



DSM-5 and Autism

Changes are in the air

W.David Lohr, M.D.

Assistant Professor Child Psychiatry

Co-Clinical Director University of
Louisville Autism Center

University of Louisville School of
Medicine

wdlohr01@louisville.edu

502-852-6941

“New Definition of Autism Will Exclude Many, Study Suggests”

- ◆ “proposed changes in the definition of autism would sharply reduce the skyrocketing rate at which the disorder is diagnosed”
- ◆ “proposed changes would probably exclude people with a diagnosis who were higher functioning”
- ◆ “experts...strongly disagree”
 - ◆ “I don’t know how they’re getting those numbers”, Catherine Lord



- *New York Times*, Jan 19, 2012 by Benedict Carey

The New York Times
Expect the World®

“New Definition of Autism Will Exclude Many, Study Suggests”

- ◆ “45% of children and adults with higher functioning autism will qualify for proposed DSM-5 criteria”
- ◆ Access to services may be threatened
- ◆ Increased clarity



- *New York Times*, Jan 19, 2012
by Benedict Carey

Autism Prevalence On The Rise*

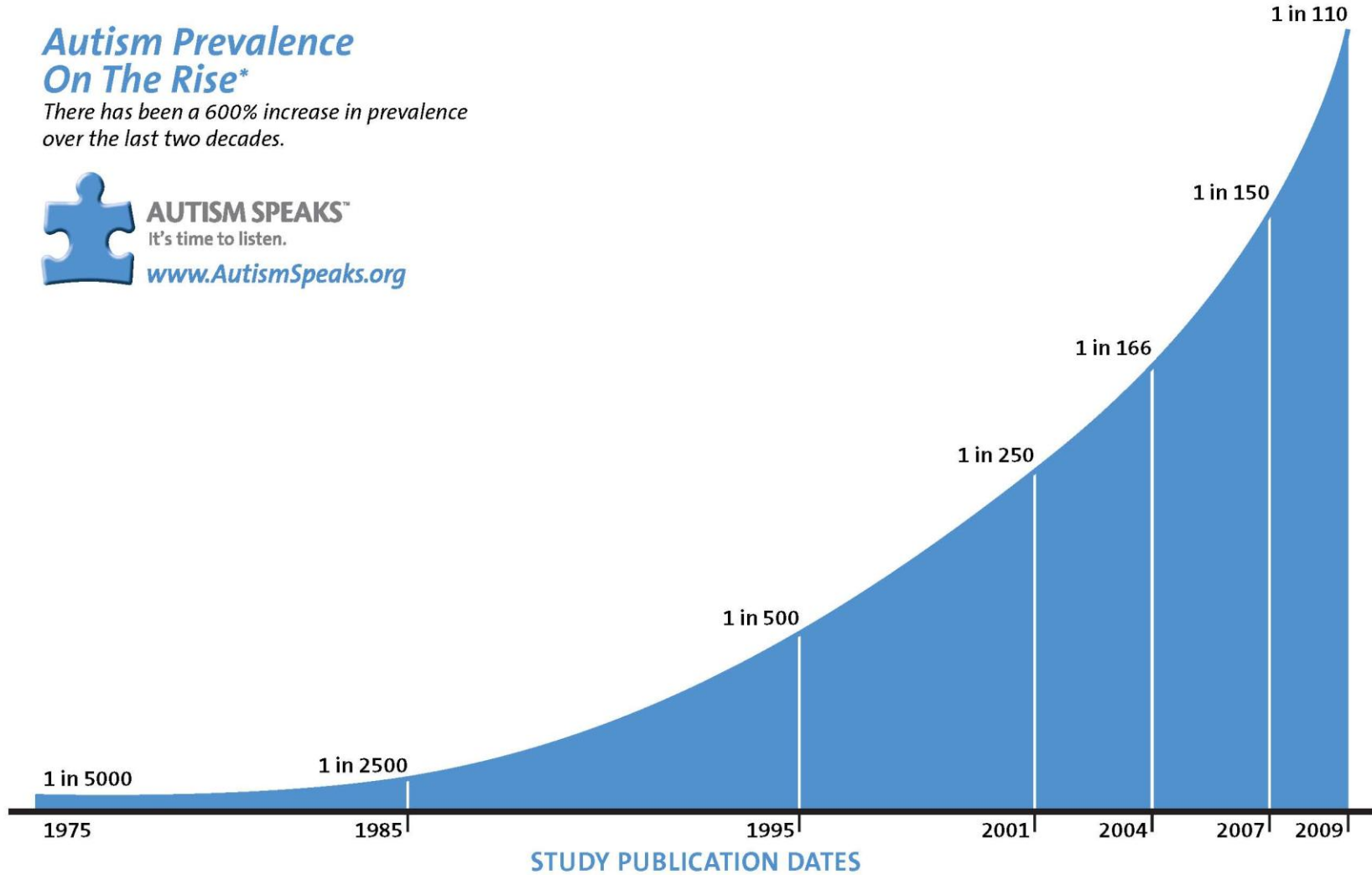
There has been a 600% increase in prevalence over the last two decades.



AUTISM SPEAKS™

It's time to listen.

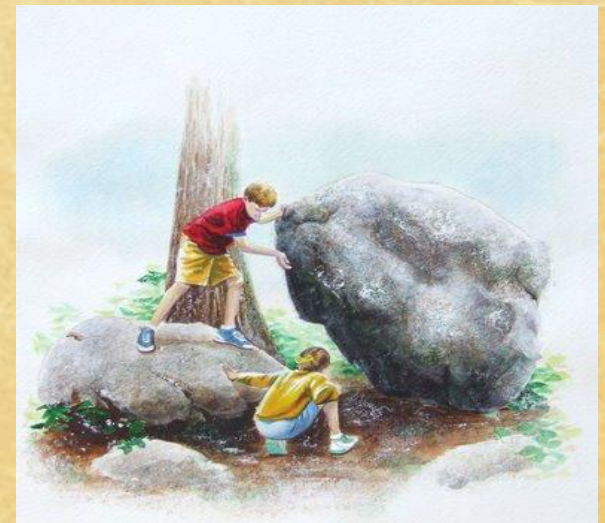
www.AutismSpeaks.org

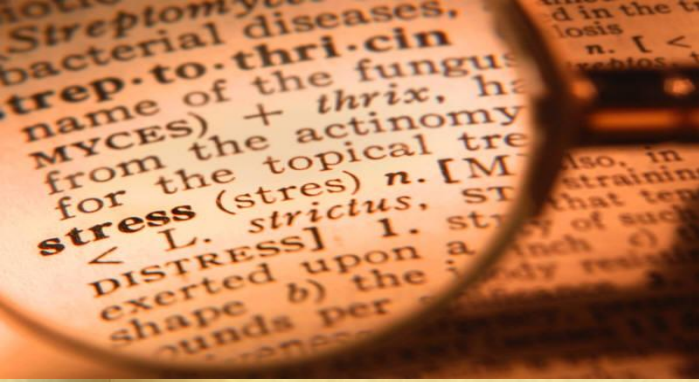


*Recent research has indicated that changes in diagnostic practices may account for at least 25% of the increase in prevalence over time, however much of the increase is still unaccounted for and may be influenced by environmental factors.

Prevalence continues to grow

- ◆ Current CDC estimates 1 in 88 children aged 8 years have an autism spectrum disorder
 - ◆ 1 in 54 boys
 - ◆ 1 in 252 girls
- (March 30 issue of CDC publication Morbidity and Mortality Weekly Report). MMWR 2012; 61:1-24.
- ◆ Reasons for increase
 - ◆ Awareness
 - ◆ Newer community studies
 - ◆ Better methods





Definitions

◆ Sensitivity

- ◆ Measures a test's ability to find those patients with a disease
- ◆ If a person has a condition, how often will the test find it
- ◆ Finds true positives

◆ Specificity

- ◆ Measures a test's ability to identify those patients without a disease
- ◆ If a person is healthy, how often will the test find it
- ◆ Finds true negatives

• wikipedia.org

Contingency Table

AP Detection Algorithm

		T	F
		T	F
Expert Truth	T	TP	FN
	F	FP	TN

Figure 2.4. Contingency table used in APCAT to score the fuzzy recognizer performance against the truth field defined by the human experts. The "TP" represents True Positive results, "FN" is False Negative results, "FP" is False Positive results, and "TN" is True Negative results.

Reliability vs. Validity



Reliable
Not Valid



Low Validity
Low Reliability



Not Reliable
Not Valid



Both Reliable
and Valid

by Experiment-Resources.com

History of DSM and autism

- ◆ Autism was first recognized in DSM-III
 - ◆ Monothetic (individuals had to meet all diagnostic criteria)
 - ◆ Classical autism
 - ◆ Emphasis on categories not etiology

The image shows the front cover of the Diagnostic and Statistical Manual of Mental Disorders, Third Edition (DSM-III). The cover is a solid, dark blue color. At the top, the title "DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS" is printed in a serif font, with "Third Edition" in a smaller font below it. In the center, "DSM-III" is printed in a large, bold, serif font. At the bottom, the text "AMERICAN PSYCHIATRIC ASSOCIATION" is visible in a smaller font. The cover has a simple, rectangular design with a thin white border.

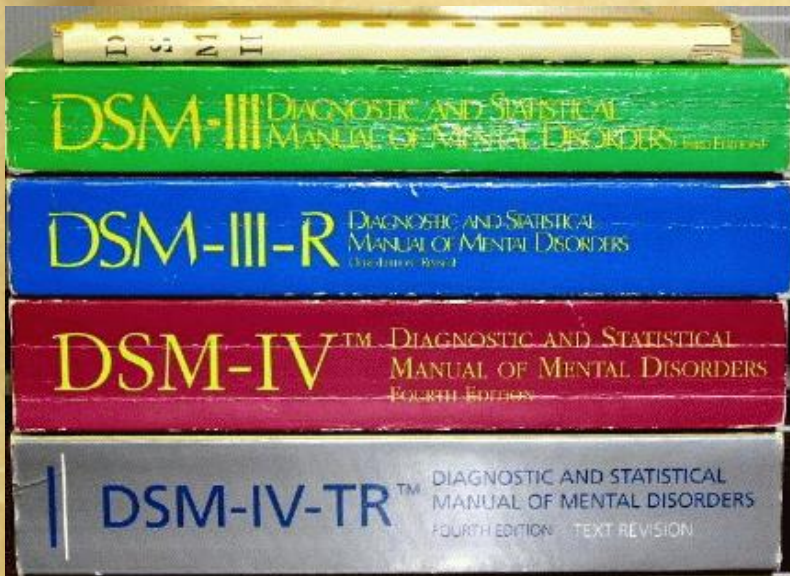
DIAGNOSTIC AND STATISTICAL
MANUAL OF
MENTAL DISORDERS
Third Edition

DSM-III

AMERICAN PSYCHIATRIC ASSOCIATION

History of DSM and autism

- ◆ DSM-III-R
 - ◆ Developmental orientation
 - ◆ Polythetic (individuals could meet a specific number of sub-criteria from a set of criteria)
 - ◆ Broader diagnostic group



**Table 1. *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR)*
Diagnostic Criteria for Autistic Disorder**

A. A total of six (or more) items from (1), (2), and (3), with at least two from (1), and one each from (2) and (3):

1. Qualitative impairment in social interaction, as manifested by at least two of the following:
 - a. Marked impairment in the use of multiple nonverbal behaviors such as eye-to-eye gaze, facial expression, body postures, and gestures to regulate social interaction
 - b. Failure to develop peer relationships appropriate to developmental level
 - c. A lack of spontaneous seeking to share enjoyment, interests, or achievements with other people (e.g., by lack of showing, bringing, or pointing out objects of interest)
 - d. Lack of social or emotional reciprocity
2. Qualitative impairments in communication as manifested by at least one of the following:
 - a. Delay in, or total lack of, the development of spoken language (not accompanied by an attempt to compensate through alternative modes of communication such as gesture or mime)
 - b. In individuals with adequate speech, marked impairment in the ability to initiate or sustain a conversation with others
 - c. Stereotyped and repetitive use of language or idiosyncratic language
 - d. Lack of varied, spontaneous make-believe play or social imitative play appropriate to developmental level
3. Restricted repetitive and stereotyped patterns of behavior, interests, and activities, as manifested by at least one of the following:
 - a. Encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus
 - b. Apparently inflexible adherence to specific, nonfunctional routines or rituals
 - c. Stereotyped and repetitive motor manners (e.g., hand or finger flapping or twisting, or complex whole-body movements)
 - d. Persistent preoccupation with parts of objects

B. Delays or abnormal functioning in at least one of the following areas, with onset prior to age 3 years:

1. Social interaction
2. Language as used in social communication
3. Symbolic imaginative play

C. The disturbance is not better accounted for by Rett's Disorder or Childhood Disintegrative Disorder

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From autism to Asperger's Disorder



DSM-IV criteria for Asperger's Disorder

- ◆ Impaired social interaction, with at least two of four criteria
- ◆ Restricted, repetitive, and stereotypical behaviors and interests with at least one of four criteria
- ◆ significant impairment in important areas of function
- ◆ no overall delay in language
- ◆ no significant delay in cognitive development, (mental retardation), or in adaptive skills
- ◆ criteria are not met for autism or schizophrenia

Problems with DSM-IV and autism

- ◆ Reliability
 - ◆ Best-estimate clinical diagnoses compared to those using ADI-R and ADOS
 - ◆ Experts differ on how they interpreted DSM-IV-TR data
 - ◆ Regional differences
 - ◆ Influenced by verbal IQ and language
 - ◆ DSM-IV is difficult to implement
 - ◆ Lord C, et al. Arch Gen Psychiatry. 2012;69(3):306-313.



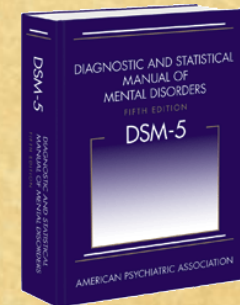
Problems with DSM-IV and autism

- ◆ Validity Happe. JAACAP. Jun 2011;50(6):540-542.
 - ◆ Asperger's disorder may not be distinct from high-functioning autism
 - ◆ No effect on outcome, Howlin, et al., *J Autism Dev Disord.* Feb 2003;33(1):3-13.
 - ◆ Difficult to retrospectively measure language delays by age 3 years.
 - ◆ Limited neuropsychological distinctions from autism
 - ◆ Precedence rule
- ◆ PDD-NOS
 - ◆ Residual category
 - ◆ Poorly defined, poor reliability of diagnosis



DSM-5 criteria for Autism Spectrum Disorder

- ◆ A. Persistent deficits in social communication and social interaction across multiple contexts, as manifest by the following, currently or by history:
 - ◆ 1. Deficits in social-emotional reciprocity
 - ◆ 2. Deficits in nonverbal communicative behaviors used for social interaction
 - ◆ 3. Deficits in developing and maintaining, and understanding relationships

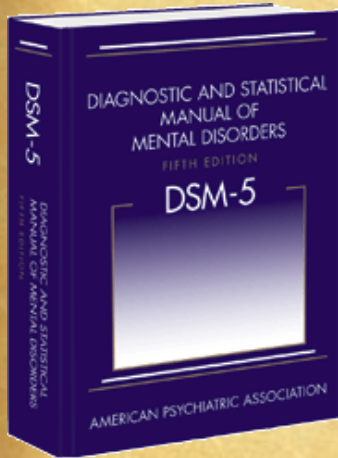


DSM-5 criteria for Autism Spectrum Disorder

- ◆ B. Restricted, repetitive patterns of behavior, interests, or activities, as manifest by at least two of the following, currently or by history.
 - ◆ 1. Stereotyped or repetitive motor movements, use of objects, or speech
 - ◆ 2. insistence on sameness, inflexible adherence to routines, or ritualized patterns of verbal or nonverbal behavior
 - ◆ 3. Highly restricted, fixated interests that are abnormal in intensity or focus
 - ◆ 4. Hyper- or hypo-reactivity to sensory input or unusual interest in sensory aspects of environment

DSM-5 criteria for Autism Spectrum Disorder revised

- ◆ C. Symptoms must be present in early developmental period childhood (but may not become fully manifest until social demands exceed limited capacities)
- ◆ D. Symptoms cause clinical significant impairment in function



Severity level for ASD	Social communication	Restricted interests and repetitive behavior
Level 3 (requiring very substantial support)	Severe deficits with very limited initiation of social interactions and minimal response to social overtures from others.	markedly interfere with functioning in all spheres. Marked distress, very difficult to redirect.
Level 2 (requiring substantial support)	Marked deficits with limited initiation of social interactions and reduced or abnormal response to social overtures from others.	obvious interference with functioning , Distress or frustration is apparent, difficult to redirect
Level 1 (requiring support)	Without supports in place, deficits in social communication cause noticeable impairments.	significant interference with functioning in one or more contexts. Resists interruption or redirection

Summary of DSM-5 changes for Autism

- ◆ Autism, Asperger's disorder, and PDD-NOS will be combined into a single category
- ◆ Monothetic for social-communication symptoms
 - ◆ Combines DSM-IV criteria for social interaction and impairments of communication
- ◆ Polythetic for restricted, repetitive behaviors
 - ◆ 2 of 4 symptoms must be present
 - ◆ Sensory symptoms are included
- ◆ Universal age onset by early childhood

DSM-5 diagnostic simplicity

McPartland JAACAP, 2012;51(4)368-383.

DSM-IV
2,027 different
combinations



DSM-5 only has 11
different ways to
meet diagnosis



Goals for DSM-5 and autism

- ◆ Recognize “essential shared features” of ASD
 - ◆ Clearer, simpler diagnosis
 - ◆ Failure of social communication development
- ◆ Combine categorical and dimensional measures
 - ◆ Individualized diagnosis
- ◆ Reintegrate Asperger’s disorder and PDD-NOS into ASD

- ◆ Happe. JAACAP. Jun 2011;50(6):540-542.



DSM-5 Neurodevelopmental Disorders Workgroup

- ◆ 13 members chaired by Susan Swedo, M.D.
 - ◆ Chief, Pediatrics & Developmental Neuroscience Branch, NIMH
- ◆ Over 6,000 hours of meetings and teleconferences
 - ◆ Formulate draft criteria
 - ◆ Field trials and data collection
 - ◆ Revision of draft criteria due Spring 2012
 - ◆ Public feedback and APA processing
 - ◆ Final draft data due December 31, 2012 with release date set for May 18-22, 2013



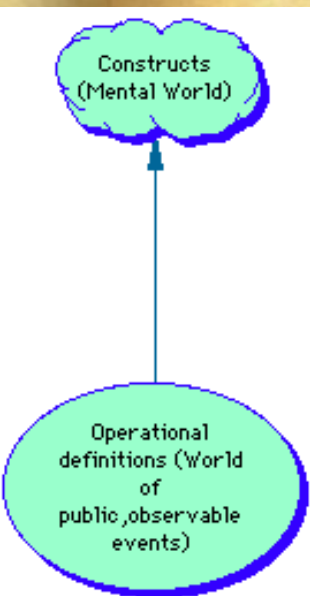
DSM-IV-TR vs. DSM-5

- ◆ 5,484 8-year olds in Finland rated for autism
 - ◆ 82 subjects with autism found by DSM-IV criteria
 - ◆ DSM-5 less sensitive for Asperger's disorder and high-functioning autism
 - ◆ 46% identification rate in those with an IQ > 50.
 - ◆ None of the 11 patients with Asperger's were seen
 - Mattila et al. JAACAP. Jun 2011;50(6):583-592.
- ◆ Early more stringent version of DSM-5



DSM-IV-TR vs. DSM-5

- ◆ DSM-5 had Improved “construct validity” over DSM-IV-TR
 - ◆ 708 subjects from autism specialty clinic, 3Di
 - ◆ removes
 - ◆ “Stereotyped and repetitive use of language”
 - ◆ “Lack of varied, spontaneous make-believe play or social imitative play appropriate to developmental level”
 - ◆ Adds “Hyper- or hypo-reactivity to sensory input or unusual interest in sensory aspect of environment”
 - Mandy et al. JAACAP, 2012;51(1):41-50.



DSM-5 validated

Frazier et al. JAACAP. Jan 2012;51(1):28-40.

- ◆ 14,744 siblings from the Interactive Autism Network
 - ◆ Hybrid model of categorical and dimensional criteria supported

	DSM-IV-TR	DSM-5
Sensitivity	0.95	0.81
Specificity	0.86	0.97

- ◆ “superior specificity”
- ◆ At risk for false negative
 - ◆ Females
 - ◆ Asperger’s disorder



Sensitivity and Specificity of DSM-5 criteria

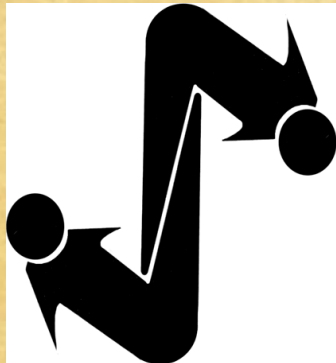
McPartland et al. JAACAP, 2012;51(4)368-383.

- ♦ 933 patients evaluated from DSM-IV field trial exposed to DSM-5 criteria
 - ♦ Overall 60% of cases with ASD met revised DSM-5 criteria
 - ♦ Overall specificity was 94.9%

Diagnosis	Sensitivity
Autism	0.76
Asperger's disorder	0.25
PDD-NOS	0.28
IQ < 70	0.70
IQ > 70	0.46

News and Views

- ◆ DSM-5 results in 30-45% fewer children, adolescents, and adults diagnosed with ASD than DSM-IV-TR
 - Matson, et al. *J Autism Dev Disord.* Aug 2012; 42(8):1549-1556.
- ◆ 10% of those with autism, 16.6% of those with Asperger's disorder, and 50% of those with PDD-NOS will not meet criteria for ASD with DSM-5
 - Gibbs, et al. *J Autism Dev Disord.* Aug 2012; 42(8):1750-1756.



DSM-5 vs. DSM-IV

Huerta, et al., Am J Psychiatry 2012;169:1056-1064

- ◆ Data set of 4,453 children assessed with ADOS and ADI-R
- ◆ Overall sensitivity of 0.91 comparable to DSM-IV
 - ◆ Lowest sensitivity for Asperger's disorder was 0.69
- ◆ specificity of 0.53 better than DSM-IV
 - ◆ Specificity improved when both parent report and clinical observation was required to identify impaired social reciprocity and nonverbal behavior
- ◆ Most children will remain eligible for ASD diagnosis

TABLE 4.

Studies Comparing Diagnosis of ASD in *DSM-IV* and *DSM-5*

Study / year	Number of Subjects	Type of Sample	Instruments Used	Results	Limitations
Mattila et al ¹⁹ / 2011	82	Screened epidemiological sample diagnosed with <i>DSM-IV</i> criteria	ADI-R, ADOS, early <i>DSM-5</i> criteria	<i>DSM-5</i> was less sensitive than <i>DSM-IV</i> for ASD, (0.46)	Early <i>DSM-5</i> criteria, prevalence for PDD-NOS was not examined
Mandy et al ²⁰ / 2012	708	Consecutive referrals to an autism specialty clinic	3Di	<i>DSM-5</i> model was superior to <i>DSM-IV</i>	Higher functioning sample, 3Di is a <i>DSM-IV</i> derived tool
Frazier et al ²¹ / 2012	14,744 siblings (8,911 with autism)	Family-selected internet registry	Mapped caregiver rated SRS and SCQ to <i>DSM-5</i> criteria	<i>DSM-5</i> had lower sensitivity, (0.81 vs. 0.95) but greater specificity, (0.97 vs. 0.86) than <i>DSM-IV</i>	Early <i>DSM-5</i> criteria, self-selected sample, reliance on caregiver reports only
McPartland et al ⁴ / 2012	933 (657 diagnosed with ASD)	Multicenter <i>DSM-IV</i> field trial database, with clear reliability data	Algorithm of items from <i>DSM-IV</i> mapped to match <i>DSM-5</i> criteria	60.6% of cases with ASD met <i>DSM-5</i> criteria with a specificity of 94.9%	Included only 48 <i>DSM-IV</i> subjects with Asperger's disorder, modified a historical data set to new criteria
Matson et al ^{22,23} / 2012	2,721 toddlers aged 17-36 months	EarlySteps participants	Clinical judgment using diagnostic algorithms	52.2% of toddlers were diagnosed with ASD by <i>DSM-5</i>	Single author review of evaluations based on <i>DSM-IV</i>
Gibbs et al ¹³ / 2012	132 youth	Referred to tertiary autism clinic for initial evaluation	ADOS, ADI-R	76.5% of participants were diagnosed with ASD by <i>DSM-5</i>	ADOS and ADI-R are <i>DSM-IV</i> based tools
Taheri and Perry ³³ / 2012	131 children aged 2-12 years	Retrospective file review	CARS, <i>DSM-IV</i> checklist	62.6% of total sample met diagnosis of ASD by <i>DSM-5</i>	No Asperger's disorder patients, <i>DSM-5</i> criteria were evaluated by checklist
Huerta et al ²⁴ / 2012	5,143 subjects, 4453 had PDD	Data sets from family genetics study, university and autism center databases	ADI-R and ADOS matched to <i>DSM-IV</i> and <i>DSM-5</i> criteria. Included parent report and/or direct observation	<i>DSM-5</i> identified 91% of children with PDD diagnoses. Overall specificity was low, (0.53) but improved over <i>DSM-IV</i>	More severe clinical sample, retrospective data analysis

3Di = Developmental, Dimensional, and Diagnostic Interview; ADI-R = Autism Diagnostic Interview; ADOS = Autism Diagnostic Observation Schedule; ASD = autism spectrum disorder; CARS = Childhood Autism Rating Scale; NOS = not otherwise specified; PDD = pervasive developmental disorder; Revised; SCQ = Social Communication Questionnaire; SRS = Social Responsiveness Scale.

The view

- ◆ All of the studies have been retrospective in nature
- ◆ Larger samples sizes support DSM-5
- ◆ Only Heurta, et al., matched a sample to both DSM-IV-TR and DSM-5
- ◆ Prospective field trials are the only answer





DSM-5 criteria for Social communication disorder

- ◆ Difficulties in verbal and nonverbal communication
 - ◆ Deficits in use of communication for social purposes
 - ◆ Inability to match context or needs of the listener
 - ◆ Poor ability to follow rules of conversation and storytelling
 - ◆ Poor understanding of nuances, humor, sarcasm
- ◆ Causes dysfunction in social, academic, or occupational settings
- ◆ Early developmental onset
- ◆ Not explained by autism or ID

Proposed Modifications to DSM-5

DSM-5 draft criteria	Suggested changes
Must meet all 3 criteria for social communication and interaction	May meet 2 of 3 criteria for social communication and interaction
“deficits in nonverbal communication”	“deficits in verbal and/or nonverbal communication”
“Excessive adherence to routines and rituals”	“excessive adherence to routines and/or rituals”
“symptoms must be present in early childhood”	“symptoms present in childhood”

Mattila et al. JAACAP. Jun 2011;50(6):583-592.

Increased sensitivity with modification

	DSM-5 criteria	Modified criteria
Autism Spectrum Disorders, FSIQ > 50	46%, (n=26)	96%
High functioning autism (FSIQ > 70)	73%, (N=11)	100%
Asperger's disorder	0%, (n=11)	91%

Mattila et al. JAACAP. Jun 2011;50(6):583-592.



Proposed Modifications to DSM-5

- ◆ Relaxing DSM-5 criteria with one less SCI or RRB criterion may increase sensitivity by 11% to 12%
 - ◆ Useful impact on those with Asperger's disorder
 - ◆ Patients with limited early childhood history
 - Frazier et al. JAACAP. Jan 2012;51(1):28-40.
 - ◆ Supported by Huerta, et al. 2012
- ◆ “symptoms must be present in early childhood” should be modified to allow children or adults without accurate early history can be diagnosed
 - ◆ Wing et al. Res Dev Disabil. Mar-Apr 2011;32(2):768-773.



Proposed Modifications to DSM-5

- ◆ Relax SCI criteria to allow 2 of 3 criteria to be used
- ◆ AND Lower RRB threshold from 2 to 1
 - McPartland JAACAP, 2012;51(4)368-383.

	DSM-5	Relaxed SCI criteria	AND Lowered RRB threshold
sensitivity	0.61	0.75	0.91
specificity	0.95	0.85	0.75

DSM-5 Workgroup response

- ◆ Expanded examples of criteria
- ◆ Symptoms may be counted if observed or historical



Finding the right balance



Pros of DSM-5 and autism

- ◆ Improved specificity
 - ◆ Stability
 - ◆ Clarity
- ◆ Dimensional approach
 - ◆ Core issue of autism = social communication deficits
 - ◆ Genetic influence
 - ◆ Normal distribution in population
- ◆ Measures of severity

CLA **RITY**

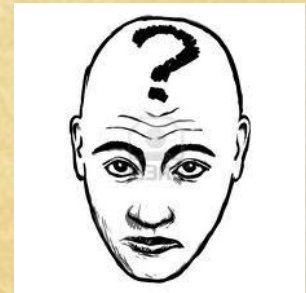
Pros of DSM-5 and autism

- ◆ Increased homogeneity
 - ◆ Longitudinal research
 - ◆ Endophenotypes
 - ◆ Genotypes
- ◆ Reflects evolution of research
- ◆ DSM-IV symptoms map to DSM-5



Cons of DSM-5 and autism

- ◆ Decreased sensitivity
 - ◆ Those with high functioning autism and Asperger's disorder may not meet criteria for DSM-5
 - ◆ Social communication disorder
- ◆ Effect on service eligibility
- ◆ Compatibility with prior research subtypes
- ◆ Fit with ICD-11



Concerns with social communication disorder

- ◆ Is it valid?
 - ◆ What does it mean?
 - ◆ How to operationalize the diagnosis?
- ◆ Will it cover services?
- ◆ What about those with more RRB than SCI?

NIMH Research Domain Criteria, RDoC

- ◆ DSM-5 vs. NIMH
 - ◆ DSM-5 is a consensus document
 - ◆ Diagnosis is based on clusters of clinical symptoms
- ◆ RDoC looks for biomarkers
 - ◆ Mental disorders are biologic disorders
 - ◆ Genetics, imaging, cognitive science
- ◆ RDoc will provide framework to collect data for new classification system

Future Directions

- ◆ Prospective field studies
 - ◆ Phase II testing
 - ◆ Compare DSM-5 vs. DSM-IV and DSM-5 vs. expert clinical diagnosis
- ◆ Define social communication disorder



DSM-5 field trial: study design

- ◆ Estimated reliability and validity of diagnoses
- ◆ Informed DSM-5 decision-making process
- ◆ Test-retest design
- ◆ Naturalistic design
- ◆ DSM-IV field trials
 - ◆ best case scenarios



- Clarke, et al., *Am J Psychiatry* 2013;170:43-58

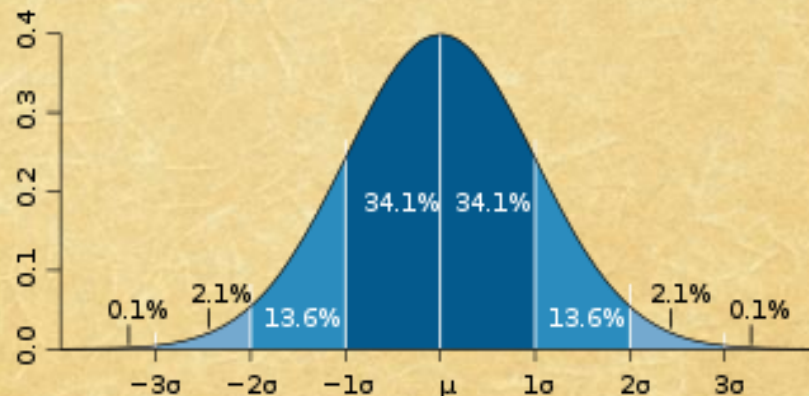
DSM-5 test-retest reliability for autism

- ◆ Intraclass kappa shows very good, (0.69) reliability
- ◆ Slight decrease in prevalence of autism spectrum rates
 - ◆ Due to diagnosis of social communication disorder
 - ◆ Regier, et al., *Am J Psychiatry* 2013;170:59-70.



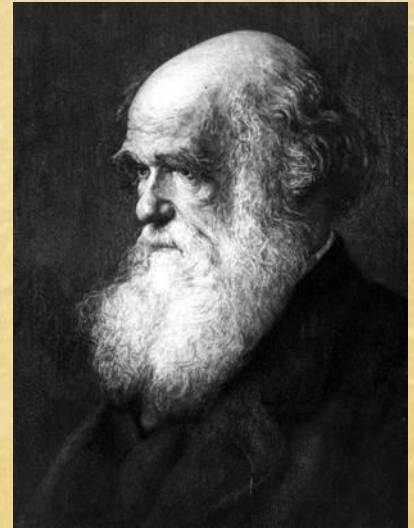
Future Directions

- ◆ Search domains of social communication and repetitive, restricted behaviors
 - ◆ Isolate endophenotypes
 - ◆ Find biologic and genetic markers
- ◆ Suitable instruments to measure social communicative function



The nature of autism

- ◆ Lumpers
 - ◆ Population distribution of social function
 - ◆ Rates in twins and siblings
- ◆ Splitters
 - ◆ Latent symptoms
 - ◆ Brain development
- ◆ Hybrid model
 - ◆ Supported by recent validity studies by Mandy et al. and Frazier et al.





FRAP!

Frenetic
random
acts of
play

W.David Lohr, M.D.

Assistant Professor Child Psychiatry

Department of Pediatrics

Co-Clinical Director University of
Louisville Autism Center

University of Louisville School of
Medicine

[wdlohro1@louisville.edu](mailto:wdlohr01@louisville.edu)

502-852-6941