Focus Your Attention on Adult ADHD

Current Trends, Diagnosis, and Treatment

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Associate Professor, University of Nevada, Reno School of Medicine PA Studies Program

Objectives

- Discuss the current trends in incidence and prevalence of Adult ADHD in the U.S.
- Diagnose adults with ADHD using clinical history, screening tools, and the DSM-5 TR.
- Apply current treatment recommendations for adults with ADHD in clinical practice.

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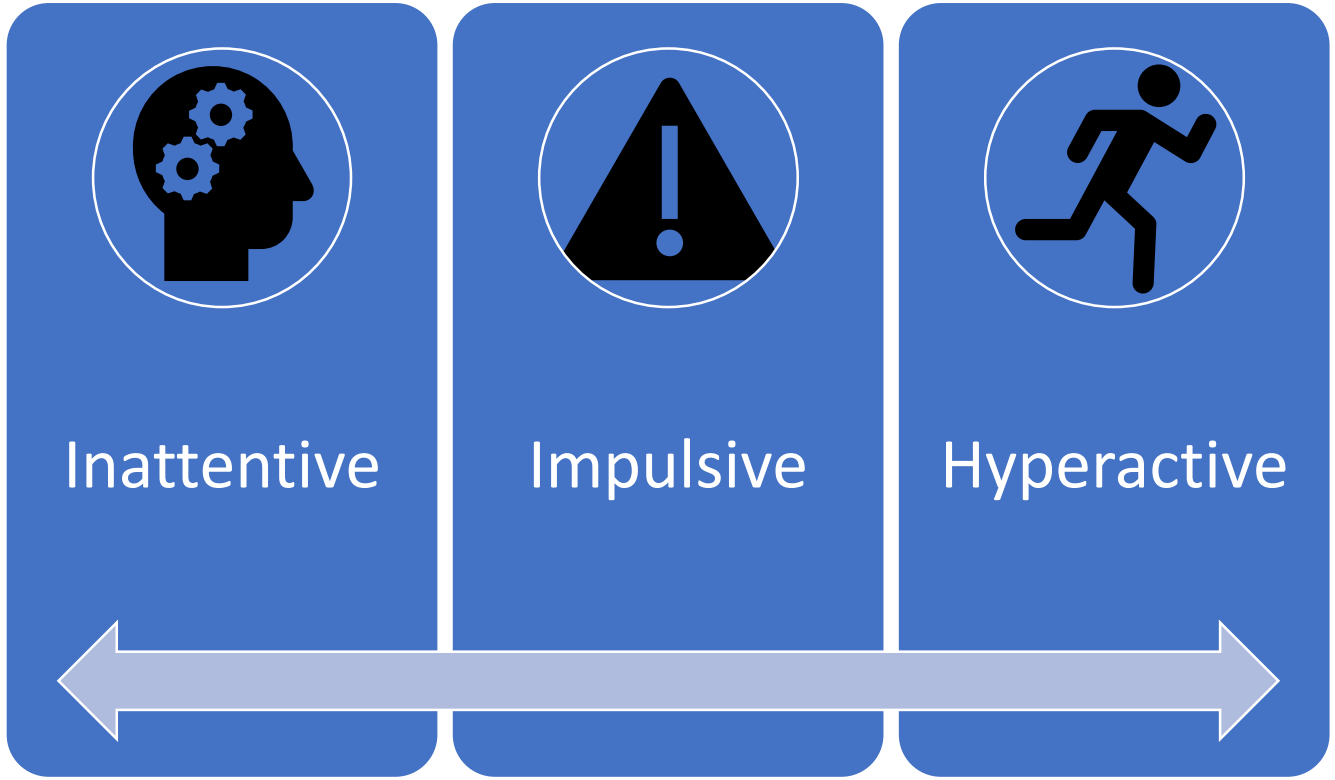
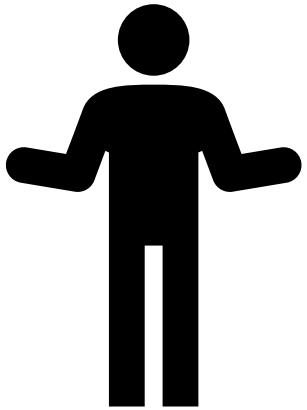
What is ADHD

- Attention Deficit Hyperactivity Disorder
- Most often identified in school-aged children





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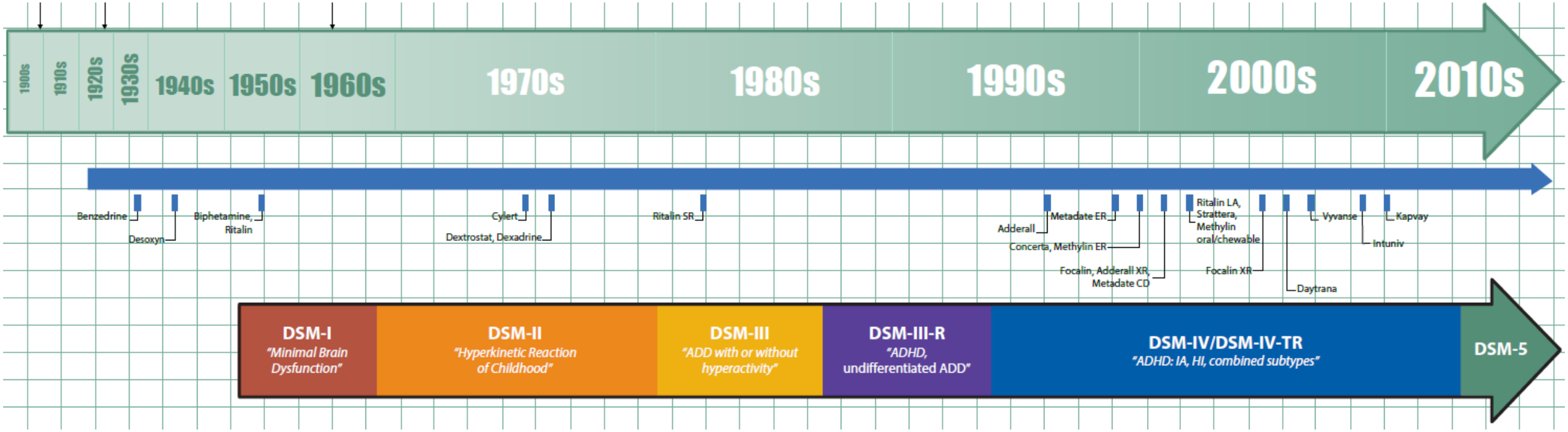
History of ADHD



https://www.cdc.gov/ncbddd/adhd/timeline.html

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Case Study (Circa 1987)

- A 7-year-old girl comes to her pediatrician with her mother who states that she is having difficulty in school. Her standardized reading and math scores are well below average for her age group. Her teacher says she is a good student, but often catches her staring out the window during instruction. The pediatrician refers her for IQ testing, vision and hearing testing, and neurocognitive evaluation.
- Results: Auditory Processing Disorder, Vision/Hearing/IQ testing all within appropriate age-range and levels
- Recommendations: Quiet room with carpet, sit in the front of the classroom

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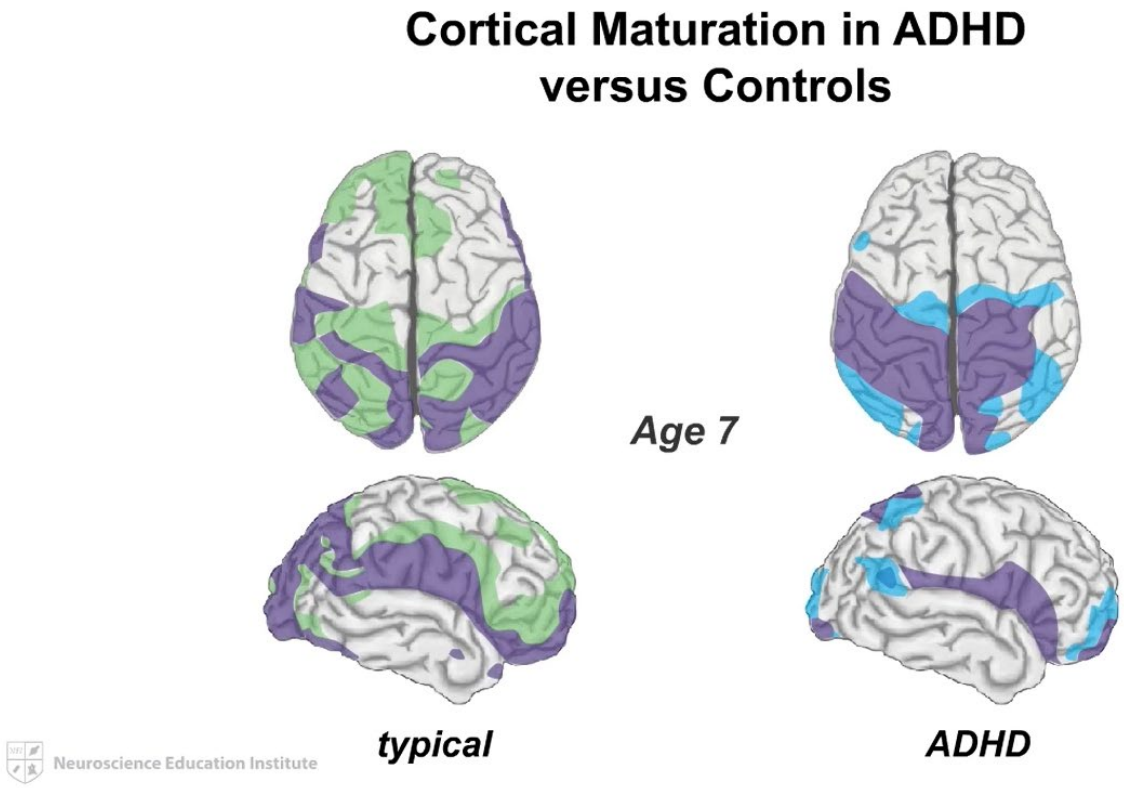
Brain Maturation Theory



- Delay in brain maturation by about 3 years
- Prefrontal cortex (PFC) delayed, primary motor cortex develops earlier
- Cortical connectivity between key areas in the brain are dysregulated
- Inability to ignore irrelevant sensory stimuli

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Developmental Trajectories of the ADHD Brain, *Neuroscience Education Institute* https://www.neiglobal.com/Members/MPP/MPPDisplay/tabid/306/action/case/args/CT_AT-MOA-22-05/Default.aspx

Case Study (Circa 1990)

- Now 10 years old, the child is catching up in school, but continues to have trouble completing work, has missing assignments, and makes careless mistakes. She also struggles to keep her room clean and often loses items. Her mother states, “she is a procrastinator,” but helps keep her on task so she continues to do well in school.

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DSM-5-TR Criteria for ADHD

6 months

Inattention: ***Six or more symptoms of inattention for children up to age 16 years, or five or more for adolescents age 17 years and older and adults;***

1. Often fails to give close attention to details or makes careless mistakes in schoolwork, at work, or with other activities.
2. Often has trouble holding attention on tasks or play activities.
3. Often does not seem to listen when spoken to directly.
4. Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (e.g., loses focus, side-tracked).
5. Often has trouble organizing tasks and activities.
6. Often avoids, dislikes, or is reluctant to do tasks that require mental effort over a long period of time (such as schoolwork or homework).
7. Often loses things necessary for tasks and activities (e.g. school materials, pencils, books, tools, wallets, keys, paperwork, eyeglasses, mobile telephones).
8. Is often easily distracted
9. Is often forgetful in daily activities.

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American Psychiatric Association. Attention Deficit/Hyperactivity Disorder. *Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR).* 5th ed., rev. Arlington VA: American Psychiatric Publishing; 2022.

DSM-5-TR Criteria for ADHD

6 months

Hyperactivity and Impulsivity: ***Six or more symptoms of hyperactivity-impulsivity for children up to age 16 years, or five or more for adolescents age 17 years and older and adults;***

1. Often fidgets with or taps hands or feet, or squirms in seat.
2. Often leaves seat in situations when remaining seated is expected.
3. Often runs about or climbs in situations where it is not appropriate (adolescents or adults may be limited to feeling restless).
4. Often unable to play or take part in leisure activities quietly.
5. Is often “on the go” acting as if “driven by a motor”.
6. Often talks excessively.
7. Often blurts out an answer before a question has been completed.
8. Often has trouble waiting their turn.
9. Often interrupts or intrudes on others

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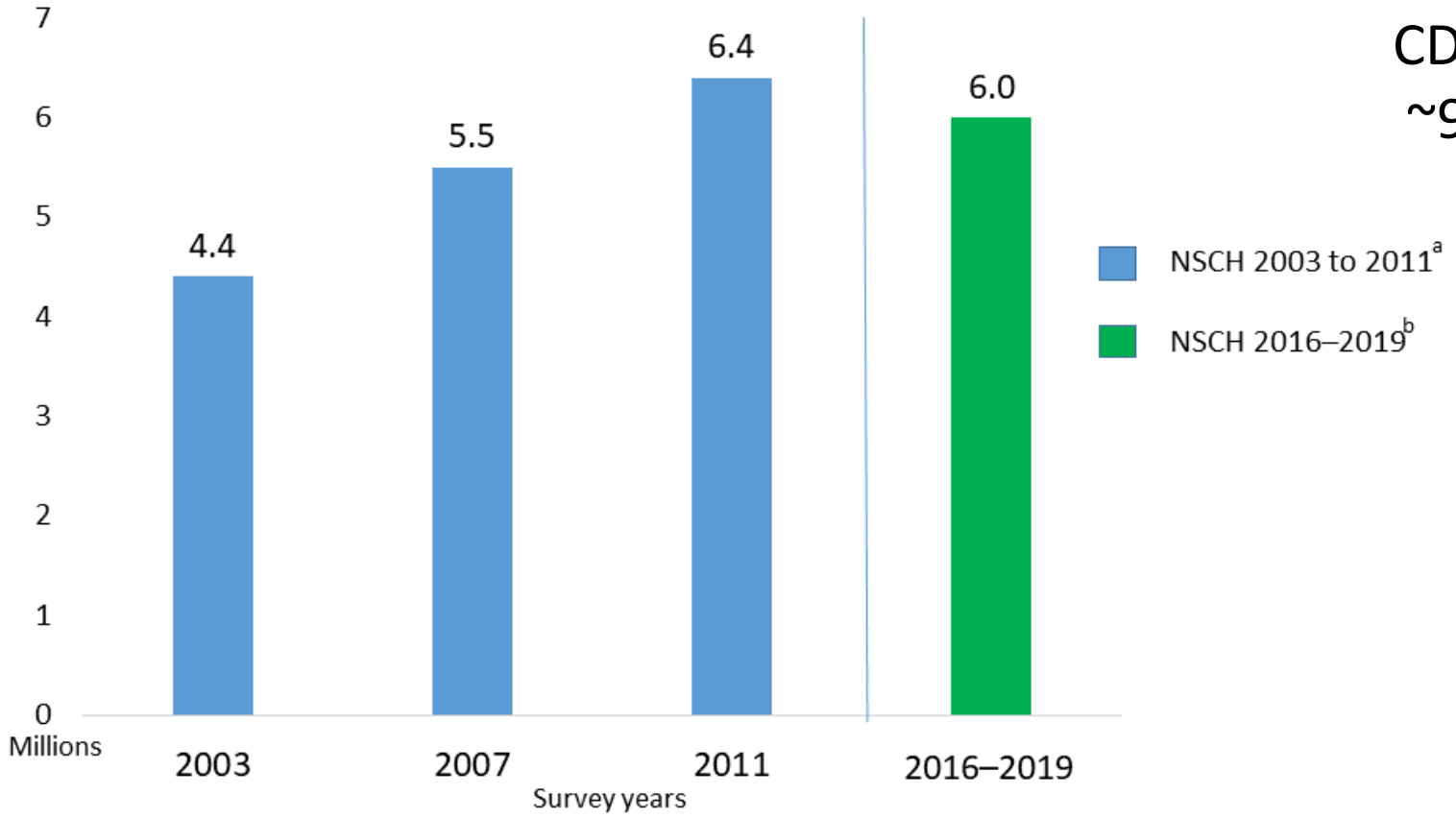
American Psychiatric Association. Attention Deficit/Hyperactivity Disorder. *Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR).* 5th ed., rev. Arlington VA: American Psychiatric Publishing; 2022.

ADHD is Common

Estimated number of U.S. children ages 3–17 years who ever had a diagnosis of ADHD,[1] in millions



CDC prevalence estimates:
~9.8% of children

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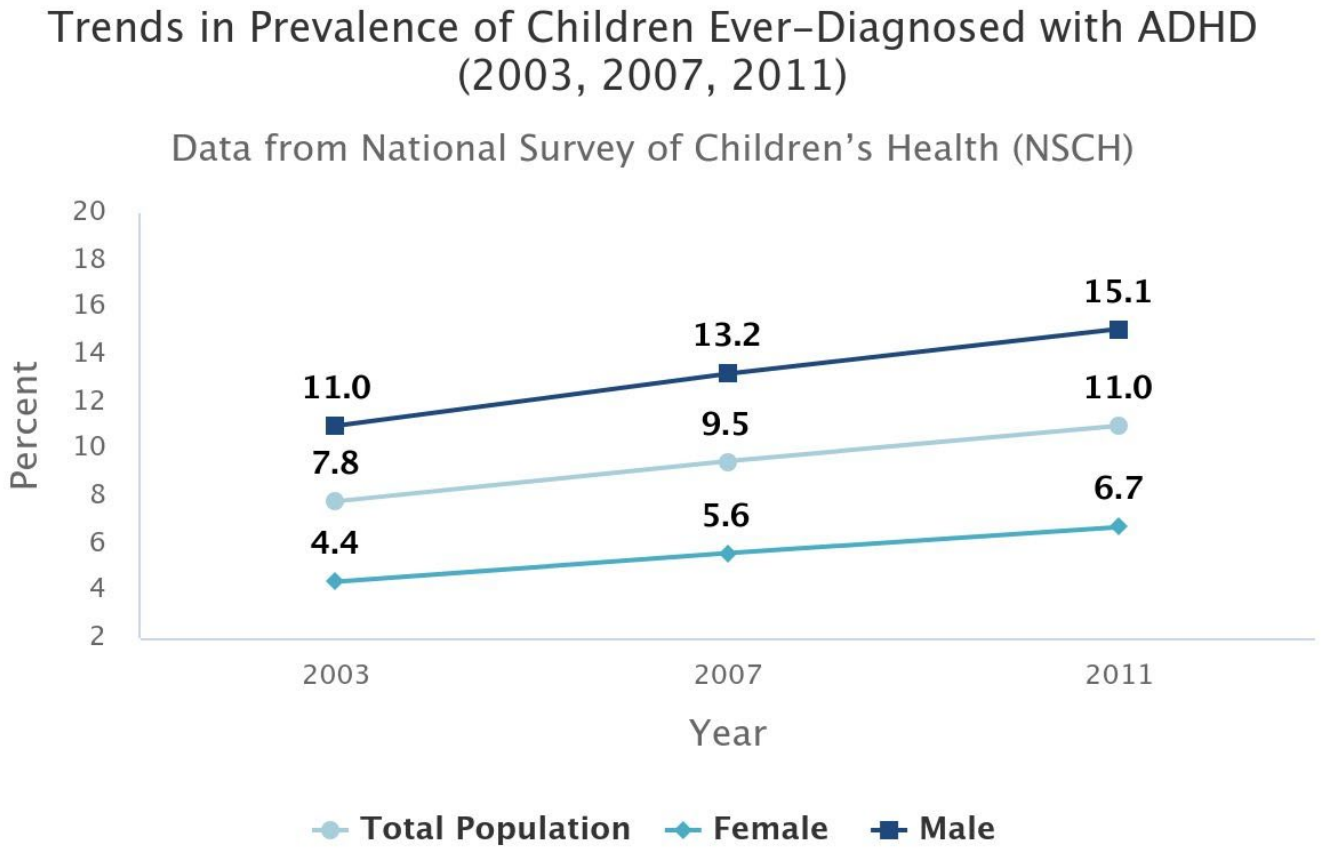
[a] **NSCH 2003 to 2011:** National Survey of Children's Health (NSCH), telephone survey data, information collected every 4 years.
[b] **NSCH 2016 to 2019:** Redesigned as an online and mail survey, information collected annually

National Trends in Children



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https://www.nimh.nih.gov/health/statistics/attention-deficit-hyperactivity-disorder-adhd

Case Study (Circa 1996)

- Now a Junior in college. She is experiencing symptoms of depression and anxiety, mixed with episodes of emotional dysregulation. She has had periods of disordered eating, binging and purging. She is regularly using alcohol and occasional marijuana which she feels helps her anxiety. After an episode of staying up for several nights in a row, cramming for finals, she presented to the Student Health Clinic where she was diagnosed with Depression and Bipolar Disorder.

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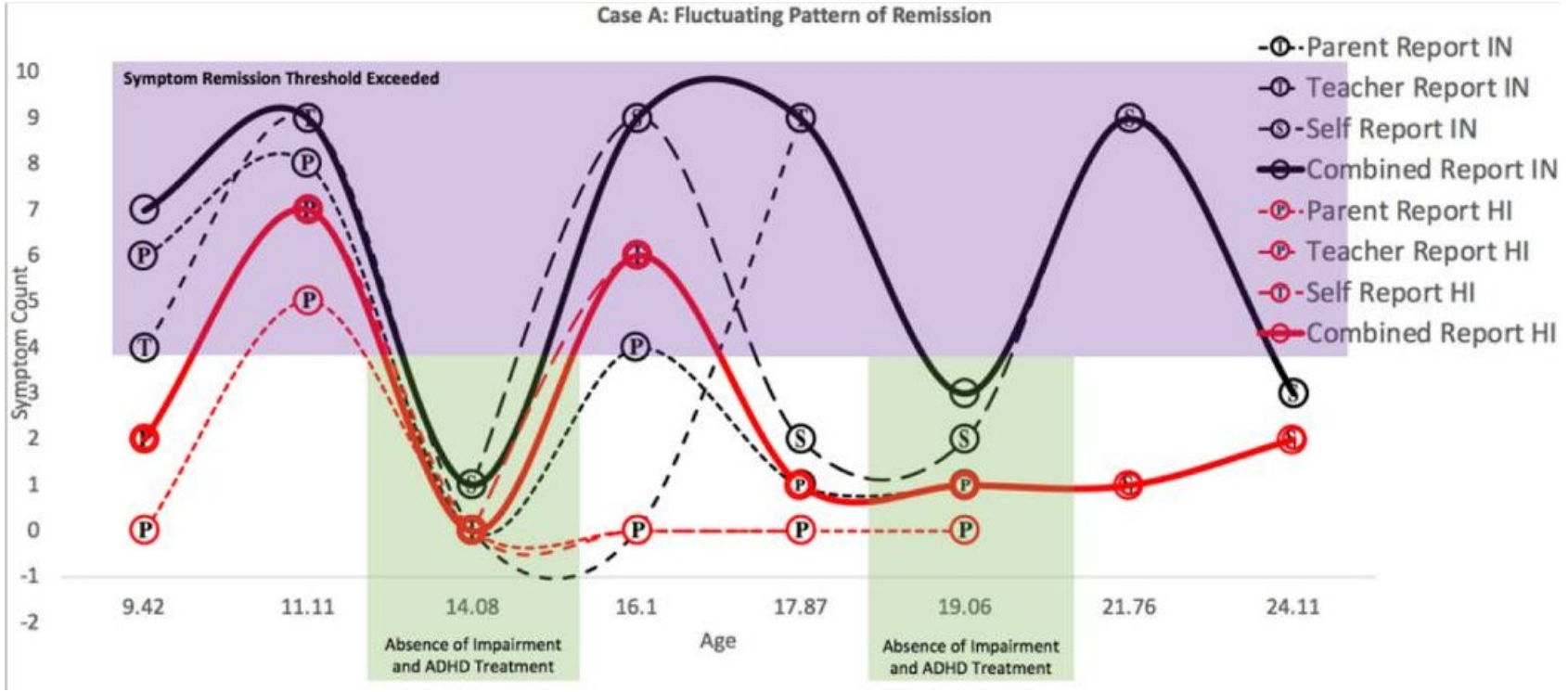
Do we grow out of ADHD?



- 90% of children with ADHD will experience symptoms into adulthood
- ~10% have persistent symptoms, but are stable
- ~15% have partial remission of symptoms
- ~65% have fluctuating symptoms and remission

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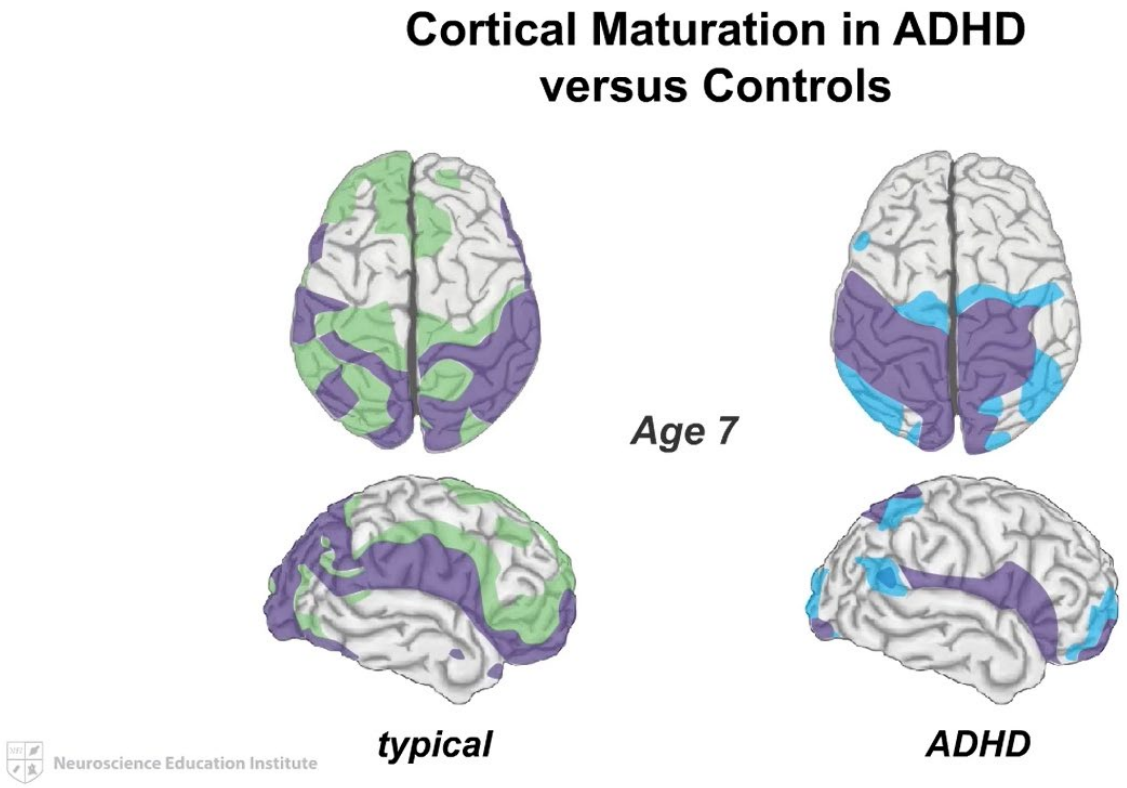
Sibley MH, Arnold LE, Swanson JM, et al. Variable Patterns of Remission From ADHD in the Multimodal Treatment Study of ADHD. *Am J Psychiatry*. 2022;179(2):142-151. doi:10.1176/appi.ajp.2021.21010032

Brain Maturation Theory



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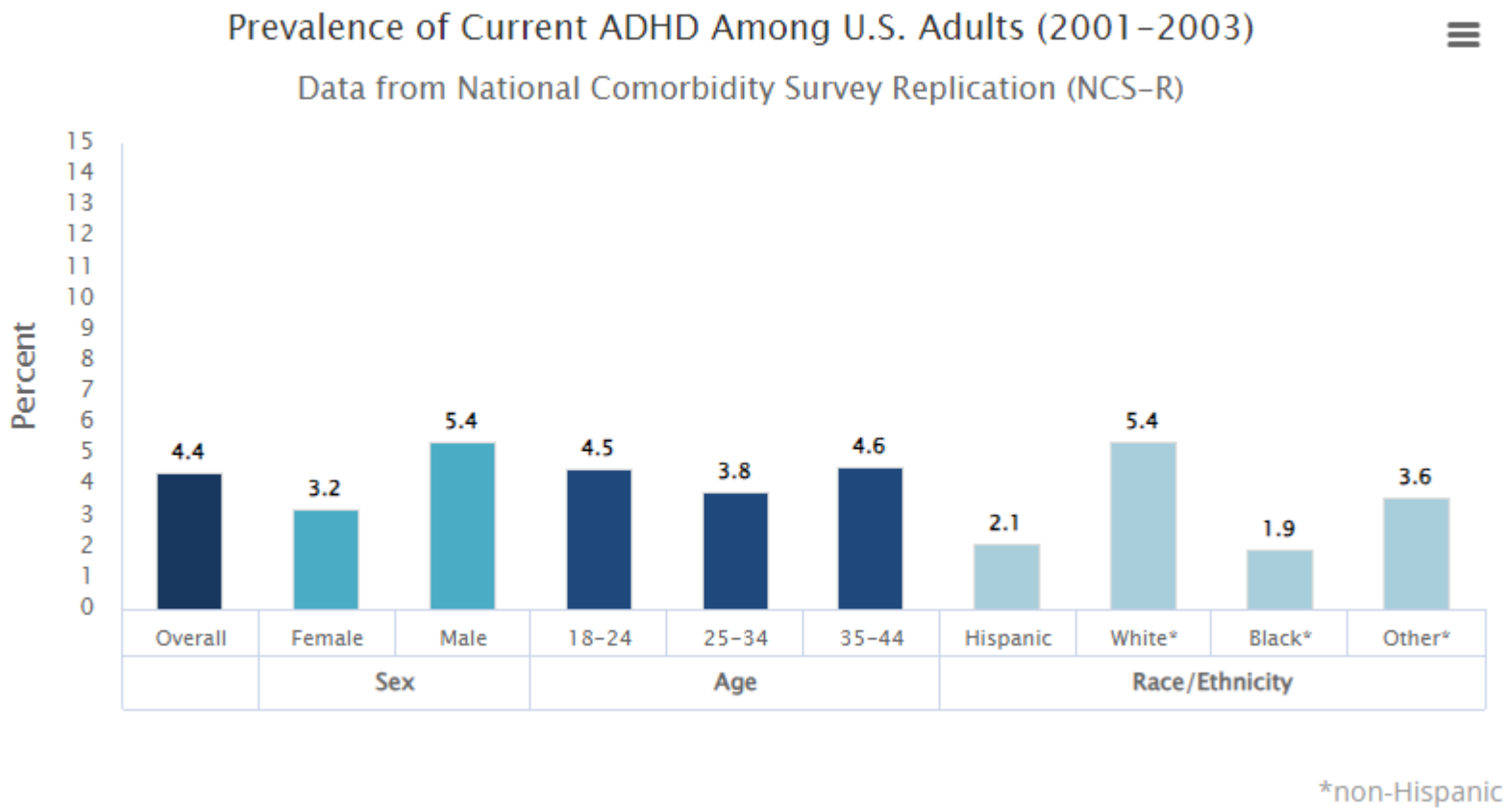
Adult ADHD Prevalence 2001-2003



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https://www.nimh.nih.gov/health/statistics/attention-deficit-hyperactivity-disorder-adhd

Data from 2022 study

- An estimated 8.7 million **(3%)** adults in the U.S. have ADHD[1]
- Approximately 2.6% (139.8 million) of adults worldwide have persistent ADHD from childhood, which includes individuals who experienced childhood onset paired with continued ADHD symptoms into adulthood[2]
- An estimated 35% to 78% of children diagnosed with ADHD maintain symptoms as an adult[1]

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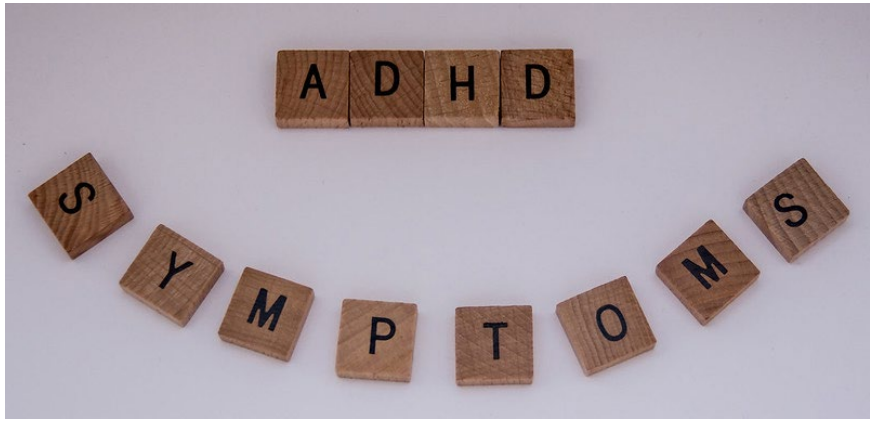
1. Schein J, Adler LA, Childress A, et al. Economic burden of attention-deficit/hyperactivity disorder among adults in the United States: a societal perspective. Journal of Managed Care Specialty Pharmacy. 2022;28(2):168–179.
2. Song P, Zha M, Yang Q, et al. The prevalence of adult attention-deficit hyperactivity disorder: A global systematic review and meta-analysis. Journal of Global Health. 2021;11:04009.

What am I seeing in my office that might be ADHD?

>50% of adults with ADHD have at least one comorbid psychiatric condition

- Major Depressive Disorder
- Substance Use Disorder
- Anxiety Disorder
- Developmental Disorder
- Bipolar Disorder (remember our case)



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Ohnishi T, Kobayashi H, Yajima T, Koyama T, Noguchi K. Psychiatric Comorbidities in Adult Attention-deficit/Hyperactivity Disorder: Prevalence and Patterns in the Routine Clinical Setting. *Innov Clin Neurosci*. 2019;16(9-10):11-16.

Case Study (Circa 2013)

- Now married with a 2-year-old child, she is grappling with going back to work full time. She is having trouble keeping up with chores. She is missing appointments and deadlines, and reports emotional distress. She has been in therapy for several years on and off. Her therapist recommends she see a psychiatrist to be evaluated for ADHD.

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How is the adult different?

Inattentive Symptoms That Can Manifest Differently With Age

Childhood	Adolescence	Adulthood
Doesn't follow through on instructions, doesn't complete homework/chores	Trouble completing long-term assignments	Starts task without reviewing instructions, poor follow-through on commitments, inefficient at work
Cannot organize	Trouble keeping track of work for multiple classes	Poor time and money management, trouble doing things in proper order
Easily distracted, appears not to listen	Appears not to listen, poor driving	Appears not to listen, poor driving
Forgets to do things, forgets lunch	Forgets homework, misses appointments	Misses appointments or deadlines

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Stahl SM, Mignon L. Stahl's Illustrated Attention Deficit Hyperactivity Disorder. Cambridge University Press; 2009; Stahl SM. Stahl's Essential Psychopharmacology. 4th ed. Cambridge University Press; 2013.

Differences (cont.)

Hyperactive-Impulsive Symptoms That Can Manifest Differently With Age

Childhood	Adolescence	Adulthood
Squirming, fidgeting, cannot stay seated	Fidgeting, internal restlessness	Internal restlessness, difficulty sitting through meetings
Runs/climbs excessively, "on the go"	Participates in multiple activities	Works more than one job and/or has a very active job
Blurts out answers	Impulsive decisions (eg, risky activities)	Impulsive decisions (eg, job changes)
Cannot wait in line	Cannot wait in line, drives too fast	Drives too fast
Intrudes/interrupts others	Interrupts others, easily frustrated	Interrupts others, easily frustrated

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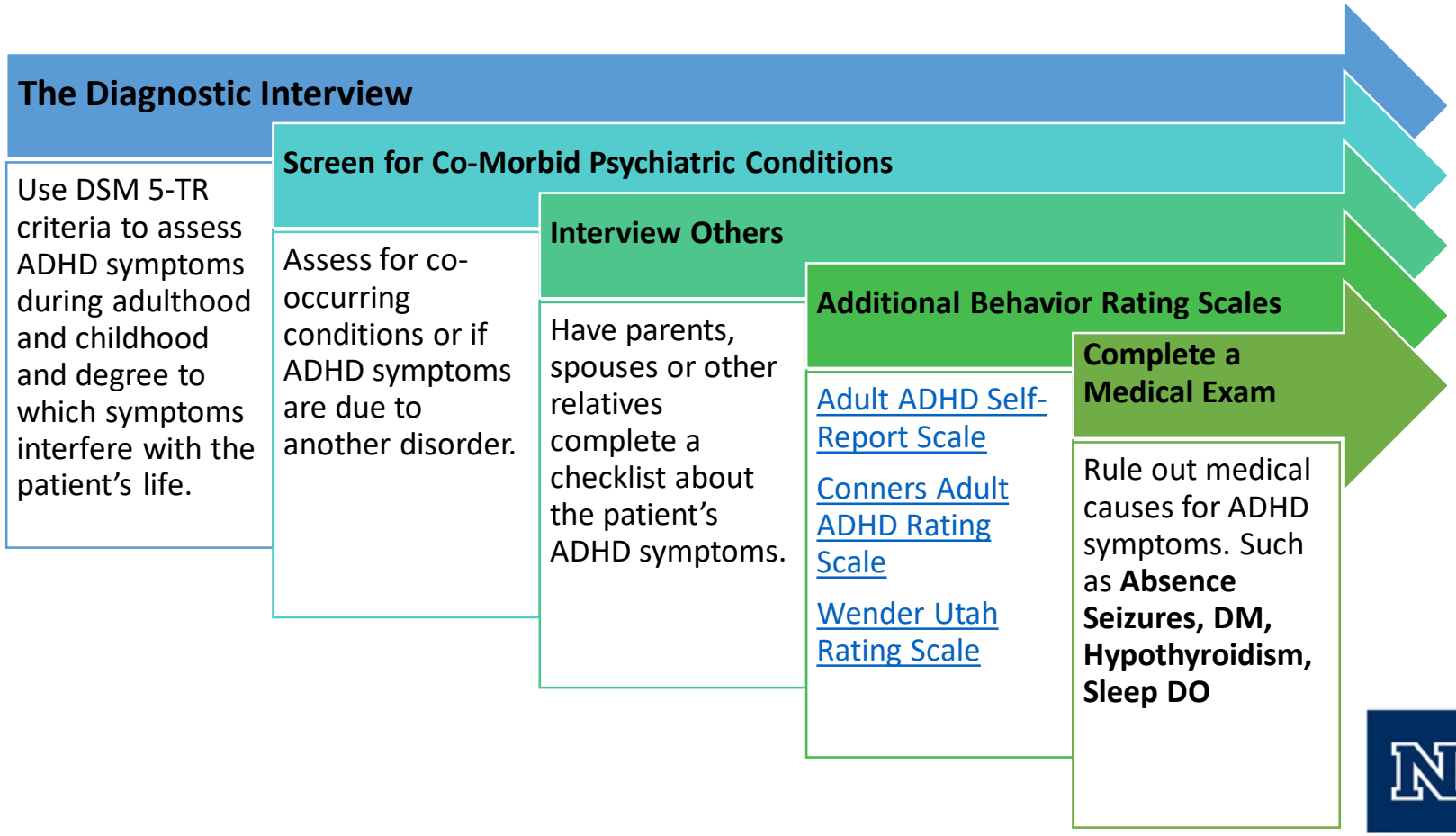
Overview of the Assessment for ADHD



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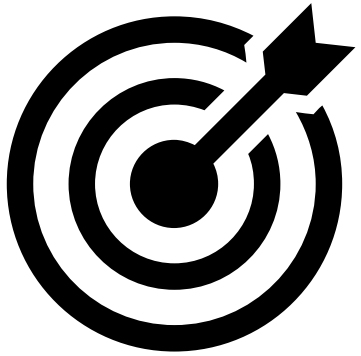
https://chadd.org/for-professionals/diagnosis-in-adults/

Rating Scales Used for ADHD in Adults vs. Children

Scales for children include:

- Vanderbilt scales
- Conners scales
- ADHD Rating Scales (ADHD-RS-V)
- Swanson, Nolan and Pelham (SNAP) scale



Scales for adults include:

- Adult ADHD Self-Report Scale Symptom Checklist Version 1.1 (Adult ASRS)
- Conners Adult ADHD Rating Scales (CAARS)
- Wender Utah Rating Scale

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Case Study (Circa 2019)

- The patient is “hanging in there” at work and home and has another child. She is overwhelmed and working to support the family. Therapy sessions have dropped off due to lack of time. She is getting Adderall 10mg from her primary care provider and admits to using it twice daily and sometimes increases her dose to as much as 30mg at a time. She is sleeping 3-4 hours per night. She has lost 30 lbs. She bought a car she cannot afford. She admits to significant depression and anxiety. She has thoughts of suicide.

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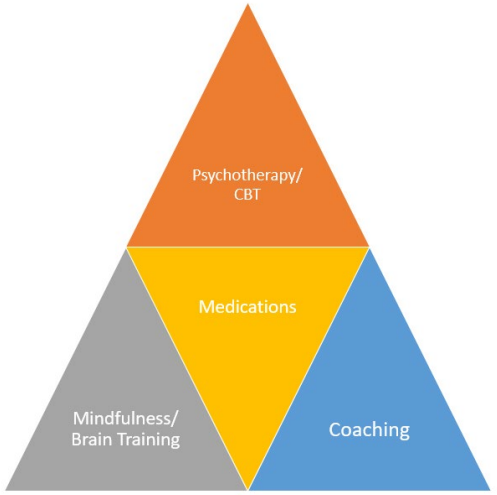
Treatment Strategies for ADHD



Multi-Modal Approach

- **Psychotherapy**
  - Cognitive Behavioral Therapy – Helpful for co-existing conditions such as substance abuse, anxiety, and depression
  - Mindfulness Training – Helpful for sleep, anxiety, and emotional regulation
  - Coaching – Helpful for organization, time management, and impulse control skill building
  - Digital Brain Training – Helpful for attention, memory, processing, cognitive flexibility
- **Pharmacotherapy**
  - Medication Choices (Stimulants vs. Nonstimulants)

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Pharmacology Lesson

- Norepinephrine (NE) and Dopamine (D) are key to “fine tuning” attention in the Prefrontal Cortex (PFC) for people with ADHD

Methylphenidate

Amphetamine

- **Stimulant medications**
- **Used in the treatment of ADHD**
- **Regulate the activity of dopamine and norepinephrine**

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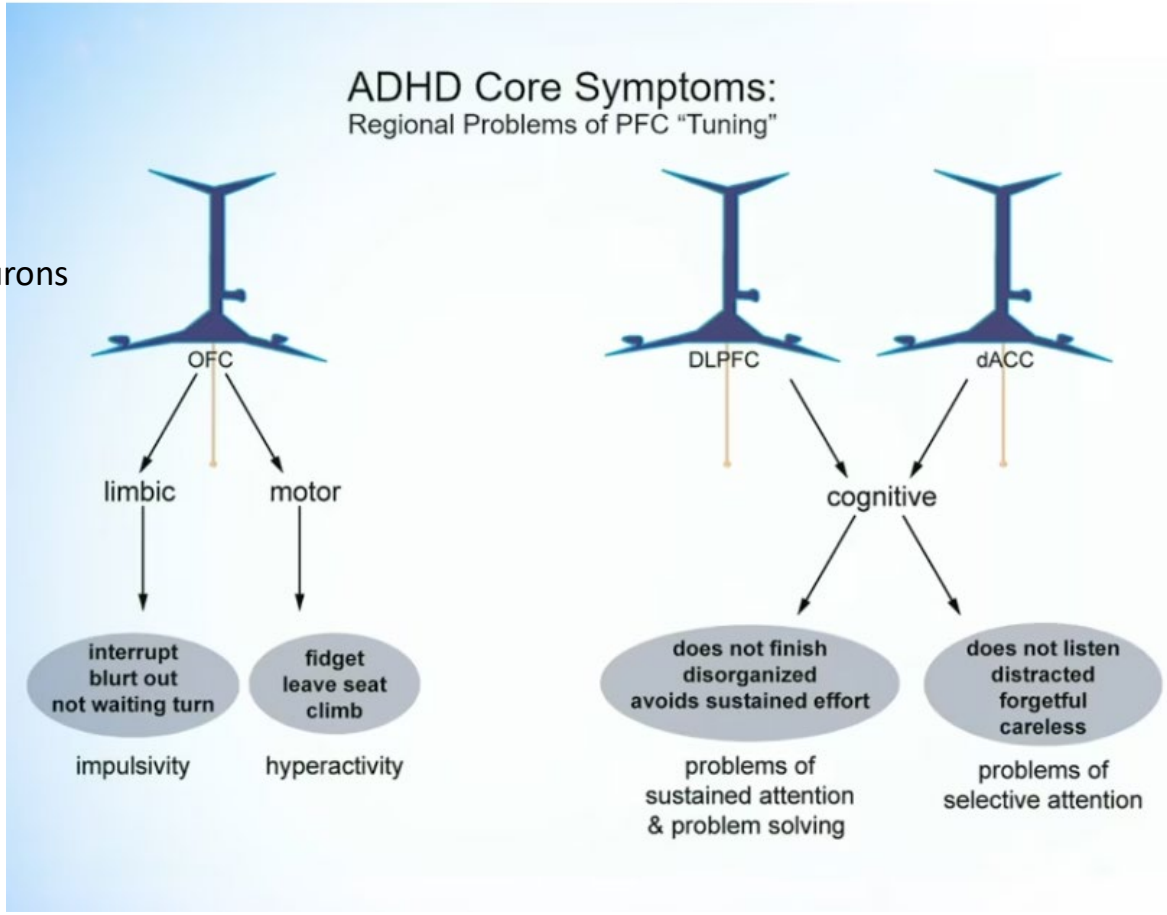
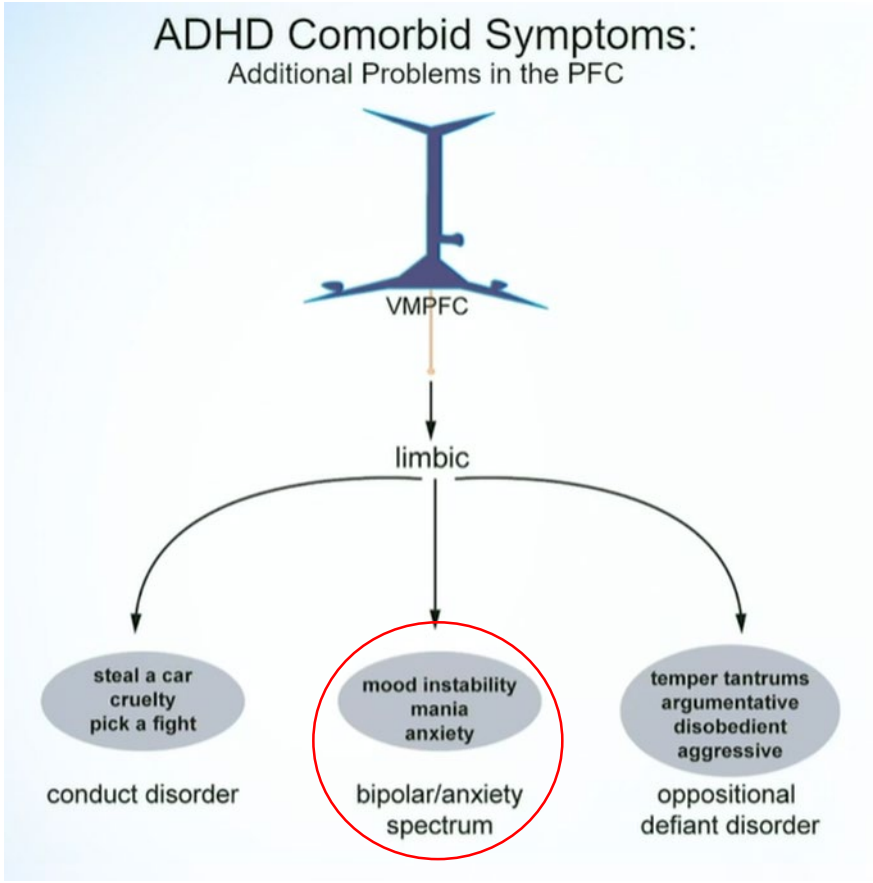
Tuning the ADHD Brain

Pyramidal Neurons

System

Symptom





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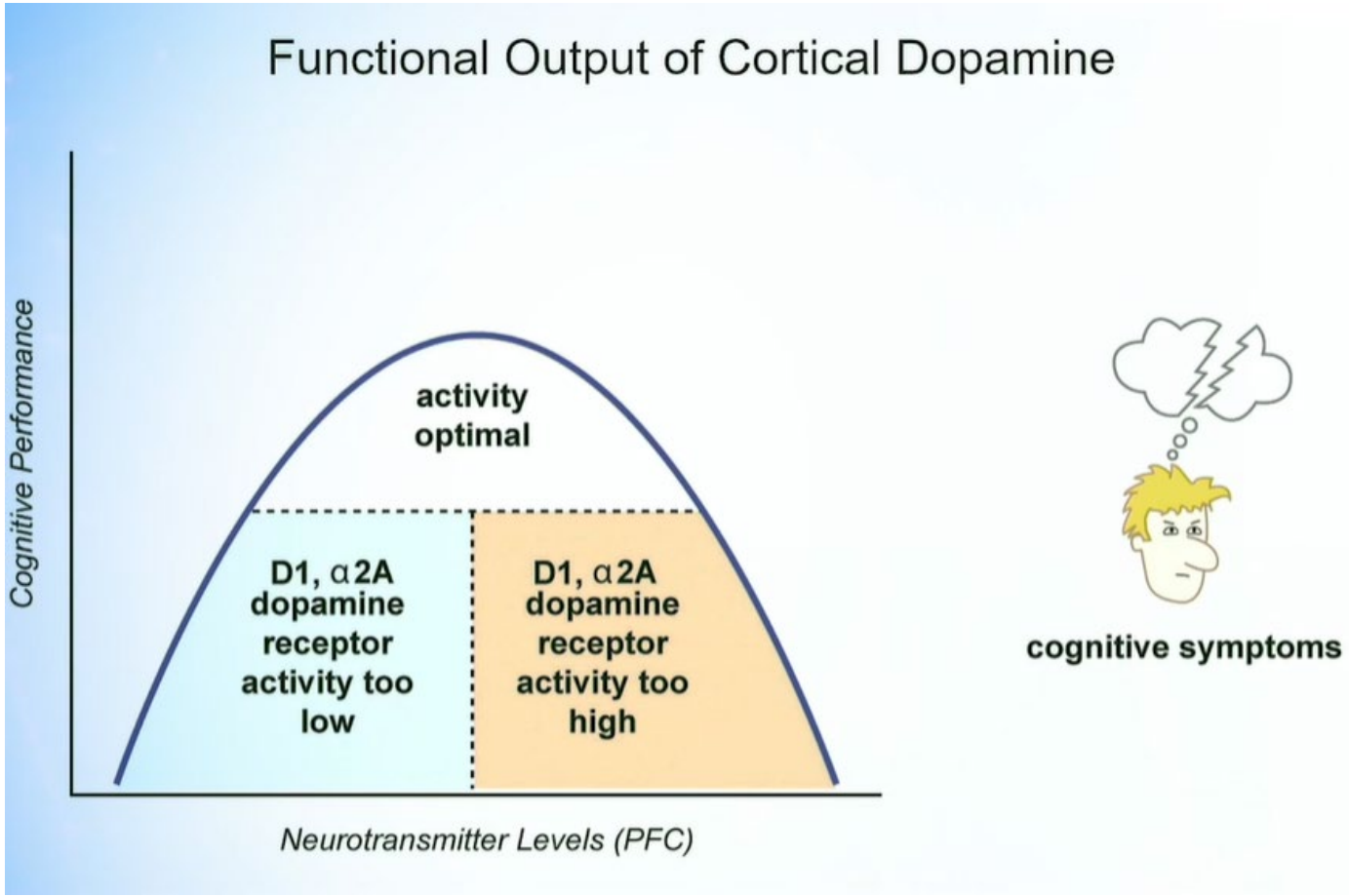
Affects of Dopamine and Norepinephrine



cognitive symptoms

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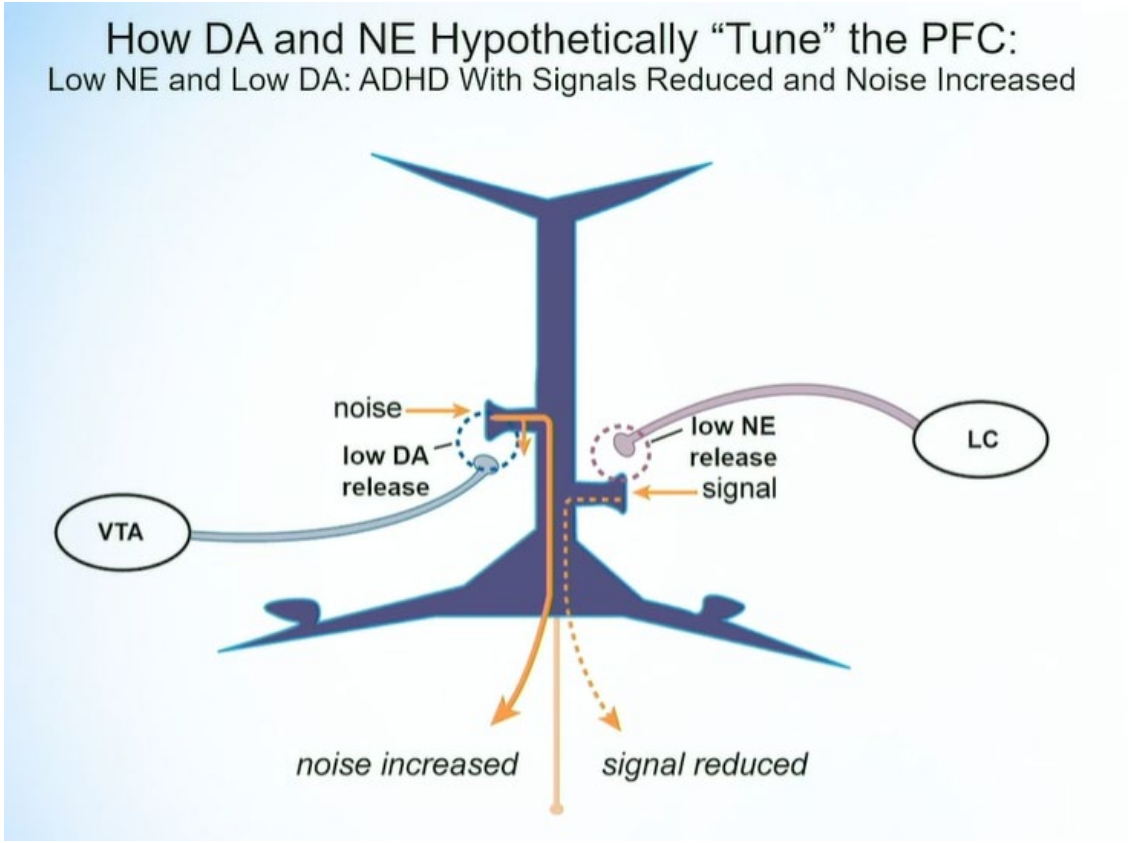
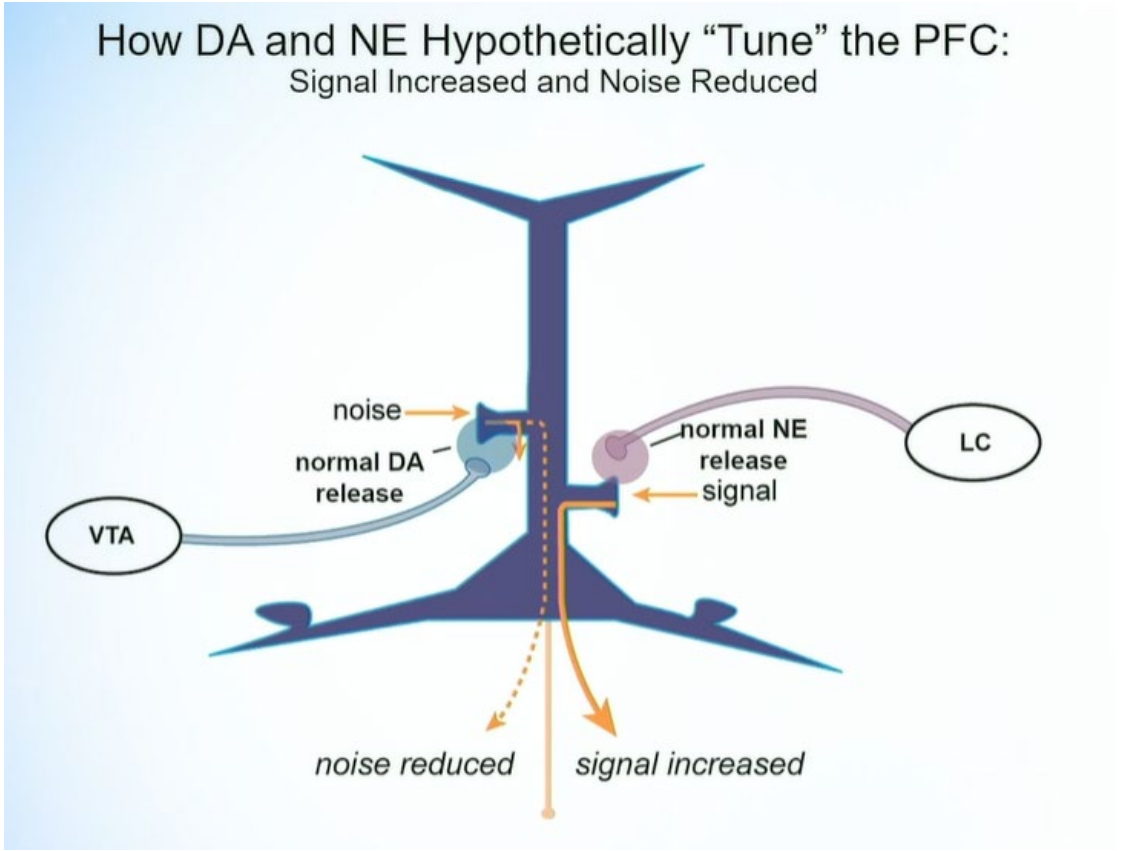
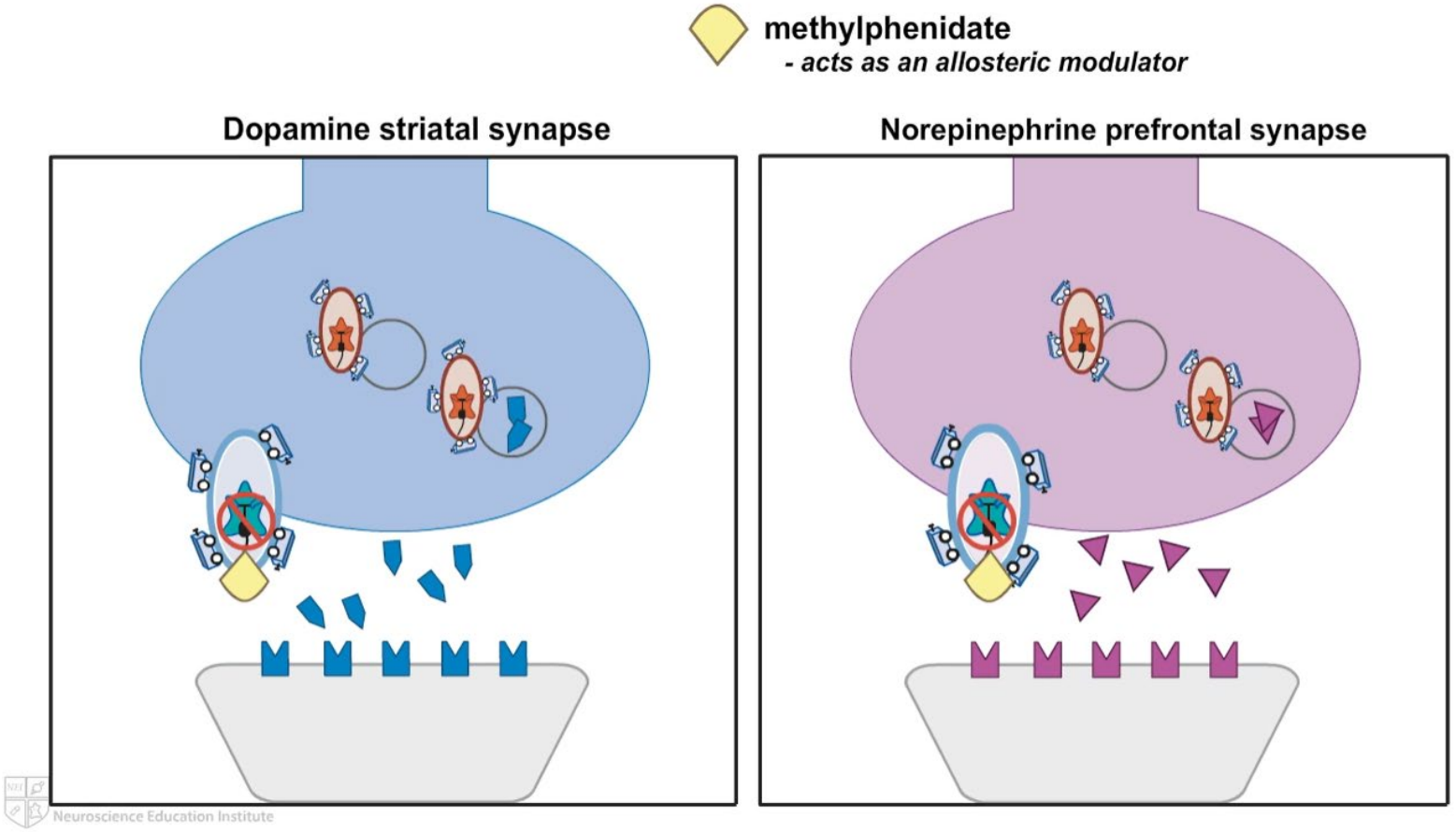
Tuning improves proper signaling in ADHD





Methylphenidate



Methylphenidate is a reuptake inhibitor which allows modulated levels of D and NE to stay in the synaptic cleft where they can be used for tuning in the PFC

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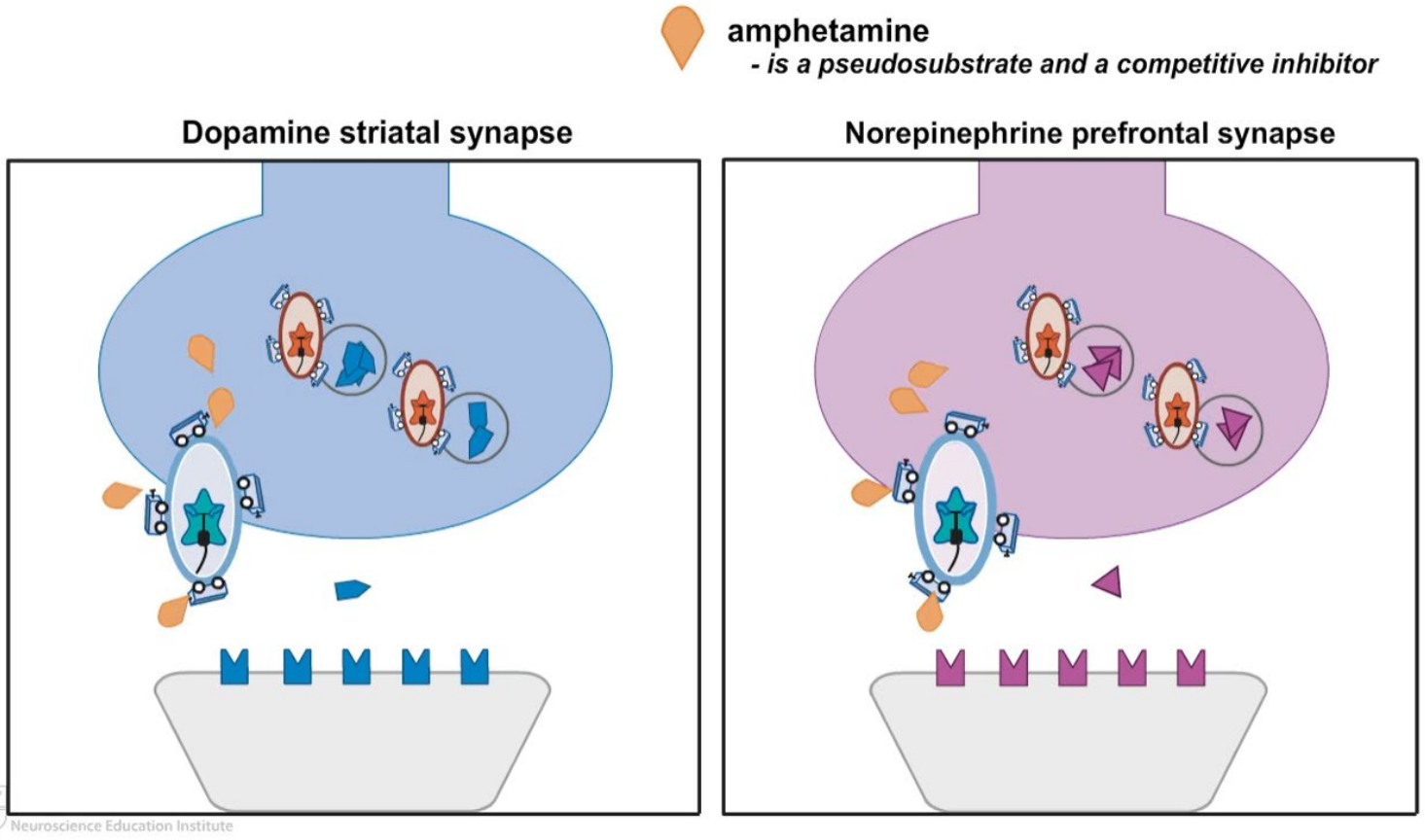
Amphetamine



Amphetamine is a pseudosubstrate and competitive inhibitor. Because is a pseudosubstrate, it will enter the synapse and be stored in the vesicles for later release. Low doses and long acting formulations control the release of NE and D so that they can be used for “tuning” in the PFC.

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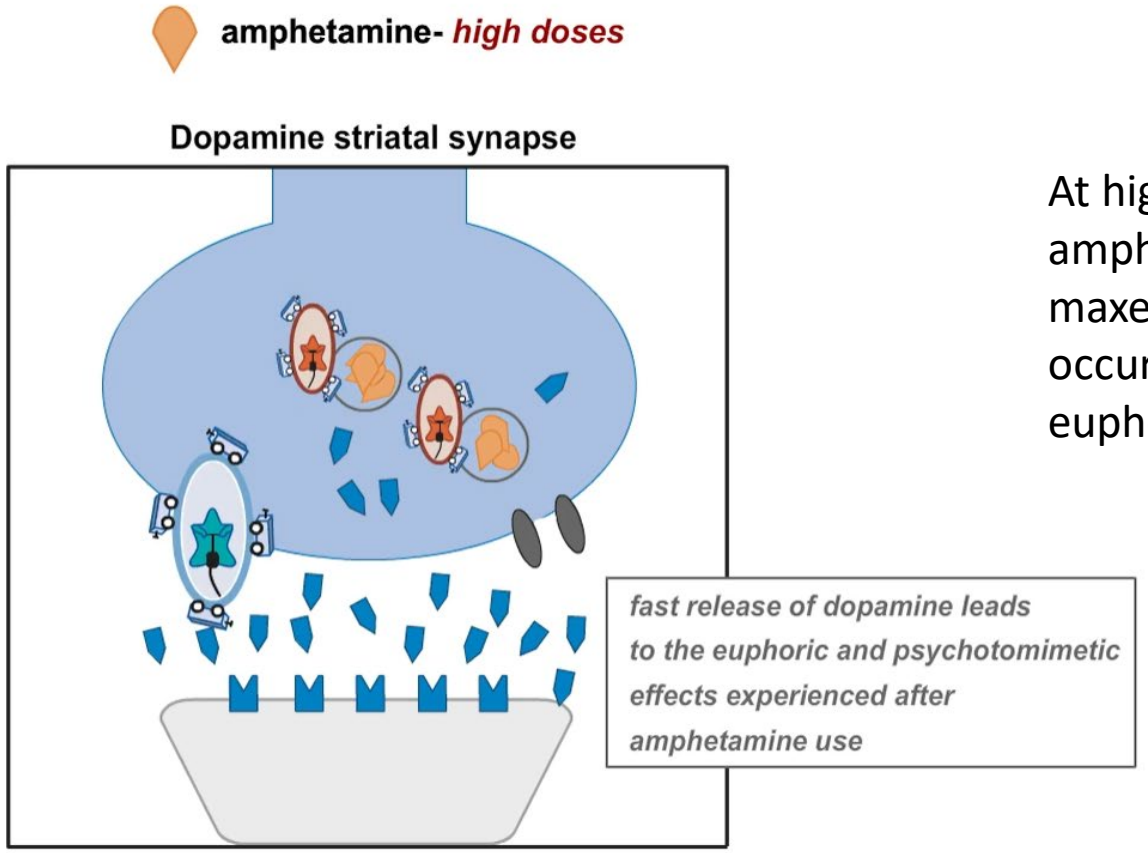
Amphetamine



At high doses of immediate release amphetamine the D is stored in the vesicles and maxed out. Once maxed out, a large release of D occurs, causing a euphoric effect. This can lead to euphoria and addiction.

Risk of Abuse

amphetamine- ADHD treatment doses

- clinical differences in the actions of amphetamine vs. methylphenidate can be relatively small

amphetamine- *high doses*

- additional pharmacologic actions of amphetamine are triggered
- linked to reinforcement, reward, euphoria, and continuing abuse

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Medications (Methylphenidate)

Class	Brand Name	Generic Name	Duration	Available Dosage Strengths
Methylphenidate	Adhansia XR™	methylphenidate hydrochloride - extended-release (capsule)	16 hours	25mg 35mg 45mg 55mg 70mg 85mg
	Azstarys™	serdexmethylphenidate and dexmethylphenidate (capsule)	10+ hours	26.1mg/5.2mg 39.2mg/7.8mg 52.3mg/10.4mg
	Aptensio XR™	methylphenidate hydrochloride - extended-release (capsule)	7–8 hours	10mg 15mg 20mg 30mg 40mg 50mg 60mg
	Concerta®	methylphenidate hydrochloride - extended-release (tablet)	10–12 hours	18mg 27mg 36mg 54mg
	Cotempla™XR-ODT	methylphenidate extended-release (orally disintegrating tablet)	8–12 hours	17.3mg
	Daytrana®	methylphenidate (transdermal patch)	10–12 hours	10mg 15mg 20mg 30mg
	Focalin®	dexmethylphenidate hydrochloride (tablet)	3–5 hours	2.5mg 5mg 10mg
	Focalin XR®	dexmethylphenidate hydrochloride - extended-release (capsule)	12 hours	5mg 10mg 15m 20mg 25m 30mg 35mg 40mg
	Jornay PM™	methylphenidate hydrochloride - extended-release (capsule)	12+ hours	20mg 40mg 60mg 80mg 100mg
	Metadate CD®	methylphenidate hydrochloride - extended-release (capsule)	8 hours	10mg 20mg 30mg 40mg 50mg 60mg
	Metadate® ER	methylphenidate hydrochloride - extended-release (tablet)	8–12 hours	20 mg
	Methylin® Chewable	methylphenidate hydrochloride (chewable tablet)	3-5 hours	2.5mg 5mg 10mg
	Methylin® ER	methylphenidate hydrochloride - extended-release (tablet)	8 hours	10mg 20mg
	Methylin® Oral Solution	methylphenidate hydrochloride (liquid)	3–5 hours	5mg/5ml 10mg/5ml
	QuilliChew ER™	methylphenidate hydrochloride - extended-release (chewable tablet)	8–12 hours	20mg 30mg 40mg
	Quillivant XR®	methylphenidate hydrochloride - extended-release (liquid)	8, 10, and 12 hours	25mg/5ml (5mg/ml)
	Ritalin®	methylphenidate hydrochloride (tablet)	3–5 hours	5mg 10mg 20mg
	Ritalin-SR®	methylphenidate hydrochloride - sustained-release (tablet)	7–8 hours	20mg
	Ritalin LA®	methylphenidate hydrochloride - extended-release (capsule)	8 hours	10mg 20mg 30mg 40mg 60mg

CHADD

Children and Adults with Attention Deficit/Hyperactivity Disorder (ADHD)

FDA Approved Medication List

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Medications (Amphetamine)

Class	Brand Name	Generic Name	Duration	Available Dosage Strengths
Amphetamine	Adderall ®	Amphetamine and dextroamphetamine mixed salts (tablet)	4–8 hours	5mg 7.5mg 10mg 12.5mg 15mg 20mg 30mg
	Adderall XR®	Amphetamine and dextroamphetamine mixed salts - extended-release (capsule)	8–12 hours	5mg 10mg 15mg 20mg 25mg 30mg
	Adzenys ER	amphetamine extended-release oral suspension (liquid)	9-12 hours	3.1mg/2.5ml 6.3mg/5ml 9.4mg/7.5ml 12.5mg/10ml 15.7mg/12.5ml 18.8mg/15ml
	Adzenys XR-ODT™	amphetamine extended-release (orally disintegrating tablet)	9–12 hours	3.1mg 6.3mg 9.4mg 12.5mg 15.7mg 18.8mg
	Desoxyn®	methamphetamine hydrochloride (tablet)	4-8 hours	5mg
	Dexedrine®	dextroamphetamine sulfate - extended-release (tablet)	6–9 hours	5mg 10mg 15mg
	Dyanavel® XR	amphetamine extended-release oral suspension (capsule)	8–12 hours	2.5mg/1ml 5mg/2ml 7.5mg/3ml 10mg/4ml 12.5mg/5ml 15mg/6ml 17.5mg/7ml 20mg/8ml
	Evekeo®	amphetamine sulfate (tablet)	4–6 hours	5mg 10mg
	Evekeo ODT ™	amphetamine sulfate - orally disintegrating (tablet)	4–6 hours	5mg 10mg 15mg 20mg
	Mydayis™	mixed salts of a single-entity amphetamine product - extended-release (capsule)	16 hours	12.5mg 25mg 37.5mg 50mg
	ProCentra®	dextroamphetamine sulfate (liquid)	4-8 hours	5mg/5ml
	Vyvanse®	lisdexamfetamine dimesylate (chewable tablet)	8-12 hours	10mg 20mg 30mg 40mg 50mg 60mg
	Vyvanse®	lisdexamfetamine dimesylate (capsule)	10–12 hours	10mg 20mg 30mg 40mg 50mg 60mg 70mg
	Zenzedi®	dextroamphetamine sulfate (tablet)	4–8 hours	2.5mg 5mg 7.5mg 10mg 15mg 20mg 30mg

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Medications (Others)

Class	Brand Name	Generic Name	Duration	Available Dosage Strengths
Norepinephrine reuptake inhibitor	Strattera®	atomoxetine hydrochloride (capsule)	24 hours	10mg 18mg 25mg 40mg 60mg 80mg 100mg
	Qelbree™	viloxazine extended-release (capsule)	24 hours	100mg 150mg 200mg
Alpha agonist	Kapvay®	clonidine hydrochloride - extended-release (tablet)	12–24 hours	0.1mg 0.2mg
	Intuniv®	guanfacine hydrochloride - extended-release (tablet)	12–24 hours	1mg 2mg 3mg 4mg

CHADD

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Bupropion

MOA: Norepinephrine-Dopamine Reuptake Inhibitor (NDRI) Molecule Blocking Both Norepinephrine and Dopamine Reuptake Pumps

Formulations:

- Oral route only
- Immediate-release tablets are available in 75 mg and 100 mg strength.
- Extended-release forms of 12-hour hydrochloride salts formulations are available in 100 mg, 150 mg, and 200 mg tablets.

- **Off Label** use for ADHD

Viloxazine (Qelbree)

MOA: Selective NE reuptake inhibitor but does not affect the release of NE. Also mildly increases D levels in the PFC without affecting release.

Formulations:

- Rapid and Extended Release
- Approved for adults and children

- No risk for abuse or misuse, generally safe and well tolerated

Side Effects

Side effects of stimulants

- Loss of appetite, Upset stomach, Feeling restless or jittery, Racing heartbeat, Trouble sleeping, Irritability or mood swings, Headaches, Dizziness, Depression, Tics, Increased blood pressure

- Long-acting medicines may have greater effects on **appetite and sleep** than short and intermediate-acting stimulants.

- **Black Box:** potential for abuse and diversion, and potential for sudden death and serious cardiovascular effects if the drug is misused.

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Common Concerns

- The long-term effects on people whose brains are still developing.
- Change in personality
- The risk of sudden death in people with heart conditions.
- The increased risk for other psychiatric problems.
- The potential for abuse.

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Medication Pearls

- Methylphenidate works better for kids, Adderall seems to be better for adults
- Bupropion great drug for inattentiveness and depression
- Clonidine/Guanfacine great adjuncts to stimulants. Can use in the afternoon. Great for those with sleep disturbance
- If the drug doesn't work in the first couple of weeks, change it
- Lots of formulations, ask your patient what will work best for their lifestyle
- If they don't take the drug, it won't work!

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Case Study 2023

- The patient started marriage counseling and ADHD coaching. She hired an organizer for her home. She stopped Adderall. After trying several different medications for ADHD, she settled on bupropion 450mg daily. She has noticed improved emotional regulation, motivation, and attention. She is maintaining high productivity at work and her relationships have been stable. She has been feeling “good” for about a year now.

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Clinical Pearls and Summary

- Shared decision-making
- Must engage in counseling or coaching
- Co-morbid conditions that may a result of ADHD
- Patients will reveal themselves (Bipolar vs. ADHD vs. Personality D/O)

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Questions

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