

Autism & Neurophysiology

Alya Reeve, MD, MPH

PI, Continuum of Care

Professor Psychiatry, Neurology, & Pediatrics

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Overview

- ◆ **What are the Autism Spectrum Disorders?**
- ◆ **What sensory challenges do people with ASD face or experience?**
- ◆ **How can therapy improve the functioning of a person with ASD**
- ◆ **Roles of people with different expertise**
- ◆ **Participate with cases/questions/clinical challenges**

DSM-5

Autism Spectrum Disorder (299.00/F84.0)

A. Persistent deficits in social communication and social interaction across multiple contexts, as manifested by the following, currently or by history:

- 1. Deficits in social-emotional reciprocity, ranging, from abnormal social approach and failure of normal back-and-forth conversation; to reduced sharing of interests, emotions, or affect; to failure to initiate or respond to social interactions.**
- 2. Deficits in nonverbal communicative behaviors used for social interaction, ranging from poorly integrated verbal and nonverbal communication; to abnormalities in eye contact and body language or deficits in understanding and use of gestures; to a total lack of facial expressions and non-verbal communication.**
- 3. Deficits in developing, maintaining, and understanding relationships ranging from difficulties adjusting behavior to suit various social contexts; to difficulties in sharing imaginative play or in making friends; to absence of interest in peers.**

DSM-5 ASD, cont.

B. Restricted, repetitive patterns of behavior, interests, or activities, as manifested by at least two of the following:

- 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 the environment**

DSM-5 ASD, cont.

C. Symptoms must be present in the early developmental period (but may not become fully manifest until social demands exceed limited capacities, or may be masked by learned strategies in later life)

D. Symptoms cause clinically significant impairment in social, occupational, or other important areas of current functioning.

E. These disturbances are not better explained by ID or global developmental delay.

Specify if:

With or Without accompanying intellectual impairment;

With or Without accompanying language impairment;

Associated with a known medical or genetic condition or environmental factor;

Associated with another neurodevelopment, mental, or behavioral disorder

With catatonia (293.89)

DSM-5 ASD, cont. — Table 2.

Severity Level	Social Communication	Restricted, repetitive behaviors
Level 3	Severe deficits verbal/nonverbal skills lead to severe impairment in functioning; v. limited initiation of social interactions; minimal response to social overtures from others	Inflexibility of behavior; extreme difficulty coping with change & repetitive behaviors interfere with functioning in all areas; great distress/difficulty changing focus or action
Level 2	Marked deficits in v/nv social communication skills; social impairments apparent even with supports in place; limited initiation of social interactions; reduced or ban responses to social overtures from others	Inflexibility of behavior, difficulty coping with change, or other restricted/repetitive behaviors appear frequently enough to be obvious to the causal observer and interfere with functioning in different contexts
Level 1	Without supports in place, deficits in social communication cause noticeable impairments; clear examples of atypical or unsuccessful responses to social overtures; difficulty initiating social interactions	Inflexibility of behavior causes significant interference with functioning in one or more contexts; difficulty in switching between activities; problems of organization and planning hamper independence

Differential Diagnosis

- Fragile – X
- Tuberos Sclerosis
- Intellectual Disability
- Schizophrenia
- Brain Injury
- Narcissism
- Severe depression
- Severe anxiety
- OCD with psychosis

Learning Characteristics

- ◆ **Difficulty with abstraction**
- ◆ **Often impulsive**
- ◆ **Rely on cues, learned routines, familiar people**
- ◆ **Problems with shifting attention and maintaining focus**
- ◆ **Stubborn, but not competitive**

Cases....?

- **Who are you working with now?**

Theories on Etiology

- ◆ Differing hypotheses re: cause; no proven etiology.
- ◆ a) psychosocial – “refrigerator mother” unresponsive to child’s emotional needs
- ◆ b) biological - high rates of ID and seizures, underlying abnormalities are unknown.
- ◆ c) neuroimaging studies – brains same size, but during childhood grow larger in ASD, and then similar size in late teens. No apparent dysfunction in pruning. Amygdala is larger. Reduced size of Corpus Callosum. Evidence points to Gray Matter Abnormality.

Theories on Etiology

- **c) genetic – early impression was this played no role in pathogenesis. High rates of concordance seen in twin studies, increased recurrence risk in families with ASD child, is now linked to several chromosomes**

- **d) Medical conditions – assoc. with conditions with strong genetic component - fragile X syndrome and tuberous sclerosis. (Once thought fragile X may cause most autism in boys – but only accounts for 1%. TS accounts for 0.4 to 2.8%)**

Theories on Etiology

- ◆ **e) Other Factors - Food allergy; Infections – ear and viral; Antibiotics; Immunizations; Pollutants; Vitamin or Mineral Deficiencies; Enzyme Deficiencies; Metabolic Imbalances; Environmental Factors; Exposure to Manmade Pitocin**

ASD - meanings?...

- ◆ **Social Behavior Characteristics**
- ◆ **Giggle, laugh or scream randomly**
- ◆ **Lack imaginative play throughout lifespan**
- ◆ **Use objects in unusual ways such as lining them up, spinning them**
- ◆ **Express emotions differently than others and have narrower range**
- ◆ **Lack social/sexual understanding**
- ◆ **Must be taught to share, cooperate, be aware of others**

ASD - how is it possible?

- ◆ **Act deaf and/or very sensitive to some sounds**
- ◆ **Resist change in routine, people, environment**
- ◆ **Lack fear of real danger**
- ◆ **Exhibit repetitive body movements such as rocking, pacing, hand flapping**

ASD- integrating the world...

- ◆ **Explore environment by using methods such as licking, smelling, and handling things**
- ◆ **Perseverate or have short attention to activities**
- ◆ **Use peripheral vision rather than straight on and/or avoid looking directly at others or objects**

ASD - preferences...

- ◆ **May avoid human contact in favor of objects or visual stimuli**
- ◆ **May stare or fixate on objects such as lights, mirrors, or fans**

Perception - Senses

- ◆ **Vision**
- ◆ **Hearing**
- ◆ **Smell**
- ◆ **Touch**
- ◆ **Kinesthetic — position, tone, movement**
- ◆ **Multi-modal**
- ◆ **Autonomic Nervous system**

Tasks for improved functioning

- ◆ **Restoration of function**
- ◆ **Self-care**
- ◆ **Inter-dependence**
- ◆ **Social participation**

Measures of cognitive neurophysiology

- ◆ **Attention**

- ◆ Modulating arousal and anxiety

- ◆ **Memory**

- ◆ Encoding, Retrieving, Association

- ◆ **Organization**

- ◆ Ideational, Physical

- ◆ Triage of inputs

- ◆ **Interpersonal**

- ◆ Boundaries, relatedness, reciprocity

- ◆ **Self-awareness**

- ◆ In real time; abstraction

Promotion of plasticity

- ◆ **BDNF (brain-derived neurotrophic factor)**
- ◆ **Syn 1 (synapsin 1)**
- ◆ **GABA (B) (bicuculline-resistant, baclofen-sensitive)**
- ◆ **GFAP+ (glial fibrillary acidic protein-positive cells)**

Cellular molecules affecting neuronal integrity

- ◆ **Excitotoxins**

- ◆ Amino acids

- ◆ Enzymatic cascade

- ◆ Inflammatory cascade

- ◆ **Neuropeptides**

- ◆ **Hormones**

- ◆ Cortisol

- ◆ Estrogen, progesterone, testosterone

CAM

- ◆ **Homeopathy: small incremental changes**
- ◆ **Herbal medicine:**
- ◆ **Aromatherapy: scents**
- ◆ **Relaxation techniques: meditation, hypnosis, music, guided imagery**
- ◆ **Biofeedback:**
- ◆ **Energy-based therapy: healing touch, reflexology, Reiki, massage**
- ◆ **Cranio-sacral manipulation:**
- ◆ **Electromagnetic therapy: transcranial magnetic stimulation**
- ◆ **Movement therapy: Alexander, Feldenkrais, Qi Gong, Tai Chi, Yoga**
- ◆ **Hyperbaric oxygen:**
- ◆ **Acupuncture:**
- ◆ **Chinese medicine: management of body energies**

Cases...

- ◆ **Who hasn't been stumped?**
- ◆ **Where are you currently struggling?**

Clinical Evaluation

- ◆ **Disciplines**

- ◆ **Education; Medical; Social;
Employment; Safety & self-care;**

- ◆ **Time/setting/attitudinal-energy
differences**

- ◆ **Context and distractions**

- ◆ **History; Sources**

Assessment Challenges

- ◆ **Disruptive behavior**
- ◆ **Antecedent: need careful assessment, sometimes changing point of view**
- ◆ **Consequences: intended or unintended; dealing with fall-out**
- ◆ **Subsequent actions: establishing an environment of gentle inquiry rather than inquisition**
- ◆ **Recall: Has it had important meaning or results?**

Communication

- ◆ **Common language**
- ◆ **Ask for clarification**
- ◆ **Do not lose common sense**

ASD Diagnostic Assessment

- ◆ **Medical History**
- ◆ **Physical and Neurologic Exams**
- ◆ **Lab Studies, MRI, EEG**
- ◆ **Genetic Evaluation**
- ◆ **Psychological Testing**
- ◆ **Audiological and Visual Exams**
- ◆ **Speech, language, OT, and PT**

ASD Assessment Tools

Checklist for autism in toddlers - CHAT

M-CHAT

Autism observation scale for infants - AOSI

Childhood asperger syndrome test - CAST

Childhood autism rating scale - CARS

Autism diagnostic interview - ADI*

Autism diagnostic observation scale - ADOS*

Learning Characteristics — repeat

- ◆ **Difficulty with abstraction**
 - ◆ **Make concrete; use visual aides**
- ◆ **Often impulsive**
- ◆ **Rely on cues, learned routines, familiar people**
- ◆ **Problems with shifting attention and maintaining focus**
- ◆ **Stubborn, but not competitive**

Educational Approaches

- ◆ **Imitation can be used to model positive (effective) social behaviors**

- ◆ **Teach sequence of incremental steps to make plans, express choices, arrive at decisions**

- ◆ **Problem solving skills must be tailored to each specific situation**

- ◆ **generalization of skill(s) cannot be presumed.**

Educational Approaches

- ◆ **Academic Expectations**

- ◆ **Reading comprehension**

- ◆ Making inferences

- ◆ **Math**

- ◆ Problem solving

- ◆ **Writing**

- ◆ Organization of thoughts

- ◆ **Modifications**

- ◆ For grade level expectations: elementary, middle school, high school

Educational Strategies

- ◆ **Intervention strategies Derived from Applied Behavioral Analysis (ABA):**

- Individual applicability
- Continued evaluation of progress
- Flexibility

- ◆ **Discrete Trial Training (DTT)**

- ◆ **Picture Exchange Communication System (PECS)**

- ◆ **Pivotal Response Training (PRT)**

- ◆ **Treatment and Education of Autistic and related Communication-handicapped Children (TEACCH)**

- ◆ **Enhanced Milieu Teaching (EMT)**

Symptoms & Medications

- ◆ **Inattention, distractibility – stimulants**
- ◆ **Impulsivity – SSRIs**
- ◆ **Affective instability – mood stabilizers**
- ◆ **Cognitive disorganization & aggression – atypical neuroleptics**
- ◆ **Increased arousal – alpha adrenergic agents**



Autism - History of Diagnosis



- ◆ Leo Kanner, MD
- ◆ Child Psychiatrist at Johns Hopkins
- ◆ *“Autistic Disturbances of Affective Contact”*
- ◆ The Nervous Child, 1943

Autism – History of Diagnosis

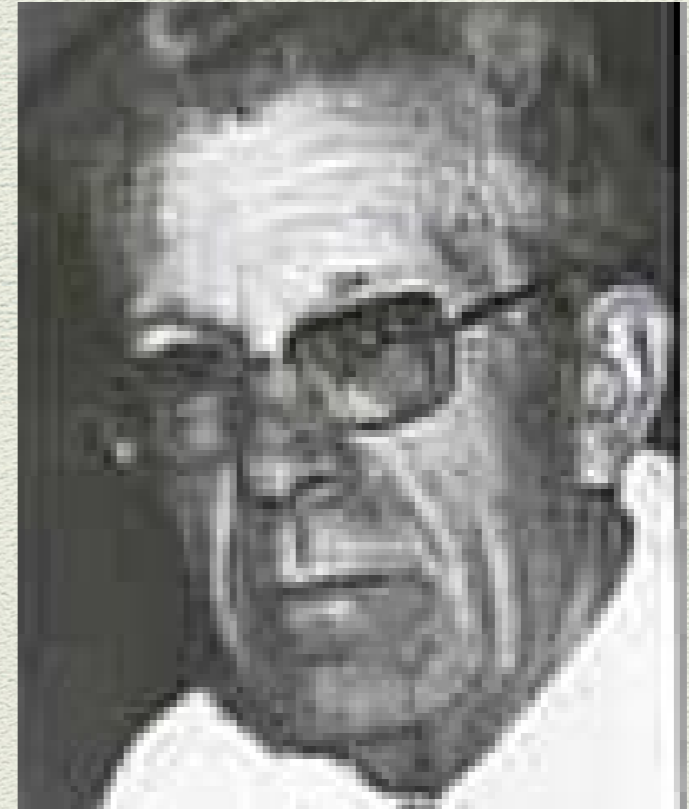
• 11 cases

- inability to relate to people in usual ways
- unusual responses to the environment, stereotyped motor mannerisms, insistence on sameness, resistance to change
- unusual communication, pronoun reversal, tendency to echo language

Autism – History of Diagnosis

- **Got some things wrong:**
 - **didn't believe associated with MR, children "looked intelligent", did well on parts of IQ tests. (Actually, marked scatter is seen in skills – "splinter skills")**
 - **parents were well educated and successful occupationally. Lead to notion that autism may result from pathological pattern of care**
 - **used autism in similar manner to Bleuler - self-centered thinking in schizophrenia. Assumed on a continuum with schizophrenia.**

Asperger's - History of Diagnosis



- ◆ **Hans Asperger, MD**
- ◆ **Pediatrician at the University of Vienna who was interested in special education**
- ◆ **Submitted thesis on “*Autistic Pathology*” (1944)**
- ◆ **Unaware of Kanner’s work**

Asperger's – History of Diagnosis

◆ 4 cases

- Stable personality disorder marked by social isolation
- Preserved intellectual skills, with paucity of nonverbal communication (gestures and affective tone of voice)
- "little professors", formalistic, long-winded, one-sided, sometimes incoherent speech
- poor empathy with tendency to intellectualize emotion
- dominated by all-absorbing unusual interests
- theorized familial nature, male transmitted

History of Diagnosis

- ◆ Autism wasn't recognized diagnosis in DSM-I or DSM-II
- ◆ DSM-III criteria largely based on Michael Rutter's synthesis of Kanner's original description and research
- ◆ DSM-IV-TR greater attempt to differentiate ASD subgroups, international agreement on definition and diagnosis
- ◆ DSM-5 notes less subgroup utility; spectrum of disorder; international agreement.

Conclusions

- ◆ **ASD diagnostic criteria have some changes in DSM-5**
- ◆ **Considering the perspective of actions or behavior may help us to determine what purpose it is serving**
- ◆ **Functioning of all individuals will improve with supports**

That's all folks

- ◆ **Thank you for your attention and participation!**

- ◆ **Please fill out the evaluation forms**

