Autism Spectrum Disorders

The gap between research and interventions

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The plan
1. What is autism?
2. How does it emerge across development?
3. What are the core impairments?
4. What are possible mechanisms?
5. Which interventions are effective?

What is autism?

Autism Spectrum Disorder
An umbrella diagnosis for similar developmental disorders
Difficulties in social interaction, communication
Repetitive/restricted behaviors
Can be associated with intellectual disability
difficulties in coordination and attention
physical health issues such as sleep and GI disturbances
The most obvious signs tend to emerge between 2-3 years of age
**DSM-V diagnostic criteria (2013)**

A. Deficits in communication and interaction across contexts
B. Restricted, repetitive patterns of behavior, interests, or activities
C. Symptoms must be present in the early developmental period
D. Symptoms cause clinically significant impairment
E. These symptoms are not better explained by other diagnoses

A level of severity is assigned for criteria A and B

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**Levels of severity - social communication**

Level 3 “Requiring very substantial support” - Very limited initiation of social interactions and minimal response to others

Level 2 “Requiring substantial support” - Limited initiation of social interactions and reduced or abnormal responses to others

Level 1 “Requiring support” - Difficulty initiating social interactions, and clear examples of atypical or unsuccessful response to others. May appear to have decreased interest in social interactions

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**Levels of severity - restricted, repetitive behaviors**

Level 3 “Requiring very substantial support” - behaviors markedly interfere with functioning, great distress/difficulty changing focus or action

Level 2 “Requiring substantial support” - behaviors appear frequently enough to interfere with functioning in a variety of contexts, distress and/or difficulty changing focus or action

Level 1 “Requiring support” - behavior causes significant interference with functioning, difficulty switching between activities, problems of organization and planning hamper independence

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**A moving target: Changes from DSM-IV to DSM-V**

ASD is an umbrella term for four previously separate diagnoses

Distinctions now based on level of support needed

Collapsing of symptom criteria from three to two domains

Diagnosing a comorbidity is now appropriate

Language delay is no longer necessary
Implications of a spectrum characterization of ASD

Multiple causes
Challenges for diagnosis
Need broader assessments for interventions

How does autism emerge over development?

Developmental trajectories

Precursor possibilities: Social Interaction
Precursor possibilities: Communication

6 mos
- Phonemic differences; less speech-related vocalizations at 8-9 mos.

12-14 mos
- Smaller receptive vocabulary according to CDI.
- Delay in first word production.

18-24 mos
- Continued language delays, if QD present.

36 mos ASD diagnosis

Precursor possibilities: Restrictive/repetitive behaviors

6 mos
- (exploratory behaviors...?)

12-18 mos
- More frequent arm waving.

18-24 mos
- “Hands to ears” posture more frequently observed.

36 mos ASD diagnosis

Precursor possibilities: motor delays

6 mos
- Head lag in sit up test.

12 mos
- Some evidence for delayed onset of walking.

14 mos
- Fine and gross motor delays.

36 mos ASD diagnosis

Precursor possibilities: executive function

Early infancy
- Less distraction during “boring” stimulus.

12-15 mos
- Lower regulation of temperament.

24 mos
- Poorer effortful emotional regulation.

36 mos ASD diagnosis
What to watch for in infancy

No big smiles or other warm, joyful expressions by six months
No back-and-forth sharing of sounds, or smiles by 9mos
No babbling by 12mos
No back-and-forth social gestures by 12mos
No words by 16mos
No meaningful, two-word phrases (not including imitating or repeating) by 24mos
Any loss of speech, babbling or social skills at any age

From Autism Speaks

Age of diagnosis

Using current diagnostic criteria, ASD can not be accurately diagnosed until 18-24mos
Cannot assess language and motor criteria accurately in first 1.5 years.
Much research devoted to discovering earlier diagnosis criteria.

What are the core impairments of autism?
Core impairments

Theory of Mind
Central coherence
Prediction

Theory of Mind

Emerges in third year
Assessed via false belief task
Most children with ASD will fail a false belief task

Central Coherence

Weak CC
Fixate on components of larger picture and fail to perceive global structure
Occurs within and between sensory modalities
May also characterize cognitive style (context of ideas)

Prediction

- A domain-general impairment in the ability to flexibly process errors in prediction
- Insistence on sameness and stereotyped behaviors can be seen as a way to grasp at predictive success in a world filled with error
What are possible mechanisms?

Causes of autism

ASD is multicausal - there is no single dominant cause

Potential mechanisms exist at four levels of organization:
- Genetic
- Neural
- Neuroendocrine
- Cognitive

Genetic mechanisms

Heritability of ASD is estimated to be 50% looking at at-risk infants to study the development of ASD

More males diagnosed, but ASD is not x-linked

Numerous gene mutations have been implicated in ASD but none are the sole cause

Neuroanatomical mechanisms

There may be atypical brain organization in ASD Emerging consensus for long-range underconnectivity but little to no evidence for local connectivity

Work has both supported and disagreed with these claims

Research tends to ignore age and factors that impact brain development

Strong evidence that individual differences in symptom severity are related to variations in connectivity patterns
Neuroendocrine mechanisms

Oxytocin (OT) is a hormone associated with social and maternal behaviors.
The better research on OT uses RCTs and compares behavior of TD and ASD individuals.
Intranasal administration of OT has been suggested as ASD treatment.
However, baseline OT levels do not differ across group or sex. (Park et al., 2014)
Long-term effects in humans unknown, unusual effects in voles.
Efficacy in RCT study due to parental effects.
No evidence exists to support drug or hormonal ASD treatments.

Cognitive mechanisms

Inflexibility in processing violations of expectation.
Individuals with ASD have weakened priors, which decreases bias.
Or, less variability in perception (environment) decreases bias.

Overview

Many therapies exist for autism, but efficacy is rarely assessed.
Few therapies exist for patients 15 years and older.
Most research on efficacy has been conducted with boys and men.
Three common interventions:
- Applied Behavioral Analysis
- Floortime
- Social skills training

Which interventions are effective?
Applied Behavioral Analysis

Intensive therapy that is highly structured and time consuming
ABA uses a behaviorist curriculum based on goals for the child
3 step process
  1. Antecedent: a verbal or physical prompt
  2. Behavior: the child’s response
  3. Consequence: positive reinforcement for desired behavior

Research supports efficacy

DIR/Floortime

Therapist or parent engages the child at a level the child currently enjoys, enters the child’s activities, and follows the child’s lead

Adult moves the child toward more increasingly complex interactions

Emphasizes emotional development - goals is to build speech, motor, and cognitive skills

No evidence about effectiveness - how to study the structure of floortime in a controlled way?
Social skills training

Goal is provide individuals with tools to meaningfully engage with their social environment.

Utilizes reinforcement, prompting, and modelling.

May target behaviors such as:
- Recognizing facial expressions.
- Turn-taking in conversations.
- Initiating an interaction and joint attention.
- Problem solving.
- Research supports efficacy.

Example of social skills training

Conclusions

ASD is a heterogeneous disorder.

ASD is multicausal.

Variability in epidemiology and diagnostic criteria.

Interventions are focused on symptoms, but not grounded in our knowledge of mechanisms.

Efficacy studies are rare and vary in quality.

Useful links

For a review of evidence-based interventions for educators:
http://www.nationalautismcenter.org/resources/for-educators/

For information of symptoms and diagnosing:

For a variety of resources and information on research, interventions, and support:
https://www.autismspeaks.org/