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# ADHD FACT VS. FICTION

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Clinical Assistant Professor, UBC.

1. "Kids on Monkey Bars" by Fat Camera.; Google Stock Images.

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# LAND ACKNOWLEDGEMENT

I respectfully acknowledge that the the land I work on is the traditional territory of the Coast Salish peoples, including the Musqueam, Squamish, and the Tsleil-Waututh Nations.

# DISCLOSURES

Nothing to disclose.  Dr. Killough and Ms. Doherty do not have any relationships with commercial interests.

# OBJECTIVES

3. "Bullseye –Clipart" ID 3130235; clipart-library.com; Google Stock Images.

1. To identify ADHD in youth, including comorbidities that increase its complexity.
2. To describe evidence-based guidelines for assessment and intervention for ADHD.
3. To recommend and/or deliver appropriate pharmacological and non pharmacological interventions to manage ADHD or ADHD symptoms without formal diagnosis in youth.

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# POP QUIZ

#1. What's the most common mental health condition in youth 18 yrs and younger?

a) ADHD
b) Depressive disorders
c) Anxiety disorders
d) Learning disorders

# EPIDEMIOLOGY – USA

6-8% children prevalence rate

4 % adults  (7 million)

4 males: 1 female  (more Inattentive); 1:1 ratio in adults

Prevalence same across cultures  and SE classes

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# POP QUIZ

#2. What proportion (%) of total ADHD cases does Simple ADHD comprise?

a) 55 %
b) 33%
c) 20%
d) 66%

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# COMPLEX ADHD

- Accounts for 66% of total ADHD cases!!
- More likely to see this, even in community practice.
- Also more likely to see it in emergencies i.e. suicidal youth in ER/crisis line/response teams, and with "lumps and bumps" in ER.
- More likely to be treatment resistant.

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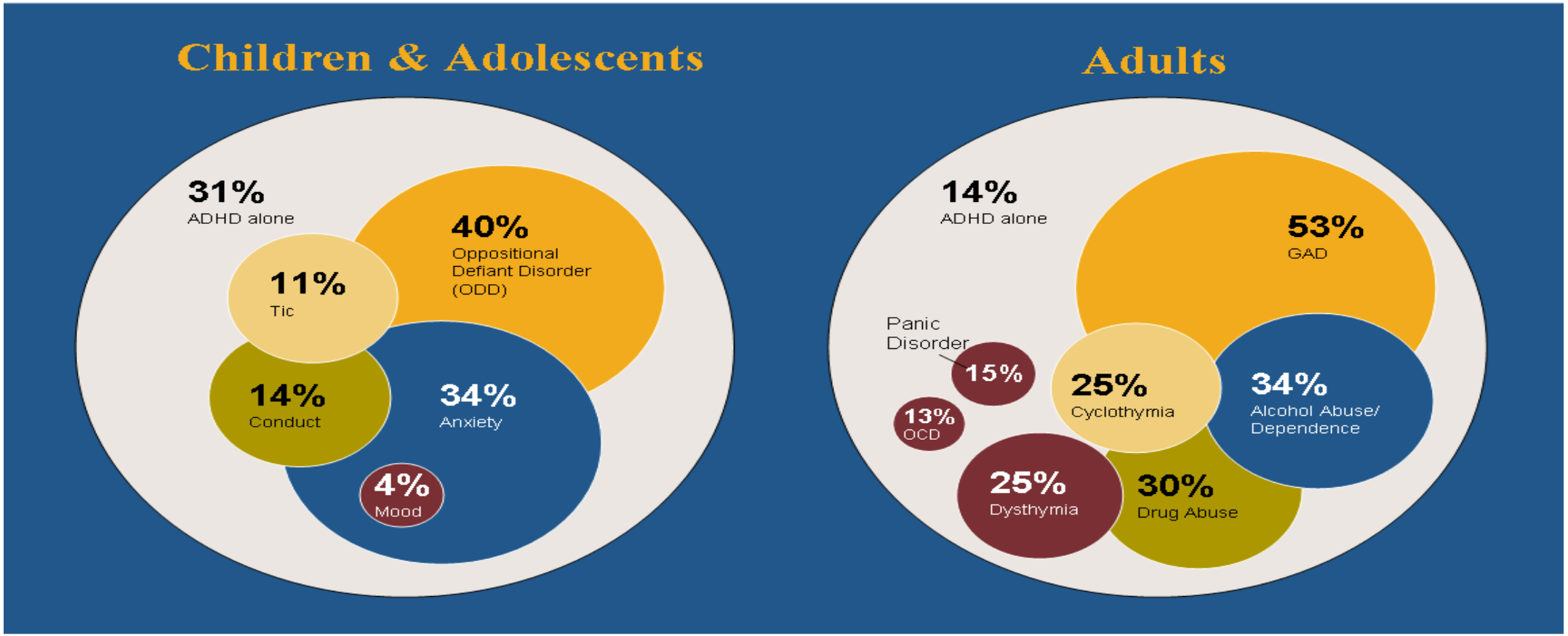
# Patients With ADHD Frequently Have Coexisting Disorders




MTA cooperative: N=579.

1.The MTA Cooperative Group. *Arch Gen Psych.* 1999;56(12):1073-1086. 2. Shekim WO. *Compr Psych.* 1990;31(5):416-425.

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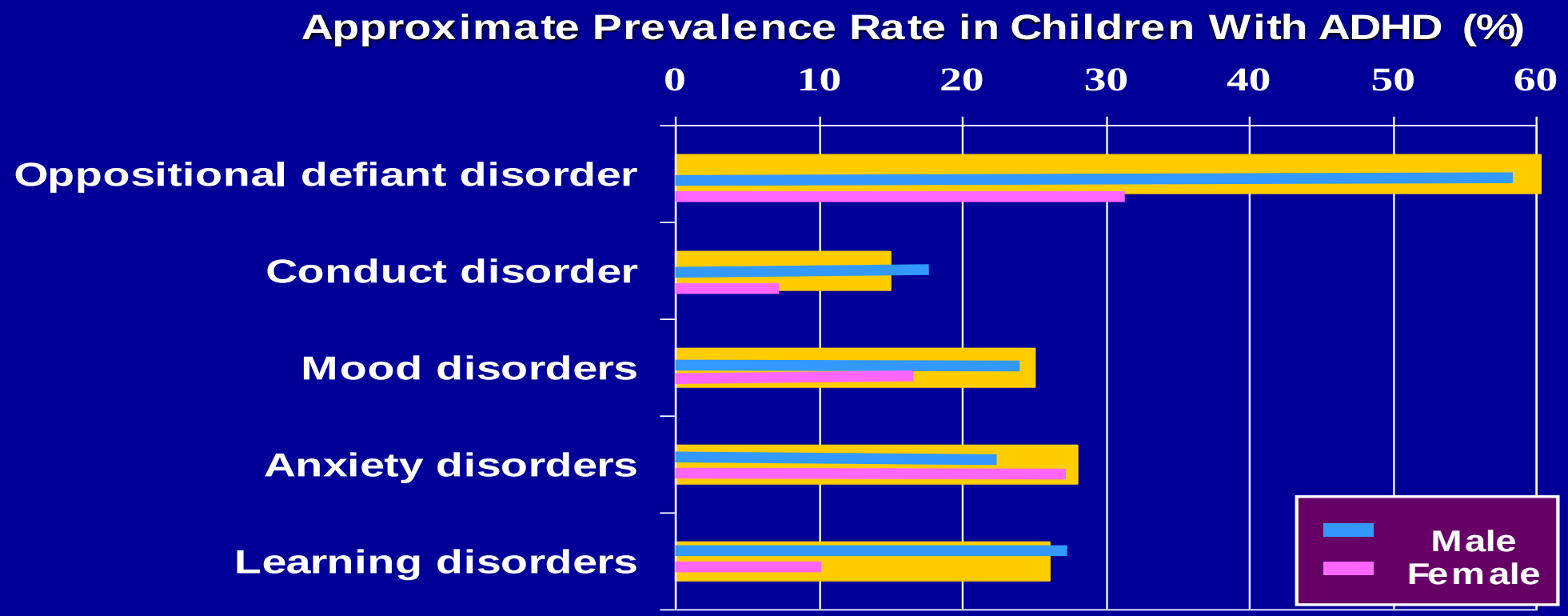
# ADHD—Childhood Common Comorbid Diagnoses




Biederman et al. *JAACAP* 1996;35:343. Pliszka. *J Clin Psychiatry* 1998:59(suppl 7):50.
Biederman et al. *JAACAP* 1999;38:966. Spencer et al. *Pediatric Clin N Am* 1999:46:915.

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# ADHD + ANXIETY IN KIDS

- Often do NOT complain of worries.
- Parents and teachers often not aware i.e. SCARED screens often normal.
- Looks like “Fight, Flight or Freeze” when frontal lobe is “offline”.

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# CLINICAL CLUES FOR POSSIBLE ANXIETY WITH ADHD YOUTH (3+ of the following)

1. Treatment resistance to ADHD meds
2. Emotional dysregulation, that impairs them at school and/or home
3. Picky eater and slow to gain weight
4. Sleep disturbance ie. 3 nights each week
5. Morning fatigue
6. Frequent complaints of headaches or stomach aches
7. Frequent bedwetting ie. 3 nights each week
8. Constipation +/- soiling
9. Presence of vocal/ motor tics
10. Skin picking +/ biting nails
11. Unable to swallow pills in kids > 8 yr old
12. Sensory processing issues
13. History of asthma, eczema or allergies
14. History of autoimmune condition
15. History of chronic medical condition with frequent investigations/admissions
16. Positive family history for Anxiety disorders

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# POP QUIZ

What are the 3 incorrect symptoms seen in ADHD?

a) Can't regulate attention.
b) Difficulties with controlling impulsive thoughts/actions.
c) Can't focus and is hyperactive in class.
d) Tends to be clumsy.
e) Difficulties regulating developmentally appropriate executive function.

# CHANGES TO DSM V DIAGNOSIS

- Onset of symptoms ≤ age 12
- Can dx ADHD and ASD together
- ≥ 5 symptoms of IA for those ≥ 17 yr old
- ≥ 5 symptoms of HI for those ≥17 yr old
- Subtypes now “presentations” – reflects dynamic course

# ADHD : Preschool Years

- Motor restlessness ( on the go)
- Aggressive (hits others)
- Spills things
- Insatiable curiosity
- “Fearless” endangers self / others
- Low  compliance
- Vigorous/destructive play

“Boy with Painted Hands” by Sharon McCutcheon; Pexels.

- Interrupting others
- Demanding, argumentative & noisy
- Excessive melt downs

Dupaul GJ, et al. *J Am Acad Child Adolesc Psychiatry* 2001;40:508-15.

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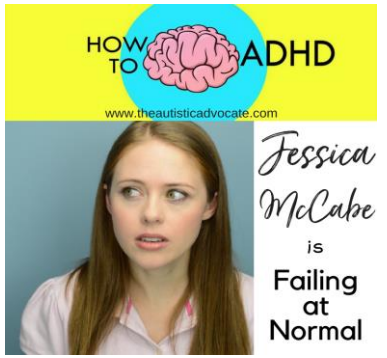
# INFANCY FACTORS AND RISK OF ADHD

Temperamental emotionality @ age 3 → ADHD + Internalizing disorder @age 7

Activity level @ age 3 → ADHD + ODD @ age 7

Stringaris A, Maughan B, Goodman R, "Avon Longtitudinal Study", JAACAP 2010; 49: 474-483.

# ADHD IN GIRLS




- "Slip through the cracks" in primary grades.
- More likely to be the "quiet daydreamers".
- "Social butterfly" comments on report card.
- Start to fall behind in intermediate grades.
- Lots of "friend drama" in early high school years.

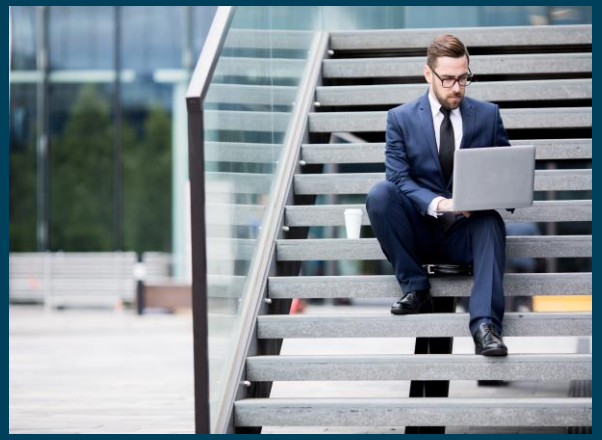
- Impairing anxiety & depression in high school.
- Higher rates of unplanned pregnancy.
- More likely to get Borderline PD Dx.
- More likely to have chronic anxiety as adults.

# ADHD: TEENS

- Impulsivity and hyperactivity remit, but still inattentive.
- Executive skill impairment can worsen.
- Emotional dysregulation and sleep dysregulation very impairing.
- Often benefit from an LST block for homework.
- Have more difficulties regulating screen time.
- Truancy and substance use rates higher.

# ADHD : Adults

- Distractible, restless, poor planning and organization
- Emotional distress, frustration, bad temper
- Low achievement
- Comorbidities



"Man sitting on steps with laptop and cup of hot drink". https://photodune.net/24539847. Google images.

- Family problems
- Frequent accident/MVA
- Rule-breaking behavior
- Difficulty finishing jobs
- Costs Canadians over $7 billion annually (CADDAC position paper, "Paying the Cost of ADHD.." 2013).

Faraone SV, et al. *Biol Psychiatry* 2000;48:9-20.

# WHAT ARE EXECUTIVE FUNCTION SKILLS

4. ID129602788 © Kiankhoon; Dreamstime.com; Google Stock Images

- Emotion regulation
- Organization & planning
- Calculation
- Self motivation
- Time perception
- Working memory
- Shifting & sustaining attention
- Self monitoring & inhibition

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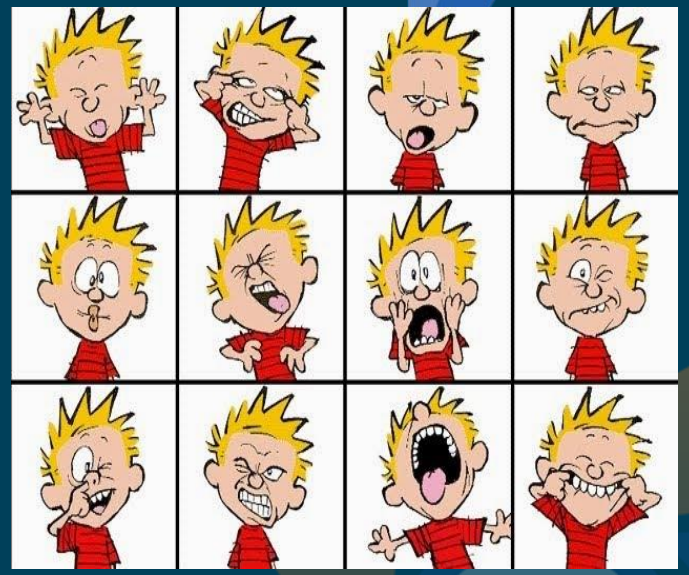
# WHAT IS EMOTIONAL REGULATION?

- A person's ability to change their emotional state in order to promote healthy adaptive and goal oriented behaviours.
- There are processes that involve

  1. selecting, attending and judging emotional stimuli.

  2. using behavioural and physiological actions that are in keeping with our goals.

  i.e. use of regular exercise to regulate our mood, or staying calm when our child has a melt down.



"The Many Faces of Calvin". htpps://imgur.com.

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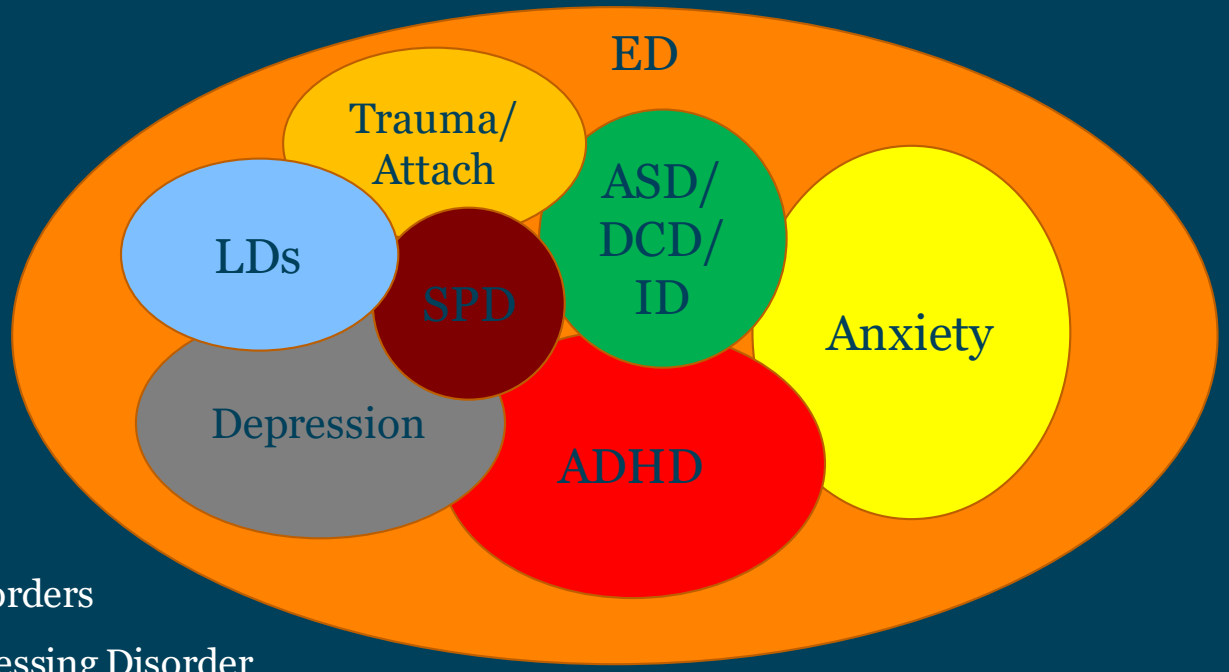
# EMOTIONAL DYSREGULATION (ED) IN YOUTH




LDs = Learning Disorders

SPD = Sensory Processing Disorder

DCD = Developmental coordination Disorder

ID = Intellectual Disability

ASD = Autism Spectrum Disorder

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# EMOTIONAL DYSREGULATION (ED) AND ADHD

Epidemiologic literature review with clinic based studies

ADHD youth → 24-50% reported ED

ADHD adults → 34-70 % reported ED

Shaw et al., American Journal of Psychiatry 171:3, 276-293.

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# EMOTIONAL DYSREGULATION AND ADHD IN ADULTS

% of specific emotional dysregulation symptoms

- impatient
- quick to anger
- easily frustrated
- emotionally over-excitable
- easily excitable

Persistent ADHD → 42-70%

Remitted ADHD → 23-45%

Barkley and Fisher. JAACAP 2010; 49: 503-513

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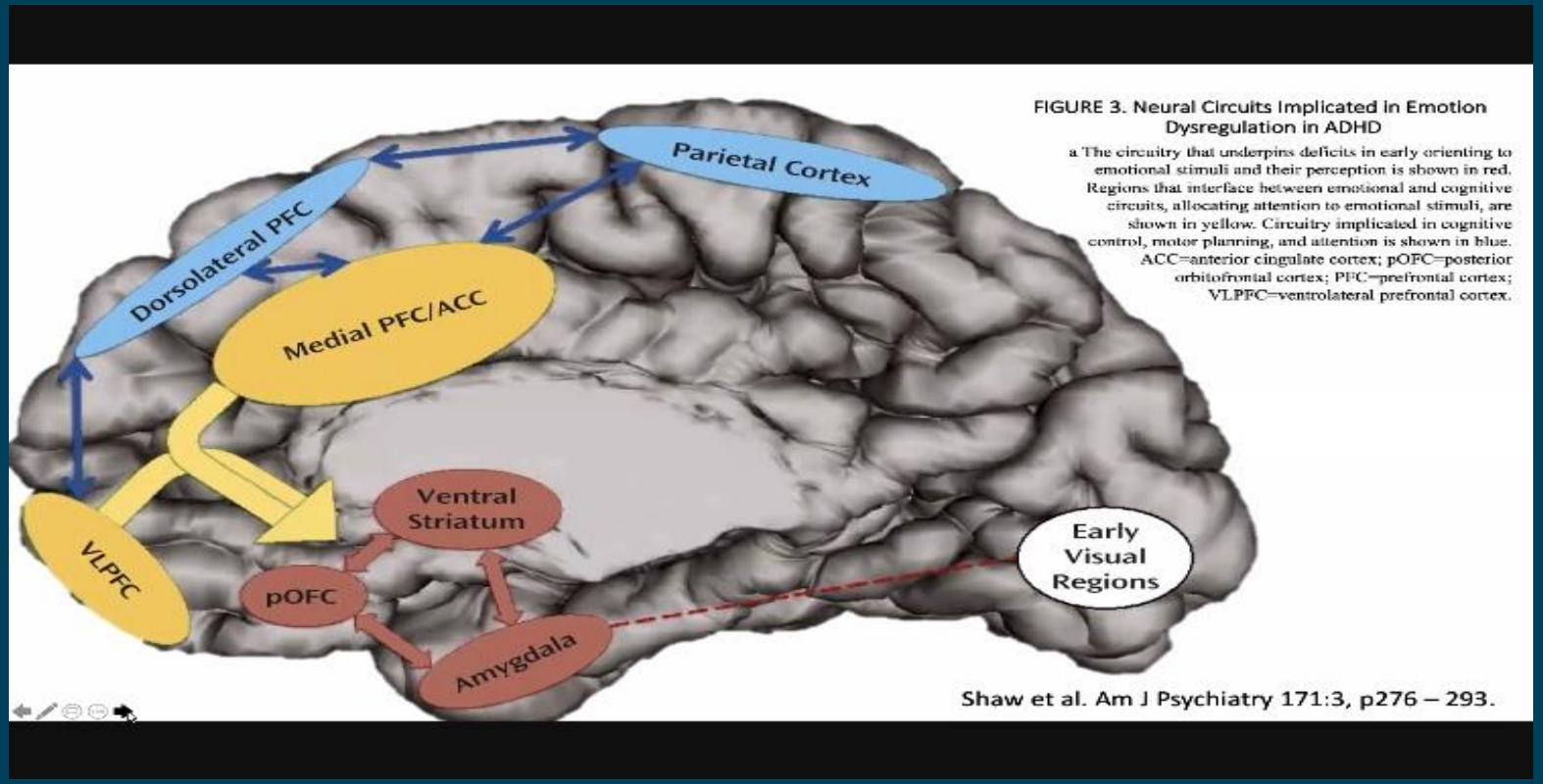
# NEUROANATOMY OF ADHD EMOTIONAL DYSREGULATION



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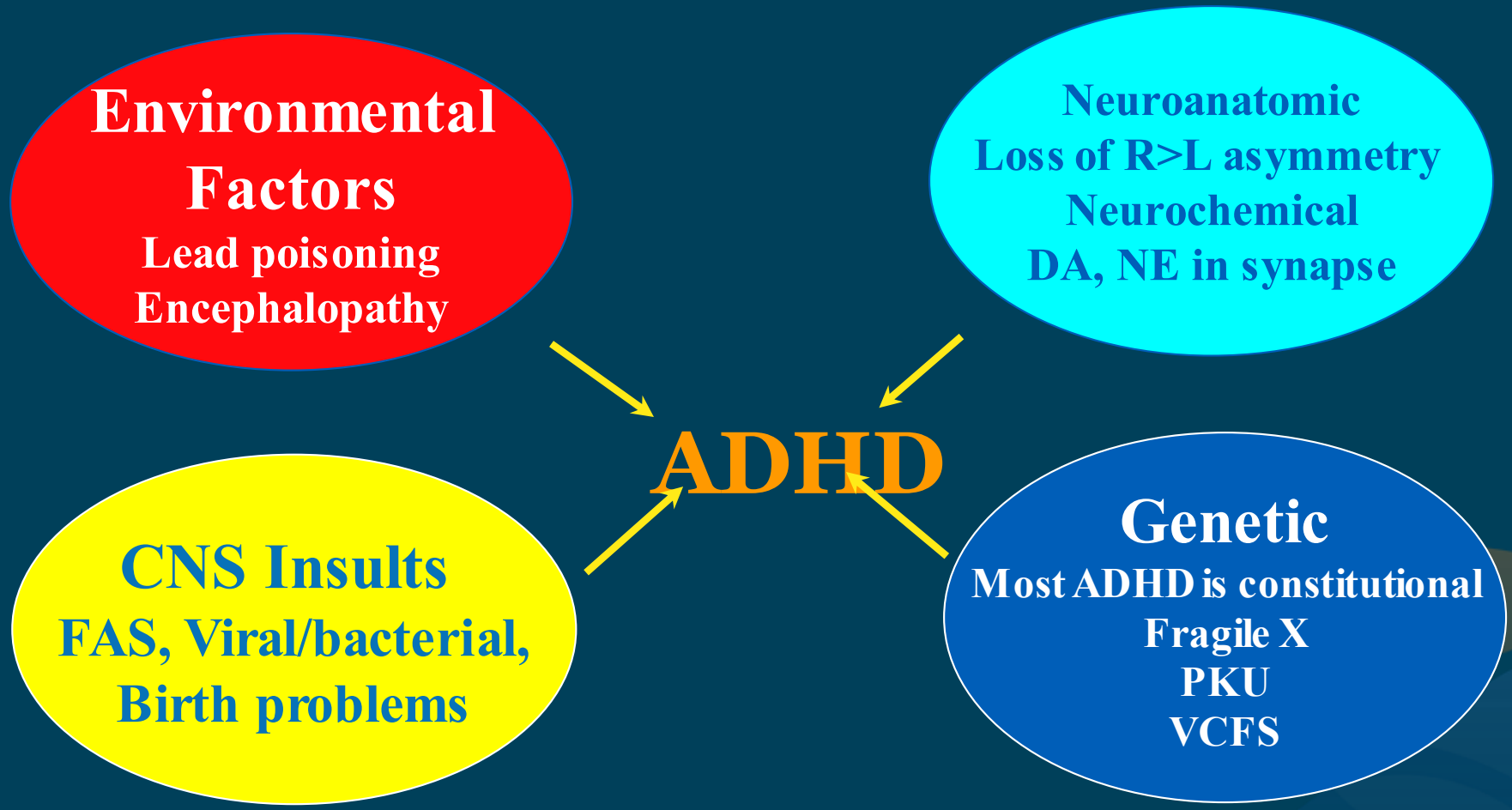
# Etiology




CNS = Central Nervous System

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# ADHD Is Highly Familial

- The risk of an adult with ADHD having a child with ADHD is about 57%
- About 25% of children with ADHD have a parent with ADHD
- Non identical sib risk~25%
- Identical twin risk~95%

**J. Biederman, et al. High risk for attention deficit hyperactivity disorder among children of parents with childhood onset of the disorder: a pilot study. *Am.J.Psychiatry* 152 (3):431-435, 1995.**

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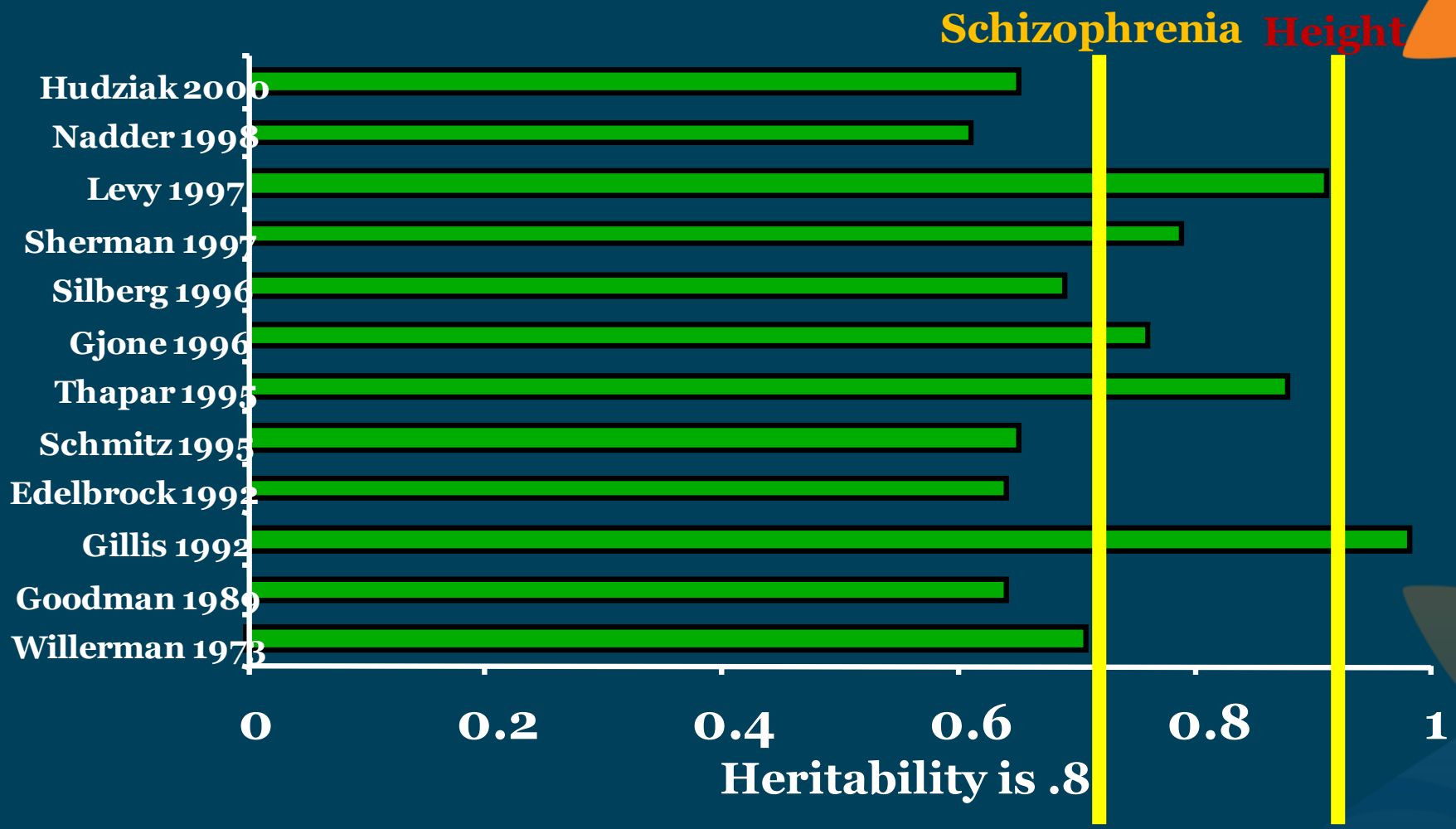
# ADHD is highly genetic: twin, adopted away studies



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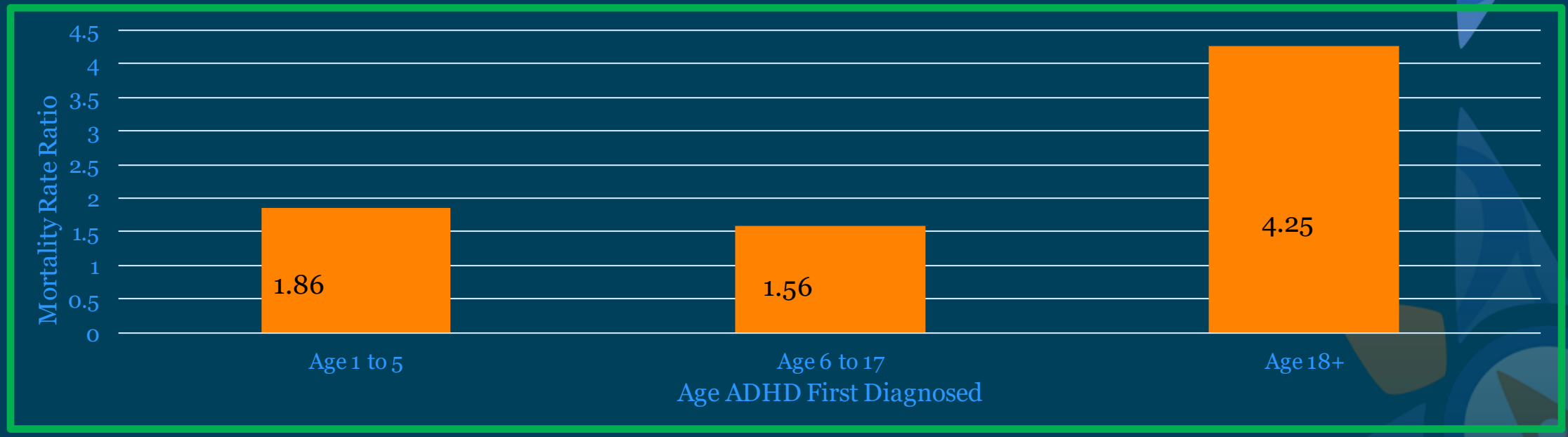
# Excess Adjusted Mortality Rate in ADHD




Dalsgaard et al, Lancet 2015; 385:2190-2196.

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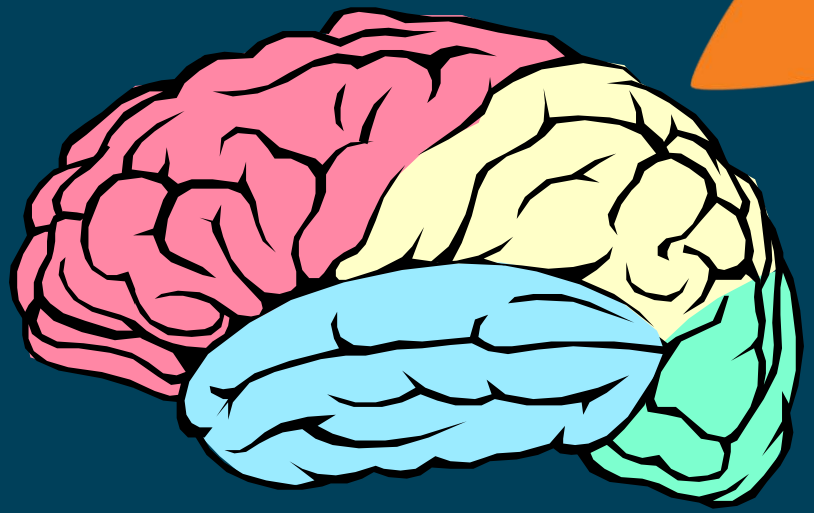
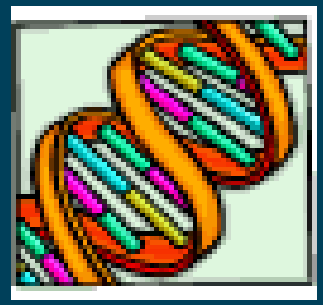
# Neurobiology & Genetics



Genetic research focussed on:

1. DRD4, DRD5, and DAT1.

2. Others i.e. DBH , serotonin gene 5HT, 5HTT, and Snap 25 (vesicle fusion) that all effect neurotransmitters.



S. Faraone July 2004

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# Neurobiology

- Decreased activity in the prefrontal cortexes (edits behaviour)
- Smaller frontal lobes, basal ganglia, & cerebellar vermus (think before speak, motivation, attention)
- May have delayed maturation of the prefrontal circuits which is consistent with improving prognosis over time
- Sig. anatomic differences of the left caudate which was 3% smaller than normal population (n=Left larger than right side)
- Neurotransmitters dysregulation of dopamine, norepinephrine, and serotonin.

Salee, US Psych Congress, 1998, Nov p37.

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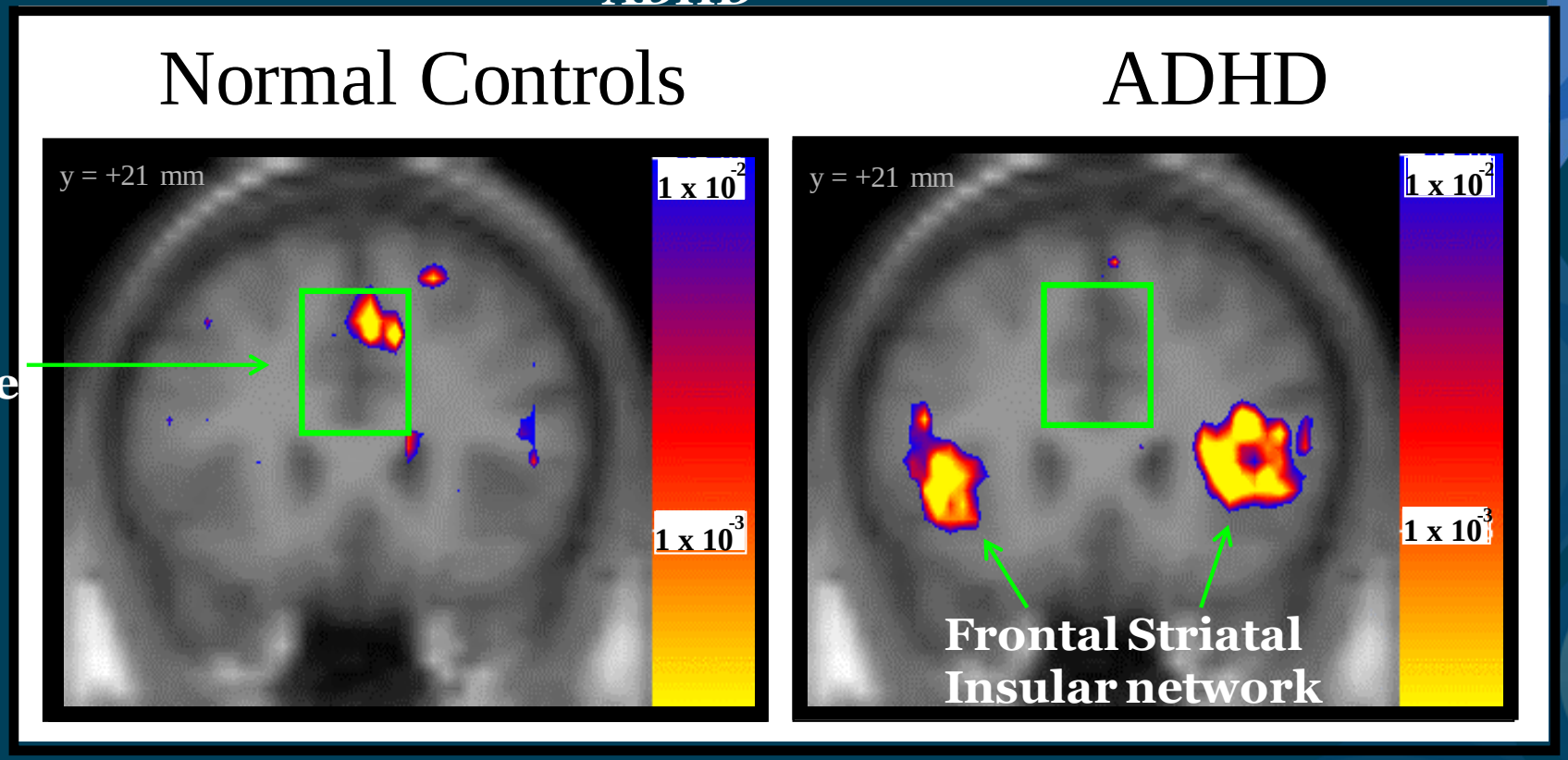
# Neuroimaging and ADHD

## Anterior Cingulate (Cognitive Division) Fails to Activate in ADHD




MGH-NMR Center & Harvard- MIT CITP Bush, et al. *Biol Psychiatry.* 1999;45:1542-1552.

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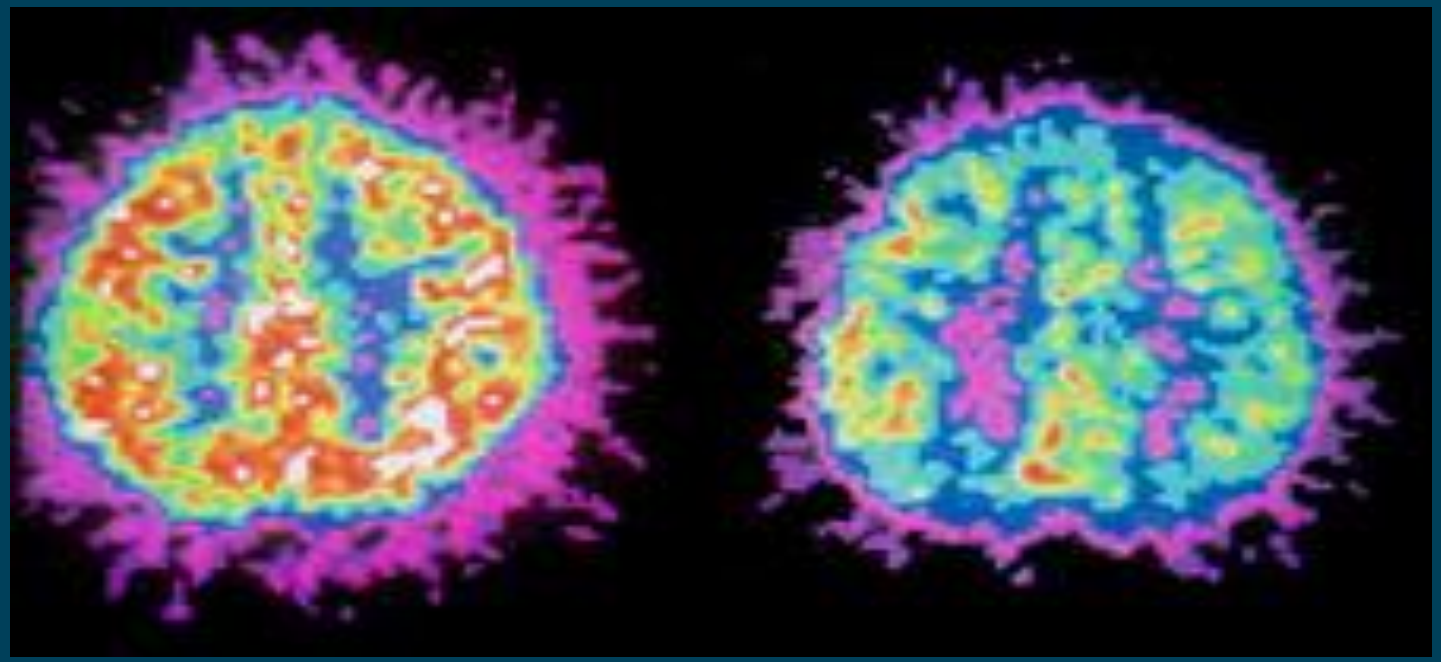
# Neuroimaging and ADHD

## Positron-emission tomography (PET) Scanning

**No ADHD** **ADHD**



Zametkin, et al. *N Engl J Med.* 1990;323:1361-1366.

# ADHD MISINFORMATION (1)


- The above noted review letter that was published in the Province paper reveals that there is still much work to do with educating health care providers.
- In this edition, writers claim that ADHD is over diagnosed and that ADHD patients are being over medicated as prescription rates have increased up to 4% in the province. Actually prescription rate consistently approx. 4%

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# ADHD MISINFORMATION (2)

1. Netflix series “Take Your Pills”.
2. Marijuana and CBD oil – to be continued…

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# IN SUMMARY…

- Complex ADHD is more likely than Simple ADHD.
- ADHD is highly heritable.
- Majority of ADHD mainly due to low levels of DA and NE.
- ADHD is often a chronic condition, but generally improves with age.
- Anxiety is a common comorbidity seen with ADHD. You have to really look for it though as younger ADHD patients don't complain about anxiety.
- Latest research is focused on emotional dysregulation and other other executive function skill deficits, as another part of ADHD.

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# ADHD

# + Sensory Processing Disorder (SPD)

# + Developmental Coordination Disorder (DCD)

Miranda Doherty, OT
Occupational Therapist

# Sensory Processing Disorder (SPD)

- previously Sensory Integration Dysfunction

- **impaired sensory processing which affects an individual's ability to engage in activities and environment** [1]

- SPD is **NOT** a recognized diagnosis in the DSM-5
- Many subtypes of SPD which need careful assessment

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# Prevalence of sensory processing problems

- Sensory symptoms estimated at 5-16% in general population [2, 3]
- Children with ADHD exhibit more sensory processing problems than children without ADHD [4, 5]

- **Tactile and auditory** are the most common sensitivities found with ADHD[6]
- Sensory modulation dysfunction highly correlated with ADHD[7]

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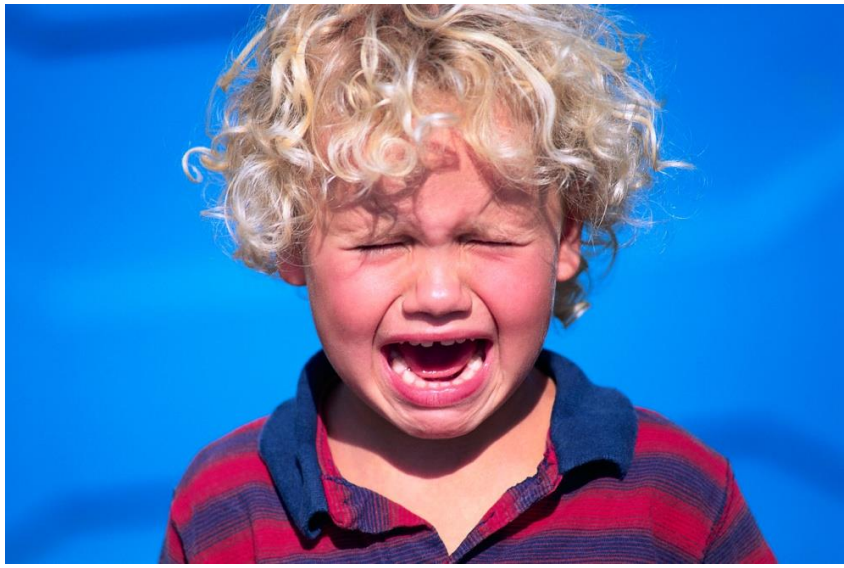
# Sensory Modulation Disorder (SMD)[8]



- **SMD is one pattern of SPD**
- **<u>3 Subtypes:</u>**

1. **Sensory Over Responsiveness (SOR) =** Predisposition to respond too much, too soon, or for too long to sensory stimuli
2. **Sensory Under Responsiveness (SUR) =** Predisposition to be unaware of sensory stimuli, to have a delay before responding, responses are muted
3. **Sensory Craving (SC) =** Driven to obtain sensory stimulation

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# Screening for Sensory Processing Difficulties

1. Sensory sensitivities or craving behaviours **impact a child's functioning** in every day activities.

2. Sensory responses are **extreme compared to peers**

3. Check Red Flags for SPD (next slide)

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# SPD Red Flags (school-aged)[9]

____ Over-sensitive to touch, noise, smells, other people

____ Easily distracted, fidgety, craves movement; aggressive

____ Easily overwhelmed

____ Difficulty with handwriting or motor activities

____ Difficulty making friends

____ Unaware of pain and/or other people

**Look at underlying reason for behavior**

**Refer to OT**

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# SPD Resources

- **SPD Foundation**
- **Star Institute**

- **Children's Hospital of Eastern Ontario (CHEO)** Resources and Support - Sensory Processing Disorder
- **Sensory motor self-regulation** programs have shown some benefit (e.g. Alert program)

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# Developmental Coordination Disorder (DCD)

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# Developmental Coordination Disorder (DCD)

- neurodevelopmental disorder
- difficulty in **performing and learning** coordinated motor skills
- significantly impacts daily life activities [10]
- Worldwide prevalence of DCD~5-6% of school-age children[11]
- 2-7x more common in males than females
- ~35-50% of children with DCD have ADHD [12, 13, 14]
- ~50% of children with ADHD have DCD [15]

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# Key characteristics of DCD[16]

**Difficulty with handwriting / printing / copying**

**Delay in developing certain motor skills**

**Difficulty coordinating both sides of the body**

**Poor balance or avoid activities requiring balance**

**Clumsiness or awkward – bump, spill, knock things over**

**Difficulty learning new motor skills**

**Difficulty with activities requiring constant change in body position**

**Difficulty with gross or fine motor, or both**

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# DCD Screening

- "LISTENING for DCD Interview Guide" (at canchild.ca)[17]
- "Blank Interview Guide" (at canchild.ca)[18]

- DCDQ https://www.dcdq.ca/

- **Refer to OT** for formal assessment
  - Through the school
  - CAOT Find an OT **https://www.caot.ca/site/findot**

# How to formally assess for DCD…[19]

- A thorough medical and developmental history
- Clinical examination
- Motor testing
- Questionnaires
- Discussion with the child and key individuals regarding the impact of the child's motor skills on daily living skills, school, leisure and participation

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# DSM-5 Criteria - Developmental Coordination Disorder [10]:

A. Acquisition and execution of coordinated motor skills are **substantially below what would be expected given the child's age and opportunity** for skill learning and use. Difficulties may be seen as clumsiness, inaccuracy, or slowness of performance of motor skills (e.g., catching a ball, using scissors, printing or handwriting, riding a bicycle, or participating in sports). **(OT)**

B. The motor skills deficit **significantly and persistently interferes** with activities of daily living and impacts school productivity, vocational skills, leisure activities, and play. **(OT)**

C. The **onset of symptoms** is in the early developmental period. **(OT/Physician)**

D. The motor skills deficit is **not better explained by** intellectual disability, visual impairment, or a neurological or medical condition affecting movement. **(Physician)**

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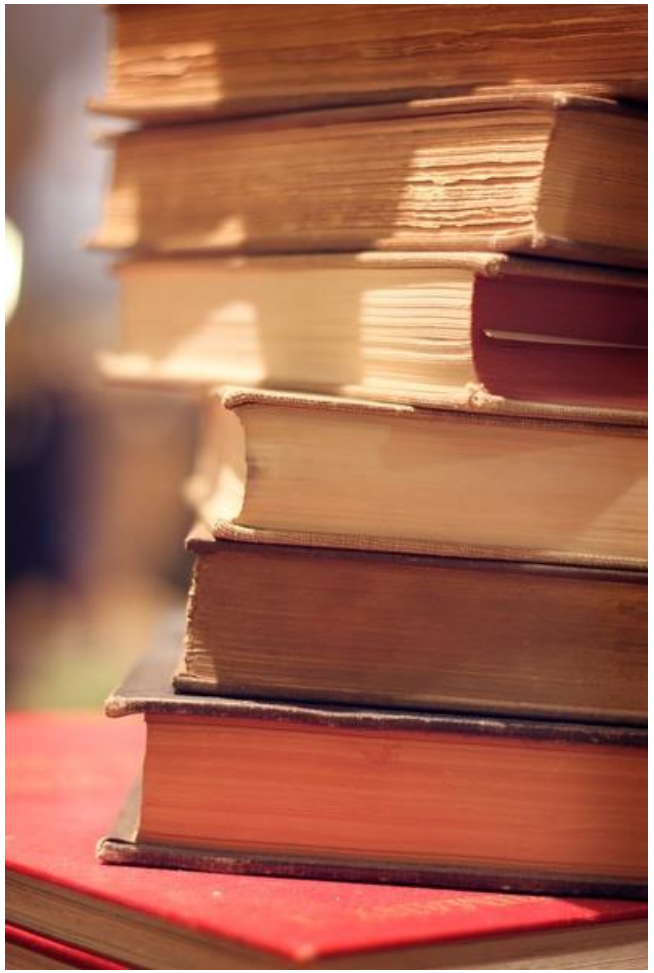
# More on DCD



- Physician training – MacHealth DCD workshop for Physicians
- Management of Development Coordination Disorder (AACPDM)
- McMaster CanChild website DCD
- CAOT DCD Advocacy Toolkit
- 14$^{th}$ International Developmental Coordination Disorder Conference in Vancouver, B.C. July 6-9, 2022 https://dcd14.osot.ubc.ca/

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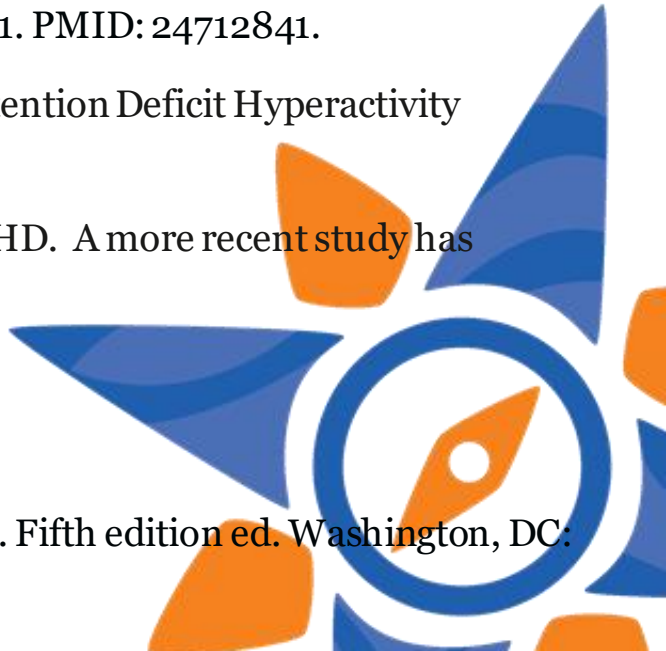

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