

Evaluating the Evidence For and Against the Overdiagnosis of ADHD

Mark J. Scututto

Miriam Eisenberg

Muhlenberg College, Pennsylvania

Objective: According to the DSM-IV TR, approximately 3 to 7% of school-age children meet the criteria for ADHD. However, there is a common conception that ADHD is overdiagnosed. The purpose of this article is to evaluate the evidence for and against overdiagnosis. **Method:** Recent prevalence studies and research on factors affecting diagnostic accuracy were reviewed. For ADHD to be overdiagnosed, the rate of false positives (i.e., children inappropriately diagnosed with ADHD) must substantially exceed the number of false negatives (children with ADHD who are not identified or diagnosed). **Results and Conclusion:** Based on the review of prevalence studies and research on the diagnostic process, there does not appear to be sufficient justification for the conclusion that ADHD is systematically overdiagnosed. Yet, this conclusion is generally not reflected in public perceptions or media coverage of ADHD. Potential explanations for the persistence of the belief in the overdiagnosis of ADHD are offered. (*J. of Att. Dis.* 2007; 11(2) 106-113)

Keywords: *ADHD; assessment; misdiagnosis; overdiagnosis; diagnosis; prevalence*

ADHD is one of the most commonly diagnosed childhood disorders (Barkley, 2005). According to the DSM-IV TR, approximately 3 to 7% of school-age children meet the criteria for ADHD (American Psychiatric Association [APA], 2000). However, there is a common conception that ADHD is vastly overdiagnosed, with some suggesting that it is the diagnosis du jour (Bogas, 1997) and that it may be a desirable diagnosis for some parents (Smelter & Rasch, 1996). This theme has been clearly reflected in the coverage of ADHD in popular press and mass media sources (e.g., Brazelton & Sparrow, 2003; Haber, 2000; Kissinger, 1998; Parenting with Pills, 2004). For example, after an episode on parenting hyperactive children, talk show host Dr. Phil McGraw claimed that ADHD is "so overdiagnosed" (Parenting with Pills, 2004). The issue of overdiagnosis has also been addressed by prominent politicians like Hillary Clinton. In a press conference in March of 2000, she voiced concern about overdiagnosis by suggesting that physicians might be too quick to diagnose children whose problems may be simply normal characteristics of childhood and adolescence (Vatz & Weinberg, 2001). These examples appear to be consistent with public sentiment about overdiagnosis. A CNN online

poll in 2002 found that 76% of respondents believed that ADHD is overdiagnosed (Do You Think ADHD, 2002).

When people speak of ADHD being overdiagnosed, they are typically referring to children who are diagnosed with ADHD but should not be (i.e., false positives). For example, Kissinger (1998) introduces the topic of overdiagnosis by describing a child who was initially believed to have ADHD because he was persistently inattentive even during "a popular study unit on cowboys" (p. 1). Only after additional information was gathered did the origins of his problems become apparent—he was experiencing traumatic stress as a result of being sexually abused by a man who had worn cowboy boots. Clearly, this child should not have been diagnosed with ADHD and cases like this might be expected if ADHD were in fact overdiagnosed. However, addressing the question of overdiagnosis is very complex and requires looking for evidence beyond only the cases in which a child is wrongly given a diagnosis of ADHD.

Authors' Note: Address correspondence to Mark J. Scututto, PhD, Department of Psychology, Muhlenberg College, Allentown, PA, 18104; scututto@muhlenberg.edu

Implicit in the overdiagnosis question is that there is a clearly definable level of how many children should be diagnosed with ADHD. If more children are receiving a diagnosis of ADHD than should be, then it would seem valid to conclude that ADHD is indeed overdiagnosed. However, the presence of false positives alone does not indicate overdiagnosis. With any diagnostic system that is not perfectly reliable, there will also be children who warrant the diagnosis, but go unidentified or undiagnosed (i.e., false negatives). For ADHD to be overdiagnosed, the overall number of false positives must substantially exceed the overall number of false negatives.

The most direct test of the overdiagnosis question would involve a nationally representative study in which diagnoses based on standardized, multimethod assessments were compared to actual diagnoses. If the number of children who have been actually diagnosed with ADHD exceeds the number that would meet the criteria based on a multimethod assessment, then there would be direct evidence of overdiagnosis. In other words, the issue of overdiagnosis will be resolved only when we compare the diagnoses being given in actual practice to the diagnoses that should have been given based on standardized comprehensive assessments. Unfortunately, this type of study has not been conducted to date. Alternatively, there may be indirect evidence for overdiagnosis if there are systematic inaccuracies in either (a) the accepted prevalence rates or (b) in the diagnostic process. In this paper, we examine the evidence for and against the overdiagnosis question in each of these areas.

Prevalence Rates

With regard to prevalence rates, it would be reasonable to conclude that ADHD is overdiagnosed if there is systematic evidence that the DSM-IV TR estimate of 3 to 7% is either too high (i.e., many children falsely diagnosed with ADHD are included in the 3 to 7%) or too low (i.e., the 3 to 7% underestimates the number of children actually being diagnosed). Again, without a direct comparative study, as described above, prevalence rates alone provide little insight into this issue, but may reflect trends consistent with systematic biases in the diagnosis of ADHD. For instance, if most prevalence studies exceed the 3 to 7% range, then it would be a reasonable assumption that the DSM-IV estimate is too low. Likewise, if the existing prevalence studies fall within the 3 to 7% range, then it is less plausible to argue for systematic overdiagnosis. To evaluate the validity of the DSM-IV prevalence estimates, we reviewed 14 recent prevalence studies (since the publication of the DSM-IV

criteria) and coded them for potential moderating variables such as the number and type of informants, sample characteristics, and the method of assessment. We included any study that explicitly provided an estimate of the prevalence of ADHD among school-age children in the United States. Studies were located through a PsychINFO search and through existing reviews of prevalence studies (Barkley, 2005; Faraone, Sergeant, Gillberg, & Biederman, 2003). A summary of these studies is presented in Table 1.

Results indicated that the prevalence of ADHD is often above the 3 to 7% range cited by the DSM-IV. Consistent with the DSM-IV TR, the male to female ratio in these studies ranged from 1.58 to 6.36 ($M = 2.73$, $SD = 1.12$). The overall prevalence of ADHD varied considerably depending on the assessment method and age. For instance, the Center for Disease Control study documented the considerable variability in prevalence across age, gender, and geographic location (Center for Disease Control and Prevention, 2005). The prevalence estimates were within the 3 to 7% range for younger children (ages 4 to 8) and slightly above the 3 to 7% range for older children (ages 9 to 17). In the 14 studies we reviewed, methodological characteristics also appeared to affect prevalence estimates. Specifically, the prevalence of ADHD was more likely to be lower and within the 3 to 7% range when studies used random sampling and larger samples. In contrast, several studies documented prevalence rates that were substantially higher than the expected 3 to 7%. Typically, these prevalence rates used nonrandom samples, used screening measures, and/or relied heavily on a single information source. Because the prevalence estimates are so clearly linked to methodology, it is unclear whether the 3 to 7% significantly overestimates or underestimates the number of children actually being diagnosed. Despite being frequently cited in discussions of overdiagnosis, prevalence rates provide relatively little interpretable evidence because of the substantial variations in methodology (Cohen, Riccio, & Gonzalez, 1994).

The Diagnostic Process

Conceptually, looking at prevalence studies alone reveals very little about overdiagnosis per se. Overdiagnosis, by definition, implies a comparison to a reference point. When people speak of ADHD being overdiagnosed, they may not be referring to the 3 to 7% prevalence estimate but to the frequency of false positives—more children are being diagnosed than should be. As mentioned previously, the presence of false positives by itself does not indicate

Table 1
Recent Studies Estimating the Prevalence of ADHD in U.S. Samples

Author	Sample Size	Random Sample	Assessment	Ages (Grades)	Prevalence Estimate (%)		
					Overall	Male	Female
Barbaresi et al. (2002)	5,718	N	A(medical, school)	5-19	7.5 ^a (Definite) / 15.9 (Definite or probable)	10.8 / 13.3	3.9 / 5.1
Carlson et al. (1997)	2,984	N	BRS-T	(1-5)	18.9	25.5	11.6
Costello et al. (2003)	6,674	Y	I-P	9-16	4.1 ^b	7.0	1.1
Cuffe et al. (2005)	10,255	N	BRS-P	4-17	3.3 ^c	4.8	1.8
Gaub & Carlson (1997a)	2,744	N	BRS-T	(K-5)	8.1	—	—
Gimple & Kuhn (1998)	253	N	PR	2-6	9.5	11.8	6.8
LeFever et al. (1999)	29,734	N	A	(2-5)	8.2-9.9	14.1 ^c	5.5 ^c
LeFever et al. (2002)	808	N	PR ^d	(1-5)	17.0	28.0	11.0
Nolan et al. (2001)	3,006	N	BRS-T	3-18	18.2 (Preschool) 15.9 (Elementary) 14.8 (Secondary)	21.5 23.1 20.1	13.6 8.2 8.8
Robison et al. (2002)	23,339 (office visits)	Y	PD	5-18	5.9	7.9	3.3
Rowland et al. (2001)	362	N	BRS-T, PR	8-12	16.1	—	—
Rowland et al. (2002)	6,099	N	PR	(1-5)	10.0	14.8	4.7
Wolraich et al. (1996)	8,258	N	BRS-T	(K-5)	11.4	16.2	6.1
Wolraich et al. (1998)	4,323	N	BRS-T	(K-5)	16.1	22.8	9.2

Note: PR = Parent Report of Diagnosis; BRS-P = Behavior Rating Scale—Parent; BRS-T = Teacher Rating Scale; I-P = Interview with Parent; A = Archival records; PD = Physician office visit.

a. Cumulative incidence by age 19.

b. Predicted cumulative prevalence by age 16.

c. Estimated from sample size and descriptive statistics presented in the article.

d. Did not specifically ask parents if their child had been given a diagnosis of ADHD (see LeFever, Villers, Morrow, & Vaughn, 2005).

overdiagnosis. For ADHD to be overdiagnosed, the number of false positives must substantially exceed the number of false negatives. Although, we are not aware of any studies that address this issue directly, there is a wealth of research evidence documenting factors that contribute to false positives and false negatives in the identification of children with ADHD.

Factors That May Contribute to an Increased Rate of False Positives in the Diagnosis of ADHD

Comorbidity. As many as 75% of children with ADHD meet the criteria for another psychiatric diagnosis (Barkley, 2005). The most common comorbid conditions contain symptoms that overlap with the criteria for ADHD. For example, difficulty sustaining attention may be a characteristic of stress, depression, or anxiety. In addition, some features associated with ADHD (e.g., noncompliance) may also be prominent in other disorders like conduct disorder or oppositional defiant disorder (APA, 2000; Barkley, 2005). This overlap complicates diagnosis and, without a comprehensive assessment, may increase the likelihood of an incorrect ADHD diagnosis (Barkley, 2005; Cotugno,

1993; Kube, Petersen, & Palmer, 2002; Milberger, Biederman, Faraone, Murphy, & Tsuang, 1995).

Diagnostic inaccuracy. Some studies have shown that, for a significant number of children, an actual or suspected diagnosis of ADHD is disconfirmed after further assessment. For instance, Cotugno (1993) evaluated 92 children previously referred to a specialized ADHD clinic. He found that, after a comprehensive evaluation, only 22% of the children were given a primary diagnosis of ADHD and only 37% were given a secondary diagnosis of ADHD. Similarly, Desgranges, Desgranges, and Karsky (1995) found that 62% of clinic referrals for suspected ADHD were not confirmed as ADHD cases after further evaluation. One potential reason for the diagnostic inaccuracy is the variability in assessment procedures. Studies of assessment practices among psychologists and physicians suggest that a diagnosis of ADHD is often made without a comprehensive assessment. Handler and DuPaul (2005) found that a large majority of practicing psychologists did not regularly follow assessment procedures that are consistent with the best practice guidelines. Similarly, Wasserman and colleagues (1999) found that primary care physicians varied considerably in their assessment and diagnosis of childhood disorders. They found that physicians relied very heavily on interviews and

most did not adhere to the DSM criteria or use standardized assessment tools. Although such variability in assessment procedures may provide fertile soil for overdiagnosis, it has not been empirically established that a failure to follow best practices for assessment invariably leads to more false positives than false negatives.

Changes in diagnostic criteria. There is some evidence that using the DSM-IV criteria may result in an increased likelihood of an ADHD diagnosis (Cuffe, Moore, & McKeown, 2005). In two studies comparing the DSM-IIIR and DSM-IV criteria, Wolraich and colleagues found that the DSM-IV criteria may lead to an increase in the number of children diagnosed with ADHD compared to the DSM-IIIR criteria. (Wolraich et al., 1996; Wolraich, Hannah, Baumgaertel, & Feurer, 1998). The addition of subtypes to the DSM-IV may account for much of this increase (Barkley, 2005). Although the change in diagnosis could reasonably result in more false positives, it may also identify valid cases of ADHD that would have been missed under the previous criteria.

Factors That May Contribute to an Increased Rate of False Negatives in the Diagnosis of ADHD

Gender differences. Research on gender differences suggests that girls may be consistently underidentified and underdiagnosed. Girls with ADHD tend to exhibit lower levels of disruptive behavior and higher levels of inattentiveness, internalizing symptoms, and social impairment (Biederman et al., 2002; Carlson, Tamm, & Gaub, 1997; Gaub & Carlson, 1997b; Gershon, 2002). This pattern of symptoms is less likely to disrupt the classroom and may be more readily overlooked. Girls with ADHD who are never identified or diagnosed would constitute false negatives in the assessment process and must be considered when evaluating whether ADHD is being overdiagnosed.

Subgroup norms. Significant differences in the severity of ADHD symptoms across gender (DuPaul et al., 1997; Reid et al., 2000) and ethnicity (Reid et al., 1998) have been well documented. However, general population norms typically given by behavior rating scales pool these disparate groups together. Consequently, when using general norms to evaluate developmental deviance, some groups (e.g., females) may be underidentified as ADHD because the cutoff score is raised by the presence of other groups (e.g., males) in the normative sample (Reid et al., 2000). Conversely, some groups (e.g., males) may be overidentified as ADHD because the cutoff score is lowered by the presence of other groups (e.g., females) in the normative sample. In an empirical evaluation of this issue, Waschbusch and King (2006) found

that the use of sex-specific norms identified a small subset of girls with serious impairment who would have otherwise been missed if general norms were used. Identification of boys did not differ depending on the norms used, suggesting that the failure to use sex-specific norms is more likely to result in underidentification of girls than overidentification of boys.

Barriers to identification and treatment. There are numerous factors that serve as barriers to the identification, diagnosis and treatment of mental health needs (Power et al., 2005). More than 50% of all children with mental health needs do not receive any form of treatment (Kataoka, Zhang, & Wells, 2002). Access to mental health services differs according to a variety of factors including gender, age, race or ethnicity, and health insurance (Power, Eiraldi, Clarke, Mazzuca, & Krain, 2005). It stands to reason that at least some of the children who might meet the criteria for ADHD never get identified or never pursue treatment. If this is the case, most methods of assessing prevalence will not reflect these children. Prevalence estimates based on parental report of a diagnosis, school records, or medication use will not reflect children with ADHD who were never identified in the first place. Only prevalence estimates based on randomly selected community samples will capture these cases.

Summary

There is clearly evidence that a variety of factors contribute to the misidentification of ADHD in children. Each of these factors is well documented in the literature on the assessment of ADHD. However, at least on a qualitative review, there does not appear to be sufficient evidence that these factors systematically favor false positives over false negatives. For ADHD to be overdiagnosed, the number of children incorrectly diagnosed with ADHD must be large enough to account for the well-documented underidentification of girls with ADHD and the widespread barriers to mental health service utilization. Furthermore, many of the factors contributing to false positives, in particular, can be reduced through careful and thorough assessment. Studies examining the extent to which mental health professionals and pediatricians adhere to best practices in the assessment of ADHD will shed additional light on the impact of these factors on misdiagnosis (e.g., Handler & Du Paul, 2005).

Discussion

Analysis of the evidence suggests that the most defensible conclusion about the diagnosis of ADHD is that it

is frequently misdiagnosed, but there is currently insufficient evidence that it is systematically overdiagnosed. Prevalence estimates of ADHD vary markedly depending on sampling characteristics and the method of assessment, and therefore offer relatively little insight into whether ADHD is diagnosed too much or too little in practice. An examination of research on factors that might impact inaccuracy in diagnosis does not suggest that the rate of false positives is substantially greater than the rate of false negatives. Yet, as cited earlier, this conclusion is generally not reflected in public perceptions or media coverage of ADHD. Below we offer several potential explanations for the persistence of the belief in the overdiagnosis of ADHD. Future studies are needed to evaluate the potential merits of these factors on public perceptions of overdiagnosis in ADHD.

Cognitive Biases

On what basis do people form their perceptions of whether ADHD is overdiagnosed or not? Most likely, people get their information from one of three types of sources: personal experience, mass media coverage, or professional literature. For most people outside of the mental health professions, the first two types of sources are probably more common. However, the interpretation of information from each of these types of sources is potentially subject to cognitive biases. For instance, media coverage of ADHD often emphasizes vivid or dramatic cases to attract a larger audience. Unfortunately, these cases may not be representative and may unintentionally bias perceptions of ADHD. Presenting anecdotal evidence of a child being misdiagnosed as ADHD and inappropriately treated with stimulant medication (perhaps with drastic consequences) may be very memorable and compelling. Focusing on particularly vivid or salient cases may lead to an availability bias, where people judge the likelihood of an event based on how easy it is to recall examples (Tversky & Kahneman, 1973). In the case of ADHD overdiagnosis, an availability bias may come into play when personal experiences or news stories involve vivid instances of clearly inappropriate diagnoses like in the cowboy example cited earlier (Kissinger, 1998). This type of case is memorable and therefore judged to be more likely. The potential for an availability bias to affect perceptions of ADHD overdiagnosis is exacerbated by the fact that events that suggest underdiagnosis (i.e., valid ADHD cases that are never identified) are typically not salient. False positives are simply more noticeable and therefore more likely to be remembered than false negatives.

Personal experiences and anecdotal cases may not be representative of ADHD diagnostic accuracy. However,

an availability bias might also come into play when reading about ADHD research studies. Bushman and Wells (2001) found that people's conclusions about a series of research studies were influenced by incidental factors such as the salience of the titles. In their experiment, studies with more salient and catchy titles were more likely to be remembered and more likely to bias the person's impressions of the literature. With regard to ADHD overdiagnosis, the study by LeFever, Villers, Morrow, and Vaughn (2002) was widely cited in a variety of media outlets, yet the high prevalence rates found in this study do not appear to be the norm (see Table 1). Furthermore, there has been widespread controversy surrounding the methodology and findings from this study (see Sizemore, 2006). However, the major findings from this study are very memorable, and prominent media coverage of the study may lead people to judge the results to be more likely.

Another factor that may influence perceptions of ADHD overdiagnosis is a confirmation bias. In a thorough review of the literature on confirmation bias, Nickerson (1998) cites several ways in which a confirmation bias might play a role in evaluating hypotheses. A confirmation bias may influence people's judgments about a particular issue by leading them to (a) entertain only a single hypothesis, (b) give greater weight to evidence that supports preexisting beliefs, or (c) look only for confirmatory information (Nickerson, 1998). In terms of people's perceptions of ADHD diagnosis, a person may consider the hypothesis that ADHD is overdiagnosed but never consider testing the hypothesis that it is underdiagnosed. Likewise, a person who believes that ADHD is overdiagnosed may attach more weight to studies that support a very high prevalence (e.g., LeFever et al., 2002) and tend to discount studies that suggest a lower prevalence (e.g., Cuffe et al., 2005). Another possibility is that a person who believes ADHD is overdiagnosed will seek only pieces of evidence that confirm overdiagnosis (e.g., rising stimulant rates) and not pieces of evidence that would disconfirm it (e.g., underidentification of girls).

There are two aspects of the ADHD overdiagnosis question that might make a confirmation bias particularly likely. First, Nickerson (1998) argues that a confirmation bias may be a result of information processing deficits—a general tendency to focus on one piece of information at a time. In particular, people focus more on confirmatory events because they are more salient than nonconfirmatory events (Nickerson, 1998). In the case of ADHD overdiagnosis, people may disregard or fail to consider false negatives because they never actually see

them. Nonoccurrence is simply harder to notice than the occurrence and therefore gets weighted less in people's judgments about overdiagnosis. Second, Koehler (1991) suggested that merely bringing a hypothesis to someone's attention may increase his or her confidence in the truth of the hypothesis, making it what Koehler calls a focal hypothesis. Once a person entertains a focal hypothesis, the person forms a conditional reference frame, where the focal hypothesis is assumed to be true. The adoption of this conditional reference frame will impact subsequent judgments about how the problem is perceived, how relevant evidence is interpreted, and how or whether new information is sought. In the case of ADHD overdiagnosis, hearing a media report of a dramatic case or of a controversial research finding may initially increase a person's confidence that a focal hypothesis (e.g., ADHD is overdiagnosed) is true. From there, he or she will interpret subsequent evidence in ways that bias judgment toward seeing ADHD as overdiagnosed.

The evidence for cognitive biases in human decision making and judgment is extensive. The availability heuristic and confirmation bias have been implicated in a variety of judgment activities including clinical decision making, research interpretation, policy rationalizations, and judicial reasoning (Bushman & Wells, 2001; Dawes, 2003; Dumont, 1993; Nickerson, 1998). Although we have made an argument that these biases may also play a role in judgments about the overdiagnosis of ADHD, future research is needed to evaluate the merits of this argument. Specifically, studies should address the role that vivid case studies, media reports, and research findings play in people's judgments about ADHD overdiagnosis.

Medication Safety Concerns.

Another potential factor in perceptions of the overdiagnosis of ADHD is recent concern over the safety of psychotropic medication use in children (Mathews & Abboud, 2005; Wurtzel, 2000). The rate of stimulant treatment for ADHD has risen dramatically over the last 10 to 15 years (Castle, Aubert, Verbrugge, Khalid, & Epstein, *in press*; Safer, Zito, & Fine, 1996; Zito et al., 2000), and some studies have found rates of medication use that exceed documented prevalence rates (Angold, Alaattin, Egger, & Costello, 2000; LeFever et al., 1999). A growing public concern about overprescription of psychotropic drugs for young children has been reflected in media coverage of several prominent research studies (Angold et al., 2000; LeFever et al., 2002) and has resulted in legislative efforts to place black-box warnings on medications used for childhood disorders (Vedantam, 2006). However, recent research on medication trends indicates that stimulant use has risen most rapidly for traditionally underserved groups (e.g.,

girls, adults), which is likely an indication of improved recognition and diagnosis rather than systematic overdiagnosis (Castle et al., *in press*). It is true that a majority of children diagnosed with ADHD are being treated with medication; however, a rise in medication rates does not necessarily reflect overdiagnosis. Increased medication use may reflect increased awareness of the disorder, improved access to resources, or a legitimate rise in incidence (Goldstein, 2006).

To some extent, people may conflate overmedication concerns with overdiagnosis concerns. In fact, several of the prevalence studies cited in Table 1 estimate ADHD prevalence based on medication use and LeFever, Arcona, and Antonuccio (2003) point out that discussions of overdiagnosis and overmedication often treat the two issues as equivalent. To the extent that medication use or misuse is linked to the diagnosis of ADHD, we would expect perceptions of overdiagnosis to increase as reports of black-box warnings and serious but rare side effects continue to receive attention in the media. Moreover, the consequences of overdiagnosis may be perceived as more severe, making the dangers of overdiagnosis more salient than the dangers of underdiagnosis.

Beliefs About Children's Misbehavior.

The core symptoms of ADHD are present, to some extent, in most children. Consequently, people may question the legitimacy of the ADHD diagnosis in the first place (e.g., Armstrong, 1997; Bailly, 2005; Timimi et al., 2004), which essentially lowers the threshold for how many cases of ADHD there should be. Despite widespread scientific agreement on the validity of an ADHD diagnosis (Barkley et al., 2002; Faraone, 2005), prominent critiques of the validity of ADHD may contribute to public perceptions of overdiagnosis. To the extent that the public sees ADHD as an invalid diagnosis, any rate of diagnosis will be judged to be excessive. Future studies should examine public perceptions of the validity of an ADHD diagnosis and the degree to which these perceptions are responsive to various types of information (e.g., media reports, scientific studies).

Conclusion

In this article, we present a primarily qualitative assessment of the evidence for and against the overdiagnosis of ADHD. There is considerable evidence both for and against overdiagnosis. Whether the evidence for overdiagnosis is stronger or weaker than the evidence against overdiagnosis involves a subjective judgment that may be subject to the very types of cognitive biases mentioned above (see Bushman & Wells, 2001). However,

it does not appear that there is currently sufficient evidence to support the public perception that ADHD is systematically overdiagnosed. Although there are still many unanswered questions, this is not merely an academic debate. Public perceptions of ADHD, including whether it is overdiagnosed, are likely to have important public health implications. An unfounded or premature assumption that ADHD is overdiagnosed may be destructive or counterproductive because it may influence parents' willingness to seek help for their child, and it may influence broader policy decisions related to special education and children's mental health issues.

References

- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text revision). Washington, DC: Author.
- Angold, A., Alaattin, E., Egger, H. L., & Costello, E. J. (2000). Stimulant treatment for children: A community perspective. *Journal of the American Academy of Child and Adolescent Psychiatry*, 39, 975–984.
- Armstrong, T. (1997). *The myth of the A. D. D. child: 50 ways to improve your child's behavior and attention span without drugs, labels, or coercion*. New York: Plume.
- Bailly, L. (2005). Stimulant medication for the treatment of attention-deficit hyperactivity disorder: evidence-based practice? *Psychiatric Bulletin*, 29, 284–287.
- Barbaresi, W. J., Slavica, K. K., Colligan, R. C., Pankrantz, S., Weaver, A. L., Weber, K. J., et al. (2002). How common is attention-deficit hyperactivity disorder? Incidence in a population-based cohort in Rochester, Minn. *Archives of Pediatric and Adolescent Medicine*, 156, 217–224.
- Barkley, R. A. (2005). *Attention-deficit hyperactivity disorder: A handbook for diagnosis and treatment* (3rd ed.). New York: The Guilford Press.
- Biederman, J., Mick, E., Faraone, S. V., Braaten, E., Doyle, A., Spencer, T., et al. (2002). Influence of gender on attention deficit hyperactivity disorder in children referred to a psychiatric clinic. *American Journal of Psychiatry*, 159, 36–42.
- Bogas, S. (1997, January/February). "Diagnosis du jour?" Understanding attentional deficits can sharpen our treatment strategies. *Family Therapy Networker*, 21, 63–67.
- Brazelton, T. B., & Sparrow, J. (2003, April 24). Overdiagnosis is a major problem with ADHD. *Deseret News*. Retrieved May 19, 2006, from http://www.findarticles.com/p/articles/mi_qn4188/is_20030424/ai_n11386912
- Bushman, B. J., & Wells, G. L. (2001). Narrative impressions of literature: The availability bias and the corrective properties of meta-analytic approaches. *Society for Personality and Social Psychology*, 27, 1123–1130.
- Carlson, C. L., Tamm, L., & Gaub, M. (1997). Gender differences in children with ADHD, ODD, and co-occurring ADHD/ODD identified in a school population. *Journal of the American Academy of Child and Adolescent Psychiatry*, 36, 1706–1714.
- Castle, L., Aubert, R. E., Verbrugge, R. R., Khalid, M., & Epstein, R. S. (in press). Trends in medication treatment for Attention-Deficit Hyperactivity Disorder. *Journal of Attention Disorders*.
- Center for Disease Control and Prevention. (2005). Mental health in the United States: Prevalence of diagnosis and medication treatment for Attention-Deficit/Hyperactivity Disorder—United States, 2003. *MMWR*, 54, 842–847.
- Cohen, M. J., Riccio, C. A., & Gonzalez, J. J. (1994). Methodological differences in the diagnosis of attention-deficit hyperactivity disorder: Impact on prevalence. *Journal of Emotional and Behavioral Disorders*, 2, 31–38.
- Costello, E. J., Mustillo, S., Erkanli, A., Keeler, G., & Angold, A. (2003). Prevalence and development of psychiatric disorders in childhood and adolescence. *Archives of General Psychiatry*, 60, 837–844.
- Cotugno, A. J. (1993). The diagnosis of attention deficit hyperactivity disorder (ADHD) in community mental health centers: Where and when. *Psychology in the Schools*, 30, 338–344.
- Cuffe, S. P., Moore, C. G., & McKeown, R. E. (2005). Prevalence and correlates of ADHD symptoms in the National Health Interview Survey. *Journal of Attention Disorders*, 9, 392–401.
- Dawes, R. M. (2003). *Everyday irrationality: How pseudo-scientists, lunatics, and the rest of us systematically fail to think rationally*. Boulder, CO: WestView.
- Desgranges, K., Desgranges, L., & Karsky, K. (1995). Attention deficit disorder: Problems with preconceived diagnosis. *Child and Adolescent Social Work Journal*, 12, 3–17.
- Do You Think ADHD is Overdiagnosed?* (2002). Retrieved May 19, 2006, from <http://archives.cnn.com/2002/HEALTH/parenting/03/13/adhd.study/index.html>
- Dumont, F. (1993). Inferential heuristics in clinical problem formulation: Selective review of their strengths and weaknesses. *Professional Psychology: Research and Practice*, 24, 196–205.
- DuPaul, G. J., Power, T. J., Anastopoulos, A. D., Reid, R., McGoey, K. E., & Ikeda, M. J. (1997). Teacher ratings of attention deficit hyperactivity disorder symptoms: Factor structure and normative data. *Psychological Assessment*, 9, 436–444.
- Faraone, S. V. (2005). The scientific foundation for understanding attention-deficit/hyperactivity disorder as a valid psychiatric disorder. *European Child and Adolescent Psychiatry*, 14, 1–10.
- Faraone, S. V., Sergeant, J., Gillberg, C., & Biederman, J. (2003). The worldwide prevalence of ADHD: Is it an American condition? *World Psychiatry*, 2, 104–113.
- Gaub, M., & Carlson, C. L. (1997a). Behavioral characteristics of DSM-IV ADHD subtypes in a school-based population. *Journal of Abnormal Child Psychology*, 25, 103–111.
- Gaub, M., & Carlson, C. L. (1997b). Gender differences in ADHD: A meta-analysis and critical review. *Journal of the American Academy of Child and Adolescent Psychiatry*, 36, 1036–1045.
- Gershon, J. (2002). A meta-analytic review of gender differences in ADHD. *Journal of Attention Disorders*, 5, 143–154.
- Gimpel, G. A., & Kuhn, B. R. (2000). Maternal report of attention deficit hyperactivity disorder symptoms in preschool children. *Child: Care, Health and Development*, 26, 163–179.
- Goldstein, S. (2006). Editorial: Is ADHD a growth industry. *Journal of Attention Disorders*, 9, 461–464.
- Haber, J. S. (2000). *ADHD: The great misdiagnosis*. Dallas: Taylor Trade Publishing.
- Handler, M. W., & DuPaul, G. J. (2005). Assessment of ADHD: Differences across psychology specialty areas. *Journal of Attention Disorders*, 9, 402–412.
- Kataoka, S. H., Zhang, L., & Wells, K. B. (2002). Unmet need for mental health care among U.S. children: Variation by ethnicity and insurance status. *American Journal of Psychiatry*, 159, 1548–1555.

- Kissinger, M. (1998, November 16). Looking behind the label: Is ADHD being overdiagnosed? *Milwaukee Journal Sentinel, Health and Science*, Section 1. Retrieved March 19, 2006, from <http://www2.jsonline.com/alive/family/1116sadkid.stm>
- Koehler, D. J. (1991). Explanation, imagination, and confidence in judgment. *Psychological Bulletin, 110*, 499-519.
- Kube, D. A., Petersen, M. C., & Palmer, F. B. (2002). Attention-deficit/hyperactivity disorder: Comorbidity and medication use. *Clinical Pediatrics, 41*, 461-469.
- LeFever, G. B., Arcona, A. P., & Antonuccio, D. O. (2003). ADHD among American schoolchildren: Evidence of overdiagnosis and overuse of medication. *Scientific Review of Mental Health Practice, 2*, 49-60.
- LeFever, G. B., Dawson, K. V., & Morrow, A. L. (1999). The extent of drug therapy for attention deficit-hyperactivity disorder among children in public schools. *American Journal of Public Health, 89*, 1359-1364.
- LeFever, G. B., Villers, M. S., Morrow, A. L., & Vaughn, E. S. (2002). Parental perceptions of adverse educational outcomes among children diagnosed and treated for ADHD: A call for improved school/provider collaboration. *Psychology in the Schools, 39*, 63-71.
- LeFever, G. B., Villers, M. S., Morrow, A. L., & Vaughn, E. S. (2005). Parental perceptions of adverse educational outcomes among children diagnosed and treated for ADHD: A call for improved school/provider collaboration: Erratum. *Psychology in the Schools, 42*, 227.
- Mathews, A., & Abboud, L. (2005, June 29). FDA raises concerns about ADHD drugs. *The Wall Street Journal*, p. D1.
- Milberger, S., Biederman, J., Faraone, S. V., Murphy, J., & Tsuang, M. T. (1995). Attention deficit hyperactivity disorder and comorbid disorders: Issues of overlapping symptoms. *American Journal of Psychiatry, 152*, 1793-1799.
- Nickerson, R. S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *Review of General Psychology, 2*, 175-220.
- Nolan, E. E., Volpe, R. J., Gadow, K. D., & Sprafkin, J. (2001). Teacher reports of DSM-IV ADHD, ODD, and CD symptoms in schoolchildren. *Journal of the American Academy of Child and Adolescent Psychiatry, 40*, 241-249.
- Parenting with pills: What you didn't see on the show.* (2004, September 28). Retrieved May 12, 2006 from <http://drphil.com/shows/show/371/>
- Power, T. J., Eiraldi, R. B., Clarke, A. T., Mazzuca, L. B., & Krain, A. L. (2005). Improving mental health service utilization for children and adolescents. *School Psychology Quarterly, 20*, 187-205.
- Reid, R., DuPaul, G. J., Power, T. J., Anastopoulos, A. D., Rogers-Adkinson, D., Noll, M., et al. (1998). Assessing culturally different students for attention deficit hyperactivity disorder using behavior rating scales. *Journal of Abnormal Child Psychology, 26*, 187-198.
- Reid, R., Riccio, C. A., Kessler, R. H., DuPaul, G. J., Power, T. J., Anastopoulos, A. D., et al. (2000). Gender and ethnicity differences in ADHD as assessed by behavior ratings. *Journal of Emotional and Behavioral Disorders, 8*, 38-48.
- Robison, L. M., Skaer, T. L., Sclar, D. A., & Galin, R. S. (2002). Is attention-deficit/hyperactivity disorder increasing among girls in the U.S.? *CNS Drugs, 16*, 129-137.
- Rowland, A. S., Umbach, D. M., Catoe, K. E., Stallone, L., Long, S., Rabiner, D., et al. (2001). Studying the epidemiology of attention-deficit/hyperactivity disorder: Screening method and pilot results. *Canadian Journal of Psychiatry, 46*, 931-940.
- Rowland, A. S., Umbach, D. M., Stallone, L., Naftel, J., Bohlig, M., & Sandler, D. P. (2002). Prevalence of medication treatment for attention-deficit/hyperactivity disorder among elementary school children in Johnston County, North Carolina. *American Journal of Public Health, 92*, 231-234.
- Safer, D. J., Zito, J. M., & Fine, E. M. (1996). Increased methylphenidate usage for attention deficit disorder in the 1990's. *Pediatrics, 98*, 1084-1088.
- Sizemore, B. (2006, August 14). Whatever happened to . . . the EVMS researcher who studied ADHD? *The Virginian-Pilot*, p. B2.
- Smelser, R. W., & Rasch, B. W. (1996). Is attention deficit disorder becoming a desired diagnosis? *Phi Delta Kappan, 77*, 429-432.
- Timimi, S. (2004). A critique of the international consensus statement on ADHD. *Clinical Child and Family Psychology Review, 17*, 59-63.
- Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology, 4*, 207-302.
- Vatz, R. E., & Weinberg, L. S. (2001, March 1). Problems in diagnosing and treating ADD/ADHD (Attention Deficit Disorder, Attention Deficit Hyperactivity Disorder). *USA Today Magazine*. Retrieved May 19, 2006, from http://www.findarticles.com/p/articles/mi_m1272/is_2670_129/ai_72272577
- Vedantam, S. (2006, February 10). Warning urged for ADHD drugs; Panel cites risks, fears of overuse. *The Washington Post*, p. A01.
- Waschbusch, D. A., & King, S. (2006). Should sex-specific norms be used to assess attention-deficit/hyperactivity disorder or oppositional defiant disorder? *Journal of Consulting and Clinical Psychology, 74*, 179-185.
- Wasserman, R. C., Kelleher, K. J., Bocian, A., Aker, A., Childs, G. E., Indacochea, F., et al. (1999). Identification of attentional and hyperactivity problems in primary care: A report from pediatric research in office settings and the ambulatory sentinel practice network. *Pediatrics, 103*, e38.
- Wolraich, M. L., Hannah, J. N., Baumgaertel, A., & Feurer, I. D. (1998). Examination of DSM-IV criteria for attention-deficit/hyperactivity disorder in a county-wide sample. *Journal of Developmental & Behavioral Pediatrics, 19*, 162-168.
- Wolraich, M. L., Hannah, J. N., Pinnock, T. Y., Baumgaertel, A., & Brown, J. (1996). Comparison of diagnostic criteria for attention-deficit hyperactivity disorder in a county-wide sample. *Journal of the American Academy of Child and Adolescent Psychiatry, 35*, 319-324.
- Wurtzel, E. (2000, April 4). A long, hard recovery from a cheap, easy, life-altering drug addiction. *The Plain Dealer*, p. 9B.
- Zito, J. M., Safer, D. J., DosReis, S., Gardner, J. F., Boles, M., & Lynch, F. (2000). Trends in the prescribing of psychotropic medications to pre-schoolers. *American Medical Association, 283*, 1025-1030.

Mark J. Sciutto, PhD, is an associate professor of psychology at Muhlenberg College, Allentown, Pennsylvania.

Miriam Eisenberg is currently pursuing a bachelor's degree in psychology from Muhlenberg College, Allentown, Pennsylvania.