

ECHO IDAHO: PEDIATRIC AUTISM

Differential Diagnosis Part 1

5.9.24

Amy Francis, DO, FAAP

St. Luke's Children's Hospital

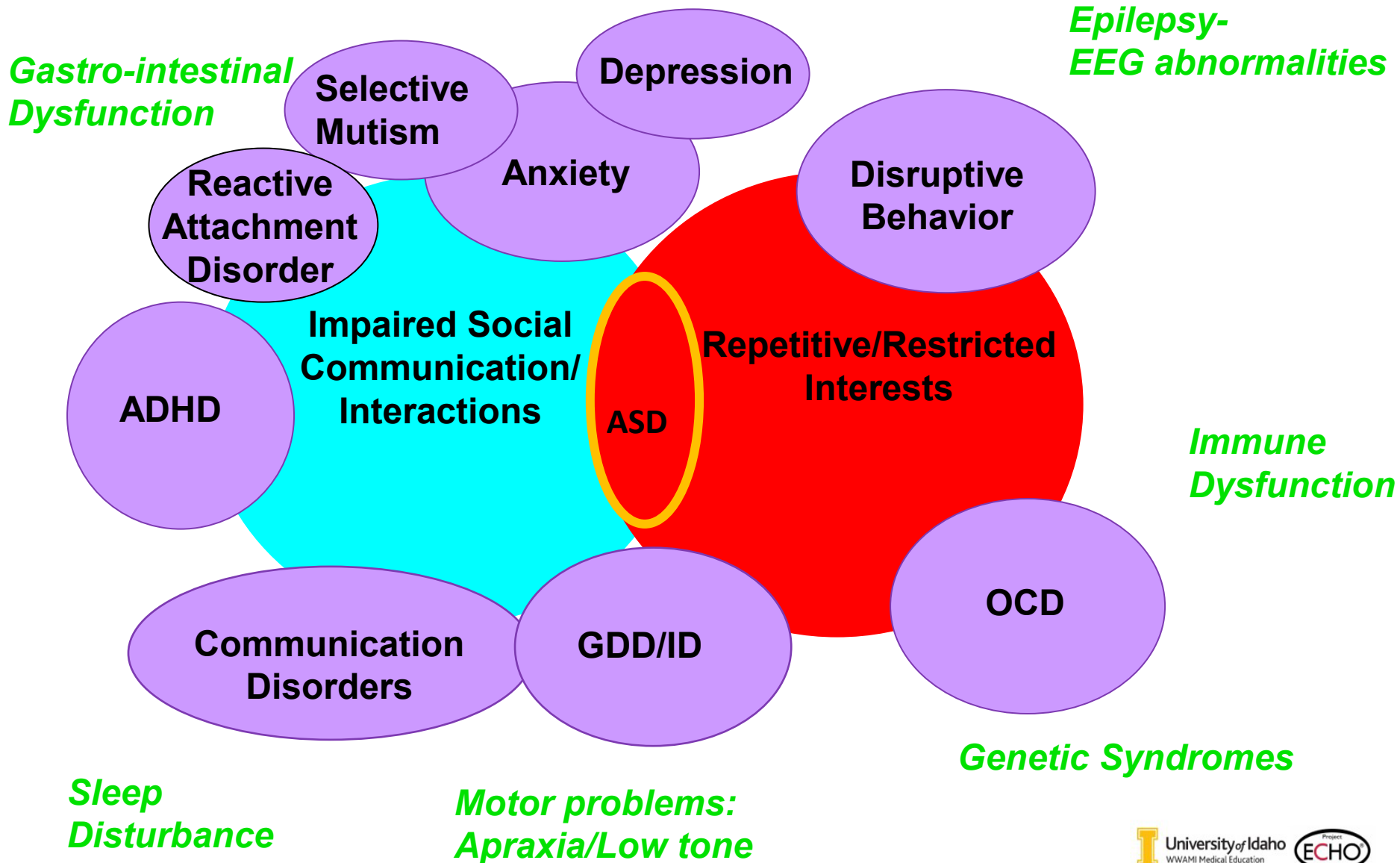
Developmental and Behavioral Pediatrics

Learning Objectives

- Examine the core symptom domains of Autism Spectrum Disorder (ASD)
- Consider the differential diagnosis for ASD and related neurological, developmental and emotional conditions
- Implement strategies for developing a differential diagnosis

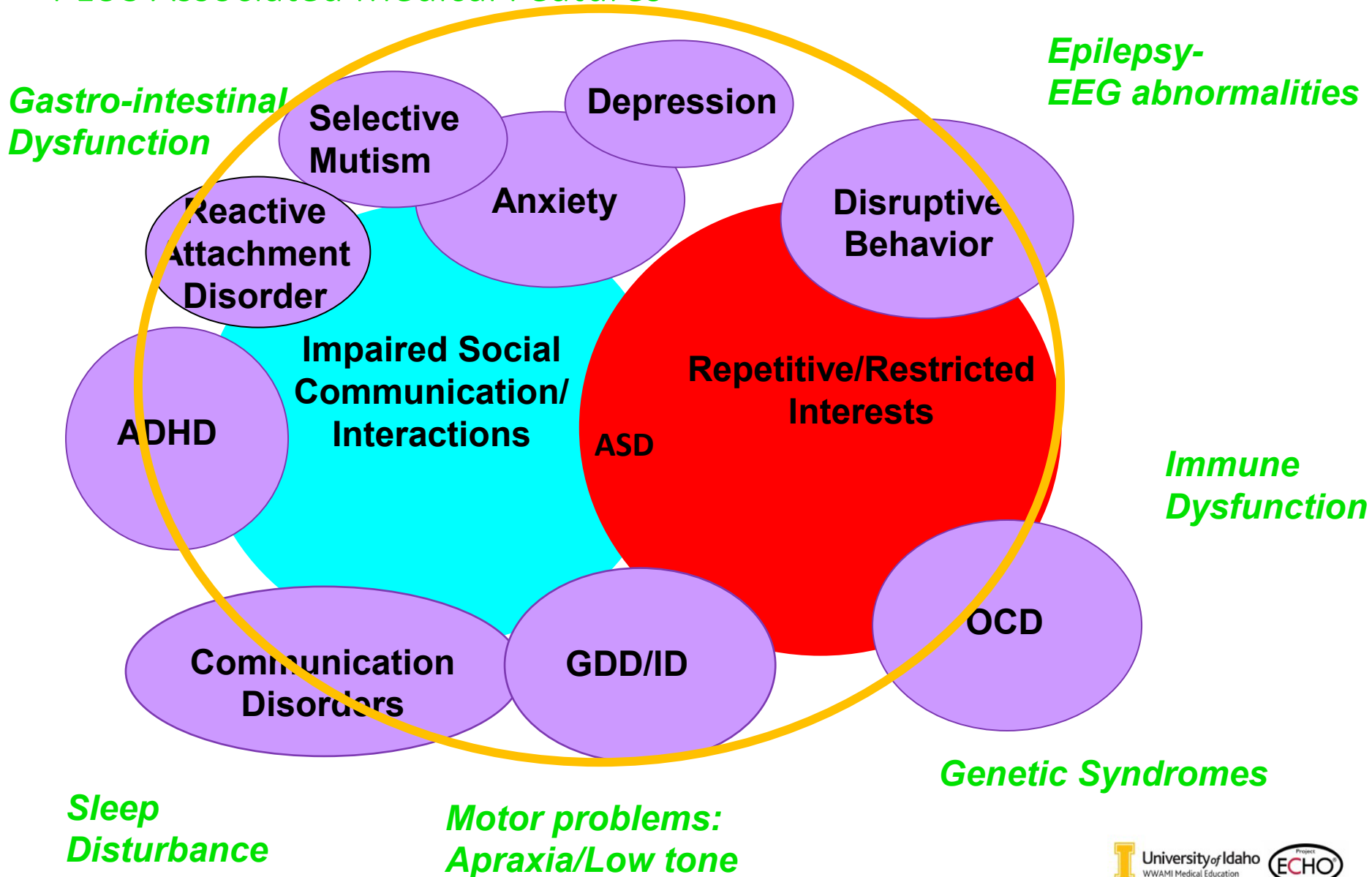
ASD Core Symptom Domains

PLUS Associated Medical Features



ASD Core Symptom Domains

PLUS Associated Medical Features



Differential Diagnosis

Neurogenetic
Syndromes

Communication
Disorders

Sensory deficits
(hearing/vision)

Global
Developmental
Delay

Sensory
Processing
Difficulty

Neurogenetic Disorders



Copy Number Variants		Single Genes			
1q21.1 del	16p12.2 del	ACTB	DNMT3A	NAA15	SHOC2
1q21.1 dup	16p13.11 del	ADNP	DSCAM	NBEA	SIN3A
2p16.3 del	16p13.3 del	ADSL*	DYNC1H1	NCKAP1	SLC6A1
2q37.3 del	17p11.2 del	AFF2	DYRK1A	NEXMIF	SLC9A6
3q29 del	17p11.2 dup	AHDC1	EBF3	NF1	SMARCC2
3q29 dup	17p13.3 del	ALDH5A1*	EHMT1	NIPBL	SON
5p- del	17p13.3 dup	ANK2	EIF3F*	NLGN2	SOS1
5q35 del	17q11.2 del	ANK3*	EP300	NLGN3	SOS2
5q35 dup	17q11.2 dup	ANKRD11	FMR1	NLGN4X	SOX5
6q16 del	17q12 del	ARRHGFE9	FOXG1	NR4A2	SPAST
7q11.23 del	17q12 dup	ARID1B	FOXP1	NRAS	SRCAP
7q11.23 distal del	17q21.3 del	ARX	GIGYF1	NRXN1	STXBP1
7q11.23 dup	17q21.3 dup	ASH1L	GRIN1*	NRXN2	SYNGAP1
8p23.1 dup	22q11.2 del	ASXL3	GRIN2A*	NSD1	TANC2
9q34 del	22q11.2 dup	ATRX	GRIN2B	PACS1*	TAOK1
9q34 dup	22q11.2 central del	AUTS2	HIVEP2	PCDH19	TBCK*
15q11.2q13.1 del	22q11.2 central dup	BCKDK*	HNRNPH2*	PHF21A	TBR1
15q11.2q13.1 dup	22q13.3 del	BCL11A	HNRNPU	PHF3	TCF4
15q13.3 del	Xq28 dup	BRAF	HRAS	PHIP	TCF20
15q15 del		BRSK2	IQSEC2	POGZ	TLK2
15q24A_C del		CACNA1C	IRF2BPL	POMGNT1*	TRIO
16p11.2 del		CAPRIN1	KANSL1	PPP1CB	TRIP12
16p11.2 distal del		CASK	KCNB1	PPP2R5D*	TSC1
16p11.2 dup		CASZ1	KCNQ3*	PSMD12	TSC2
		CBL	KDM3B	PTCHD1	UBE3A
		CDKL5	KDM6B	PTEN	UPF3B
		CHAMP1	KMT2A	PTPN11	VPS13B*
		CHD2	KMT2C	RAF1	WAC
		CHD3	KMT5B	RAI1	WDFY3
		CHD7	KRAS	RALGAPB	YY1*
		CHD8	LZTR1	RELN*	ZBTB20
		CIC	MAGEL2	RERE	ZNF292
		CNOT3	MAP2K1	RFX3	ZNF462
		CREBBP	MAP2K2	RIT1	
		CSDE1	MBD5	RORB	
		CTCF	MBOAT7*	SCN1A	
		CTNNB1	MECP2	SCN2A	
		CUL3	MED13	SCN8A	
		DDX3X	MED13L	SETBP1	
		DEAF1*	MEF2C	SETD2	
		DHCR7*	MEIS2	SETD5	
		DLG4	MTOR*	SHANK2	
		DMPK	MYT1L	SHANK3	

11% → 7q11.23 del

18% → 17q11.2 dup

45-20% → 22q11.2 del

60% → FMR1

LKS → GRIN2A*

40-50% → TSC1, TSC2

34% → UBE3A

30% → CHD7

61% → MECP2

Chromosomal Differences

- Trisomy 21 (Down syndrome) ← 16-18%
- XO (Turner syndrome)
- XXY (Klinefelter syndrome)
- XXYY
- XXXY

<https://d2dxtcm9g2oro2.cloudfront.net/wp-content/uploads/2022/10/05140332/SPARK-gene-list-sept-2022.pdf>

Richards C, Jones C, Groves L, Moss J, Oliver C. Prevalence of autism spectrum disorder phenomenology in genetic disorders: a systematic review and meta-analysis. *Lancet Psychiatry*. 2015 Oct;2(10):909-16. doi: 10.1016/S2215-0366(15)00376-4. Epub 2015 Sep 1. PMID: 26341300.

Landau Kleffner Syndrome (LKS)

Areas of Difference	Autism	LKS
Age of Regression	Before 3 years or from 18 to 24 months	Normal development at first. From 3 to 8 years of age. It may peak anywhere between 4 and 5 years
Type of Regression	Language and behavioral regression	Only language regression
Features of Regression	Language regression with regression of social skills and repetitive behaviors/interests	Loss of auditory receptive language

Average Age of Diagnosis DS+ASD

Autistic disorders in Down syndrome: background factors and clinical correlates

Peder Rasmussen* MD PhD;
Ola Börjesson, Medical Student,
Elisabet Wentz MD PhD;
Christopher Gillberg MD PhD, Institute for the Health of
Women and Children, Department of Child and Adolescent
Psychiatry, University of Göteborg, Göteborg, Sweden.

A study of a clinic-based sample of 25 individuals (12 females, 13 males; age at diagnosis 14.4 years, SD 7.4 years; age range 4 to 33 years) with Down syndrome (DS) and autism spectrum disorders, demonstrates that autism is by no means rare in DS. Results showed that there was a considerable delay in the diagnosis of autism as compared with children with autism who did not have DS. In 11 participants medical

Mean diagnosis much later (studies range from 6-14 years)

Regression may occur but usually around age 3-6 years

Behaviors not characteristic in children with DS alone Consistent with the DS+ASD neurodevelopmental profile



POOR INITIATION OF COMMUNICATIVE ATTEMPTS (SHOWING, SHARING, GREETING, ETC.)



LACK OF SPONTANEOUS VERBAL COMMUNICATION WITH DECREASED COMPENSATORY USE OF GESTURES, SIGNING, FACIAL EXPRESSIONS, ETC.



POOR RESPONSE TO NAME OR RECEPTIVE LANGUAGE ABILITIES WITH ATYPICAL ATTENTION



ATYPICAL EYE CONTACT, POOR JOINT ATTENTION AND SOCIAL REFERENCING, TREATING PEOPLE AS TOOLS DURING REQUESTING



PLAYS ALONE/SOCIALLY WITHDRAWN OR DISINTERESTED IN PEOPLE, CAN'T MAINTAIN BACK/FORTH INTERACTION



FREQUENT REPETITIVE MOTOR BEHAVIORS THAT ARE DIFFICULT TO DISTRACT OR REDIRECT FROM



DECREASED IMITATION OF OTHERS WITH MORE INTEREST IN WHAT OBJECTS DO THAN IN WHAT PEOPLE ARE DOING



LACK OF ANY FUNCTIONAL OR PRETEND PLAY IN CONJUNCTION WITH ODD SENSORY EXPLORATION



EXTREME SENSORY HYPERSENSITIVITIES AND SELF-INJURIOUS BEHAVIORS



DEVELOPMENTAL REGRESSION

Hearing Impairment and Autism

	Similarities	Hearing Impairment
Language	Echolalia, language delay, minimal babbling	Use compensatory nonverbal forms of communication
Social	Social isolation, withdrawn	They make eye contact, look intently at others speaking, and use facial expressions
Responding	Under-responds to name	Under-responds to all sounds, May recognize sounds with more lip movement (W)
Play	Plays alone	Good imaginative play

Visual Impairment and Autism

Developmental Area	Similarities	Visual Impairment
Language	Echolalia	Rely on nonverbal communication strategies
Social	Lack of typical social interaction, decreased joint attention	Active touch during shared interaction
Joint Attention/ Responding	Decreased joint attention	Joint attention is delayed but show more with caregiver
Play	Play alone, with only a few toys, play repetitively	More exploratory play, musical and colorful toys
Behavior	Stereotypies, Need for sameness, prefer routine and structure	Blindisms – eye rubbing, light gazing, decrease with age

Communication Disorders

Speech
&
Language Disorders

Dysarthria

Childhood
Apraxia of
Speech

Hoarse
Hypo-,
hyper-nasal

Disfluency/
Stutter

Speech
Sound
Disorder

Articulation
Disorder

Phonological
Disorder

Pragmatic
Disorder

Receptive/
Expressive
Language
Impairment

Semantics
Disorder

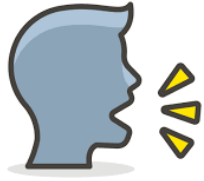
Childhood Apraxia of Speech

- Characteristics

- Child typically has a good understanding of language and knows what to say
- Difficulty planning and sequencing the complex movements necessary to produce intelligible speech
- Disconnect between the brain and mouth
- Autism and apraxia are highly comorbid

- Differences

- Better receptive than expressive language skills
- Compensate with nonverbal gestures



Mixed Expressive Receptive Language Disorder



Expressive Language The “Output”	Receptive Language The “Input”
<p>Expressive Language is when a child uses speech, writing, signs, and gestures to communicate their wants, needs, and thoughts.</p>	<p>Receptive Language is a child’s ability to understand language, words, gestures, and their meaning.</p>
<p>Expressive Language Disorder is when a child has difficulty conveying information through speech or other forms of communication</p>	<p>Receptive Language Disorder is when a child has difficulty with language comprehension.</p>
<p>What should you look for?</p> <ul style="list-style-type: none">• Limited vocabulary• Difficulty using words to express wants and needs• Difficulty combining words to make sentences• Difficulty telling age-appropriate stories	<p>What should you look for?</p> <ul style="list-style-type: none">• Difficulty following directions• Difficulty understanding Wh- and Yes/No questions• Difficulty understanding what is read to them/read aloud

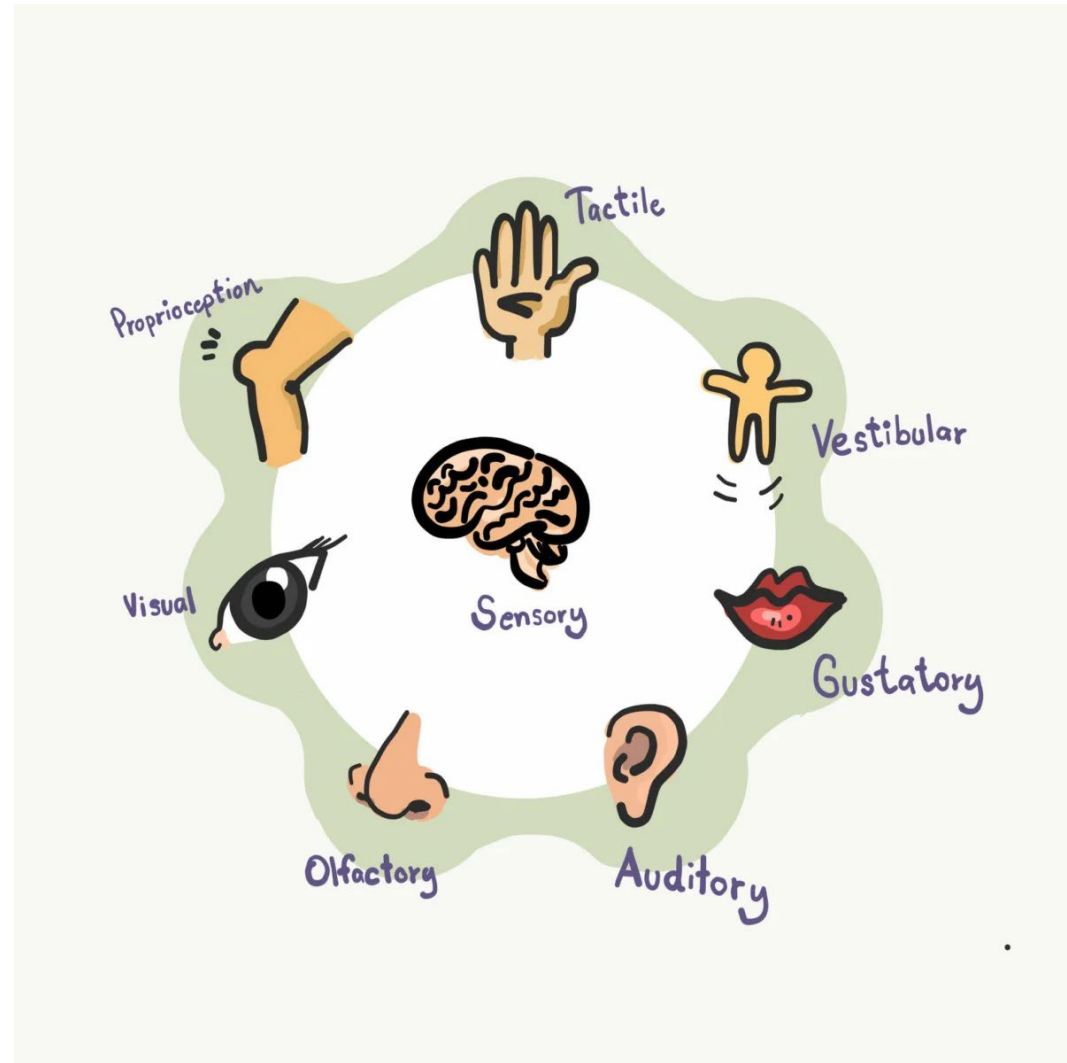
Mixed Expressive Receptive Language Disorder

- Language is the primary tool for social interactions and primary mode of learning

Autism	Mixed Expressive Receptive Language Disorder
Reduced eye contact	Appropriate eye contact
May not respond when name is called	Responds when name is called
Seldom imitates sounds, actions, and expressions	Imitates sounds, actions, and expressions
Reduced use of gestures and facial expressions to communicate	Uses a variety of gestures and facial expressions to communicate
Rarely points to or shows objects of interest to others	Often points or shows objects of interest to others
Unusual pattern of language development	Typical pattern of language development
Does not engage in pretend play nor uses an object to represent something else	Engages in pretend play and can use an object to represent something else

Sensory Processing Difficulties

- Sensory Modulation Dysfunction
- SPD is not currently a recognized psychiatric disorder
- Sensory issues are considered a symptom
- Prevalence 5%–16%
- Hyposensitivity - described as under sensitive to stimuli
- Hypersensitivity- described as over sensitive to stimuli



Global Developmental Delay

- Delay of more than two standard deviations below the mean in at least two developmental domains
 - Cognitive (problem solving)
 - Speech-Language (receptive/expressive)
 - Motor (gross or fine)
 - Social-Emotional
 - Adaptive (activities of daily living)
- Prevalence 1-3%

Global Developmental Delay

- Used for children too young to participate in standardized testing
- Used for children under age 5 with cognitive impairment
 - Developmental testing is less predictive of IQ testing
 - IQ and adaptive assessments are less reliable in younger children
 - Not all children with GDD will have ID

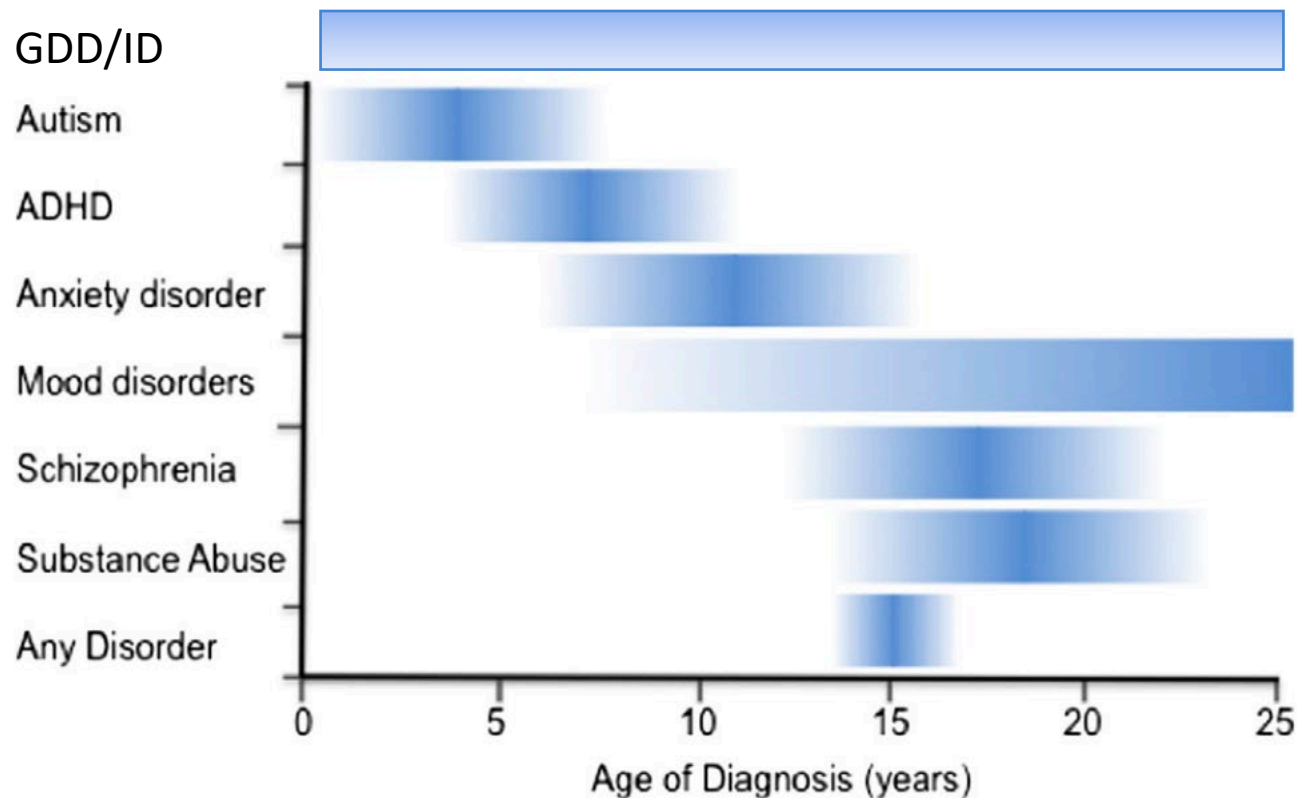
Global Developmental Delay

- Delays in social communication must be more severe than would be expected for the developmental level
- May have autistic features
- Children may go on to have ID, language disorder, or learning disability

Overlapping features ASD and GDD

- Difficulties with communication
- Motor skills difficulties
- Cognitive challenges
- Challenges in social interaction
- Behavioral patterns

How all this fits on a developmental trajectory: Time/development in hitting intersections



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