Potential Impact of *DSM-5* Criteria on Autism Spectrum Disorder Prevalence Estimates

Matthew J. Maenner, PhD,
University of Wisconsin–Madison. National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention, Atlanta, Georgia

Catherine E. Rice, PhD,
National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention, Atlanta, Georgia

Carrie L. Arneson, MS,
University of Wisconsin–Madison

Christopher Cunniff, MD,
University of Arizona, College of Medicine, Phoenix

Laura A. Schieve, PhD,
National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention, Atlanta, Georgia

Laura A. Carpenter, PhD,
Medical University of South Carolina, Charleston

Kim Van Naarden Braun, PhD,

National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention, Atlanta, Georgia

Russell S. Kirby, PhD,
University of South Florida, Tampa

Amanda V. Bakian, PhD, and
University of Utah, Salt Lake City

Maureen S. Durkin, PhD, DrPH
University of Wisconsin–Madison

Abstract

IMPORTANCE—The *DSM-5* contains revised diagnostic criteria for autism spectrum disorder (ASD) from the *DSM-IV-TR*. Potential impacts of the new criteria on ASD prevalence are unclear.

OBJECTIVE—To assess potential effects of the *DSM-5* ASD criteria on ASD prevalence estimation by retrospectively applying the new criteria to population-based surveillance data collected for previous ASD prevalence estimation.

DESIGN, SETTING, AND PARTICIPANTS—Cross-sectional, population-based ASD surveillance based on clinician review of coded behaviors documented in children's medical and educational evaluations from 14 geographically defined areas in the United States participating in the Autism and Developmental Disabilities Monitoring (ADDM) Network in 2006 and 2008. This study included 8-year-old children living in ADDM Network study areas in 2006 or 2008, including 644 883 children under surveillance, of whom 6577 met surveillance ASD case status based on the *DSM-IV-TR*.

MAIN OUTCOMES AND MEASURES—Proportion of children meeting ADDM Network ASD criteria based on the *DSM-IV-TR* who also met *DSM-5* criteria; overall prevalence of ASD using *DSM-5* criteria.

RESULTS—Among the 6577 children classified by the ADDM Network as having ASD based on the *DSM-IV-TR*, 5339 (81.2%) met *DSM-5* ASD criteria. This percentage was similar for boys and girls but higher for those with than without intellectual disability (86.6% and 72.5%, respectively; *P* < .001). A total of 304 children met *DSM-5* ASD criteria but not current ADDM Network ASD case status. Based on these findings, ASD prevalence per 1000 for 2008 would have been 10.0 (95% CI, 9.6–10.3) using *DSM-5* criteria compared with the reported prevalence based on *DSM-IV-TR* criteria of 11.3 (95% CI, 11.0–11.7).

CONCLUSIONS AND RELEVANCE—Autism spectrum disorder prevalence estimates will likely be lower under *DSM-5* than under *DSM-IV-TR* diagnostic criteria, although this effect could be tempered by future adaptation of diagnostic practices and documentation of behaviors to fit the new criteria.

Autism spectrum disorders (ASDs) are a group of neurodevelopmental disorders characterized by impairments in social interaction and communication, as well as repetitive behaviors and restricted interests. The American Psychiatric Association first described *infantile autism* as a distinct condition in the *DSM-III* and introduced the category of

pervasive developmental disorders (PDDs).[1] In 1987, the American Psychiatric Association revised the diagnostic label from infantile autism to autistic disorder and slightly expanded the diagnostic criteria in the *DSM-III-R*.[2] In 1994, the American Psychiatric Association included several subtypes in the *DSM-IV*: autistic disorder, Asperger disorder, Rett disorder, childhood disintegrative disorder, and pervasive developmental disorder not otherwise specified (PDD-NOS).[3] Since the 1994 revision, population prevalence estimates of ASD have regularly included 3 of the 5 PDDs: autistic disorder, Asperger disorder, and PDD-NOS. The criteria described in the *DSM-IV-TR* published in 2000 were largely unchanged from those presented in the *DSM-IV* and the *International Statistical Classification of Diseases, 10th Revision*.[4,5] Although the term *ASD* did not appear in the *DSM-IV-TR*, it is popularly used in place of *PDD* (inclusive of subtypes), which is how we use it here.

Population reports from developed countries show consistent, secular increases in ASD prevalence since the mid-1990s.[6–16] Throughout this article, we refer to the estimates obtained from ASD prevalence studies as ASD prevalence. The newly revised ASD criteria[17] in the *DSM-5* (published in 2013) presents challenges for monitoring ASD prevalence over time. It will be difficult to differentiate changes in prevalence owing to the revised diagnostic criteria from other factors such as enhanced and more widespread screening or changes in risk factors for ASD.

Some experts suggest the *DSM-5* criteria require a higher threshold of symptoms.[18] Previous studies based on clinical or research samples have reported that a proportion of individuals who meet *DSM-IV-TR* criteria for ASD fail to meet the *DSM-5* criteria.[19–30] We evaluated the potential effects that the revised criteria for diagnosing ASD could have on the population prevalence of ASD among 8-year-old children in a large multisite ASD surveillance system in the United States.

Methods

Autism and Developmental Disabilities Monitoring Network Case Ascertainment

We used data from the Autism and Developmental Disabilities Monitoring (ADDM) Network, an active, population-based surveillance system that implements a multisite, multiple-source, health and education record review methodology. The ADDM Network monitored ASD prevalence among 644 883 8-year-old children who resided in 11 US surveillance sites during the 2006 surveillance year and 14 US sites during 2008.[9,10] Data in the ADDM Network are collected every other year. The 14 sites were located in Alabama, Arizona, Arkansas, Colorado, Florida, Georgia, Maryland, Missouri, New Jersey, North Carolina, Pennsylvania, South Carolina, Utah, and Wisconsin (Arkansas, New Jersey, and Utah participated in 2008 only). Sites were funded by the Centers for Disease Control and Prevention through a competitive review process. Although each site represented a local population, the overall sample was not nationally representative. Sites met applicable local institutional review board and privacy/confidentiality requirements under 45 CFR 46; the ADDM Network is a public health surveillance system, which does not require patient consent for record review.

Details of the ADDM Network have been described previously.[6–10] In brief, within each site, records of 8-year-old children were screened at multiple health facilities serving children with developmental disabilities (all 14 sites) and public school special education programs (9 sites). Records for children with a variety of developmental conditions were requested. For children meeting established birth year and residency requirements, records with certain behavioral or diagnostic descriptions contained in developmental evaluations were abstracted. Abstracted information included verbatim behavioral descriptions, psychometric testing and screening results, developmental history or concerns, and developmental diagnoses and classifications. Multiple records from different facilities for the same child were combined into a composite record. Trained clinicians reviewed the information for each child and used a specified protocol to determine (*DSM-IV-TR*–based) ASD case status.

DSM-IV-TR Criteria and ADDM Network Case Definition

The *DSM-IV-TR* (see Supplement) included 12 diagnostic criteria for PDD divided into 3 domains of impairment: (1) social interaction; (2) communication; and (3) repetitive behavior or restricted interest. For a diagnosis of autistic disorder, an individual met at least 6 criteria altogether including 2 criteria in the social domain and 1 each in the communication and repetitive/restricted behaviors and interests domains. The onset of impairment must have occurred before age 3 years, and the condition could not be better accounted for by Rett disorder or childhood disintegrative disorder. Diagnoses of PDD-NOS and Asperger disorder required a fewer number or different pattern of criteria than required for autistic disorder.

The ADDM Network ASD case definition was based on the *DSM-IV-TR* diagnostic criteria for autistic disorder, Asperger disorder, and PDD-NOS in 2006 and 2008. However, the ADDM Network case definitions for Asperger disorder and PDD-NOS were more stringent than the *DSM-IV-TR*, requiring an autism discriminator in addition to the *DSM-IV-TR* criteria. Autism discriminators included specific behaviors considered to be common among children with ASD than without or a documented ASD diagnosis.[31] This approach is consistent with the notion that using the minimum diagnostic criteria for PDD-NOS leads to more diagnoses than clinically appropriate.[32,33] Even when the *DSM-IV-TR* behavioral criteria were technically met, ADDM Network clinician reviewers could rule out ASD case status if the impairments were likely attributable to another disorder or were otherwise contraindicated. If the clinician was uncertain whether ASD was an appropriate classification, a second clinician independently reviewed the record and the clinicians reached consensus on final case status. In addition to determining case status, ADDM Network clinician reviewers recorded previous diagnoses, history of regression, and other behavioral features consistent with ASD (eg, odd responses to sensory stimuli). Race/ ethnicity information was collected from health, educational, and birth certificate records when available and was missing or unknown for 3.6% of the children meeting ADDM Network ASD case status.

Classification Based on *DSM-5* ASD Criteria

The *DSM-5* criteria for ASD differ from the *DSM-IV-TR* criteria in several respects. First, they do not distinguish subtypes of ASD, such as autistic disorder and Asperger disorder, instead classifying a single category of ASD. Second, the *DSM-5* recognizes only 2 domains of impairment: social communication and restricted, repetitive patterns of behavior, interests, or activities, and all 3 items in the social communication domain are required. Third, in contrast to the 12 distinct diagnostic criteria of the *DSM-IV-TR*, the *DSM-5* specifies 7 criteria but some of the *DSM-5* criteria describe more general principles and behaviors than in the *DSM-IV-TR*.[34] Fourth, the *DSM-5* ASD criteria allow for the consideration of historical behaviors in addition to current behaviors, instead of primarily focusing on current behavior as with the *DSM-IV-TR* ASD criteria.

We operationalized the *DSM-5* ASD behavioral criteria using behaviors corresponding to *DSM-IV-TR* ASD criteria and other behaviors abstracted from a child's records. Some *DSM-5* ASD criteria corresponded directly to 1, or a combination of, specific *DSM-IV-TR* criteria, making application of *DSM-5* criteria to the data recorded by the ADDM Network clinician reviewers straightforward. Other *DSM-5* criteria were not directly comparable with *DSM-IV-TR* criteria but corresponded to other behavioral features already recorded as part of the ADDM Network protocol such as unusual sensory interests. For the purposes of this study, behaviors corresponding to some distinct *DSM-IV-TR* criteria were allowed to contribute toward meeting more than 1 *DSM-5* ASD criteria (Table 1). This operationalization is similar to the coding scheme used in clinical studies of the proposed *DSM-5* ASD criteria.[20,21] Because the ADDM Network relies on documented descriptions of behaviors through age 8 years, the surveillance system method is consistent with the *DSM-5*'s inclusion of historical behaviors.

Analysis

For the 2006 and 2008 surveillance years, ADDM Network clinician reviewers determined 6577 children met ASD criteria based on the *DSM-IV-TR*. The reviewers identified an additional 1020 children whose behaviors could have met ASD criteria but, after consensus, they were judged to not meet ADDM Network ASD case criteria. We calculated the proportions of these children who met *DSM-5* ASD criteria overall and stratified by sex, race/ethnicity, intellectual disability, history of developmental regression, previous ASD classification by a community professional (ASD diagnosis or autism classification in special education), ADDM Network site, and number of *DSM-IV-TR* ASD criteria documented in evaluations.

To calculate the potential impact on prevalence, we applied *DSM-5* ASD criteria to 2 groups of 8-year-old children under surveillance for the years 2006 and 2008: (1) the 6577 children who met both ADDM Network ASD criteria based on the *DSM-IV-TR* and our operationalized *DSM-5* ASD criteria and (2) the 1020 children who did not meet ADDM Network ASD criteria but could plausibly meet *DSM-5* criteria. These 1020 children all technically met *DSM-IV-TR* criteria for PDD-NOS, but the clinician reviewers did not classify them as ASD cases for surveillance purposes; for most of these children, the clinician reviewers concluded that the behaviors were better accounted for by another

disorder. For comparability to previously published prevalence estimates, we used the same denominators that were described in the ADDM Network prevalence reports in 2006 and 2008.[9,10]

We performed χ^2 tests to assess differences in proportions, and we calculated 95% CIs using the binomial exact method. All analyses were performed with the R Statistical Computing Package version 2.15.3 (R Foundation for Statistical Computing). Plots were created with ggplot2.[35]

Results

Proportion of ADDM Network ASD Case Children Based on *DSM-IV-TR* Who Met *DSM-5* ASD Criteria

Among the 6577 children who met the ADDM Network ASD case definition based on the *DSM-IV-TR* in surveillance years 2006 and 2008, 5339 (81.2%) met the *DSM-5* criteria for ASD (Table 1). Of the 3 (required) criteria in the *DSM-5* ASD social communication domain, deficits in nonverbal communication was the least frequent, with 86.8% of the 6577 children meeting this criterion. Restricted interests (in the repetitive/restricted behavior domain) was the least frequent overall at 62.8% (Table 1). Nearly all children (96.1%) who met ADDM Network ASD case definition either met, or were within 1 criterion of meeting, *DSM-5* ASD criteria (Table 1).

The proportion of children who met *DSM-5* ASD criteria among those who met ADDM Network ASD criteria based on the *DSM-IV-TR* increased from 78.5% in 2006 to 83.1% in 2008 (*P* < .001; Table 2). Overall, boys and girls were nearly equally likely to meet *DSM-5* ASD criteria (81.4% vs 80.0%, *P* = .28); similar proportions of non-Hispanic black and non-Hispanic white children met *DSM-5* ASD criteria (82.2% vs 81.6%, *P* = .73). Asian children were more likely to meet *DSM-5* ASD criteria than Hispanic children (88.0% vs 78.1%, *P* < .001). Children with a history of developmental regression were more likely to meet *DSM-5* ASD criteria than those without a history (89.4% vs 79.0%, *P* < .001), and children with intellectual disability were more likely to meet *DSM-5* ASD criteria than children with an IQ greater than 70 (86.6% vs 82.5%, *P* < .001). Children with a history of regression remained more likely to meet *DSM-5* ASD criteria than children without a history of regression after controlling for intellectual disability (eTable 1 in Supplement). Children identified as having ASD by a community professional (including special education classification of autism) were more likely to meet *DSM-5* ASD criteria than those who were not (84.8% vs 69.7%, *P* < .001). There was variability by ADDM Network site, ranging from 95.6% of children in Utah to 68.8% of children in Florida meeting *DSM-5* criteria (*P* < .001). Some of these pairwise comparisons are not shown in Table 2, which presents overall χ^2 statistics for all levels of a factor. In Supplement, eTable 2 shows the proportions of children meeting *DSM-5* ASD criteria by site for 2006 and 2008 separately.

We observed a substantial association between the proportion meeting *DSM-5* ASD criteria and the number of documented *DSM-IV-TR* behavioral criteria (Figure 1). None of the 38 children with only 2 *DSM-IV-TR* behavioral criteria documented met *DSM-5* ASD criteria. In contrast, all 899 children with evidence of all 12 *DSM-IV-TR* criteria met *DSM-5* ASD

criteria (Figure 1). In Supplement, eTable 3 and eTable 4 show the frequency of specific criteria among children meeting ADDM Network ASD case status only, *DSM-5* ASD only, and both sets of criteria.

Potential Impact on ASD Prevalence Estimates

When ASD prevalence estimates are adjusted to include only children meeting *DSM-5* ASD criteria, the prevalence of ASD is lower than previously reported (*DSM-IV-TR)* ASD prevalence for both 2006 and 2008 (Figure 2). The adjusted prevalence estimates included 5339 (of the 6577) children meeting both *DSM-IV-TR* ADDM Network criteria for ASD and *DSM-5* ASD criteria and 304 (of the 1020) children who did not meet ADDM Network ASD case status after clinician review but did have documented behaviors consistent with *DSM-5* ASD criteria. For 2006, the prevalence estimate using *DSM-5* criteria was 7.4 per 1000 (95% CI, 7.1–7.7) compared with 9.0 (95% CI, 8.6–9.3) based on the ADDM Network application of the *DSM-IV-TR*. For 2008, the *DSM-5*–based estimate was 10.0 per 1000 (95% CI, 9.6–10.3) compared with 11.3 (95% CI, 11.0–11.7) based on the *DSM-IV-TR* (Figure 2).

Discussion

These results suggest that fewer children would have been classified as having ASD using the *DSM-5*–based criteria than the *DSM-IV-TR*–based ADDM Network surveillance approach. The net reduction on prevalence estimates for surveillance years 2006 and 2008 would have been approximately 18% and 12%, respectively. While a number of recent clinic-based studies examined the percentage of patients in specific clinics or research samples meeting *DSM-IV-TR* criteria for autism (or PDD) who also meet *DSM-5* ASD criteria, this population-based study evaluated the potential impact of the *DSM-5* criteria on the population prevalence of ASD. The percentages found in clinic-based studies,[19–30] summarized in Table 3, ranged from 46% to 93%. The analogous percentage from our study was 81%.

The potential reduction in ASD prevalence under the *DSM-5* criteria was smaller in 2008 than 2006 both in terms of absolute prevalence (a reduction of 1.3 per 1000 in 2008 compared with 1.6 per 1000 in 2006) and the proportion of ADDM Network ASD cases who did not meet *DSM-5* criteria (16.9% in 2008 compared with 21.5% in 2006). This suggests that the adoption of the *DSM-5* criteria is unlikely to reverse the trend of increasing ASD prevalence over time (Figure 2). Continually increasing awareness of ASD—leading to more detailed descriptions of behaviors in evaluations—could potentially explain why the ADDM Network ASD case children in 2008 were more likely to meet *DSM-5* criteria than in 2006. These same factors could also contribute to the considerable variability across sites in ASD prevalence and the proportion of children meeting *DSM-5* ASD criteria. A previous evaluation of the ADDM Network methods cited these factors among the most difficult to assess.[36]

An advantage of the population-based design was that it is representative of all children in defined populations who meet ASD criteria and are evaluated in typical community settings rather than selected samples attending a particular clinic or enrolled in specific research

projects. Another important strength of this study was that we considered children who may meet *DSM-5* ASD criteria but did not meet ADDM Network *DSM-IV-TR*–based criteria. The inclusion of this group allowed us to estimate the potential net impact of the new criteria on prevalence accounting for cases lost and gained. However, it is likely that many of the 304 ASD cases gained could be classified as having another disorder and not ASD, which is how most were classified using the current ADDM Network methods.

Previous introductions of new criteria for ASD suggest that the process by which professionals become trained in and familiar with the new diagnostic or eligibility criteria is gradual.[37–40] With the advent of the *DSM-5*, it is likely that policies for service eligibility and reimbursement—as well as diagnostic tools—will be adapted in response to the revised criteria. It is also possible that as clinicians become cognizant of the revised criteria, they will assess and document additional symptoms to substantiate an ASD diagnosis. If community professionals will be more inclined to document symptoms that receive greater emphasis in the *DSM-5*, the differences between ASD prevalence based on the *DSM-IV-TR* and *DSM-5* could decline over time.

Children identified as having ASD by a community professional were more likely to meet *DSM-5* ASD criteria than those who were not (84.8% vs 69.7%). Furthermore, most of the ADDM Network ASD case children who did not meet the *DSM-5* ASD criteria were only lacking by 1 criterion. Similar to the findings of 3 other studies,[23,26,41] relaxing the *DSM-5* criteria to require 1 fewer (in either domain) included almost all children (96.1%) meeting the current ADDM Network (*DSM-IV-TR*) ASD case definition. This suggests that the *DSM-5* ASD criteria could have a smaller effect on eligibility for services than their effect on prevalence estimates (which include children never diagnosed as having ASD).

A limitation of this study was its reliance on symptoms documented in records by professionals in the community during a time when the *DSM-IV-TR* held sway over the ASD diagnostic process; the children were born in 1998 or 2000. Because most *DSM-5* ASD criteria refer to behavioral features documented in developmental assessments performed to evaluate *DSM-IV-TR* criteria and the ADDM Network included documentation of other clinical features specified under *DSM-5* ASD criteria (eg, unusual responses to sensory inputs), the retrospective analysis presented in this study was possible and provides a reasonable estimate of the anticipated impact of the *DSM-5* criteria on ASD prevalence.

Some children meeting PDD criteria under the *DSM-IV-TR* will not meet *DSM-5* ASD criteria but might meet the *DSM-5* criteria for social communication disorder.[34,42] We were unable to assess social communication disorder prevalence because the criteria for it did not readily correspond to existing measures in the ADDM Network data.

Conclusions

The results of this population-based study suggest ASD prevalence estimates may be lower under the *DSM-5* ASD criteria than under the criteria based on the *DSM-IV-TR*. Autism spectrum disorder prevalence estimates for 2014 and beyond should be interpreted in context. Future changes in evaluation and reporting practices, as well as refinements to

standardized diagnostic instruments, will also affect future trends in ASD prevalence estimation and may run counter to the potential effects of the *DSM-5* criteria suggested by this study.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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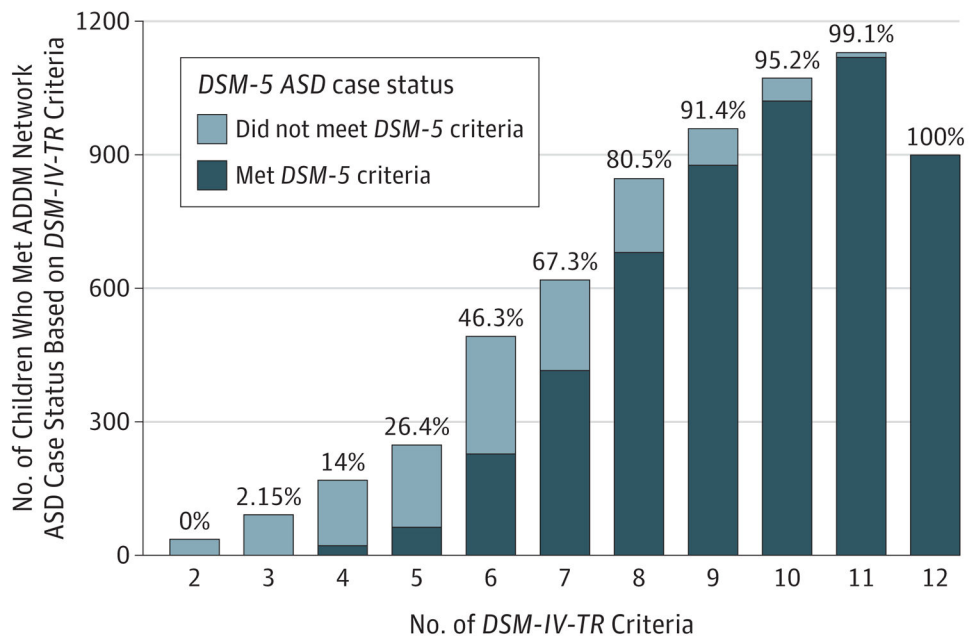
Figure 1. Children Who Met *DSM-5* Autism Spectrum Disorder (ASD) Criteria
The bar graph shows the proportion of children who met *DSM-5* ASD criteria among
Autism and Developmental Disabilities Monitoring (ADDM) Network ASD case children
(N = 6577). Data are stratified by the number of *DSM-IV-TR* ASD criteria for surveillance
years 2006 and 2008. Percentages denote those who met *DSM-5* criteria among children
with a given number of *DSM-IV-TR* criteria.
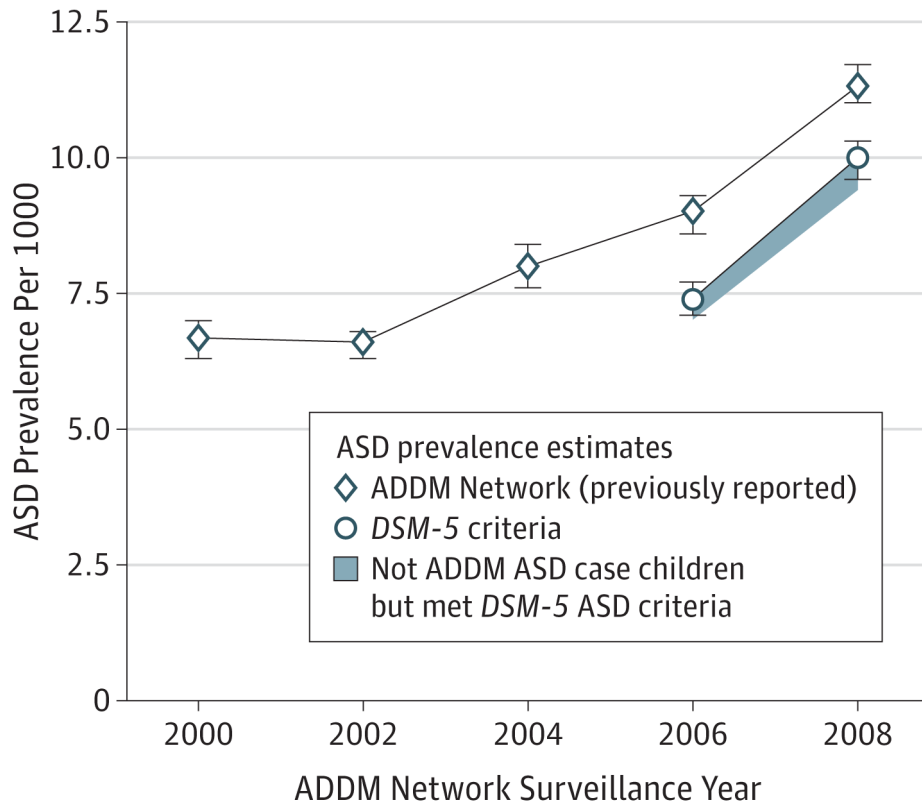
Figure 2. Comparison of Prevalence Estimates

The graph shows a comparison of previously reported Autism and Developmental Disabilities Monitoring (ADDM) Network autism spectrum disorder (ASD) prevalence estimates (2000–2008 surveillance years) to prevalence using *DSM-5* ASD criteria (2006–2008 surveillance years). The population size (or geographic area) for some ADDM Network sites varied from year to year. The data collection methods for the 2002 and 2004 surveillance years are not compatible with the application of *DSM-5* criteria. The line with diamonds indicates previously reported ADDM Network ASD prevalence estimates based on *DSM-IV-TR* criteria. The line with circles shows the prevalence of children meeting *DSM-5* ASD criteria. The shaded area shows the prevalence of children who are not currently meeting ADDM Network ASD case status but may meet ASD case status using *DSM-5* criteria. The error bars indicate 95% CIs.

Table 1

Operational Approaches for *DSM-5* ASD Criteria and Proportion of ADDM Network ASD Case Children (n=6577) Who Met *DSM-5* ASD Criteria in Surveillance Years 2006 and 2008

DSM-5 ASD Criteria	*DSM-5* Operational Criteria[a]	*DSM-5* ASD Criteria Met (Among 6577 ADDM Network ASD Case Children), %
Persistent deficits in social communication and social interaction across contexts, not accounted for by general developmental delays, and manifest by all 3 of the following:		
Deficits in social-emotional reciprocity; ranges from abnormal social approach and failure of normal back and forth conversation through reduced sharing of interests, emotions, and affect and response to total lack of initiation of social interaction	*DSM-IV*: 1b, 1d, 1c, 2b, "rarely responds to social approach"	99.1
Deficits in nonverbal communicative behaviors used for social interaction; ranges from poorly integrated verbal and nonverbal communication through abnormalities in eye contact and body language or deficits in understanding and use of nonverbal communication to total lack of facial expression or gestures	*DSM-IV*: 1a	86.8
Deficits in developing and maintaining relationships appropriate to developmental level (beyond those with caregivers); ranges from difficulties adjusting behavior to suit different social contexts through difficulties in sharing imaginative play and in making friends to an apparent absence of interest in people	*DSM-IV*: 1b, 1d, 2d, "oblivious to children or adults," "rarely responds to social approach," "little interest in others"	97.5
Restricted, repetitive patterns of behavior, interests, or activities as manifested by at least 2 of the following:		
Stereotyped or repetitive speech, motor movements, or use of objects (eg, simple motor stereotypies, echolalia, repetitive use of objects, or idiosyncratic phrases)	*DSM-IV*: 2c, 3b, 3c, "language primarily echolalia/jargon," "repeats extensive dialog," "movement preoccupation"	96.5
Excessive adherence to routines, ritualized patterns of verbal or nonverbal behavior, or excessive resistance to change (eg, motoric rituals, insistence on same route or food, repetitive questioning, or extreme distress at small changes)	*DSM-IV*: 3b, "insists on sameness," "nonfunctional routines"	85.7
Highly restricted, fixated interests that are abnormal in intensity or focus (eg, strong attachment to or preoccupation with unusual objects, excessively circumscribed or perseverative interests)	*DSM-IV*: 3a	62.8
Hyper- or hyporeactivity to sensory input or unusual interest in sensory aspects of environment (eg, apparent indifference to pain/heat/cold, adverse response to specific sounds or textures, excessive smelling or touching of objects, fascination with lights or spinning objects)	*DSM-IV*: 3d, "odd responses to sensory stimuli," "sensory preoccupation"	80.8
Symptoms must be present in early childhood (but may not become fully manifest until social demands exceed limited capacities)	Documented impairments by age 8 y	100.0
Symptoms together limit and impair everyday functioning	Referred for a developmental evaluation	100.0
ADDM Network ASD case children who met *DSM-5* criteria for ASD		81.2
ADDM Network ASD case children meeting, or within 1 criterion of meeting, *DSM-5* criteria for ASD		
Only required 2 of 3 social communication criteria		93.6
Only required 1 of 4 repetitive/restricted criteria		83.7
Required 1 fewer criterion from either social communication or repetitive/restricted domains (met 1 or 2 of the above)		96.1

Abbreviations: ADDM, Autism and Developmental Disabilities Monitoring; ASD, autism spectrum disorder.

[a] Using ADDM Network clinician reviewers' coding of the *DSM-IV* criteria, autism discriminators, and other behavioral features.

Table 2

Characteristics of Children Who Met *DSM-5* ASD Criteria Among ADDM Network ASD Case Children (n=6577) in Surveillance Years 2006 and 2008

Characteristic	ADDM Network ASD Case Children, No.	*DSM-5* ASD Criteria Met	
		%	*P* Value for χ^2
Total	6577	81.2	
Surveillance, y			
2006	2757	78.5	<.001
2008	3820	83.1	
Sex			
Boy	5452	81.4	.29
Girl	1125	80.0	
Race/ethnicity			
Black, non-Hispanic	1482	82.2	
White, non-Hispanic	3674	81.6	
Asian/Pacific Islander	192	88.0	.001
Hispanic	803	78.1	
Other, multiracial, and unknown	426	76.5	
Intellectual disability			
IQ 70	1879	86.6	
IQ>70	3042	82.5	<.001
IQ unknown	1656	72.5	
History of developmental regression			
Yes	1365	89.4	<.001
No/unknown	5212	79.0	
Identified as having autism by a professional in the community[a]			
Yes	5007	84.8	<.001
No/unknown	1570	69.7	
ADDM Network site			
Alabama	386	74.9	
Arkansas	52	88.5	
Arizona	1011	81.1	
Colorado	145	88.3	
Florida	327	68.8	
Georgia	1075	85.5	<.001
Maryland	579	69.1	
Missouri	678	83.3	
New Jersey	145	88.3	
North Carolina	755	88.2	

Characteristic	ADDM Network ASD Case Children, No.	DSM-5 ASD Criteria Met	
		%	P Value for χ^2
Pennsylvania	395	80.0	
South Carolina	460	82.2	
Utah	45	95.6	
Wisconsin	524	79.4	

Abbreviations: ADDM, Autism and Developmental Disabilities Monitoring; ASD, autism spectrum disorder; IQ, intelligence quotient.

[a] Abstracted record contained a diagnosis of autistic disorder, pervasive developmental disorder not otherwise specified, Asperger disorder, or autism from a community professional, or child received special education services under autism eligibility during the surveillance year.

Table 3

Summary of Previous Studies Comparing *DSM-IV-TR* and *DSM-5* Criteria for ASD

Source (Country)	Study Description	Sample Size (With ASD)	Description Sample With Previous ASD Diagnosis	Proportion Who Met *DSM-5* ASD Criteria			
				Overall, %	By *DSM-IV* Subtype or Criteria	By IQ	If Criteria Were Relaxed
Mattila et al,[19] 2011 (Finland)[a]	Retrospective review: population screening in schools with ASSQ followed by diagnostic phase using *DSM-IV-TR*, ADI-R, and ADOS	26	8-year-olds with IQ 50 who completed diagnostic phase (15 autism, 11 Asperger disorder)	46	0% with Asperger disorder	100% with IQ 50–69; 36% with IQ 70	96% after 5 modifications (including requiring 2 of 3 A criteria)
Taheri and Perry,[20] 2012 (Canada)[a]	Retrospective review: several studies of behavioral intervention containing a *DSM-IV* checklist	131	Children aged 2 to 12 y (93 autistic disorder, 36 PDD-NOS, and 2 not previously diagnosed)	63	81% with autistic disorder; 17% with PDD-NOS	90% with IQ<40; 56% with IQ 40–69; 22% with IQ 70	73% when required 1 of 4 B criteria; 83% when required above and 2 of 3 A criteria
McPartland et al,[21] 2012 (US)	Reanalysis of *DSM-IV* field trial data, including an extensive symptom checklist (61 items) encompassing *DSM-III* and *DSM-III-R* criteria and the proposed diagnostic criteria for *DSM-IV*	657	Children and adults aged 1 to 43 y (450 autistic disorder, 48 Asperger disorder, 159 PDD-NOS)	61	76% with autistic disorder; 25% with Asperger disorder; 28% with PDD-NOS	70% with IQ<70; 46% with IQ 70	75% when required 2 of 3 A criteria 91% when required 1 of 4 B criteria
Gibbs et al,[22] 2012 (Australia)	Clinical evaluation of children referred for an autism diagnostic assessment using the ADOS and ADI-R	111	Children aged 2–16 y (59 autistic disorder, 18 Asperger disorder, 34 PDD-NOS)	77	90% with autistic disorder; 83% with Asperger disorder; 50% PDD-NOS		Noted that "at least some" more children would have met if required 1 of 4 B criteria
Matson et al,[23] 2012 (US)	Retrospective clinician review of birth-3 program measures including the BISCUIT Part 1, M-CHAT, and BDI-2	773	Toddlers aged 17–36 mo (breakdown by ASD subtype not stated)	52			66% when required 2 of 3 A criteria; 82% when required above and 1 of 4 B criteria
Matson et al,[24] 2012 (US)	Reanalysis of *DSM-IV-TR/ICD-10* checklist items (this tool does not include an item related to the unusual responses to sensory input)	156	Adults aged 18–88 y with intellectual disability (breakdown by ASD subtype not stated)	63[b]		Entire sample had intellectual disability	
Worley and Matson,[25] 2012 (US)	Reanalysis of *DSM-IV-TR/ICD-10* checklist items (this tool does not include an item related to the unusual responses to sensory input)	180	Children aged 3–16 y (breakdown by ASD subtype not stated)	67[b]			
Frazier et al,[26] 2012 (US)	Statistical analysis of symptom data using the SRS and SCQ as obtained from IAN Registry	6426	Youth aged 2–18 y (breakdown by ASD subtype not stated)	81[c]			93% when required 1 fewer criterion from either A or B
Huerta et al,[27] 2012 (US)	Retrospective review: 3 sources of patient and participant assessments using the ADI-R and ADOS	4453	Children aged 2–17 y, 11 mo (3221 autistic disorder, 971 PDD-NOS, 261 Asperger disorder)	91	89%–93% with PDD-NOS and Asperger disorder (combined group);	86%–91% with IQ>70; 93%–97% with IQ 70	

Source (Country)	Study Description	Sample Size (With ASD)	Description Sample With Previous ASD Diagnosis	Proportion Who Met *DSM-5* ASD Criteria			
				Overall, %	By *DSM-IV* Subtype or Criteria	By IQ	If Criteria Were Relaxed
Mazefsky et al,[28] 2013 (US)	Mapped ADOS and ADI-R items onto *DSM-5* criteria for former research participants who had a clinical diagnosis prior to *DSM-5* and met cutoffs on the ADOS and ADI-R	498	Participants aged 5–61 y (breakdown by ASD subtype not stated)	93	93%–95% with autistic disorder 93%–95% with autistic disorder	Sample mean IQ = 105, range 69–141	
Mayes et al,[29] 2013 (US)	Evaluation (parent interview; review of records; test scores; psychological testing) in psychiatric and developmental pediatrics samples	93	Children aged 1–16 y (29 autism with IQ ≥80, 34 autism with IQ<80, 30 PDD-NOS)	82	47% with PDD-NOS	100.0% with IQ ≥80; 97% with IQ<80	91% when required 1 fewer criterion
Wilson et al,[30] 2013 (UK)	Mapped *ICD-10R* diagnostic criteria to *DSM-IV-TR* and *DSM-5* for participants with psychiatric assessments and ADI-R and/or ADOS-G	80	Adults aged 18–65 y (Asperger disorder or autistic disorder, breakdown not given)	76			85% when required 2 of 3 A criteria; 90% when required 1 of 4 B criteria; 99% when required 1 fewer criterion from either A or B
Current study (US)	Population-based surveillance using retrospective record review	6577	8-year-old children who met ADDM Network case definition for autistic disorder, Asperger disorder, or PDD-NOS	81	Children who met more *DSM-IV-TR* criteria were more likely to meet *DSM-5* criteria (Figure 1 in this article)	87% with IQ ≤70; 83% with IQ>70; 73% with unknown IQ	96% when required 1 fewer criterion from either A or B

Abbreviations: ADDM, Autism and Developmental Disabilities Monitoring; ADI-R, Autism Interview–Revised; ADOS, Autism Diagnostic Observation Schedule; ASD, autism spectrum disorder; ASSQ, Autism Spectrum Screening Questionnaire; BDI, Battelle Developmental Inventory; BISCUIT, Baby and Infant Screen for Children with Autism Traits; IAN, Interactive Autism Network; *ICD, International Classification of Diseases*; IQ, intelligence quotient; M-CHAT, Modified Checklist for Autism in Toddlers; PDD-NOS, pervasive developmental disorder not otherwise specified; SCQ, Social Communication Questionnaire; SRS, Social Responsiveness Scale.

a Used an older version (2010) of the *DSM-5* ASD criteria than the other studies, which used the draft published in January 2011.

b After adjusting the sample to account for *DSM-5* B criterion "unusual responses to sensory input," which is not included on the *DSM-IV-TR/ICD*-10 checklist.

c 81% of the IAN Registry youth who had a previous ASD diagnosis.