The Annual General Pediatric Review & Self Assessment

Nicklaus Children's Hospital

DEVELOPMENT

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Disclosure of relevant relationships

Dr. Fierro-Cobas has not had (in the past 12 months) any conflicts of interest to resolve or relevant financial relationship with the manufacturers of products or services that will be discussed in this presentation.

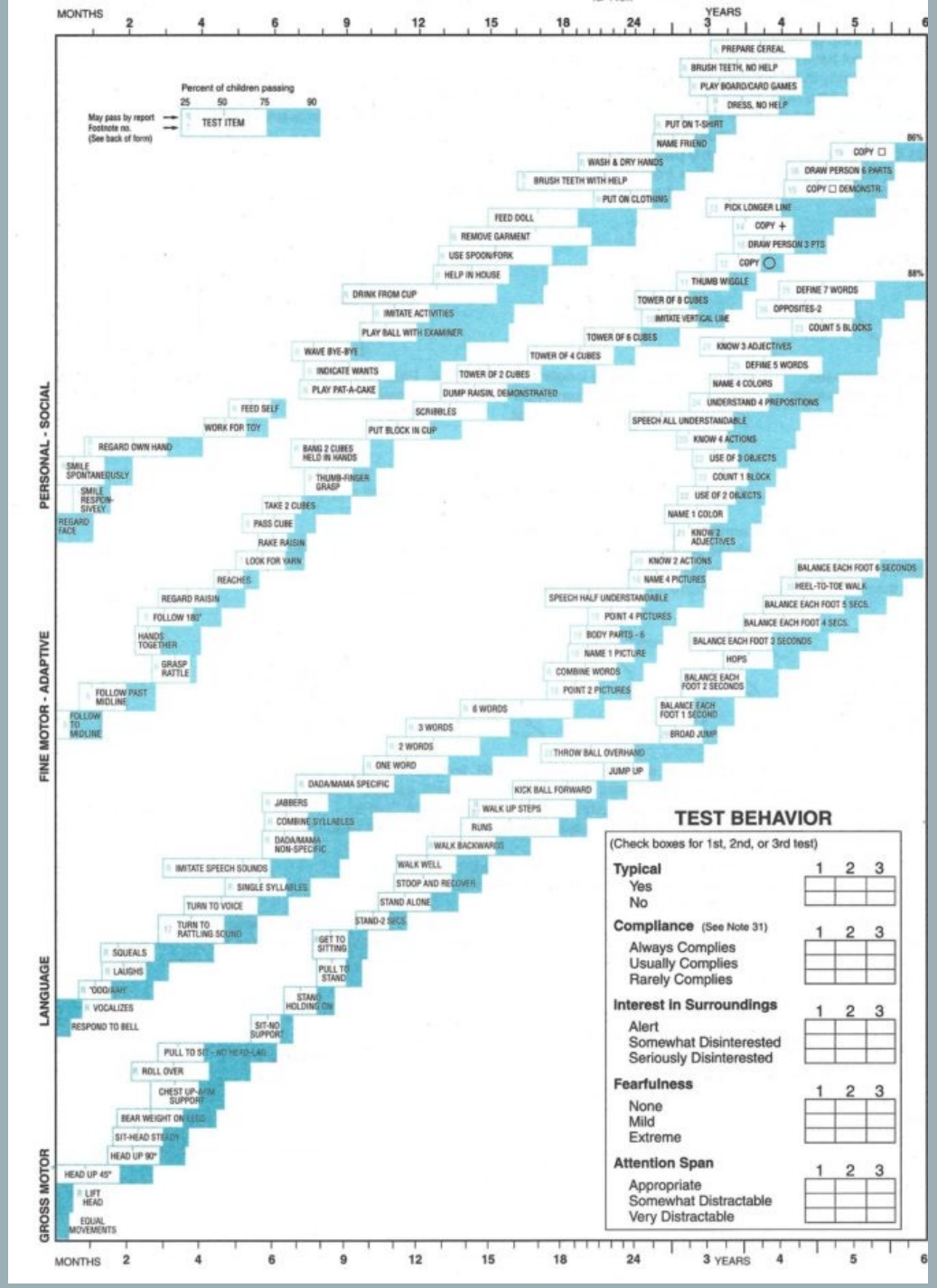
Dr. Fierro-Cobas does not intend to discuss an unapproved/investigative use of a commercial product/device in this presentation.

This presentation and clinical recommendations are supported with the "best available evidence" from medical literature.

OBJECTIVES

- Describe normal child development and age-appropriate milestones.
- Have a basic knowledge of how to identify, diagnose and treat various developmental disorders.
- Recognize and evaluate common mental health disorders and initiate therapeutic intervention.

DEVELOPMENTAL MILESTONES



- Delay
- Deviation or deviance
- Dissociation

Volume 149, Issue 3

March 2022

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SPECIAL ARTICLES | FEBRUARY 08 2022

Evidence-Informed Milestones for Developmental Surveillance Tools

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CONFLICT OF INTEREST DISCLOSURES: Dr Squires is a developer of the *Ages & Stages Questionnaires* and receives royalties from Brookes Publishing, the company that publishes this tool; the other authors have indicated they have no conflicts of interest relevant to this article to disclose.

* Contributed equally as co-senior authors.

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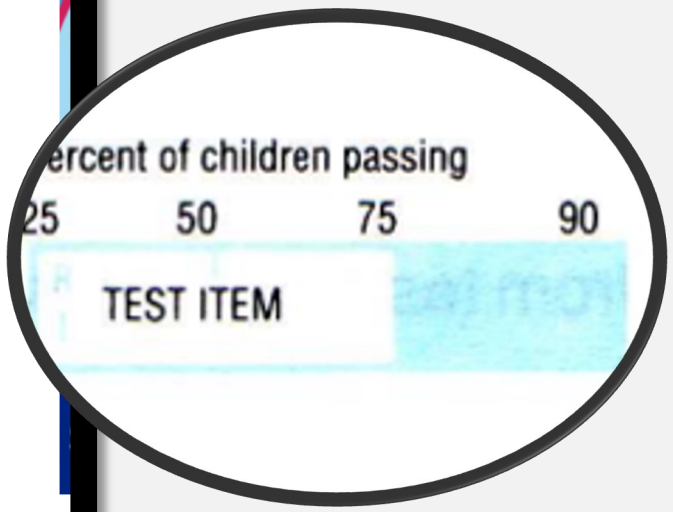
Pediatrics (2022) 149 (3): e2021052138.

https://doi.org/10.1542/peds.2021-052138 **Article history**

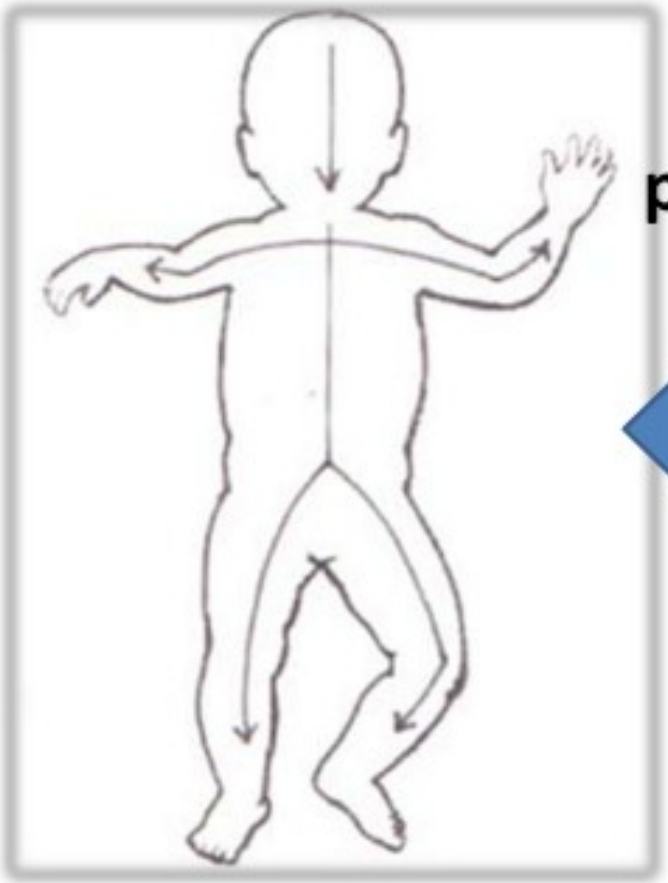


GROSS MOTOR

Principles of Physical development

cephalo-caudal

Downwards – head to toe



proximodistal

Outwards – arms and legs, then hands and feet

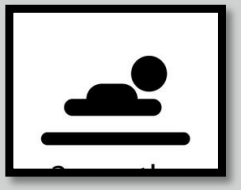
NEWBORN REFLEXES

Reflex	Extinguished (m)
Stepping	1-4
Moro	2-6
Rooting	3-4
Palmar grasp	3-6
Tonic neck	5-7
Plantar grasp	9-12
Extensor plantar	9-24

Reflex	Develops (m)
Head righting	4
Lateral propping	6
Parachute	8-9

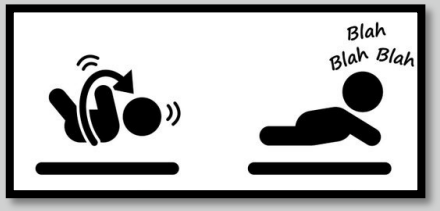
POSTURAL REFLEXES

2 months: lifts head when prone



4 months: lifts chest on wrists when prone holds objects

6 months: sits tripoded, rolls supine to prone



9 months: sits without support, crawls, parachute reflex

12 months: pulls to stand, stands without support, cruises

15 months: Takes a few steps on his own, squats

18 months: Walks without holding

24 months: walks upstairs holding and leading with 1 foot, kicks a ball, runs

30 months: jumps off the ground with both feet

3 years: pedals tricycle, broad jump, balances in 1 foot 3 seconds

4 years: stands on one foot, walks up stairs without rail, catches a ball

5 years: walks downstairs holding a rail alternating feed, hops in one foot, skips

6 years: bicycle without training wheels

FINE MOTOR

2 months: Opens hands briefly

4 months: Hands unfisted. Bidextrous reach. Uses her arm to swing at toys. Holds a toy when you put it in his hand. Brings hands to mouth and midline.

6 months: Unidextrous reach. Bangs objects at table. Transfers.

9 months: Bangs objects together. Probes with forefingers. "Rakes". Immature pincer grasp.

12 months: Mature pincer grasp. Releases intentionally (block in cup). Drinks from opened cup with help.

15 months: Uses fingers to feed herself some food. Places block inside and outside container.

18 months: Scribbles. Drinks from opened cup without help.

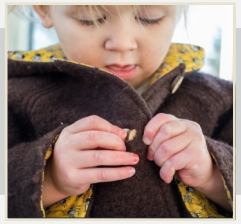
Feeds self with fingers. Tries to use a spoon.

24 months: Eats with a spoon, stacks 2 objects.

30 months: Uses hands to twist things. Takes some clothes off by himself.

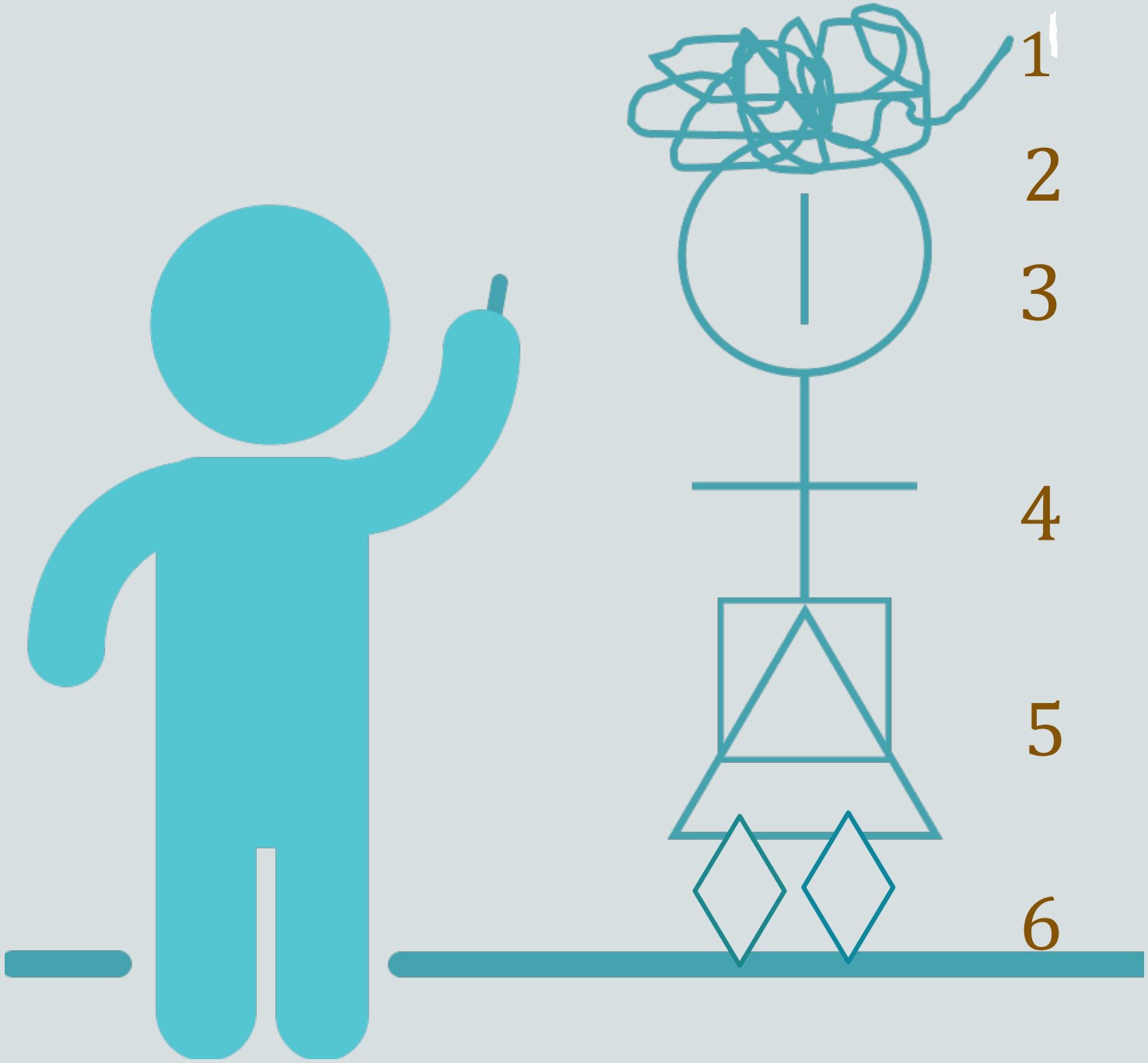
3 years: Strings items together. Puts on some clothes by himself. Uses a fork

4 years: Serves himself food. Unbuttons. Holds crayon or pencil between fingers and thumb.

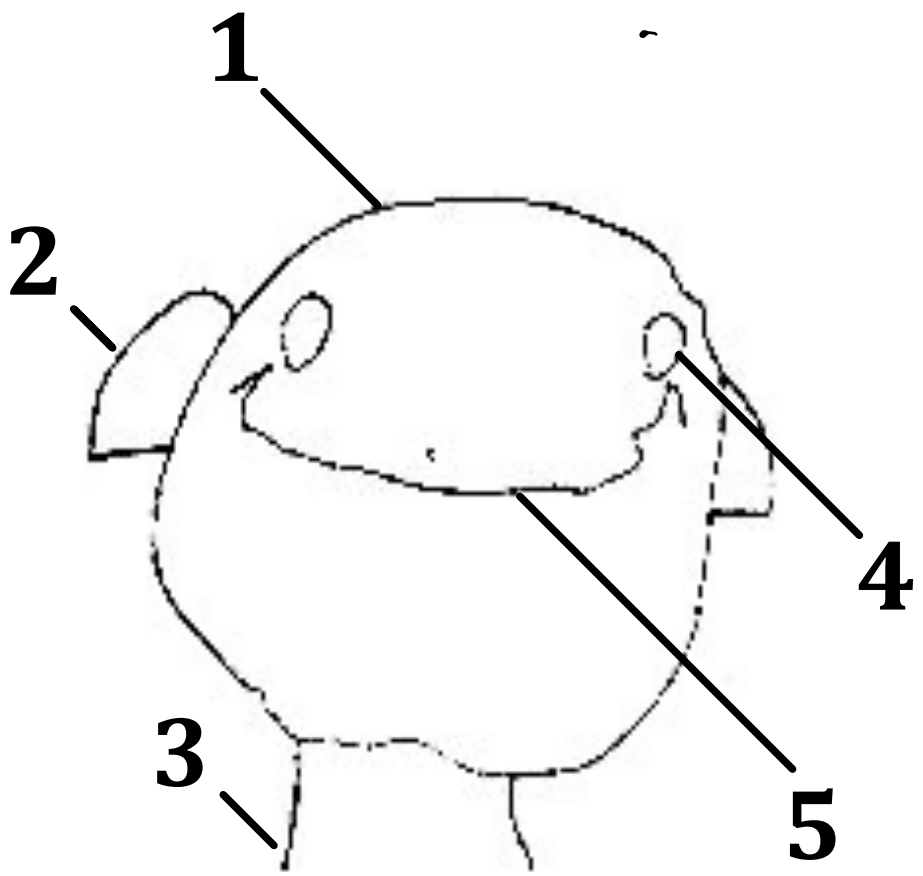


5 years: Buttons some buttons. Writes first name.

6 years: Writes first and last names. Ties shoelaces


1
2
3
4
5
6

$$\begin{array}{r} 3 \\ 5/4 \\ \hline 4\ \frac{1}{4} \end{array} +$$



LANGUAGE

AGE	EXPRESSIVE LANGUAGE	RECEPTIVE LANGUAGE
2 months	Makes sounds other than crying	Reacts to loud sounds
4 months	Coos ("oooo","aahh") back when you talk to him	Locates voice
6 months	Blows "raspberries" Makes squealing noises and babbles	Takes turns making sounds with you
9 months	Repetitive nonspecific babbling "mamama" and "babababa"	Lifts arms up to be picked up
12 months	Waves "bye-bye" Calls for care-taker "mama" or "dada" or another special name	Understands "no" Follows directions given with both a gesture and words

Age	EXPRESSIVE LANGUAGE	RECEPTIVE LANGUAGE
15 months	3 words, besides "mama" or "dada" Points to ask for something or to get help	Looks at a familiar object when you name it Follows one-step directions without any gestures
18 months	10-25 words	Identifies 2 – 4 body parts Points to show when asked
24 months	2-word phrases Uses more gestures (blowing a kiss or nodding yes) Uses "I," "me," or "we"	Points to things in a book Follows 2 step commands Identifies 6 body parts
30 months	50 words, 2-word phrases with one action word Uses pronouns correctly Knows part of a song or rhyme	Names things in a book when you point and ask, "What is this?" Understands prepositions

1 year

- 1 word
- Follows 1 step command

2 y

- 2 words phrase
- Follows 2 step commands
- 2/4 understandable

3 y

- 3 words phrases
- Follows 3 step commands
- 3/4 understandable

4 y

- 4 or more words sentence
- 4/4 understandable

AGE	EXPRESSIVE LANGUAGE	RECEPTIVE LANGUAGE
3 years	Two back-and-forth exchanges in conversation. Asks "who," "what," or "where" questions	Says what action is happening in a picture or book when asked, like "running," "eating," or "playing" Says first name, when asked
4 years	Says sentences with four or more words Asks "why" questions Talks about at least one thing that happened during his day, like "I played soccer."	Answers simple questions like "What is a coat for?" or "What is a crayon for?"
5 years	Tells a story she heard or made up with at least two events Keeps a conversation going with more than three back-and-forth exchanges Uses or recognizes simple rhymes (bat-cat, ball-tall)	Answers simple questions about a book or story after you read or tell it to him

SOCIAL-EMOTIONAL

Age	Social / emotional	Cognitive
2 months	Calms down when spoken to or picked up Reciprocal smile	Watches you as you move Looks at a toy for several seconds
4 months	Smiles on his own or makes noises to get your attention Chuckles (not yet a full laugh)	If hungry, opens mouth when she sees breast or bottle Looks at his hands with interest
6 months	Knows familiar people Likes to look at self in a mirror Laughs	Puts things in her mouth to explore them Reaches to grab a toy he wants Closes lips to show she doesn't want more food
9 months	Stranger anxiety. Separation anxiety. Facial expressions. Turns when name is called.	Uses fingers to "rake" food towards himself Object permanence (peek-a-boo)
12 months	Plays games with you, like pat-a-cake	Plays games with you, like pat-a-cake

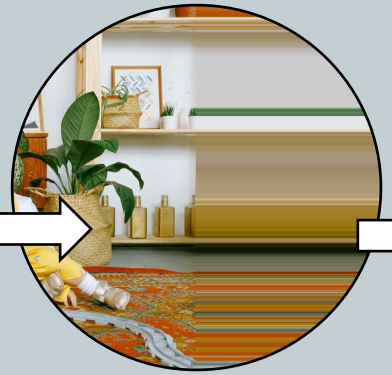
DEVELOPMENT OF PLAY

Body play	Object exploration	Conventional object	Pretend play	Symbolic play	Dramatic play
					
< 6 m	6 m-1 y	1 y	2 y	3 y	4 y

STAGES OF PLAY

Unoccupied
0-3 m

Solitary
0-2 y



Spectator
2 y

Parallel
2 y +

Associate
3-4 y

Cooperative
4 y +

TOILET TRAINING

Readiness:

walk, follow 2 step commands, pull pants up and down, dislike being wet

Sphincter control: 24 m

Daytime continence: 36 m

Night-time continence: 5-7 y

MONITORING

SURVEILANCE

Done in every well check up visit

Flexible, longitudinal, continuous and cumulative

Addresses concerns

Obtains and documents developmental history

Identifies risks and strengths

SCREENING

Done at particular encounters

Uses a validated instrument

Identifies an area of concern

Does not result in a diagnosis

AAP AND USTFPS RECOMMENDATIONS:

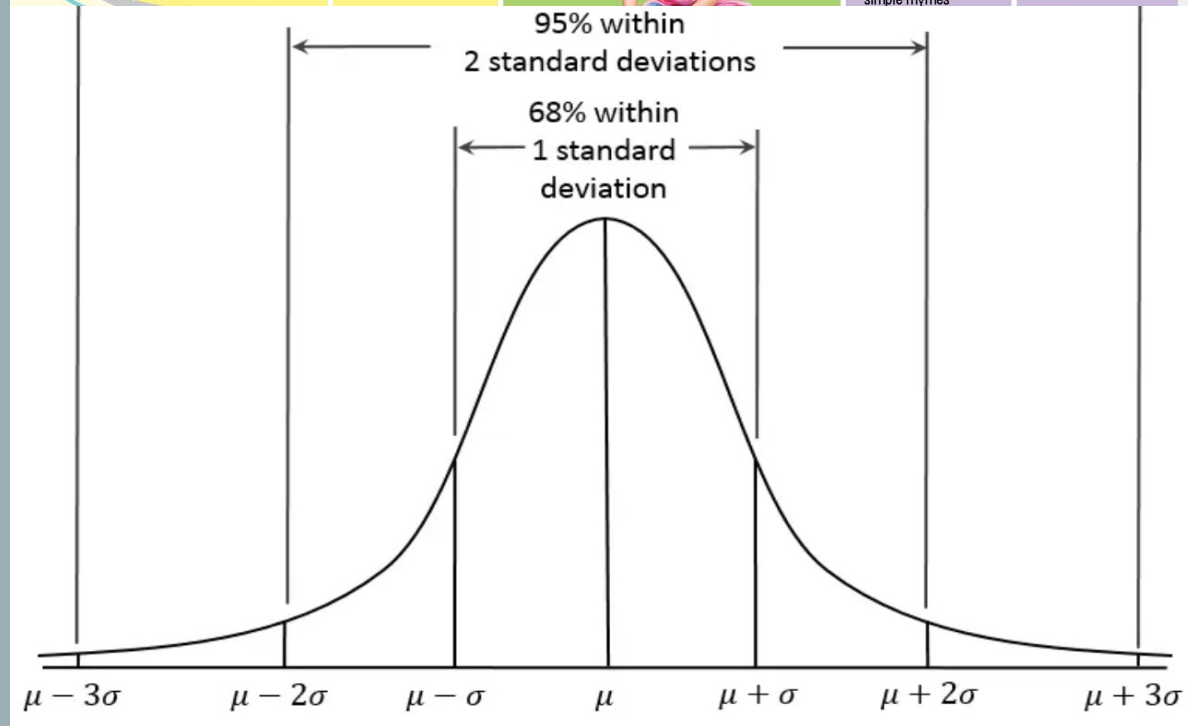
- Surveillance each well check up
- Screening at 9, 18, and 30 m or if concerns at surveillance
- ASD screening at 18 and 24 m
- Postpartum depression screening at 1, 2, 4, and 6 m
- Depression screening from 12 y/o

SCREENINGS

Developmental	Autism	Behavior	Mental health
ASQ	CSBS	ASQ-SE	PHQ-9
PEDS	MCHAT-R	BITSEA	PHQ-2
SWYC	CAST	CBCL	Vanderbilt
	SCQ	PSC	SCARED
		SDQ	ADHD-IV

DEVELOPMENTAL DELAY

- >1.5 or 2 ST below the mean
- >25% less than expected
- Children < 5 years of age
- Requires reassessment



	Cerebral Palsy	Intellectual Disability	Language disorder	Autism
Gross motor	DQ< 50	Normal or delayed	Normal or delayed	Normal or delayed
Language	Normal or delayed	DQ<70	Delayed	Delayed
Fine motor	Normal or delayed	DQ<70	Normal	Normal or delayed
Adaptive	Normal or delayed	Delayed	Normal	Normal or delayed
Social	Normal or delayed	Normal or delayed	Normal or delayed	Delayed

LANGUAGE DELAY

LANGUAGE DELAY

- 1:5 children are "late talkers"
- 50% of children delayed at 2 y/o remain delayed at 4 y/o
- Degree of impairment on dx does not correlate with prognosis
- Favorable prognosis: appropriate receptive language and symbolic play

MISCONCEPTIONS ABOUT LANGUAGE DELAY:

Boys are delayed

Second and third-born let their older siblings speak for them

Children from bilingual households are significantly delayed

ETIOLOGIES

Social interaction	Verbal input	Hearing	Brain development	Oral mechanisms
Unsupportive	Inadequate	Impaired	Genetic or neurologic disorder	Abnormal structure or function
Child abuse or neglect, orphanage	Low SES, parent with limited education	Sensorineural hearing loss	ID, ASD	Cleft plate, velopharyngeal insufficiency

FLUENCY DISORDERS (STUTTERING)

- Normal dysfluency of childhood : 2.5 to 4 y/o
- True stuttering:
  - 1% of school aged children
  - 3 times more frequent in boys
- Red flags:
  - At least 3 dysfluencies in 100 words of conversation
  - Begins after 3 years of age
  - Home environment with a low tolerance for stuttering or high pressure for verbal communication

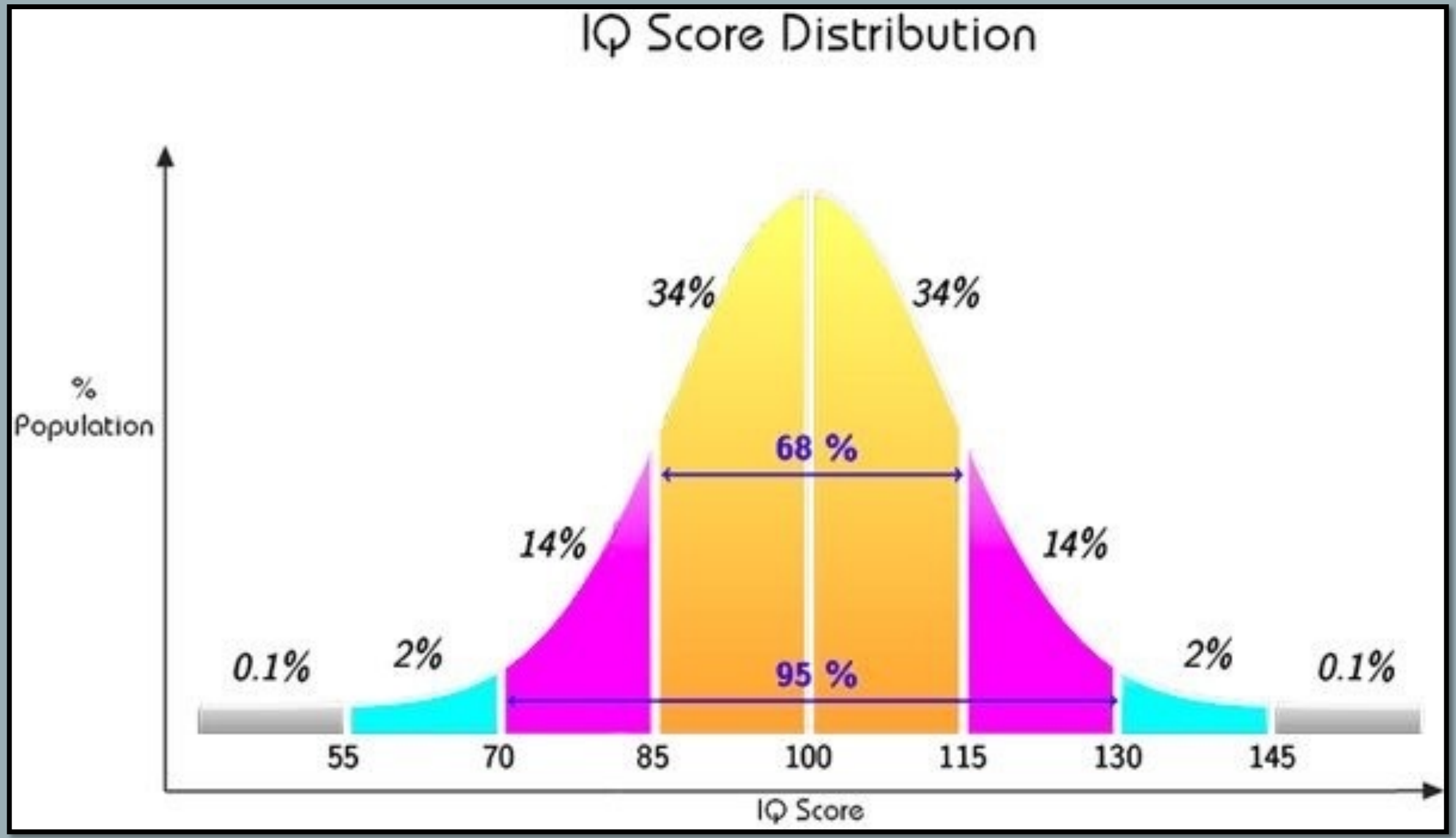
INTELLECTUAL DISABILITY

INTELLECTUAL DISABILITY

- Deficits in Intellectual functions
- Deficit in Adaptive functioning
- Onset during the developmental period

Severity: mild, moderate, severe

Specifier: medical, genetic or environmental


IQ Score Distribution
% Population
34%
34%
68 %
14%
14%
95 %
0.1%
2%
2%
0.1%
55
70
85
100
115
130
145
IQ Score

ID range	Academic/reading potential	Occupational potential	Independent leaving potential
Mild (55-70)	6th grade	Intermittent support	Independent leaving with some community or social support
Moderate (35-55)	2nd grade	Work with support (e.g., sheltered workshops)	Live in group homes or with parents or supervisors
Severe (20-35)	Self help skills, sight reading	Unlikely	Group home or with parents, extensively supported
Profound (<20)	Basic self help (feeding self), no reading	Not able	Pervasive support

ETIOLOGY

Infectious:	Genetic:	Metabolic:	Neurologic insults:	Toxins:
pre/perinatal: TORCH, HIV Postnatal: HIV, meningitis, encephalitis	Single gene defect: Fragile X Chromosomal: Trisomy 21 Neurocutaneous disorders: TS	Prenatal: Inborn Errors of metabolism (Tay Sachs, Lesch Nyhan Syndrome , PKU Postnatal: hypothyroidism, kernicterus, chronic hypoglycemia	CNS anomalies, IVH, Periventricular leukomalacia, Hypoxic-ischemic encephalopathy brain tumor	Prenatal: Alcohol, anticonvulsants Postnatal: lead, mercury

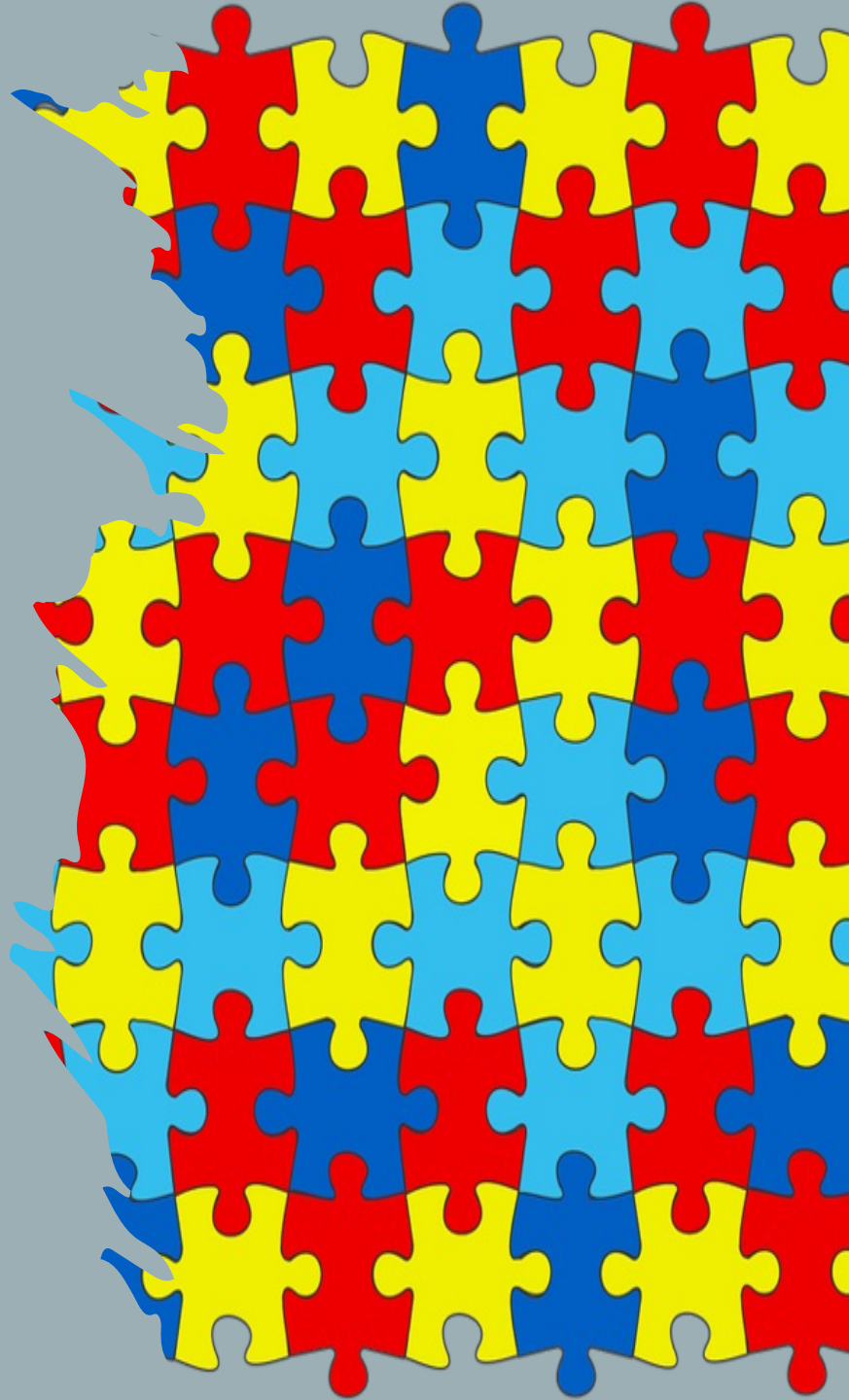
AUTISM SPECTRUM DISORDER

ASD DIAGNOSTIC CRITERIA:

Deficits in communication and social interaction

Restricted, repetitive patterns of behavior, interests, or activities

- Presents in early development
- Causes significant impairment
- No other better explanation

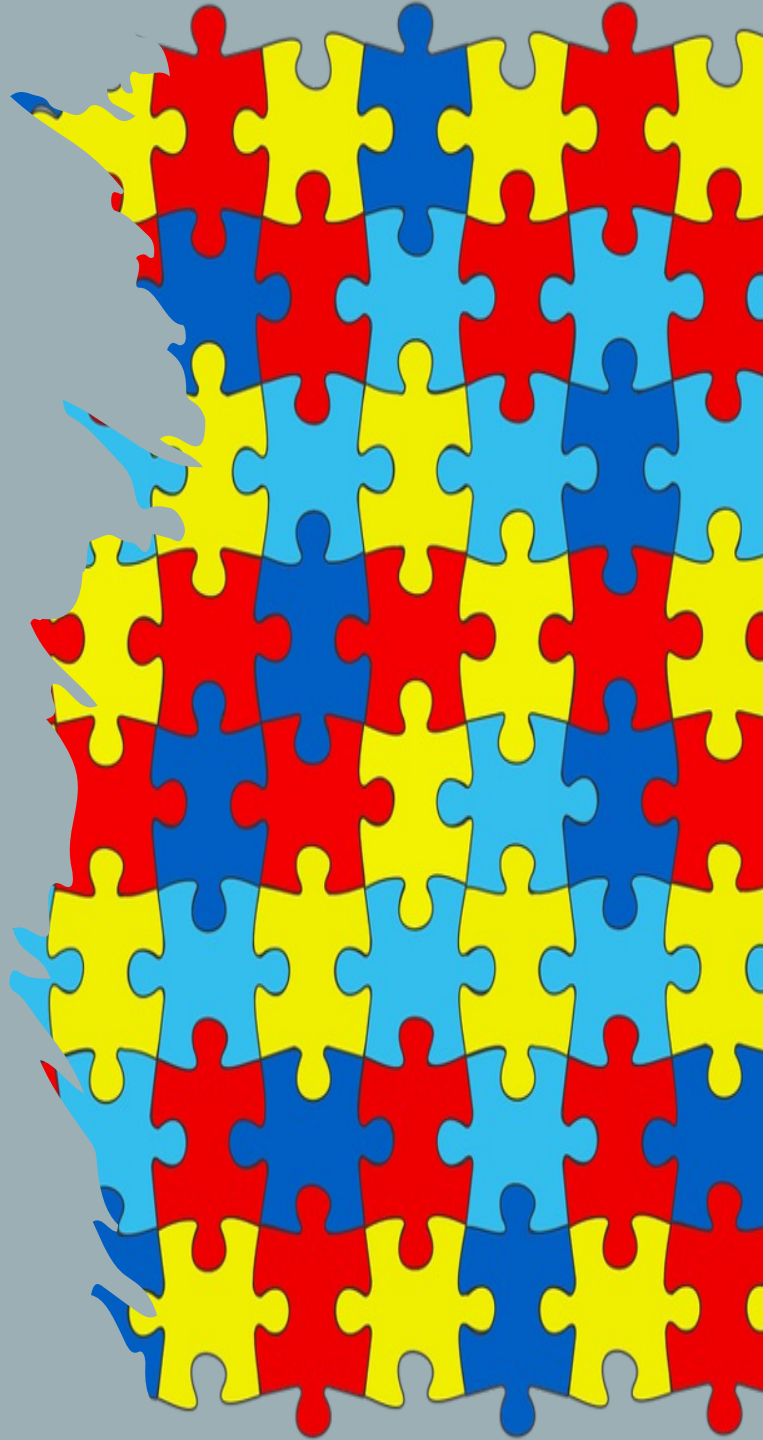


DEFICITS IN COMMUNICATION AND SOCIAL INTERACTION

-Social-emotional reciprocity

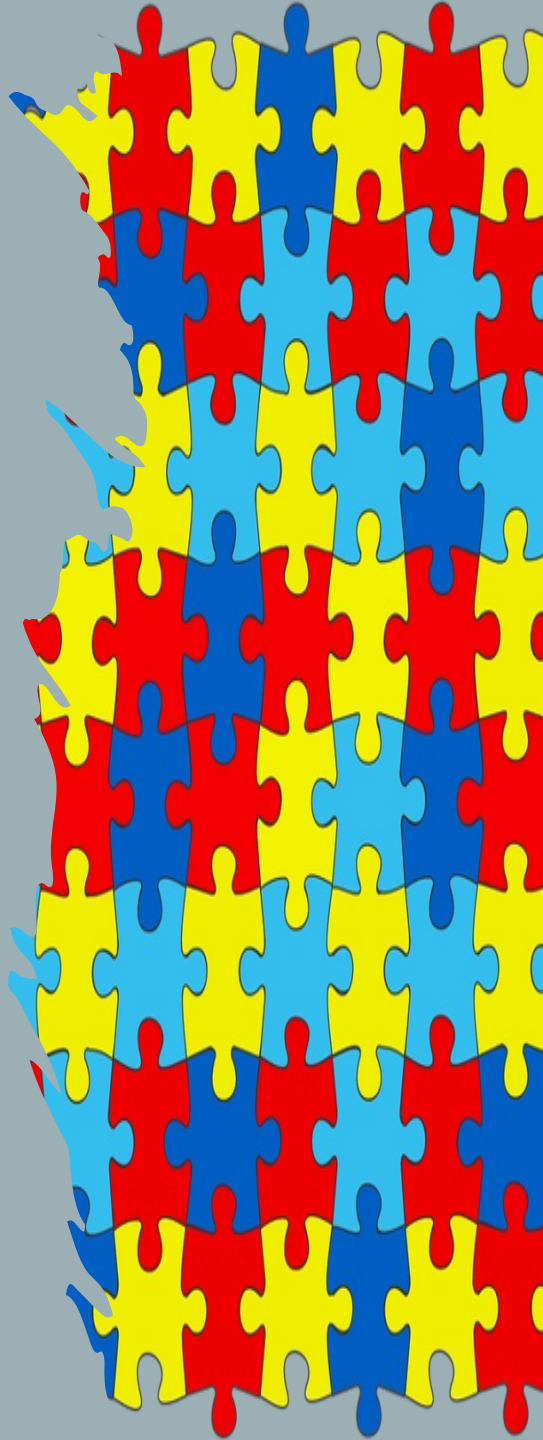
-Non-verbal communication

-Developing, maintaining or understanding relationships



RESTRICTED, REPETITIVE PATTERNS OF BEHAVIOR, INTERESTS, OR ACTIVITIES

- -Stereotyped movements, use of objects or speech
- -Difficulties with transitions
- -Restricted interests
- -Hypo or hyperreactivity to sensory input



LEARNING DISORDERS

DIAGNOSTIC CRITERIA FOR LD

A) Difficulties in at least one of these aspects for more than 6 months, despite the provision of extra help:

- Reading
- Understanding the meaning of what is read
- Spelling
- Written expression
- Understanding number concepts, number facts or calculation
- Mathematical reasoning

DIAGNOSTIC CRITERIA FOR LD

B) The affected academic skills are substantially and quantifiably below potential

C) Onset during school age

D) Not due to other factors

RISK FACTORS FOR LD:

- Family Hx of LD
- Prematurity
- Cyanotic congenital heart disease
- Toxic stress
- Genetic disorders:
  - Klinefelter syndrome
  - Turner syndrome
  - Velocardiofacial syndrome
  - Spina bifida with shunted hydrocephalus

INDIVIDUALS WITH DISABILITIES EDUCATION ACT (IDEA)

- Free appropriate public education
- Children with disabilities
- Early intervention services Part C: birth–2 years
- Special education Part B: 3-21 years

REHABILITATION ACT OF 1973, SECTION 504

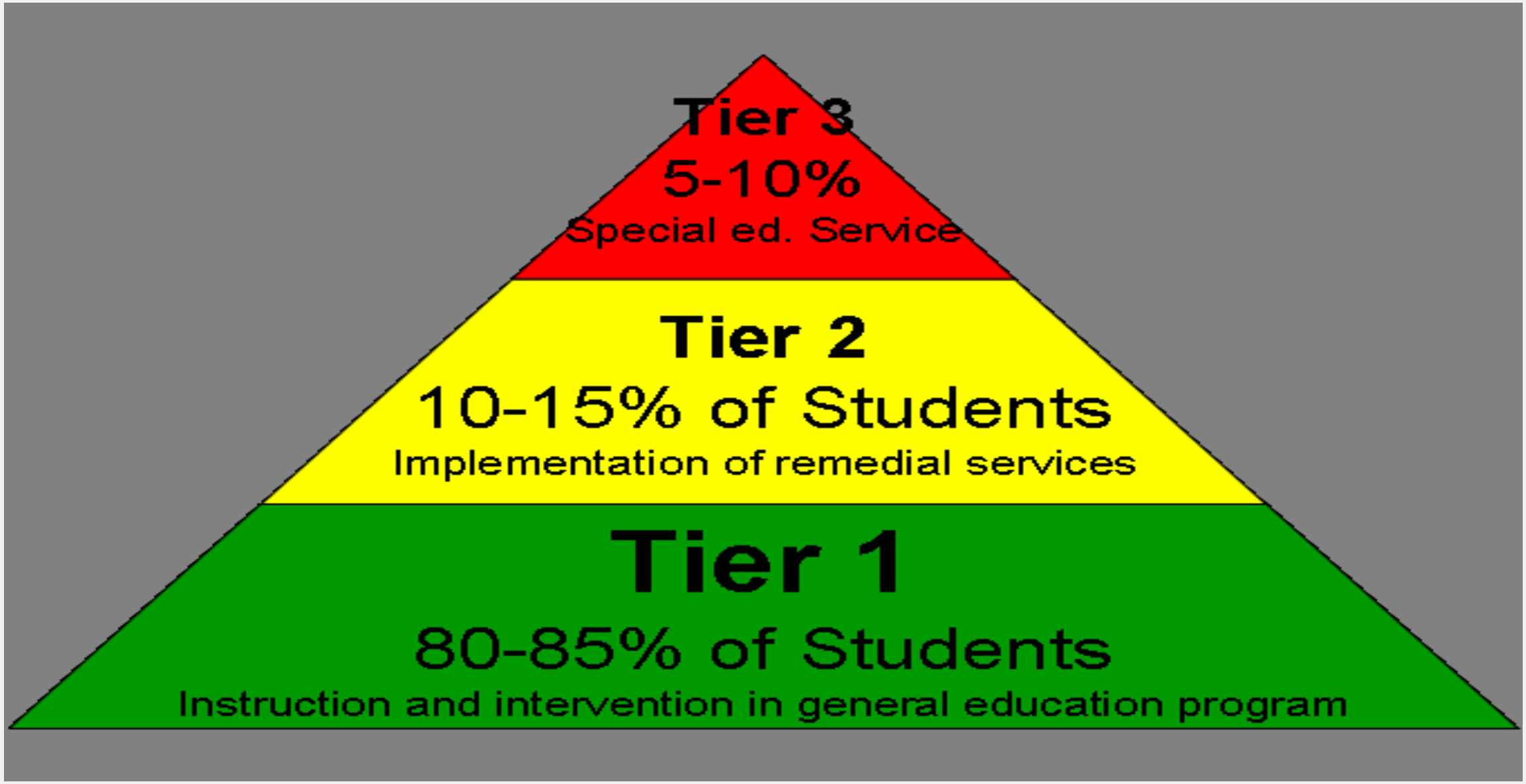
- No otherwise qualified individual with a disability in the United States… shall, solely by reason of her or his disability, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance…."
- Accommodations
- Related aids and services: counseling, assistive technology

EVERY STUDENT SUCCEEDS ACT (ESSA)

- Protection for America's disadvantaged and high-need students
- All students in America be taught to high academic standards that will prepare them to succeed in college and careers

TITLE II AMERICANS WITH DISABILITIES ACT OF 1990

No discrimination


Tier 3
5-10%
Special ed. Service
Tier 2
10-15% of Students
Implementation of remedial services
Tier 1
80-85% of Students
Instruction and intervention in general education program

INTERVENTIONS

- Psychoeducational evaluation:
  - Evaluate Capacity: discrepancy between verbal and non-verbal IQ scores
  - Evaluate achievement
- Elaborate an Individual Educational Plan (IEP)
  - Alternative strategies to help learning (e.g. texts on tape, oral testing, word processors)
  - Different school placement setting
  - Behavioral interventions

INFANT AND TODDLER "CHALLENGING" BEHAVIORS

REPETITIVE BEHAVIORS:

Examples: body rocking, head banging or digit sucking

Occur in most infants during the 1st year of life

Help modulate arousal:

- self calming during anxiety provoking situations
- self stimulate during periods of low arousal

Problematic if :

- tissue damage
- subjective distress for the child (not to the parent)

BREATH HOLDING SPELLS

Involuntary (reflexive) events/ Dysregulation of the autonomic nervous system

Occur in response to an event

Onset: 3-18 m/o

Rarely persists beyond 7 y/o

Evaluation

- Typical presentation: check hemoglobin and iron levels
- Not clear Hx: EKG, EEG, consider GERD

Treatment:

- Reassurance
- Iron supplementation


ADHD

SYMPTOMS

HYPERACTIVE/IMPULSIVE

1. Squirms and fidgets
2. Cannot stay seated
3. Runs/climbs
4. On the go/driven by motor
5. Talks excessively
6. Cannot perform activities quietly
7. Blurts out answers
8. Interrupts
9. Difficulty waiting turn

INATTENTIVE

1. Carelessness
2. Difficulty sustaining attention
3. Trouble following through
4. Avoids tasks requiring mental effort
5. Difficulty organizing
6. Loses important items
7. Easily distracted
8. Forgetful
9. Doesn't appear to listen

ADHD

- Symptoms present before 12 y
- Symptoms present > 6 months
- In 2 or more settings
- Significant difficulty in functioning
- Not attributable to something else

INTERVENTIONS

Parenting behavioral training

- PCIT
- Triple P
- New Forest
- Incredible Years

Behavioral classroom management

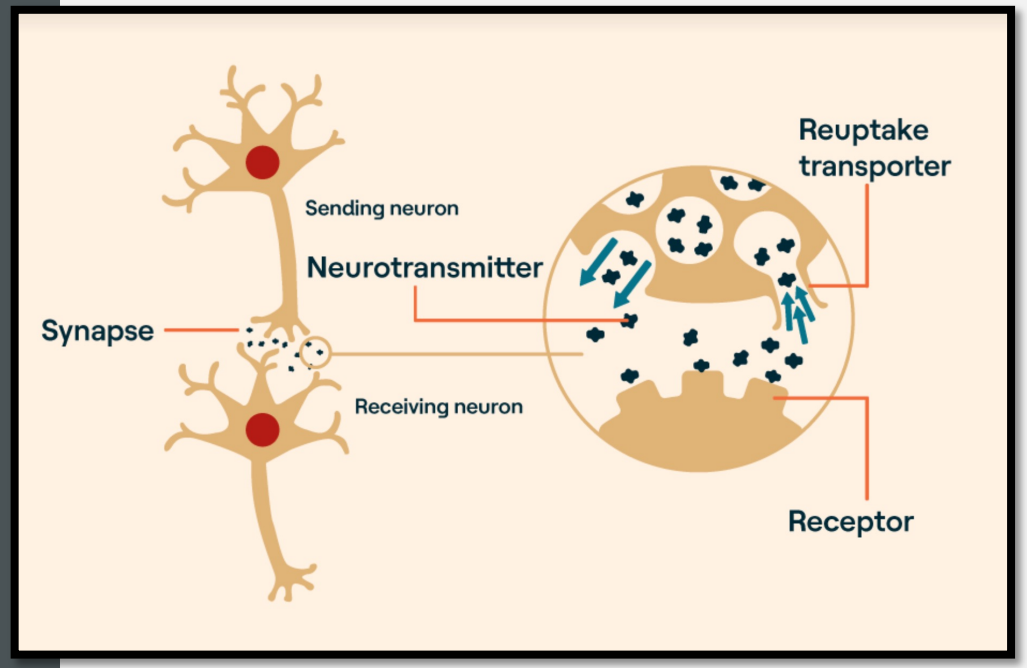
- Plan 504
- IEP
- Skills training

Medications

- Stimulants
- Non-Stimulants

- Most effective medication
- Acts immediately
- 85% response
- Effect size: 0.95
- Side effects:
  - Most common: stomachache, headache (resolve after the first week)
  - Decreased appetite, difficulty with sleep initiation, jitteriness.
  - Growth retardation (adult height doesn't differ)
  - Most studies don't support association between use of stimulants and sudden death. Routine EKG is not indicated.

STIMULANTS: METHYLPHENIDATE AMPHETAMINES



NON STIMULANTS

NE reuptake inhibitor (Atomoxetine and Viloxazine)

- Prefrontal cortex
- Not associated with tics
- Less sleep onset delay
- Black box warning: suicide risk
- Side effects:
  - Headaches,
  - Abdominal pain/nausea
  - Decreased appetite
  - Somnolence
  - BP and HR elevation
  - Liver injury
  - Dry mouth

Alpha 2 Adrenergic agonists (Clonidine and Guanfacine)

- Presynaptic, central acting
- Affects NE discharge rates in the locus coeruleus and indirectly the DA
- Counteracts delayed sleep initiation
- Effective in aggression and tics
- Side effects:
  - Soporific (wane after 2-3 weeks)
  - Hypotension
  - Bradycardia

COMORBID CONDITIONS

Condition	Coexisting with ADHD	Non-ADHD population
Oppositional Defiant Disorder	35%	2-16%
Conduct disorder	25%	6-16% (males);2-9% (females)
Anxiety disorder	25%	5-10%
Depressive disorder	18%	2% (child) , 5% (adolescent)
Learning disability	51% boys, 47% girls	14.5% boys, 7.7% girls

MENTAL HEALTH

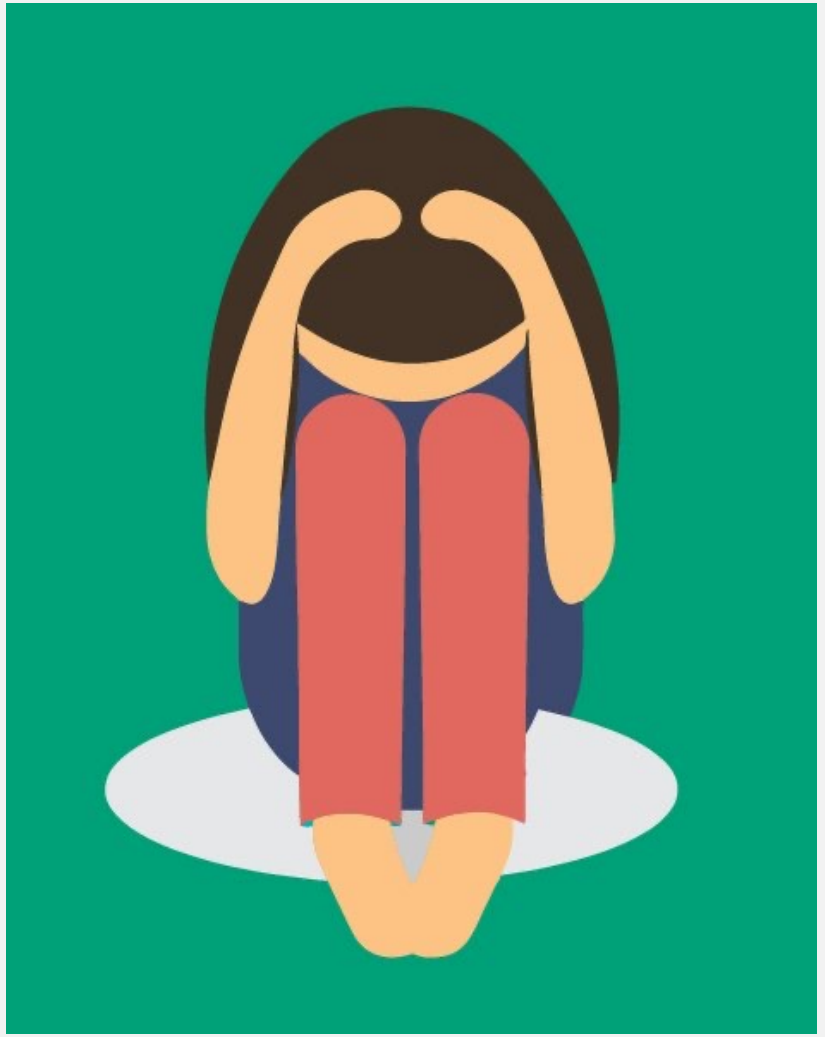
1:5 CHILDREN

EXTERNALIZING BEHAVIORS: DISRUPTIVE BEHAVIOR DISORDERS

- Oppositional Defiant Disorder
- Conduct Disorder
- Intermittent Explosive Disorder
- Antisocial behaviors, delinquency (pyromania, kleptomania)

INTERNALIZING BEHAVIORS

- Anxiety
- Depression



ANXIETY DISORDER

Prevalence: up to 8% of children and adolescents

Symptoms:

- Physical complaints
- Recurring and/or increasing fears and worries
- Trouble concentrating
- Trouble sleeping
- Fear of social situations: leaving home, going to school, separating from loved ones

MOOD AND AFFECT DISORDERS

Prevalence:

- Children: 2% - M:F 1:1
- Adolescence: 4-8% - M:F 1:2

USPSTF recommends screening (PHQ-9, Columbia Teen Screen, Beck Depression Inventory)

Diagnostic criteria for adolescents:

- 5 or more symptoms for 2 weeks
- One of the symptoms must be depressed mood or loss of interest or pleasure
- Do not meet criteria for mixed episode
- Clinically significant
- Not due to physiological effects of a substance or medical condition
- Not better accounted for by bereavement

RISK FACTORS

- Family history
- Stressors: loss, abuse, neglect, trauma, divorce, death
- Coexisting disorder
- Medical illness (e.g. diabetes, asthma)
- Biological and sociocultural factor (e.g. gender dysphoria, sexual orientation)

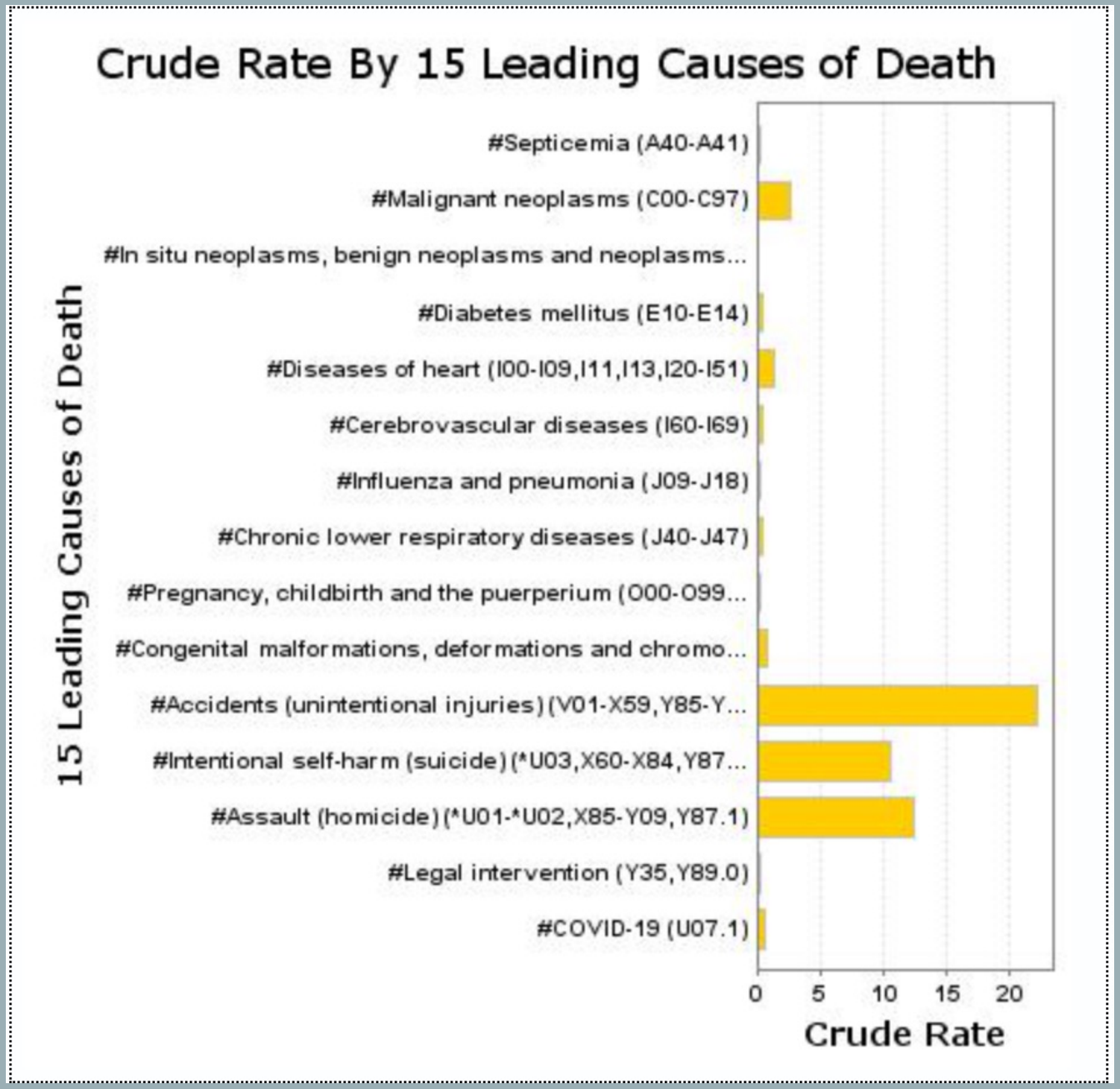
TREATMENT

Psychotherapy:

- Cognitive behavioral therapy
- Interpersonal psychotherapy

Pharmacotherapy:

- Selective Serotonin Reuptake Inhibitor
  - Fluoxetine
  - Escitalopram
  - Sertraline



SUICIDAL BEHAVIOR

Leading causes of deaths among adolescents aged 15–19 years: source: national vital statistics system – mortality data (2020) for via CDC wonder

Suicide Assessment Five-step Evaluation and Triage (SAFE-T)

01 Identify risk factors

02 Identify protective factors

03 Conduct suicide inquiry

04 Determine risk level/ intervention

05 Document

RISK FACTORS:

- Suicidal behavior
- Current/past psychiatric disorders
- Key symptoms
- Family history
- Precipitants/Stressors/Interpersonal
- Change in treatment
- Access to firearms

PROTECTIVE FACTORS:

Internal:

- ability to cope with stress
- religious beliefs
- frustration tolerance

External:

- responsibility to others
- positive therapeutic relationships
- social supports

SUICIDAL BEHAVIOR

- Always screen for suicidality
- Establish a safety plan
  - ❑Engage a concerned 3rd party
  - ❑Develop a plan for communication: emergency numbers and contact
  - ❑Remove lethal means (firearms, knives/sharps, alcohol, medications)
- Contracts are detrimental

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