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Psychiatry and Addictions Case Conference
UW Medicine | Psychiatry and Behavioral Sciences

01/17/2019

WELCOME!

Today's Topic:

Diagnosing ADHD in SUD patients

I know ADHD is common in SUD patients, how do I screen for it, and then make the diagnosis?

Justin Stamschror, MD
Presented by: Daniel Magliozzi, MD

PANELISTS:

MARK DUNCAN, MD, RICK RIES, MD, AND BARB MCCANN, PHD

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ADHD: DIAGNOSING ADHD IN SUD PATIENTS

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GENERAL DISCLOSURES

The University of Washington School of Medicine also gratefully acknowledges receipt of educational grant support for this activity from the Washington State Legislature through the Safety-Net Hospital Assessment, working to expand access to psychiatric services throughout Washington State.

SPEAKER DISCLOSURES

✓ None

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OBJECTIVES

1. Understand the epidemiology of ADHD in adults
2. Understand the neurobiology of ADHD
3. Understand the essentials of ADHD diagnosis
4. Understand ADHD mimics
5. Understand the pitfalls of ADHD diagnosis in patients with SUDs

EPIDEMIOLOGY OF ADULT ADHD

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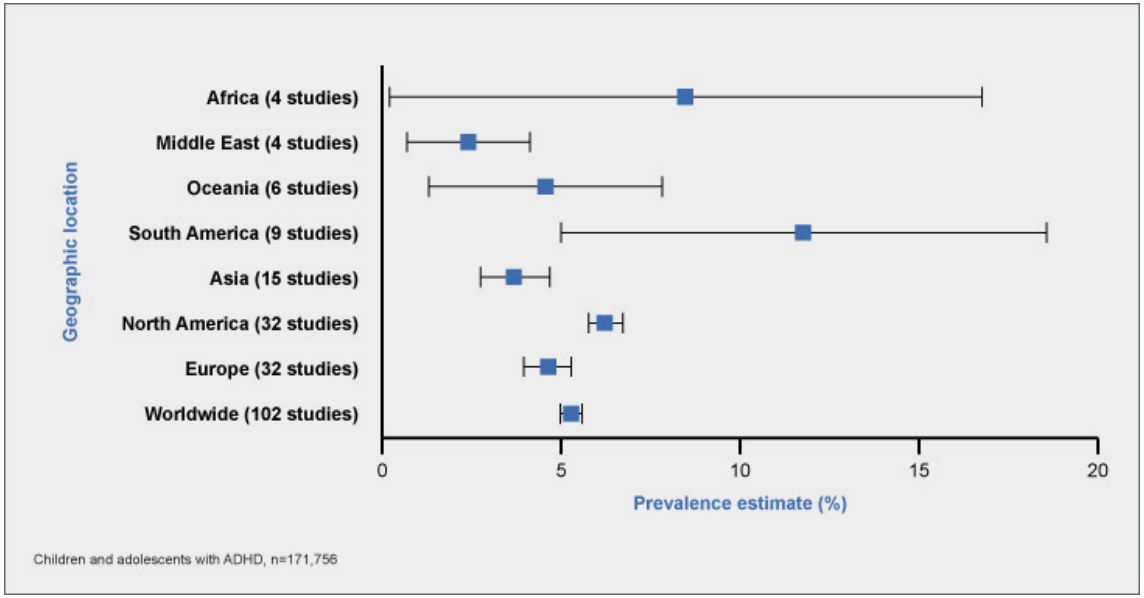
EPIDEMIOLOGY OF ADHD: PREVALENCE

- 4.4% of American's aged 18-44
- 3.4% of rest of world aged 18-44
  - Lower income 1.9%
  - Higher income 4.2%



Wilens, Timothy E., Stephen V. Faraone, and Joseph Biederman. "Attention-deficit/hyperactivity disorder in adults." *Jama* 292.5 (2004): 619-623.
Fayyad, John, et al. "Cross-national prevalence and correlates of adult attention-deficit hyperactivity disorder." *The British Journal of Psychiatry* 190.5 (2007): 402-409.

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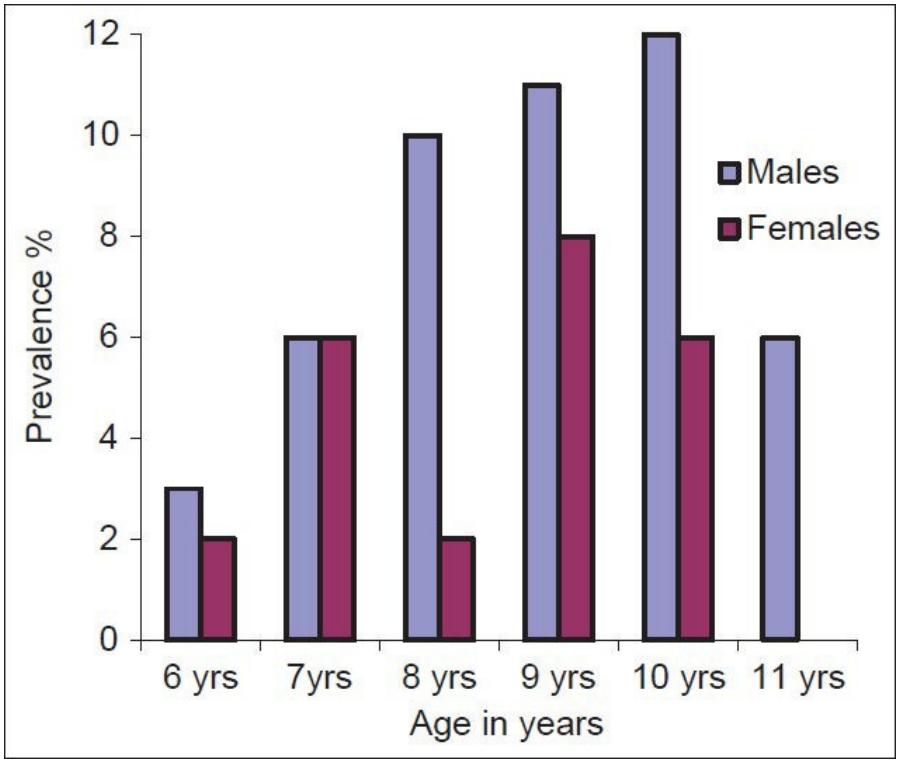
EPIDEMIOLOGY OF ADHD: COMORBIDITIES

- Frequently comorbid with other psychiatric illnesses domestically
  - Mood disorders= 2.7 to 7.5 odds ratio
  - Anxiety disorder= 1.5 to 5.5 odds ratio
  - Any substance use disorder= 3.0 odds ratio
- Results are similar internationally
  - Any substance use disorder= 4.0 odds ratio

EPIDEMIOLOGY OF ADHD: AGE AND GENDER VARIANCE

- 40-60% of childhood ADHD persists into adulthood



Akam Venkata, Jyothsna & S Panicker, Anuja. (2013). Prevalence of Attention Deficit Hyperactivity Disorder in primary school children. Indian journal of psychiatry. 55. 338-42. 10.4103/0019-5545.120544.

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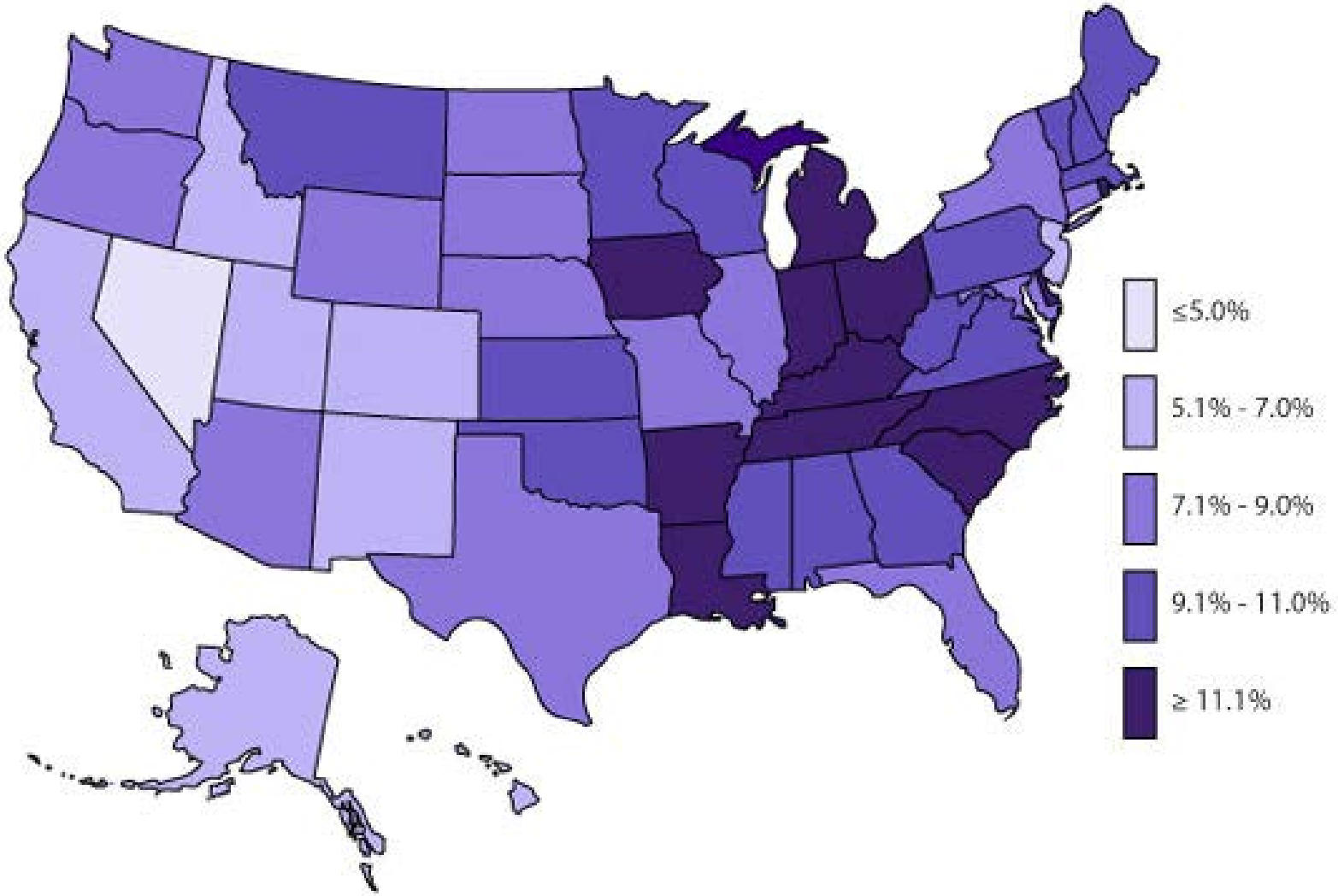
EPIDEMIOLOGY OF ADHD: DISTRIBUTION



Bloom, Barbara, Achintya N. Dey, and Gulnur Freeman. "Summary health statistics for US children; National health interview survey, 2005." (2009).

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NEUROBIOLOGY OF ADHD

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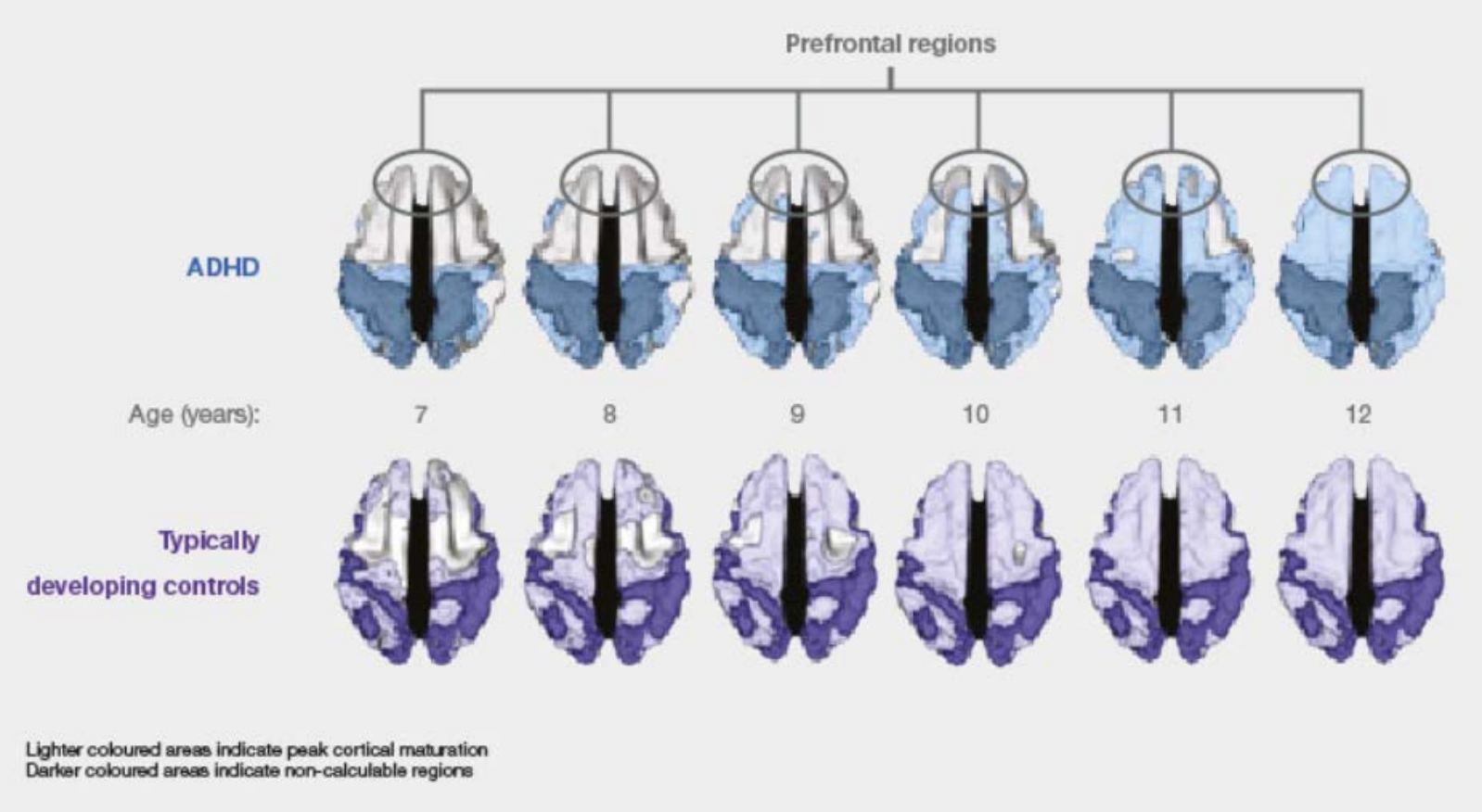
NEUROBIOLOGY OF ADHD ON FMRI



haw P, Eckstrand K, Sharp W, et al. Attention-deficit/hyperactivity disorder is characterized by a delay in cortical maturation. Proc Natl Acad Sci U S A 2007; 104: 19649-19654.

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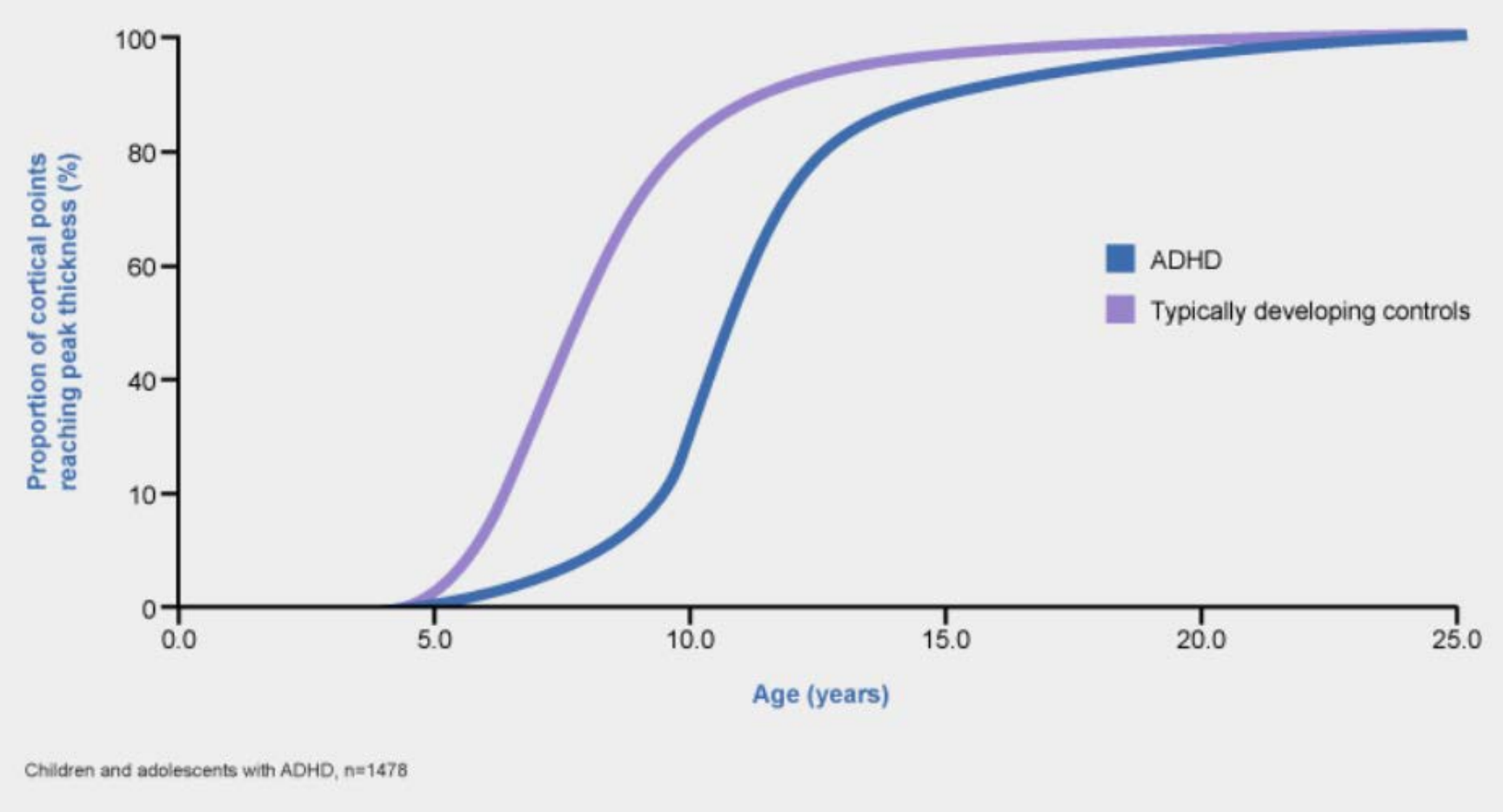
NEUROBIOLOGY OF ADHD ON FMRI



Kasparek, Tomas, Pavel Theiner, and Alena Filova. "Neurobiology of ADHD from childhood to adulthood: findings of imaging methods." *Journal of attention disorders* 19.11 (2015): 931-943.

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NEUROBIOLOGY OF ADHD: CORTICAL VOLUME

	Children			Adults			
Brain region	GM	WM	FCN	GM	WM	FCN	Changes after treatment
Caudate	↓		↓	±			Volume increase, increased activity, improved frontostriatal functional connectivity
Thalamus	↓		↓	↓		↓	
Anterior cingulated	↓	↓	↓	↓	↓	↓	Increased activity
Prefrontal cortex	↓	↓	↓	↓		↓	Volume reduction in untreated patients, increased activity
Premotor and SMA cortex	↓		↓				
Superior parietal cortex	↓		↓	↓		↓	Increased activity
Precuneus, posterior cingulate, lateral parietal cortex, medial frontal cortex (default-mode network)			↓			↓	Improved functional connectivity
Cerebellum (posterior inferior vermis)	↓	↓	↓	↓		↓	Increased activity after treatment, improved frontocerebellar functional connectivity
Corpus callosum (splenium/isthmus)		↓			↓		
Fasciculus longitudinalis superior		↓			↓		
Anterior corona radiate		↓			↓		

Note. The table summarizes the most replicated findings in children and adult patients with ADHD, and changes seen after treatment. MR = magnetic resonance; GM = gray matter volume; WM = white matter integrity; FCN = activity and functional connectivity; SMA = supplementary motor area.

Kasparek, Tomas, Pavel Theiner, and Alena Filova. "Neurobiology of ADHD from childhood to adulthood: findings of imaging methods." *Journal of attention disorders* 19.11 (2015): 931-943.

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NEUROBIOLOGY OF ADHD

- Most commonly smaller volume
  - Frontal cortex
    - Controls inhibition
  - Cerebellum
    - Controls fine motor control
  - Subcortical functions
    - Caudate
    - Putamen
    - Globus Pallidus

NEUROBIOLOGY OF ADHD: GENETICS

- Thought to have a strong genetic link
  - Risk of ADHD in parents and siblings of children with ADHD is increased two to eight times
  - Heritability of 76% based on twin studies

Smith, Alicia K., Eric Mick, and Stephen V. Faraone. "Advances in genetic studies of attention-deficit/hyperactivity disorder." *Current psychiatry reports* 11.2 (2009): 143-148.

NEUROBIOLOGY OF ADHD: SUMMATION

Table 2. Neurobiologic Mechanisms of ADHD.

Anatomical correlates
Smaller total brain volume (including frontal lobe, caudate nucleus, and cerebellum)
Reduced thickness of prefrontal and other cortical regions
Functional correlates
Alterations in connectivity in frontostriatal, frontoparietal, frontocerebellar, and parieto-occipital pathways and in the cingulate cortex
Decreased activity in the networks involved with executive function and with attention, and increased activity in the default mode network, which is deactivated during cognitive tasks and is implicated in mind wandering and interoception
Delayed brain maturation
Neurochemical factors
Dysregulation of dorsal striatal and ventral striatal dopamine systems
Dysregulation of noradrenaline systems
Genetic risk factors
Heritability of approximately 0.8
At least 18 ADHD-susceptibility genes (including the dopamine receptors D4 (DRD4) and D5, dopamine transporter (DAT1), serotonin receptor 1B, and synaptosomal-associated protein 25), but without specificity; 7-repeat allele of DRD4 most strongly implicated
Small effect sizes in molecular genetic analyses and genomewide association studies
Environmental and clinical risk factors
Prenatal exposure to alcohol, tobacco, and lead
Complications of pregnancy and birth
Neonatal anoxia, seizures, and brain injury
Obesity and diabetes
Gene–environment interactions
Interaction between genetic variants (*DRD4* and *DAT1*) and environmental factors such as maternal smoking during pregnancy

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Volkow, Nora D., and James M. Swanson. "Adult attention deficit–hyperactivity disorder." *New England Journal of Medicine* 369.20 (2013): 1935-1944.

ADHD DIAGNOSIS IN ADULTS

Adderall Receives Honorary Degree From Harvard

5/31/10 8:00am • SEE MORE: EDUCATION

CAMBRIDGE, MA—Citing the drug's extensive contributions to almost every field of academia, Harvard conferred an honorary doctoral degree upon a 30-day supply of Adderall during the university's 359th commencement exercises Thursday.

Resting on a wooden dais throughout the ceremony, the synthetic psychostimulant was warmly praised by Harvard president Drew Faust, who called Adderall a stirring testament to what the human mind can achieve when chemically altered by a combination of

Source: The Onion

ADHD DIAGNOSTIC CRITERIA

1. **Inattention: Six or more symptoms of inattention for children up to age 16, or five or more for adolescents 17 and older and adults; symptoms of inattention have been present for at least 6 months, and they are inappropriate for developmental level:**
   - Often fails to give close attention to details or makes careless mistakes in schoolwork, at work, or with other activities.
   - Often has trouble holding attention on tasks or play activities.
   - Often does not seem to listen when spoken to directly.
   - Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (e.g., loses focus, side-tracked).
   - Often has trouble organizing tasks and activities.
   - Often avoids, dislikes, or is reluctant to do tasks that require mental effort over a long period of time (such as schoolwork or homework).
   - Often loses things necessary for tasks and activities (e.g. school materials, pencils, books, tools, wallets, keys, paperwork, eyeglasses, mobile telephones).
   - Is often easily distracted
   - Is often forgetful in daily activities.

American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders, 5th edition. Arlington, VA., American Psychiatric Association, 2013.

ADHD DIAGNOSTIC CRITERIA

2. **Hyperactivity and Impulsivity: Six or more symptoms of hyperactivity-impulsivity for children up to age 16, or five or more for adolescents 17 and older and adults; symptoms of hyperactivity-impulsivity have been present for at least 6 months to an extent that is disruptive and inappropriate for the person's developmental level:**
   - Often fidgets with or taps hands or feet, or squirms in seat.
   - Often leaves seat in situations when remaining seated is expected.
   - Often runs about or climbs in situations where it is not appropriate (adolescents or adults may be limited to feeling restless).
   - Often unable to play or take part in leisure activities quietly.
   - Is often "on the go" acting as if "driven by a motor".
   - Often talks excessively.
   - Often blurts out an answer before a question has been completed.
   - Often has trouble waiting his/her turn.
   - Often interrupts or intrudes on others (e.g., butts into conversations or games)

American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders, 5th edition. Arlington, VA., American Psychiatric Association, 2013.

ADHD DIAGNOSTIC CRITERIA

In addition, the following conditions must be met:

- Several inattentive or hyperactive-impulsive symptoms were present before age 12 years.
- Several symptoms are present in two or more setting, (such as at home, school or work; with friends or relatives; in other activities).
- There is clear evidence that the symptoms interfere with, or reduce the quality of, social, school, or work functioning.
- The symptoms are not better explained by another mental disorder (such as a mood disorder, anxiety disorder, dissociative disorder, or a personality disorder). The symptoms do not happen only during the course of schizophrenia or another psychotic disorder.

- Again, ADHD is NEURODEVELOPMENTAL
  - If no symptoms as a child, no ADHD

American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders, 5th edition. Arlington, VA., American Psychiatric Association, 2013.

ADHD: COMMON MISDIAGNOSES

- Person that snores and has apneic spells while sleeping
- Adult who has started new job with one or more college degrees without difficulty, but struggles with concentration
- Depressed/Anxious person with impaired attention

ADHD: COMMONLY NOT DIAGNOSED

- Person that was dropped out of school early and took job that required very little focus or concentration
- Person that was is above average IQ and was able to developed coping skills that worked at lower complexity activities
- Older generations that had less resources to accurately refer for evaluation

ADHD MIMICS

- Bipolar disorder
- Obstructive sleep apnea
- Major depression
- Anxiety disorders
- Hearing problems
- PTSD
- Dementia
- Intellectual disability/learning disorders
- Substance use disorders

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CASE 1

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HPI

- CC: “I need a refill on my Vyvanse”
- 35 y/o wM physician and veteran with hx of ADHD, dx’d in Army, recently discharged
- Dx’d after failing Step 3
- Was taking 70mg of Vyvanse for 3 years
- Patient reported some benefit on Vyvanse, but still was unable to pass Step 3 on 2 more attempts, thus was separated from Army
- Patient reports poor attention, low energy, and easy distractibility
- No trauma or psychotic hx

PSYCH/DEVELOPMENTAL/SUBSTANCE HX

- No hx of contact with psychiatry outside of ADHD diagnosis, which was made by a paper survey
- Never trialed on any psychiatric medications
- Patient reported a history of a 4.0 in high school, undergrad, and first two years of medical school
- Patient reports he had “test anxiety” beginning second year of med school resulting in failing step 1 on first attempt
- Patient denies any substance use

SELECTED MSE

- Appearance: Age appearing man, neatly dressed
- Behavior: Cooperative but fidgeting around with poor eye contact
- Speech: Quiet and sparse
- Mood: “fine”
- Affect: Anxious appearing
- Attention: Intact for interview

COLLATERAL

- Wife reports patient frequently dozes, which annoys her because he snores loudly
- Patient's mother describes him as a "amazing" student throughout school.

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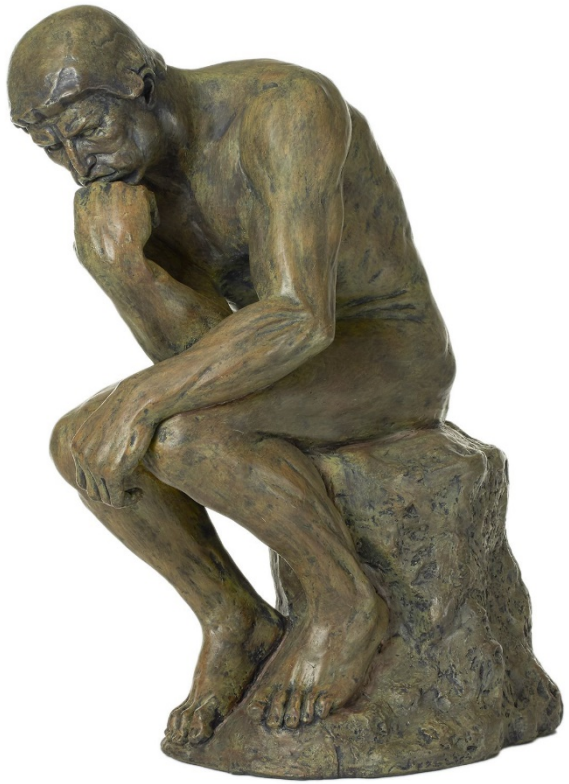
DIFFERENTIAL?



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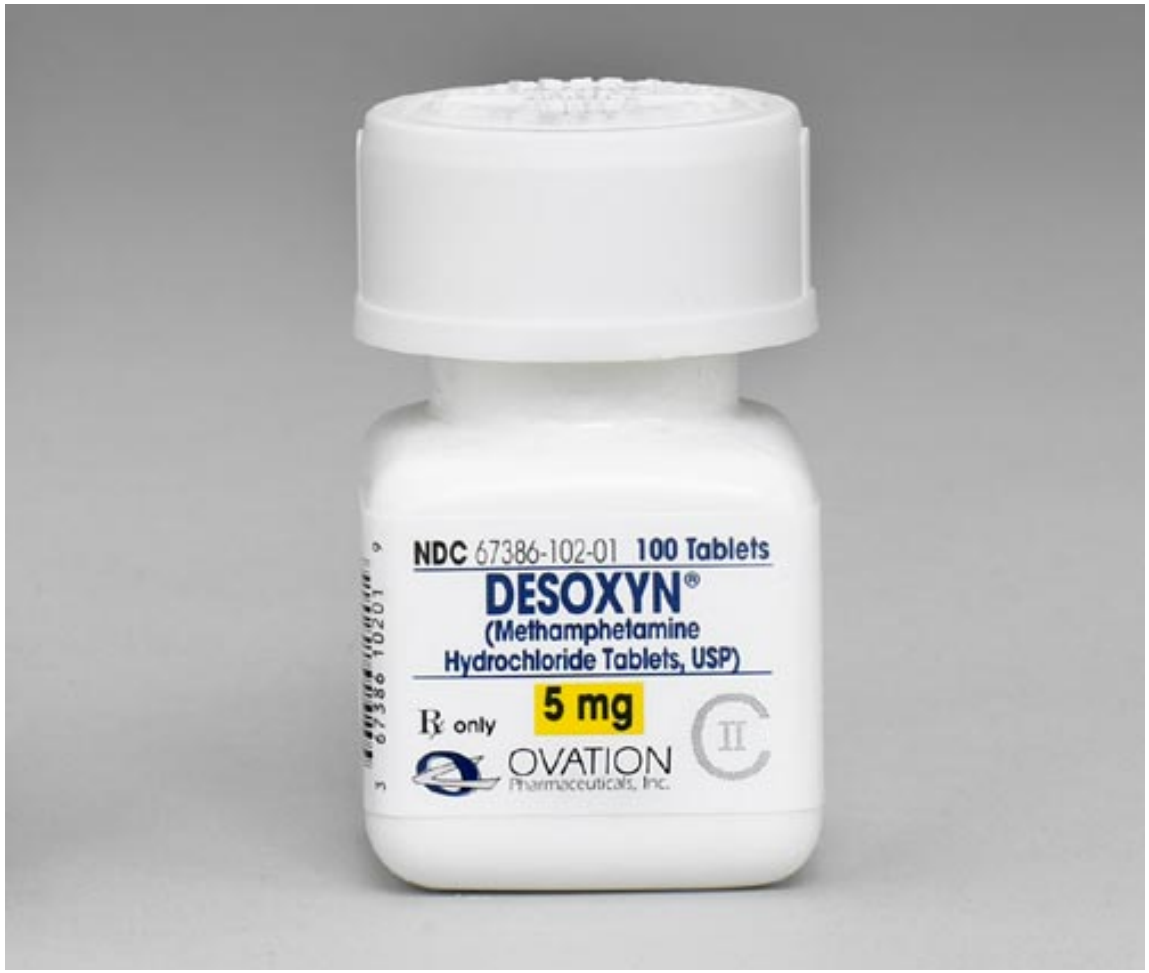
WHAT I DID

- Diagnosed an unspecified anxiety d/o with a r/o for OSA
- Referred for sleep study
  - Found to have OSA
- Started venlafaxine for anxiety
- Referred to CBT for anxiety
- Did not start a stimulant or diagnose ADHD

OUTCOME

- Patient began use of CPAP
- Patient responded well to Venlafaxine and CBT
  - MSE improved markedly, no longer appearing anxious
- Patient no longer complained about poor attention, and began studying for another attempt at Step 3

ADHD AND SUDS



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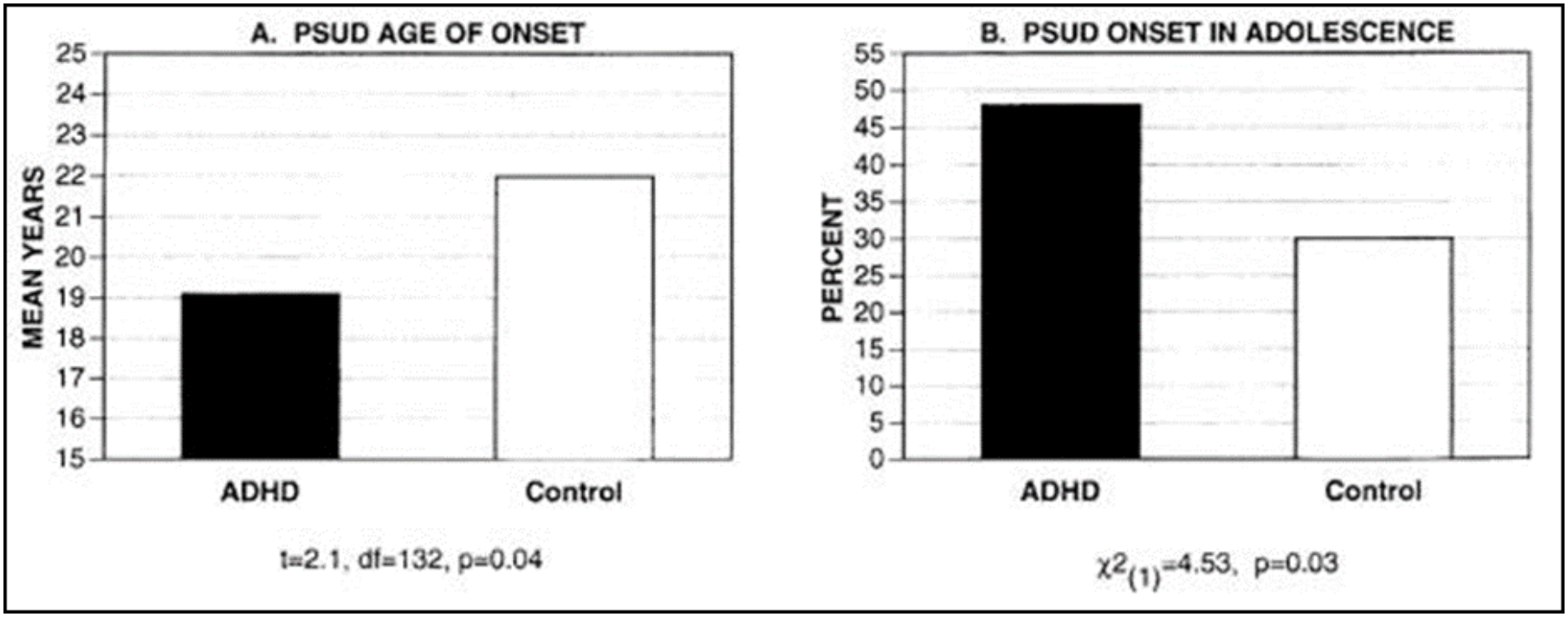
ADHD IS LINKED TO EARLIER DIAGNOSIS OF SUDS



Attention Deficit Hyperactivity Disorder (ADHD) is Associated with Early Onset Substance Use Disorders. WILENS, TIMOTHY; Journal of Nervous & Mental Disease. 185(8):475-482, August 1997.

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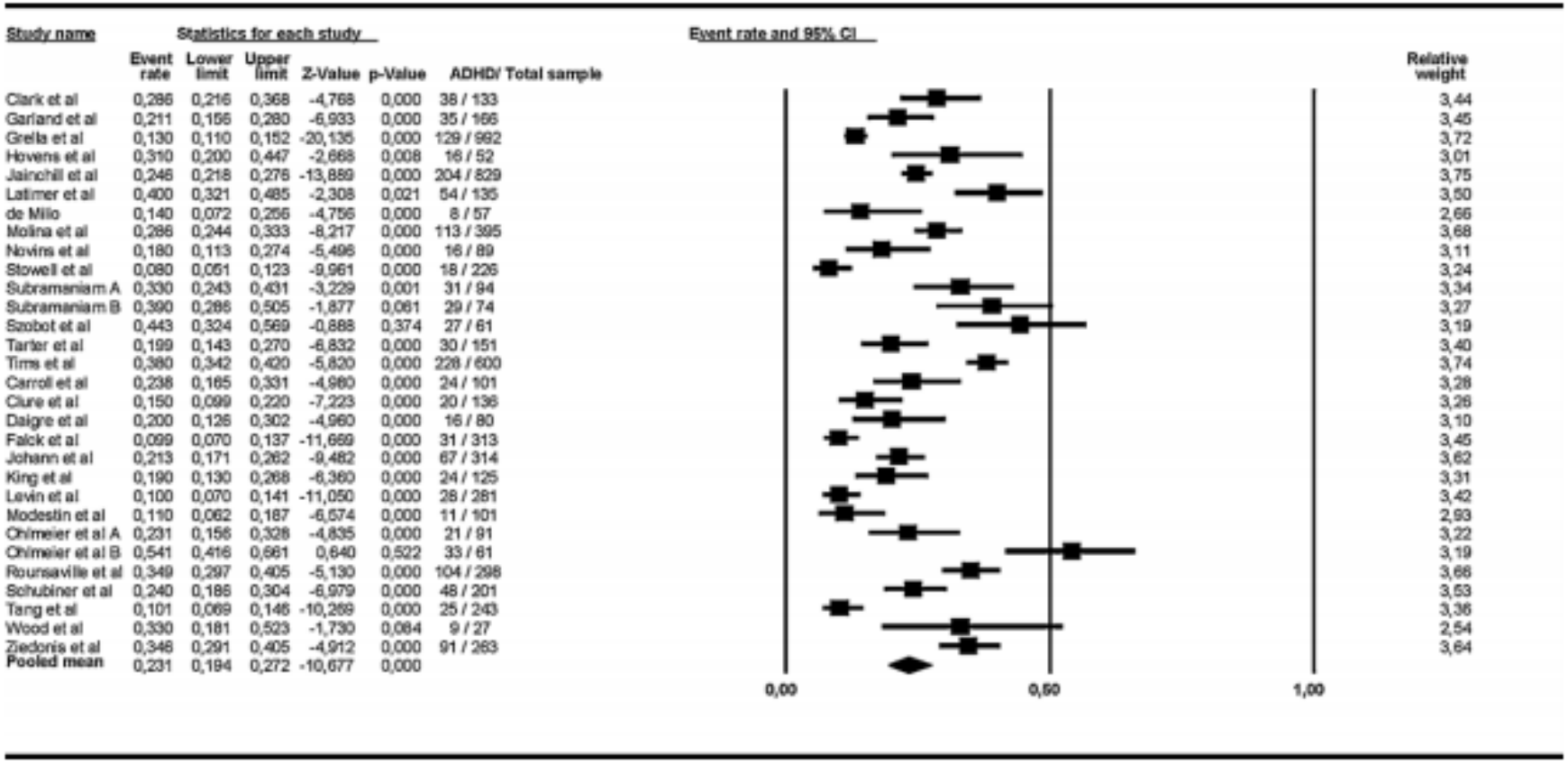
ADHD IS PREVALENT IN SUDS PATIENTS



Study name	Event rate	Lower limit	Upper limit	Z-Value	p-Value	ADHD/ Total sample	Relative weight
Clark et al	0,286	0,216	0,368	-4,768	0,000	38 / 133	3,44
Garland et al	0,211	0,156	0,280	-6,933	0,000	35 / 166	3,45
Grella et al	0,130	0,110	0,152	-20,136	0,000	129 / 992	3,72
Havens et al	0,310	0,200	0,447	-2,668	0,008	16 / 52	3,01
Jainchill et al	0,246	0,218	0,276	-13,889	0,000	204 / 829	3,75
Latimer et al	0,400	0,321	0,485	-2,308	0,021	54 / 135	3,50
de Milo	0,140	0,072	0,256	-4,756	0,000	8 / 57	2,66
Molina et al	0,286	0,244	0,333	-8,217	0,000	113 / 395	3,68
Novins et al	0,180	0,113	0,274	-5,496	0,000	16 / 89	3,11
Stowell et al	0,080	0,051	0,123	-9,961	0,000	18 / 225	3,24
Subramaniam A	0,330	0,243	0,431	-3,229	0,001	31 / 94	3,34
Subramaniam B	0,390	0,286	0,505	-1,877	0,061	29 / 74	3,27
Szobot et al	0,443	0,324	0,569	-0,888	0,374	27 / 61	3,19
Tarter et al	0,199	0,143	0,270	-6,832	0,000	30 / 151	3,40
Tims et al	0,380	0,342	0,420	-5,820	0,000	228 / 600	3,74
Carroll et al	0,238	0,165	0,331	-4,980	0,000	24 / 101	3,28
Clure et al	0,150	0,099	0,220	-7,223	0,000	20 / 136	3,26
Daigre et al	0,200	0,126	0,302	-4,960	0,000	16 / 80	3,10
Falck et al	0,099	0,070	0,137	-11,669	0,000	31 / 313	3,45
Johann et al	0,213	0,171	0,262	-9,482	0,000	67 / 314	3,62
King et al	0,190	0,130	0,268	-6,360	0,000	24 / 125	3,31
Levin et al	0,100	0,070	0,141	-11,050	0,000	28 / 281	3,42
Modestin et al	0,110	0,062	0,187	-6,574	0,000	11 / 101	2,93
Chimeier et al A	0,231	0,156	0,328	-4,835	0,000	21 / 91	3,22
Chimeier et al B	0,541	0,416	0,661	0,640	0,522	33 / 61	3,19
Rounsaville et al	0,349	0,297	0,405	-5,130	0,000	104 / 298	3,66
Schubiner et al	0,240	0,186	0,304	-6,979	0,000	48 / 201	3,53
Tang et al	0,101	0,069	0,146	-10,269	0,000	25 / 243	3,36
Wood et al	0,330	0,181	0,523	-1,730	0,084	9 / 27	2,54
Ziedonis et al	0,348	0,291	0,405	-4,912	0,000	91 / 263	3,64
Pooled mean	0,231	0,194	0,272	-10,677	0,000		

Fig. 2. Prevalence of ADHD in SUD populations. For each study ADHD prevalences (displayed as event rates), 95% confidence intervals (95% CI), numbers of ADHD cases, total sample sizes and weights are presented. At the bottom of the figure, the pooled estimate is presented.

van Emmerik-van Oortmerssen, Katelijne, et al. "Prevalence of attention-deficit hyperactivity disorder in substance use disorder patients: a meta-analysis and meta-regression analysis." *Drug and alcohol dependence* 122.1-2 (2012): 11-19.

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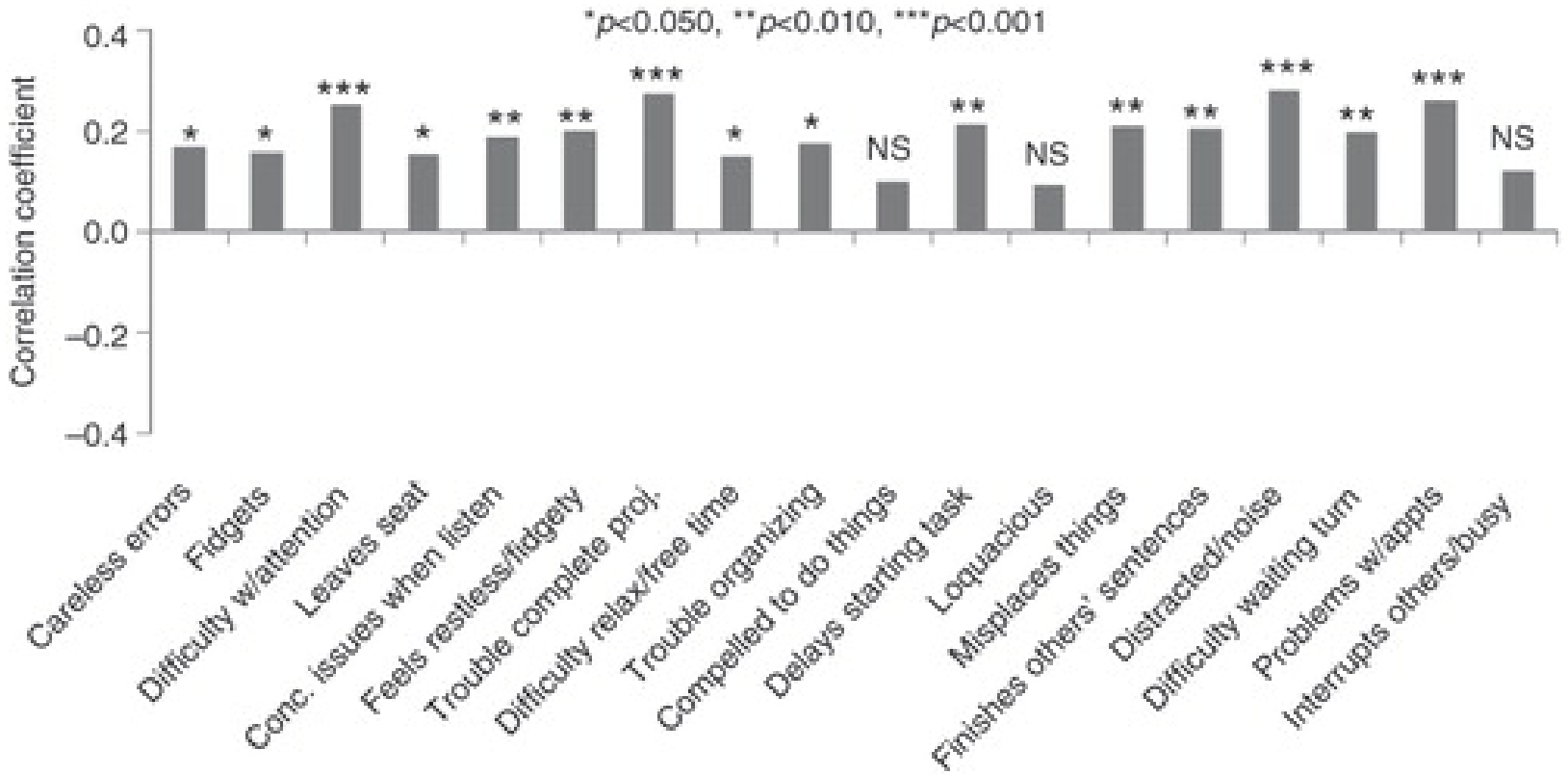
SUDS WORSEN ADHD-LIKE SYMPTOMS



Wilens, Timothy E., et al. "Correlates of alcohol use in adults with ADHD and comorbid alcohol use disorders: exploratory analysis of a placebo-controlled trial of atomoxetine." *Current medical research and opinion* 27.12 (2011): 2309-2320

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SO WHAT EXTRA STEPS ARE REQUIRED TO DIAGNOSE ADHD IN SUDS PATIENTS?

- Stabilization of SUDS is usually a first step in accurate diagnosis
- Important to obtain collateral of functioning prior to substance use
- Frequent UDAS to confirm sobriety during evaluation period is helpful as well

National Institute on Drug Abuse, Principles of drug addiction treatment: A research-based guide 2000: National Institute on Drug Abuse, National Institutes of Health

American Academy of Pediatrics, Recommendations: AttentionDeficit/Hyperactivity Disorder, Center for Disease Control and Prevention, Editor 2013: USA.gov.

CASE 2

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HPI

- CC: “I can’t seem to focus”
- 45y/o wM, unemployed and on house arrest
- Hx of severe methamphetamine use d/o, last use a week ago
- Patient reports poor attention, daytime sedation, easy distractibility, significant snoring, forgetfulness, making frequent mistakes, and trouble following directions
- No trauma or psychotic hx

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PSYCH/DEVELOPMENTAL/SUBSTANCE HX

- No known psych hx, suicide attempts, or medication trials
- B/r in Pennsylvania, dropped out of school in 8th grade
- Struggled with methamphetamine use for most of adult life

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SELECTED MSE

- Appearance: Age appearing man, somewhat disheveled, wearing ankle monitor
- Behavior: Cooperative
- Speech: Loud but otherwise normal
- Mood: “Pretty good doc”
- Affect: Jovial
- Attention: Relatively poor, requiring frequent reminders of questions or topics that were being discussed
- Memory testing: 3/3 at 5 minutes

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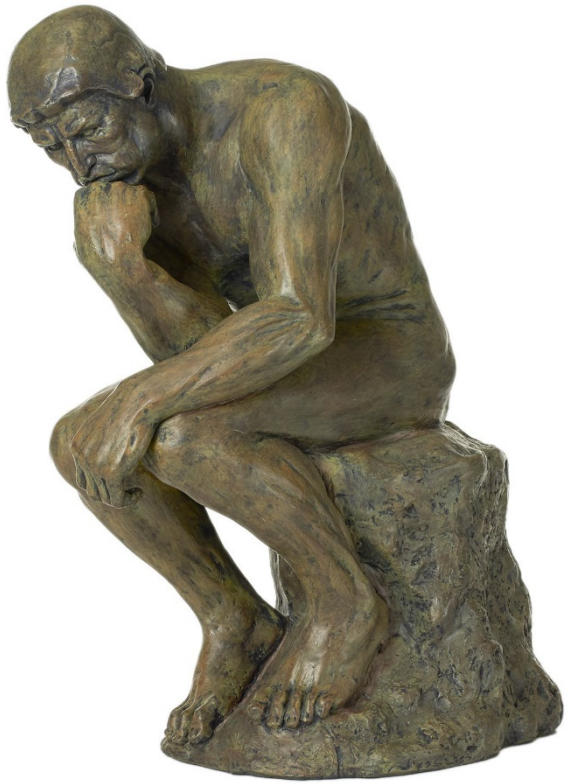
COLLATERAL

- Called patient's mother with patient present, who reported
  - Difficulty at school and at home as a child
  - Difficulty with sitting still and paying attention in school, with significant consequences behaviorally and academically

WHAT SHOULD BE DONE?



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WHAT I DID

- Diagnosed with a r/o for OSA and r/o for ADHD
  - Not all childhood ADHD lingers into adulthood
- Referred for sleep study
  - Found to have OSA, patient started on CPAP
- Patient in the meantime went on house arrest, with subsequent cessation of methamphetamine
  - Reassessed in 3 months after CPAP, and found to have similar sx and presentation as admit
- Trialed on Adderall XR, which he responded well to
- Patient currently sober, employed full time in Naval Yard, recently purchased first home

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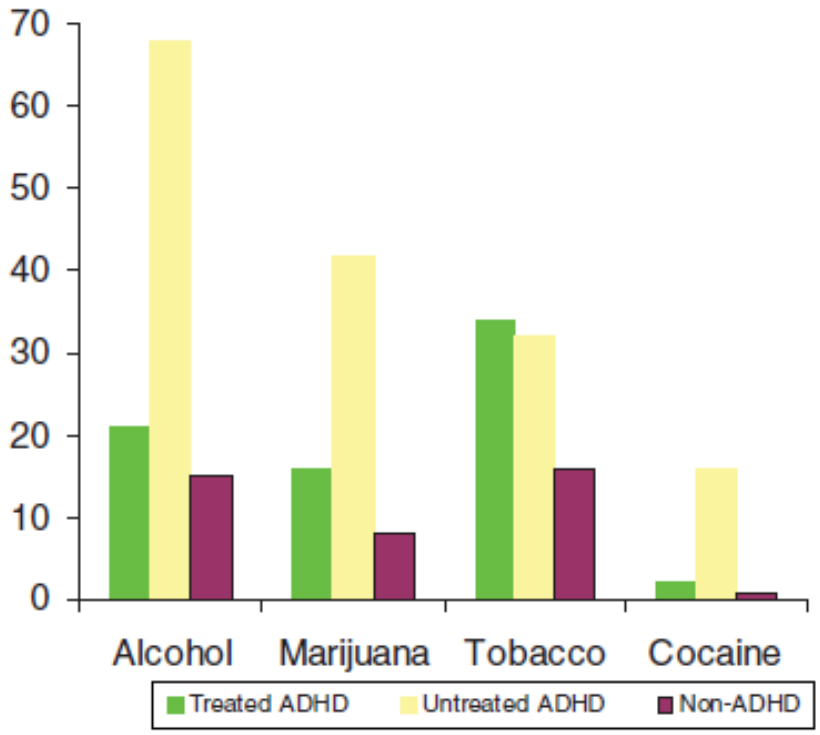
YOU SHOULD TREAT ADHD IN PEOPLE WHO HAVE SUDS

Prevalence of Substance Use Disorder (SUD) Subtypes at 4-Year Follow-up, by ADHD Medication Status



Source: Biederman, Wilens, Mick, Spencer, and Faraone (1999).
Note: Multiple logistic regression analysis showed that untreated ADHD participants were at significantly increased risk for any SUD subtype at follow-up compared to non-ADHD control participants.

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