consequences of (a) improving item descriptors, (b) adding four new impulsivity symptoms, (c) changing the age of onset, and (d) reducing the diagnostic threshold (for adolescents) may newly identify a subset of subthreshold youth without distressing or impairing ADHD symptoms. In other words, in some ways, we may be overcorrecting our definition of ADHD, sliding the symptom threshold toward the center of the attention deficit and H/I continuums. As a result, we support many of the changes proposed for the *DSM-5* but have two chief criticisms: (a) Despite the improved requirement of teacher rating collection, there is a subtle deemphasis on the importance of impairment in diagnosis that is caused by wording changes to the B, C, and D criteria and (b) there is a lack of empirical validation for some of the suggested changes (or for all of these changes in combination). As a result, we cannot know some repercussions of the proposed modifications.

Despite the concern of false positives, we believe that, overall, diagnostic sensitivity will be improved by these modifications. As a result, there may be an increase in the number of individuals with ADHD, particularly teens and preschoolers, who present for treatment. Individuals with ADHD may obtain better access to treatments as a result of these changes. Furthermore, we draw particular attention to adolescents, who may benefit most from the proposed *DSM-5* changes. Adolescents with ADHD possess a documented resistance to taking stimulant medication (McCarthy et al., 2009) and effective psychosocial treatments are not widely available to families (Smith, Waschbusch, Willoughby, & Evans, 2000). Therefore, an influx in identified adolescents with ADHD will likely stimulate the need to develop and disseminate effective psychosocial treatments for this population, which are greatly needed. However, our society must be prepared to consider changes in the cost of illness of ADHD that occur as a result of the proposed *DSM-5* modifications, and to shoulder these implications appropriately.

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