ADHD, Substance Use Disorders & Stimulant Misuse

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Faculty Disclosure

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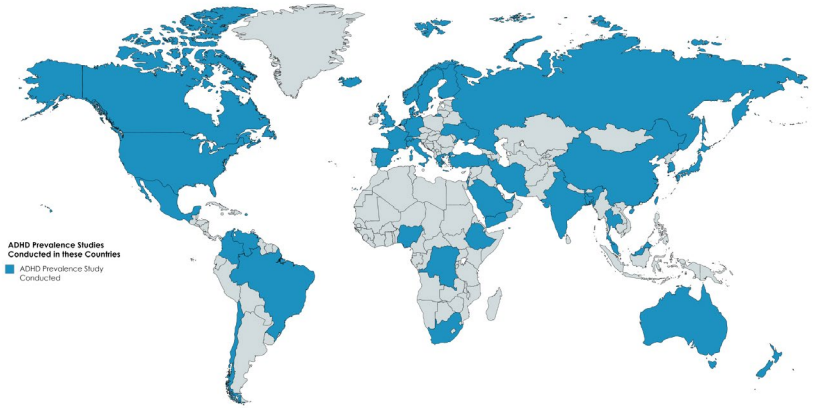
- **Licensing agreements with Ironshore, 3D Therapeutics**
- **Clinical care: MGH, Bay Cove, Gavin Foundation, Major/Minor League Baseball**
- **(Co)Edited Straight Talk About Psychiatric Medications for Kids (Guilford); ADHD Across the Lifespan (Cambridge), Update in Pharmacotherapy of ADHD (Elsevier)**
- **Some of the medications discussed may not be FDA approved in the manner in which they are discussed including diagnosis(es), combinations, age groups, dosing, or in context to other disorders (eg, substance use disorders)**

Objectives

- To describe the interplay between ADHD and substance use disorders (SUDs);
- To learn about the link between ADHD and other behavioral outcomes (i.e., substance use, antisocial and impulsive behaviors);
- To underline the consequences of treating or not ADHD in a correctional population;
- To discuss the role and effectiveness of ADHD pharmacotherapy in the treatment of people with SUD;
- To review strategies and approaches to promote good clinical practices when treating ADHD in people with SUD.
- Learn the characteristics and methods to reduce prescription stimulant misuse

Overview of ADHD



- ADHD prevalence
  - 8- to 15-year-olds: 6-9%
  - 18- to 44-year-olds: 4-5%
- Associated with chronic course
  - Circa 75% persistence into adolescence
  - Circa 50% persistence into adulthood
- High rates of psychiatric comorbidity
- Impairment in multiple domains
- Diagnosis by DSM V criteria
  - Combined, Inattentive, Hyperactive subtype
- Responds well to treatment

Froehlich TE, et al. *Arch Pediatr Adolesc Med*. 2007;161(9):857-864. Kessler RC, et al. *Am J Psychiatry*. 2006;163(4):716-723. Wilens TE, et al. *Postgrad Med*. 2010;122(5):97-109; Faraone et al, *Nature Neuroscience*, 2015. Adler, Spencer, Wilens ADHD In Children and Adults, Cambridge Press, 2016.

Health & Justice

BMC

Health Justice. 2023 Dec; 11: 36.
Published online 2023 Sep 7. doi: 10.1186/s40352-023-00234-9

PMCID: PMC10486076
PMID: 37676388

Treatments for ADHD in adults in jails, prisons and correctional settings: a scoping review of the literature

Cory Byrne[1] and Dale Guenter[2]

Associated Data

▸ **Data Availability Statement**

Abstract

Go to: ▸

Background

Attention-Deficit / Hyperactivity Disorder (ADHD) is prevalent at a higher rate in correctional settings than in the general population. Treatment of ADHD in this environment is challenging as stimulants, the most common treatment for ADHD, require cautious prescribing in the context of frequent substance use disorders (SUD) and diversion in the institutional setting. In addition, both pharmacological and non-pharmacological treatment approaches require significant staff resources. The aim of this scoping review is to map and summarize all literature addressing treatment of ADHD specifically in correctional settings, synthesize the evidence supporting various approaches, and highlight areas for future research. Due to the limited number of primary research studies addressing this question directly, we chose a scoping review methodology that would allow us to explore what kinds of studies and literature exist and include all types of articles directly related to our question.

Scoping review
N = 32 studies
3 RCT's

Rates of ADHD:
9 - 45%
High rates of psych comorbidity

Stimulant use variable (see later)

> Eur Addict Res. 2020;26(4-5):179-190. doi: 10.1159/000508829. Epub 2020 Jul 2.

Attention Deficit Hyperactivity Disorder in Prisoners: Increased Substance Use Disorder Severity and Psychiatric Comorbidity

María C Vélez-Pastrana [1 2], Rafael A González [3 4], Alexandra Ramos-Fernández [5], Rafael R Ramírez Padilla [6], Frances R Levin [7], Carmen Albizu García [6]

Affiliations + expand

PMID: 32615575 DOI: 10.1159/000508829

Free article

Abstract

Objectives: Attention deficit hyperactivity disorder (ADHD) and substance use disorders (SUD) are overrepresented among incarcerated populations. We examined whether ADHD was associated with increased severity of comorbid SUD and with increased psychiatric comorbidity among prisoners.

Methods: Cross-sectional study of 500 randomly selected Latino male prisoners in the Puerto Rico Correctional System using validated diagnostic measures to assess Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM-5) ADHD and SUD diagnosis, antisocial personality disorder (ASP) and borderline personality disorder (BPD), major depression, and generalized anxiety disorder (GAD). We defined SUD severity by symptom count and by presence of at least 2 current SUD diagnoses (polysubstance).

Results: Participants with ADHD had increased risk for lifetime ($p < 0.05$) and current ($p < 0.01$) SUDs, all comorbid psychiatric disorders, and suicidality ($p < 0.001$). They had more severe SUD, both in number of symptoms and number of SUD (polysubstance) diagnoses ($p < 0.01$). ADHD was associated with increased psychiatric comorbidity, as participants with ADHD were more likely to have a second diagnosis, and a greater number of comorbid disorders ($p < 0.001$). ASP, BPD, major depression, and GAD, but not ADHD, were significant predictors of SUD severity in adjusted models.

Conclusions: Findings highlight the complex mental health needs of incarcerated populations, where SUD, ADHD, and other psychiatric disorders are prevalent and interrelated.

Study of rates of SUD in ADHD

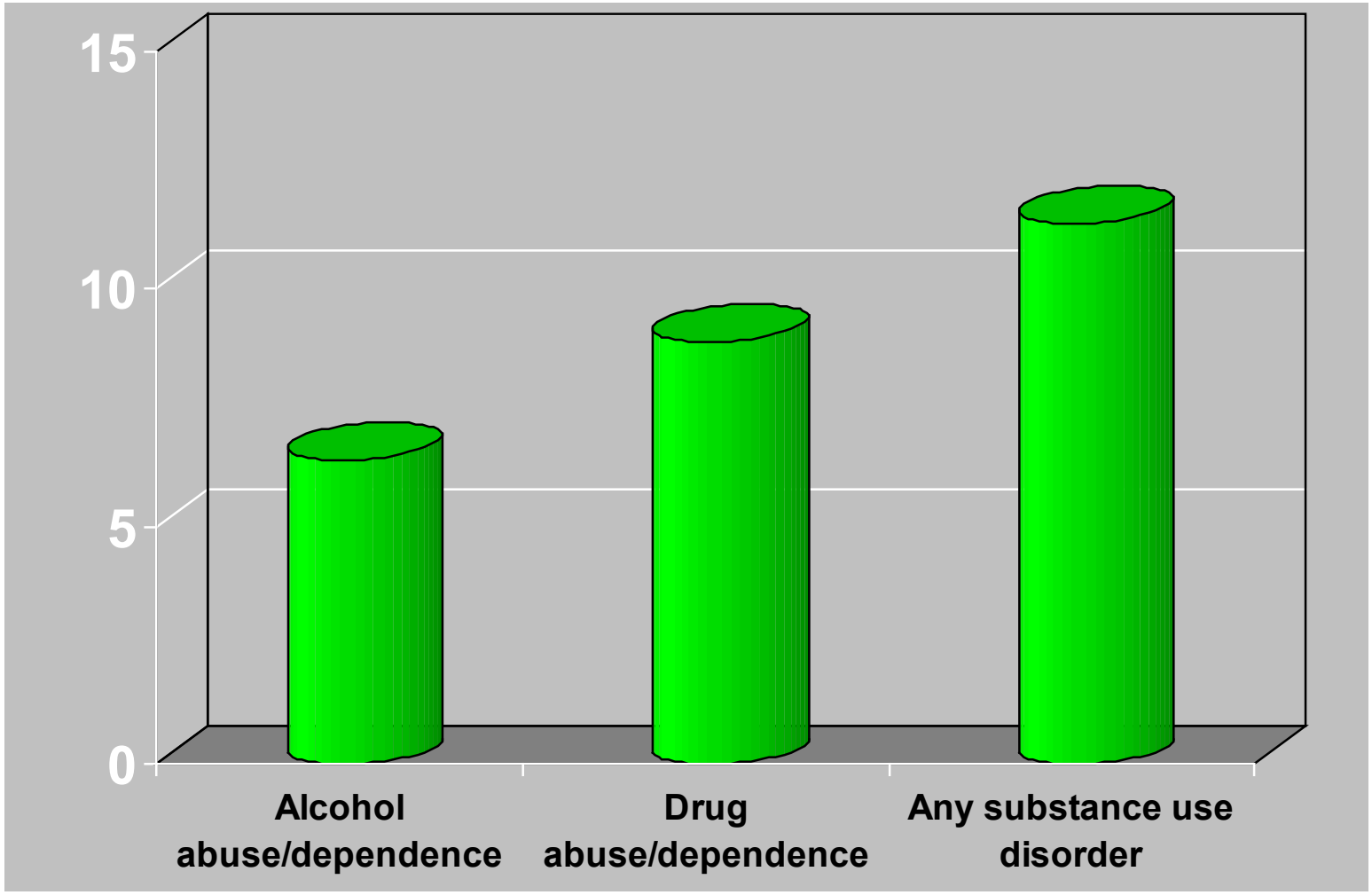
Methods

N=500 (cross-sectional)
Latino male prisoners in Puerto Rico
Diagnosis by DSM V

Findings

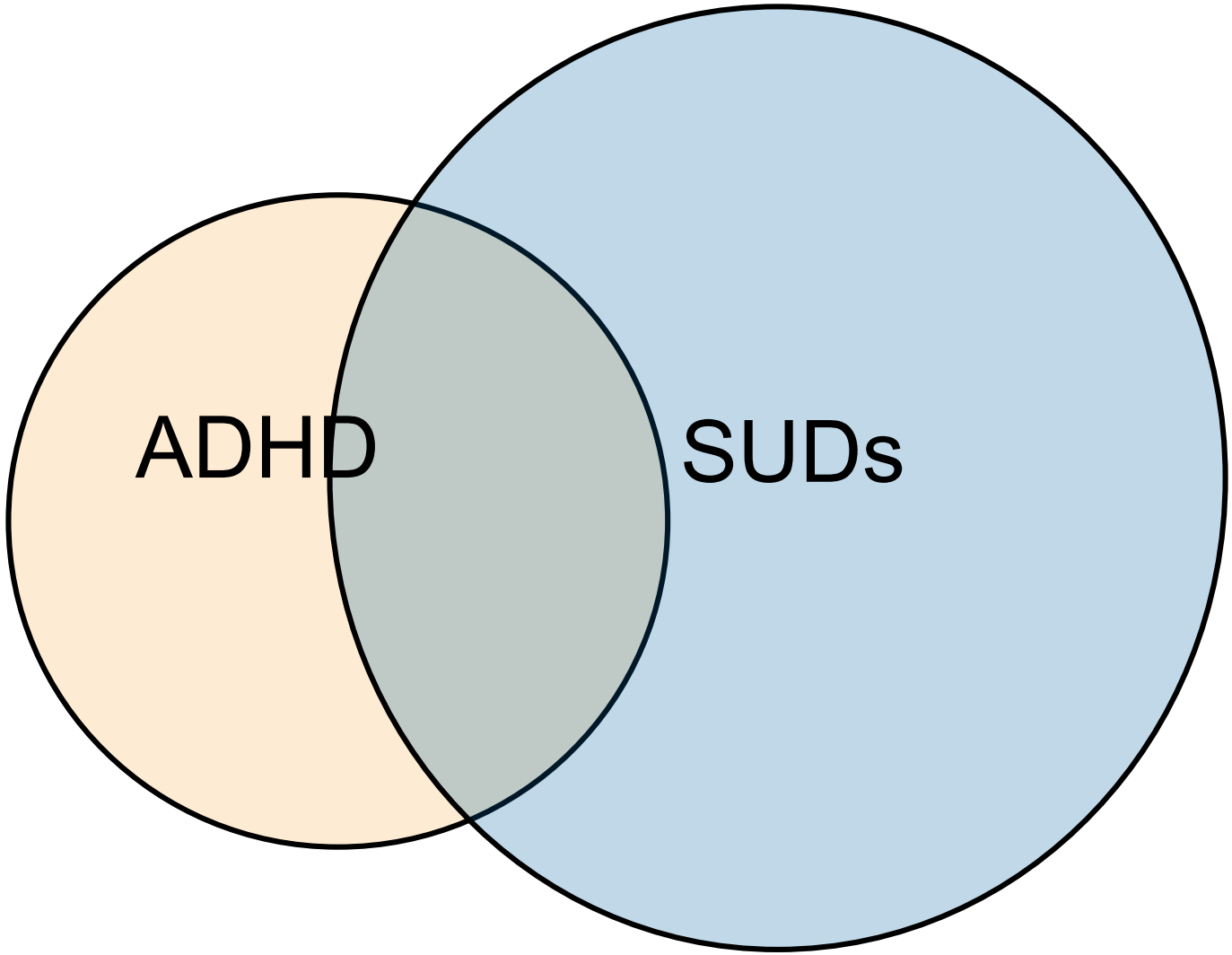
Two-fold increased risk for SUDs
More psychiatric comorbidity
More severe SUDs

Lifetime Prevalence Substance Use Disorders (SUD) in Adolescents



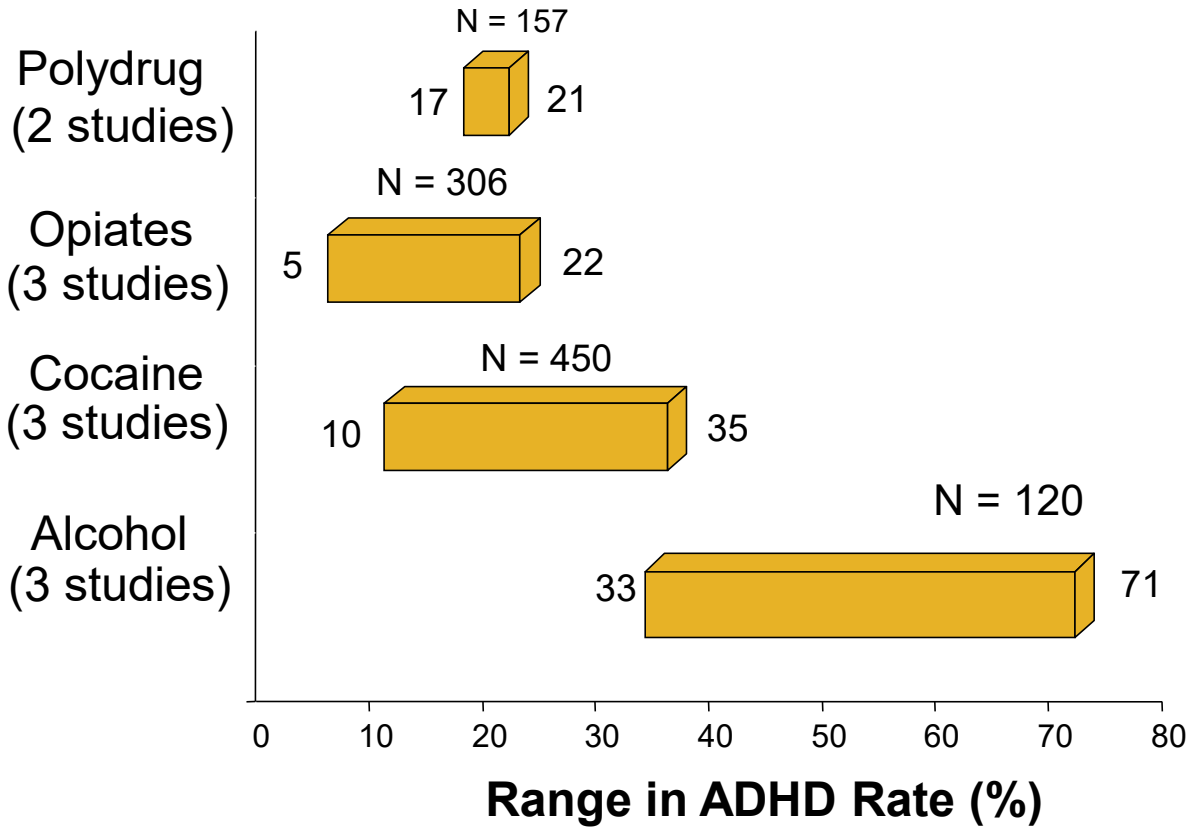
Merikangas et al. J.Am.Acad.Child Adolesc.Psychiatry, 2010;49(10):980-989

Overlap between ADHD and SUDs



Wilens TE. *Psychiatr Clin North Am*. 2004;27(2):283-301. van Emmerik-van Oortmerssen K, et al. *Drug Alcohol Depend*. 2012;122(1-2):11-19.

SUD is a Risk Factor for ADHD:
Illustrative Overlap of ADHD in Adults with SUD



Overall, 23% of adults with SUD have ADHD (N = 29 studies)*.

Wilens TE. *Psychiatr Clin North Am*. 2004;27(2):283-301. *van Emmerik-van Oortmerssen K, et al. *Drug Alcohol Depend*. 2012;122(1-2):11-19.

Psychiatr Serv. 2023 Oct 4:appips20220400. doi: 10.1176/appi.ps.20220400. Online ahead of print.

Trends in Attention-Deficit Hyperactivity Disorder Diagnosis and Pharmacotherapy Among Adults With Opioid Use Disorder

Tae Woo Park, Tithi D Baul , Jake R Morgan , Timothy E Wilens , Amy M Yule

PMID: 37789727 DOI: 10.1176/appi.ps.20220400

Abstract

Objective: This study aimed to assess nationwide trends in attention-deficit hyperactivity disorder (ADHD) diagnoses and pharmacotherapy among patients with opioid use disorder and ADHD and to examine factors predicting receipt of stimulant medications among patients receiving medications for opioid use disorder (MOUDs).

Methods: A claims-based database of commercially insured patients ages 13-64 was used to conduct two analyses: an annual cross-sectional study of 387,980 patients diagnosed as having opioid use disorder (2007-2017) to estimate the prevalence of ADHD diagnoses and pharmacotherapy, and a retrospective cohort study of 158,591 patients receiving MOUDs to test, with multivariable regression, the association between patient characteristics and receipt of stimulant medication.

Results: From 2007 to 2017, the prevalence of ADHD diagnoses increased from 4.6% to 15.1% and the rate of ADHD pharmacotherapy increased from 42.6% to 51.8% among patients with opioid use disorder. Among all patients receiving MOUDs, 10.5% received at least one prescription stimulant during the study period. Female sex; residence in the southern United States; and ADHD, mood, and anxiety disorder diagnoses were associated with increased likelihood of stimulant receipt. Stimulant use disorder and other substance use disorder diagnoses were associated with decreased likelihood of stimulant receipt

Study of Rates and Tx of ADHD in Opioid Use Disorder (OUD)

N=387,980 with OUD
Years: 2007-2017

Findings:
-Diagnosed ADHD in OUD increased from 4.6% to 15%
-52% of those with ADHD and OUD treated for ADHD pharmacologically
-Stimulants were used in 11% of those receiving medications for OUD

Childhood ADHD is Related to Future Cigarette and SUD

Likelihood (OR) to Develop Cigarette Smoking

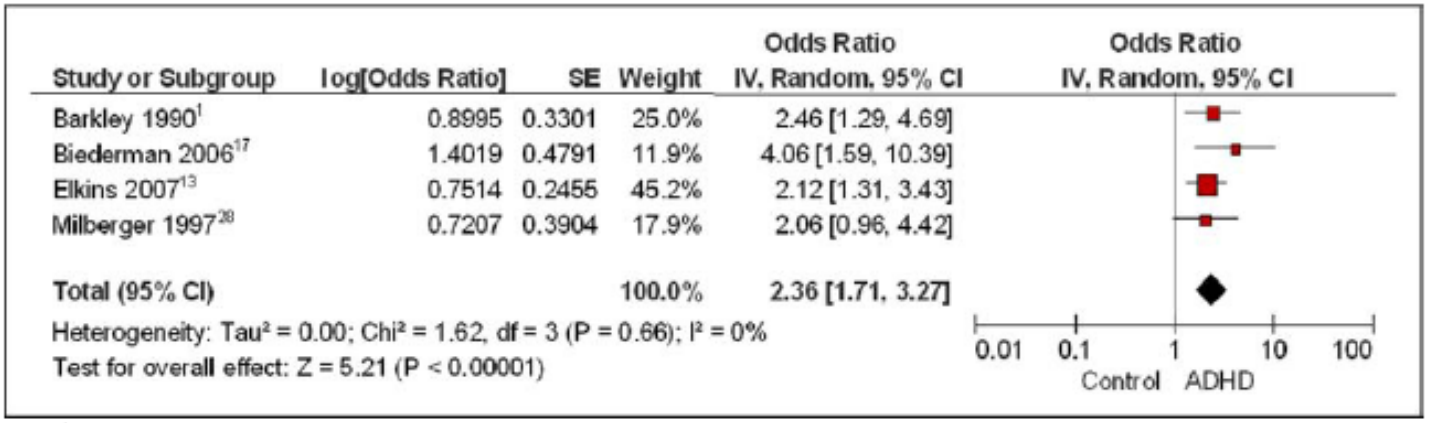


FIGURE 6 Meta-analysis of attention-deficit/hyperactivity disorder (ADHD) and nicotine use. Note: Results from a meta-analysis comparing ADHD versus control subjects for nicotine use. CI = confidence interval.

Likelihood (OR) to Develop SUD

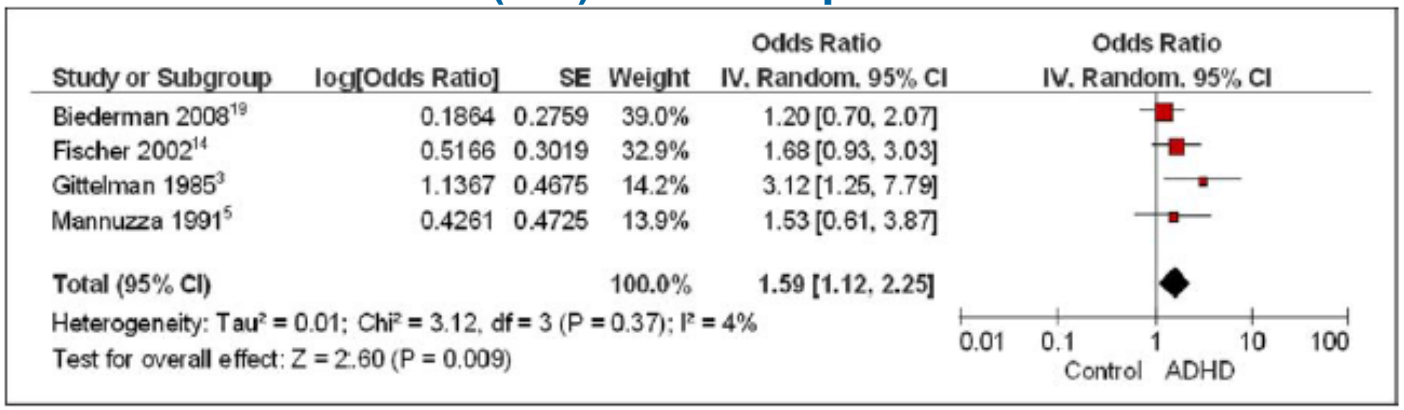


FIGURE 4 Meta-analysis of attention-deficit/hyperactivity disorder (ADHD) and psychoactive substance use disorder. Note: Results from a meta-analysis comparing ADHD versus control subjects for psychoactive substance use disorder. CI = confidence interval.

Conduct disorder and severe mood dysregulation increases SUD risk in ADHD.

OR = odds ratio. **Charach A, et al. *J Am Acad Child Adolesc Psychiatry*. 2011;50(1):9-21.**

Nicotine Vaping and ADHD

- High rates of nicotine use, and vaping in ADHD vs nonADHD
- Higher rates of ADHD in e-cig use (vs non ecig use)
- Nicotine may be experienced differently in ADHD vs controls
  - More pleasurable experiences
  - No difference in “unpleasant” experiences
  - Similar response to other “predisposed” substances (e.g. alcohol)
- Previous work has shown nicotine enhanced cognitive functioning in ADHD*

Kollins et al., Neuropsychopharmacology **volume 45**, pages851–856 (202

A More Complicated Course of SUD is Associated with ADHD

- More severe SUD
- Higher rates of other psychiatric comorbidities (eg, conduct/antisocial disorders)
- Less remission from SUD
- Longer course of SUD
- Lower retention in cigarette/SUD treatment

Carroll KM, et al. *Compr Psychiatry*. 1993;34(2):75-82. Schubiner H, et al. *J Clin Psychiatry*. 2000;61(4):244-251. Levin FR, et al. *Drug Alcohol Depend*. 1998;52(1):15-25. Levin FR, et al. *Addict Behav*. 2004;29(9):1875-1882. Wilens TE, et al. *Am J Addict*. 1998;7(2):156-163. Wilens TE, et al. *Am J Addict*. 2005;14(4):319-327.

Gambling and ADHD

- Overall, problem gambling in 8% (adolescents) to 10% (college students)
- Risk for gambling:
  ADHD persistent >
  ADHD nonpersistent >
  Controls
- 24% of those with persistent ADHD had problem gambling
- No discussion of effect of ADHD treatment on outcome*

Breyer et al. J Gambl Stud. 2009 Jun; 25(2): 227–238.

Internet Addiction and ADHD

- Study of 33 high schools and 7 vocational schools in Korea (N=1890 Students)
- 17% of students with problematic internet use
- Increased internet use, misuse and addiction linked to ADHD symptoms
- Results found in both male and females
- Other studies show ADHD *most likely* psychiatric disorder to be associated with internet addiction in young people
- Impact of early exposure to internet => ADHD symptoms not established*

Yen et al, J Adolesc Health, 2007; 93-98

Internet Gaming Addiction and ADHD

- Higher risk for internet gaming addiction in ADHD
- Study of young adults with internet gaming (N=87) and controls (N=87)
  - Higher risk for ADHD (vs controls)
  - Prominent impulsivity and hostility (mood dysregulation) mediate internet gaming disorder in ADHD*

Yen et al., Addictive Behaviors Vol 64, January 2017, pp 308-313

Major Brain Circuits Involved in Addiction

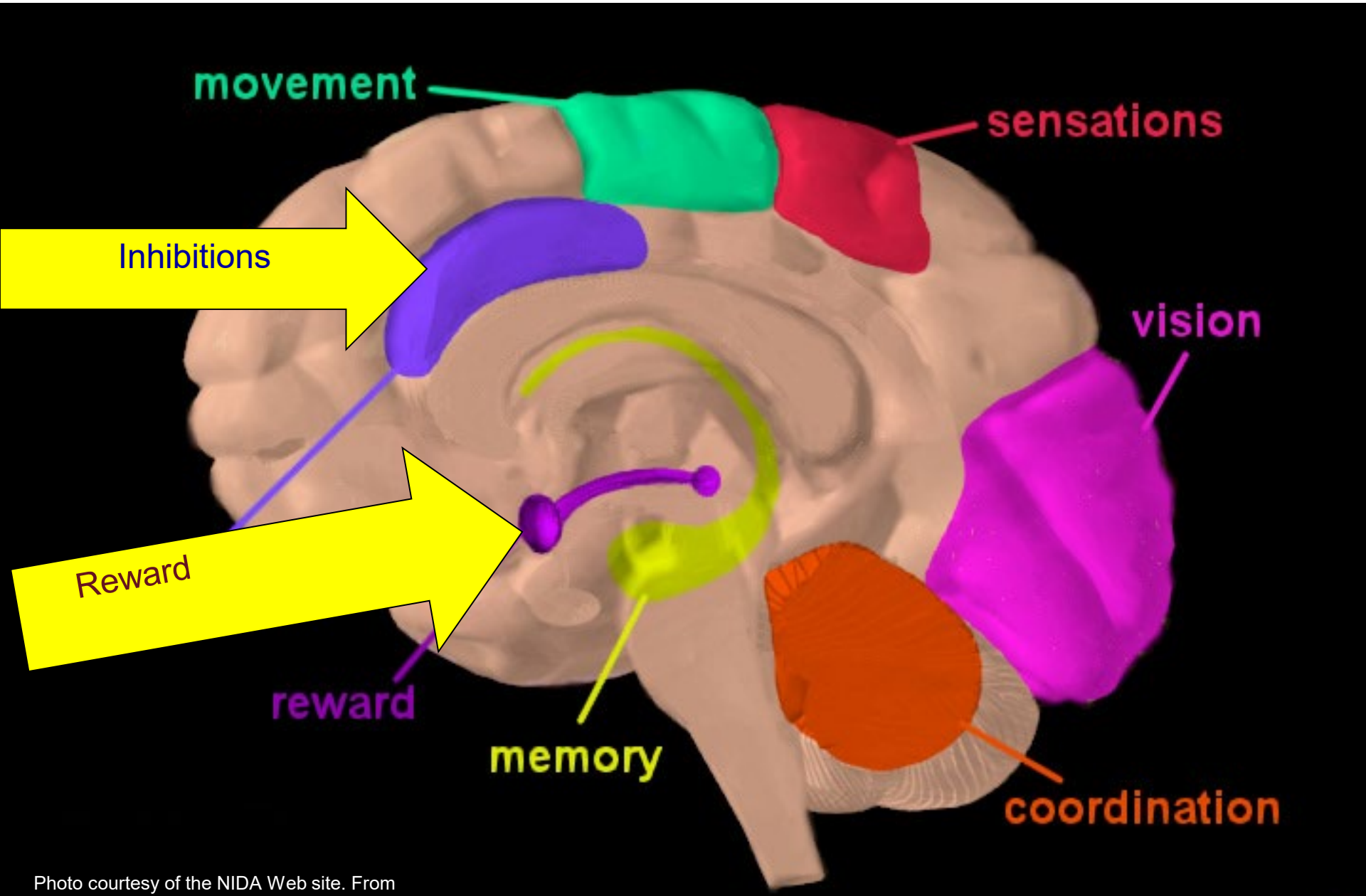


Photo courtesy of the NIDA Web site. From *A Slide Teaching Packet: The Brain and the Actions of Cocaine, Opiates, and Marijuana.*

Does Treatment of ADHD in Childhood Impact later SUD?

The Impact of Pharmacotherapy of Childhood-Onset Psychiatric Disorders on the Development of SUDs

Abstract

Background and Objective: Child- and adolescent-onset psychopathology is known to increase the risk for developing

Overall, pharmacological treatments for psychiatric disorders appear to mitigate the development of SUD especially when treatment is initiated early and for longer durations. …

especially when treatment is initiated early and for longer durations. More studies on the development of SUD linked to the effects of psychotherapy alone and in combination with medication, medication initiation and duration, adequacy of treatment, non-ADHD disorders, and psychiatric comorbidity are necessary.

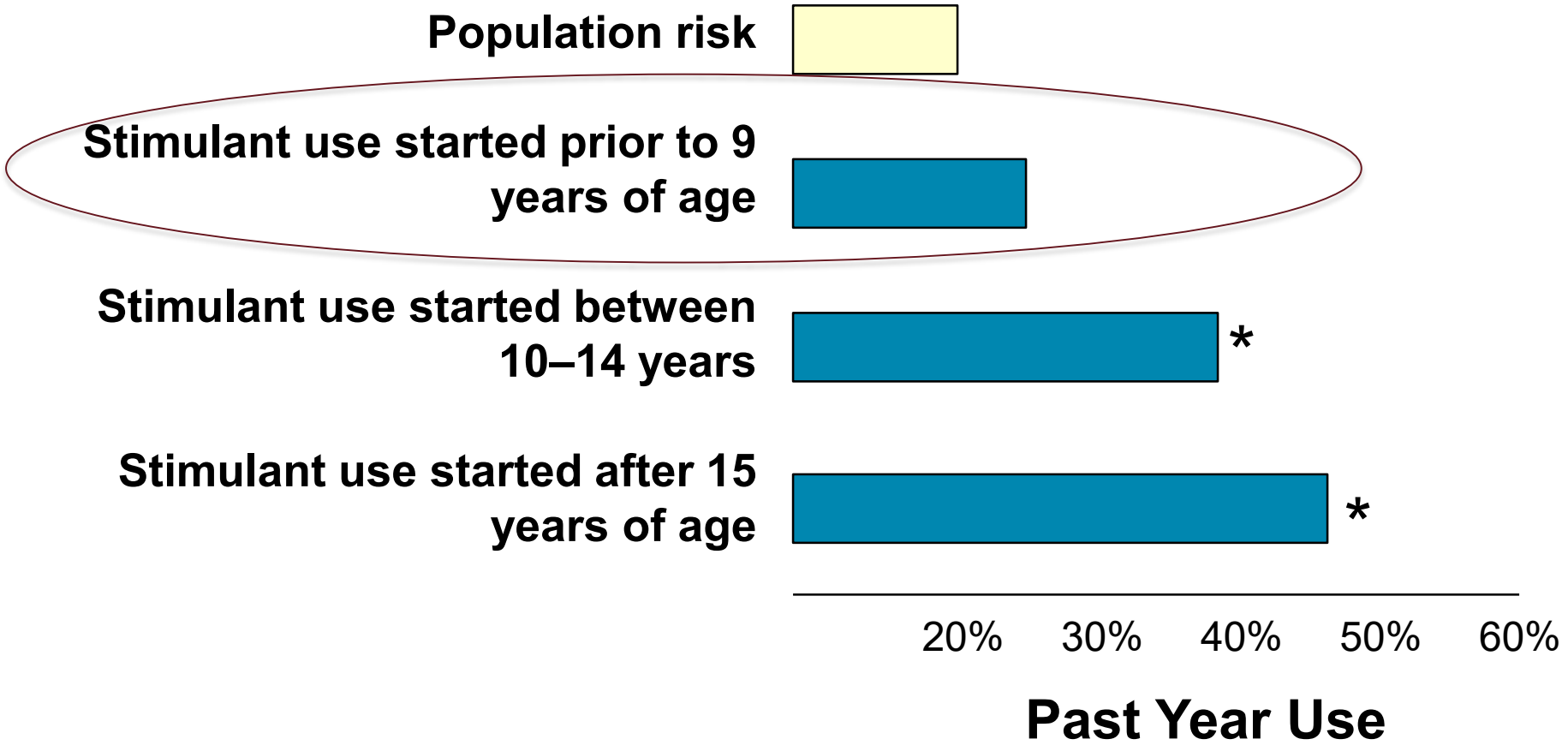
Wilens T, Woodward D, Ko J, Berger A, Burke C, Yule A. The Impact of Pharmacotherapy of Childhood-Onset Psychiatric Disorders on the Development of Substance Use Disorders. *Journal of Child and Adolescent Psychopharmacology.* 2022; 32 (4); 200-214. doi: 10.1089/cap.2022.0016.

Long-Term Studies of ADHD: Stimulant Treated vs Untreated and Subsequent Substance Use Disorders

Study	Country	Total: N	ADHD: N	Age	Main Findings Tx vs UnTx
Quinn et al. 2017	USA	146,000,000	2,993,887	15–42 yrs	Within group ↓
Sundquist et al. 2015	Sweden	551,164	9,424	Mean 15 yrs	Between group ↔
Chang et al. 2014	Sweden		38,753	8–46 yrs	Between group ↓
Steinhausen et al. 2014	Denmark		20,742	11–20 yrs	Between & Within groups ↓

(from Boland et al, J Psychiatric Research, 2020)

Early ADHD Treatment Reduces Marijuana Use



10 Cohorts of high school seniors 2005 to 2014 (N = 40,358; ~10% with ADHD; from 3-6+years of stim).
*P < .001 vs controls.
McCabe SE, et al. *J Am Acad Child Adolesc Psychiatry*. 2016;55(6):479-486.

Diagnostic Dilemmas in ADHD and SUD

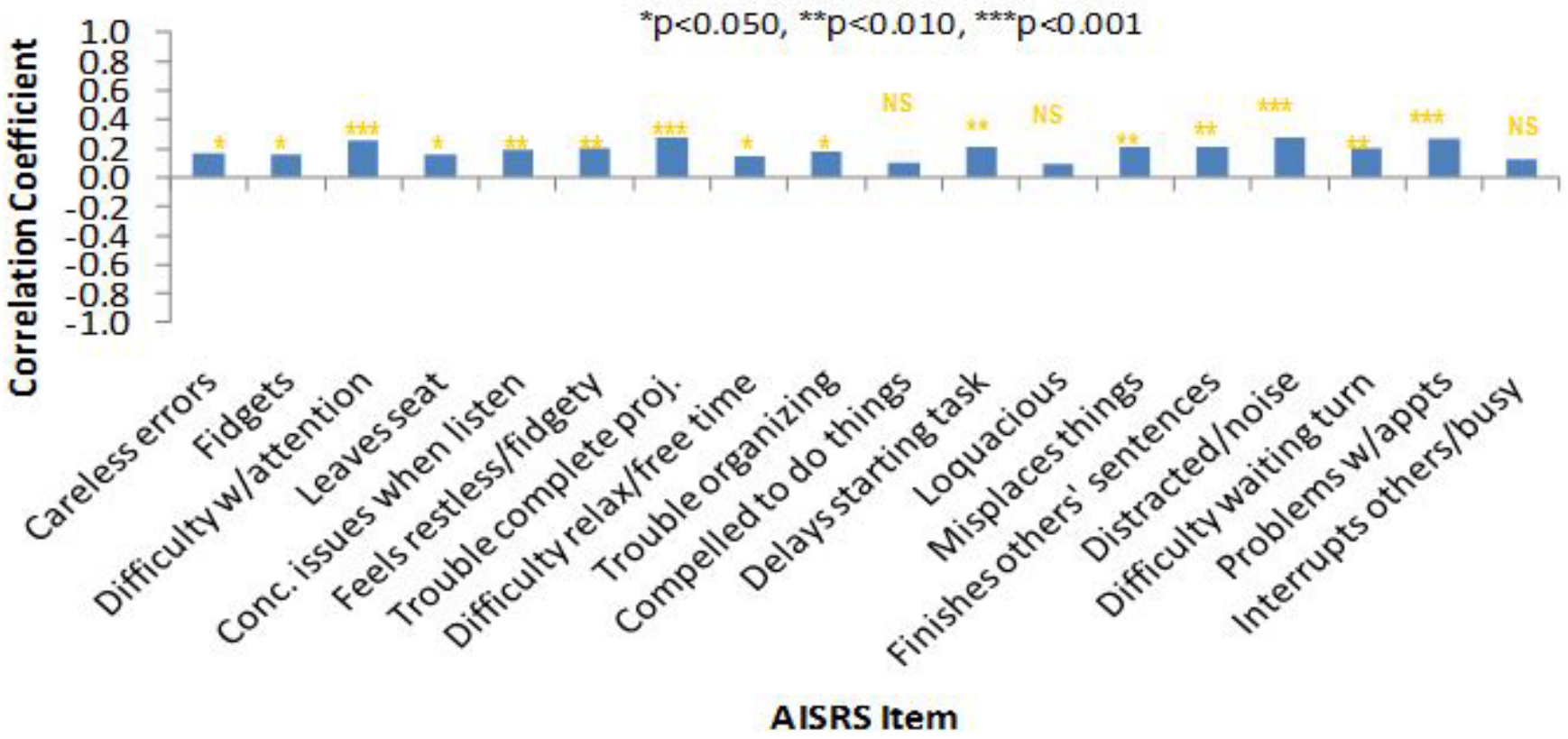
- Overlap symptoms of SUD in ADHD
  - Intoxication or withdrawal
  - Neuropsychological deficits (transient/permanent)
  - SUD "traits" misinterpreted as ADHD (eg, impulsive traits/risk-taking, harm avoidance)
- Other comorbidity (eg, anxiety, disruptive disorders)
- Reliability of retrospective report
- Subthreshold ADHD vs full ADHD
  - Age-of-onset criteria (NOS)
  - Effected domains, inadequate number of symptoms
- Concerns of drug-seeking behavior/rationalization
- Use of rating scales for ADHD helpful (eg, ASRS)

ASRS = Adult ADHD Self-Report Scale; NOS = not otherwise specified.

Levin FR, et al. *Drug Alcohol Depend*. 1998;52(1):15-25. Riggs PD. *Sci Pract Perspect*. 2003;2(1):18-29. Kaminer Y, et al. *Am J Addict*. 1999;8(2):114-119. Wilens TE, et al. *Curr Opin Psychiatry*. 2011;24(4):280-285. Faraone SV, et al. *Am J Psychiatry*. 2006;163(10):1720-1729. Faraone SV, et al. *Am J Addict*. 2007;16 Suppl 1:24-32.

Current Heavy Alcohol Use Worsens ADHD Symptoms

(AISRS Item Scores vs Presence or Absence of Alcohol Abuse* in Placebo Group)



***Consumed ≥ 4 alcoholic drinks/day for women, or ≥ 5 drinks/day for men, within 24 hours (cumulative; drink = 1.5 oz liquor, 5 oz wine, 12 oz beer), or ≥ 3 drinks/day for ≥ 1 week (ie, ≥ 7 consecutive days), during the double-blind treatment period (visit 3−14 [baseline to week 12]). *P* values were adjusted for multiple comparisons.**

Appts = appointments; Conc = concentration; NS = not statistically significant.

Wilens TE, Adler L, Tanaka J et al. *Curr Med Res Opin*. 2011;27(12):2309-2320.

Marijuana (MJ) and ADHD

- **Most common "drug" used/misused in ADHD**
- **ADHD is second most common comorbidity in cannabis use disorder**
- **Cannabis associated with neuropsychological impairment**
  - **Acute effects**
  - **Chronic - persistent executive dysfunction if marijuana initiated in adolescence (early)**

Wilens et al., J Am Acad Chld Adoles Psych: 2011; Am J Addict 2010: 16:14-23
Cooper et al. Eur Neuropsychopharm 2017: 27:795-808

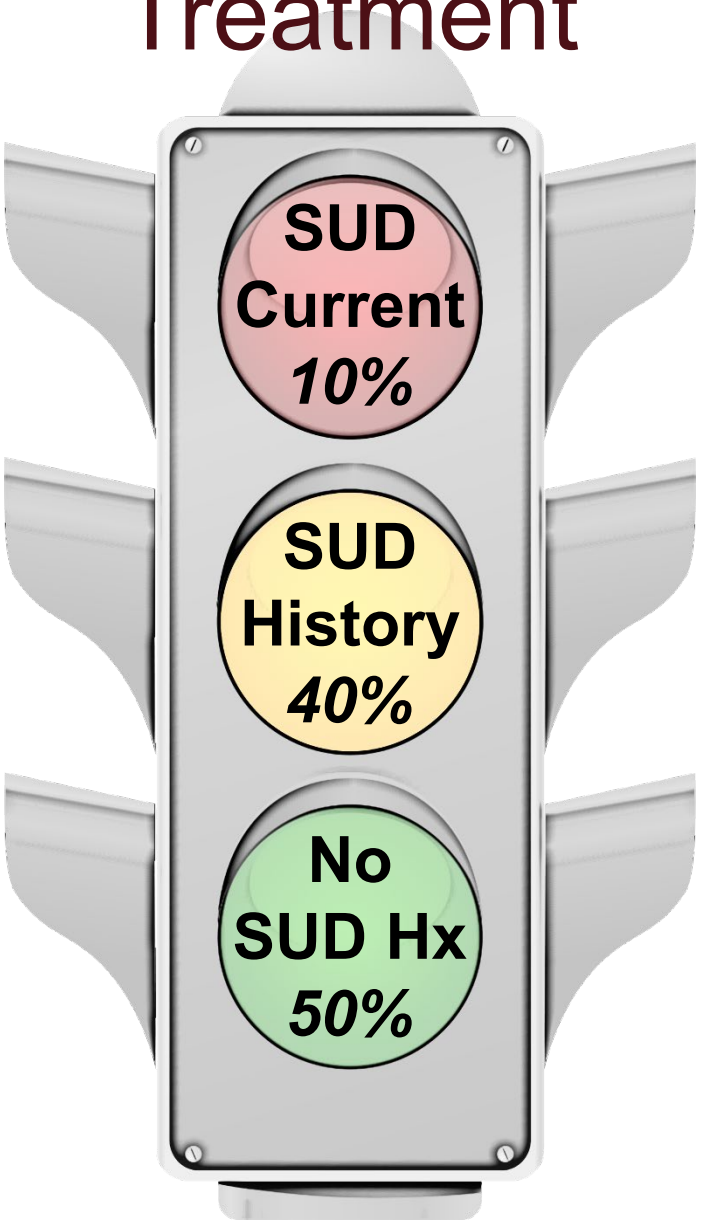
Marijuana (MJ) and ADHD

- **No evidence of more self medication versus non-ADHD**

- **Treatment of ADHD with cannabis**
- **Largely case reports**
  - **Controlled trial of 30 adults with ADHD**
  - **Use of oromucosal THC:CBD**
    - **Primary outcome: No cognitive or activity improvement**
    - **Secondary outcomes: Negative to trends to improvement in symptoms of inattention**

Wilens et al., J Am Acad Child Adoles Psych: 2011; Am J Addict 2010: 16:14-23
Cooper et al. Eur Neuropsychopharm 2017: 27:795-808

SUD in ADHD Adults Presenting for Treatment



ADHD ADULTS

Child and Adolescent Disorders (T Benton, Section Editor)

The Complicated Relationship Between Attention Deficit/Hyperactivity Disorder and Substance Use Disorders

Courtney A. Zulauf [1], Susan E. Sprich [2], Steven A. Safren [3] and Timothy E. Wilens [1, 4, 5]

Abstract

Adolescents and young adults with substance use disorders (SUD) and attention deficit/hyperactivity disorder (ADHD) are increasingly presenting in clinical practice. The overlap and role of treatment for these co-oc…odate recent…he treatm…e high risk fo…DHD across…ains disco… treatment alone does not appear to be particularly effective in treating SUD in currently active substance abusing individuals with ADHD. Structured therapies may be effective in treating adolescents and young adults with ADHD and SUD. Further controlled trials evaluating the sequence and effect of structured psychotherapies and/or ADHD pharmacotherapy on SUD relapse in these groups are warranted.

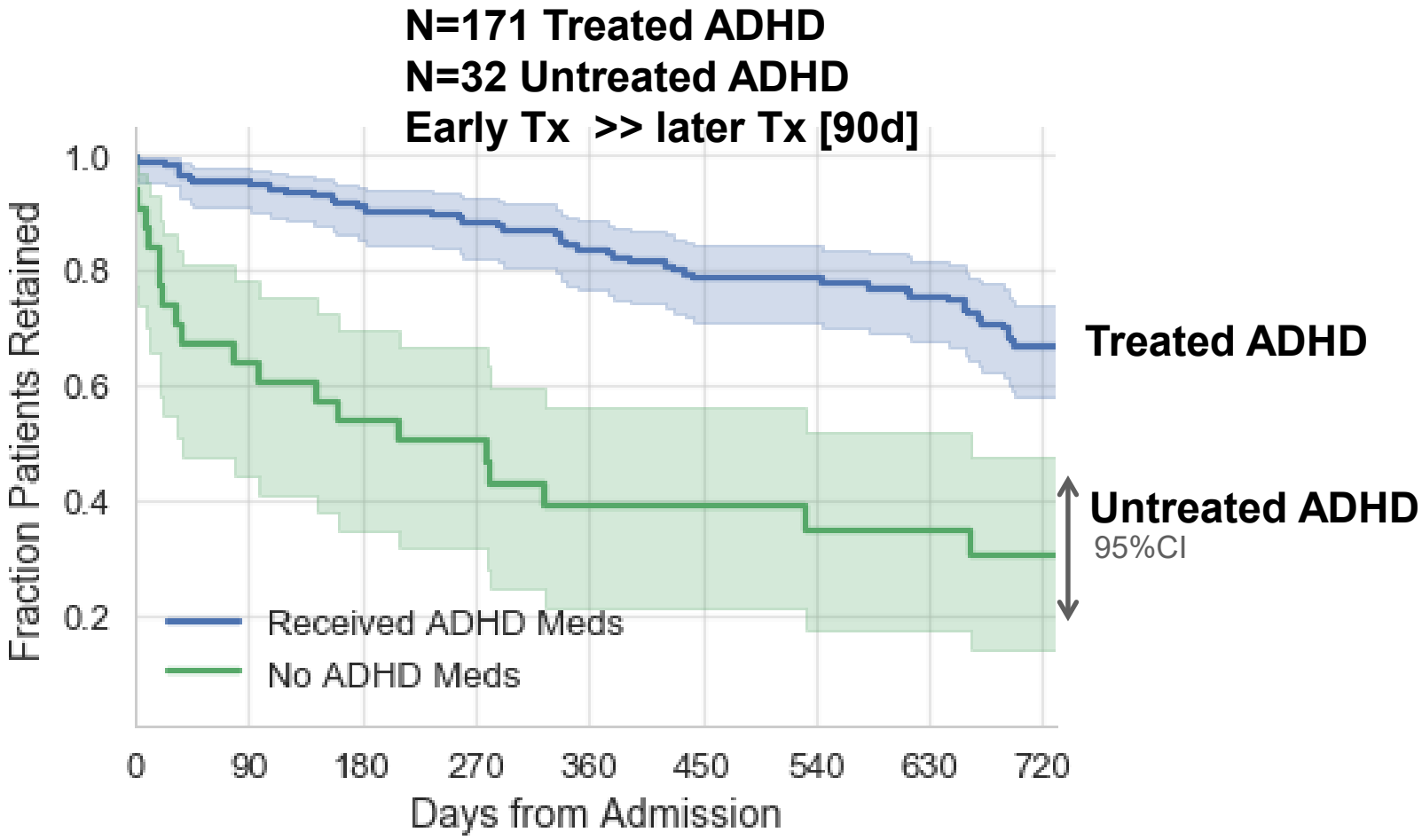
"…Structured therapies may be effective in treating adolescents and young adults with ADHD and SUD…"

Keywords Adolescence – Substance use disorders – Attention deficit/hyperactivity disorder – Stimulants comorbidity – Cognitive-behavioral therapy

This article is part of the Topical Collection on *Child and Adolescent Disorders*

Zulauf CA, et al. *Curr Psychiatry Rep*. 2014;16(3):436.

MGH Study: Medication Treatment of ADHD Improves Retention in SUD Treatment



(Kast K, Rao V, Wilens T. J Clin Psych: 2021)

Review > Aust N Z J Psychiatry. 2017 Sep;51(9):876-885. doi: 10.1177/0004867417714878. Epub 2017 Jun 22.

Managing attention deficit hyperactivity disorder in adults using illicit psychostimulants: A systematic review

Jon Cook [1 2], Martyn Lloyd-Jones [3 4], Shalini Arunogiri [5 6], Edward Ogden [3 7 8], Yvonne Bonomo [3 9]

Affiliations + expand

PMID: 28639480 DOI: 10.1177/0004867417714878

Abstract

Context: Attention deficit hyperactivity disorder and stimulant use disorder commonly co-exist, and appropriate treatments have not been well established.

Objective: To provide guidance for treatment of co-existing attention deficit hyperactivity disorder and stimulant use disorder.

…***Promising outcomes need replication in further studies utilizing higher treatment dosing***

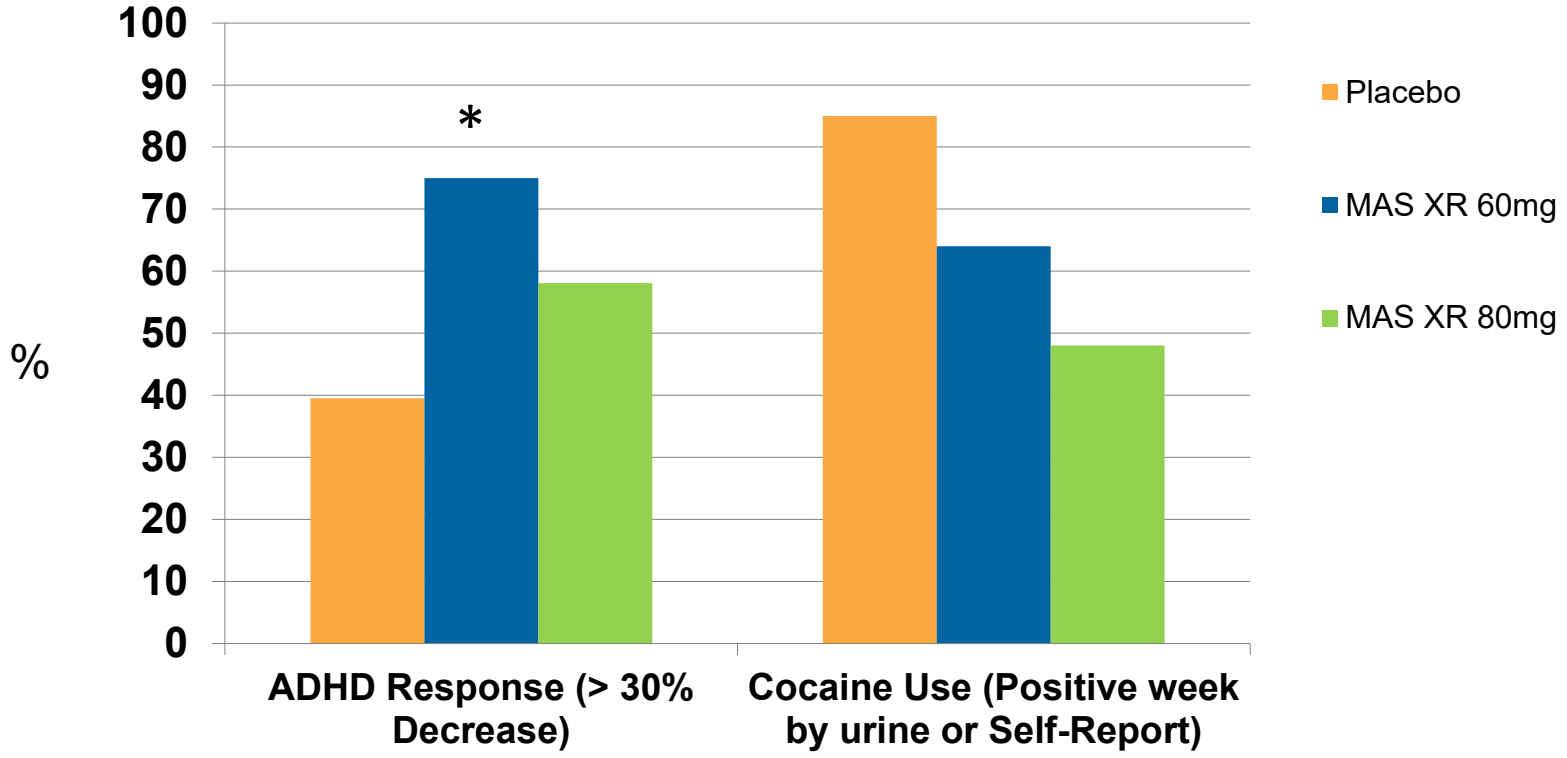
Two of six studies that reported substance use outcomes showed improvement in treatment arms compared with placebo. Studies to show effect tended to be those with the highest treatment dosage.

Conclusion: Evidence for the efficacy of treatment of patients with comorbid stimulant use disorder and attention deficit hyperactivity disorder is limited. Promising outcomes need replication in further studies utilising higher treatment dosage.

Keywords: ADHD; cocaine; methamphetamine; stimulant use disorder.

Similar articles

Higher Dose MAS XR is Helpful in ADHD and Cocaine Use Disorder in Patients with OUD



13-week RCT
Diagnosis: Cocaine Use Disorder and ADHD
Treatment: CBT +/- MAS XR

N = 126. **P* < .05.

Levin FR, et al. *JAMA Psychiatry*. 2015;72(6):593-602.

Methylphenidate Improves Retention and Outcomes in Criminal Offenders with ADHD and Substance Dependence: A 24-Week Randomized Placebo-Controlled Trial

Sample: 54 incarcerated males (mean age = 42 years)

Dose: Start dose 18 mg MPH/placebo titrated over a period of 19 days; mean dose of 108 mg/day

CBT: Individual CBT weekly for 12 weeks

Measurements: ADHD symptoms, urine toxicology, retention to treatment

Findings: **MPH treated group showed reduced ADHD symptoms (*P* = .011), significantly higher proportion negative urine screens (*P* = .047), and better retention (*P* = .032)**

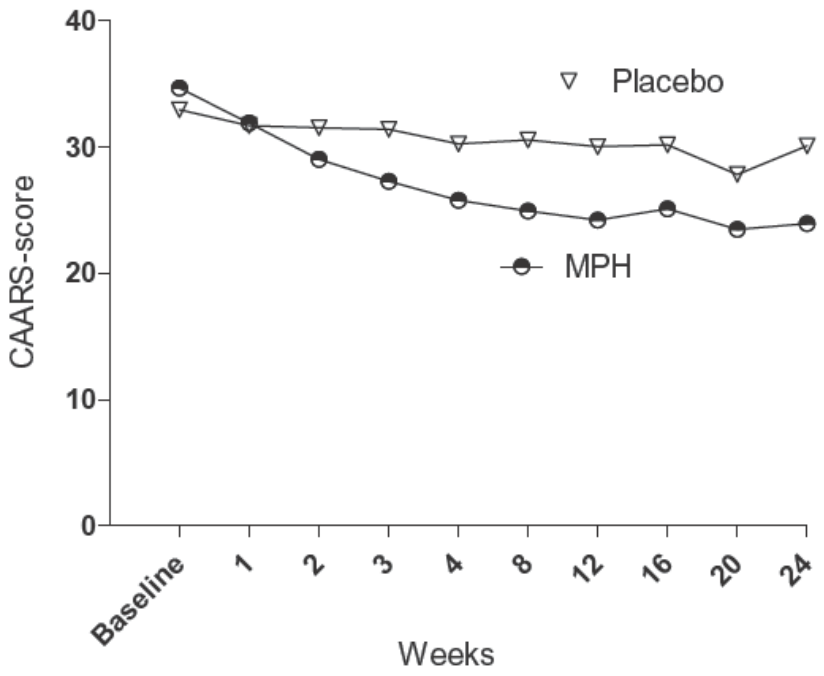
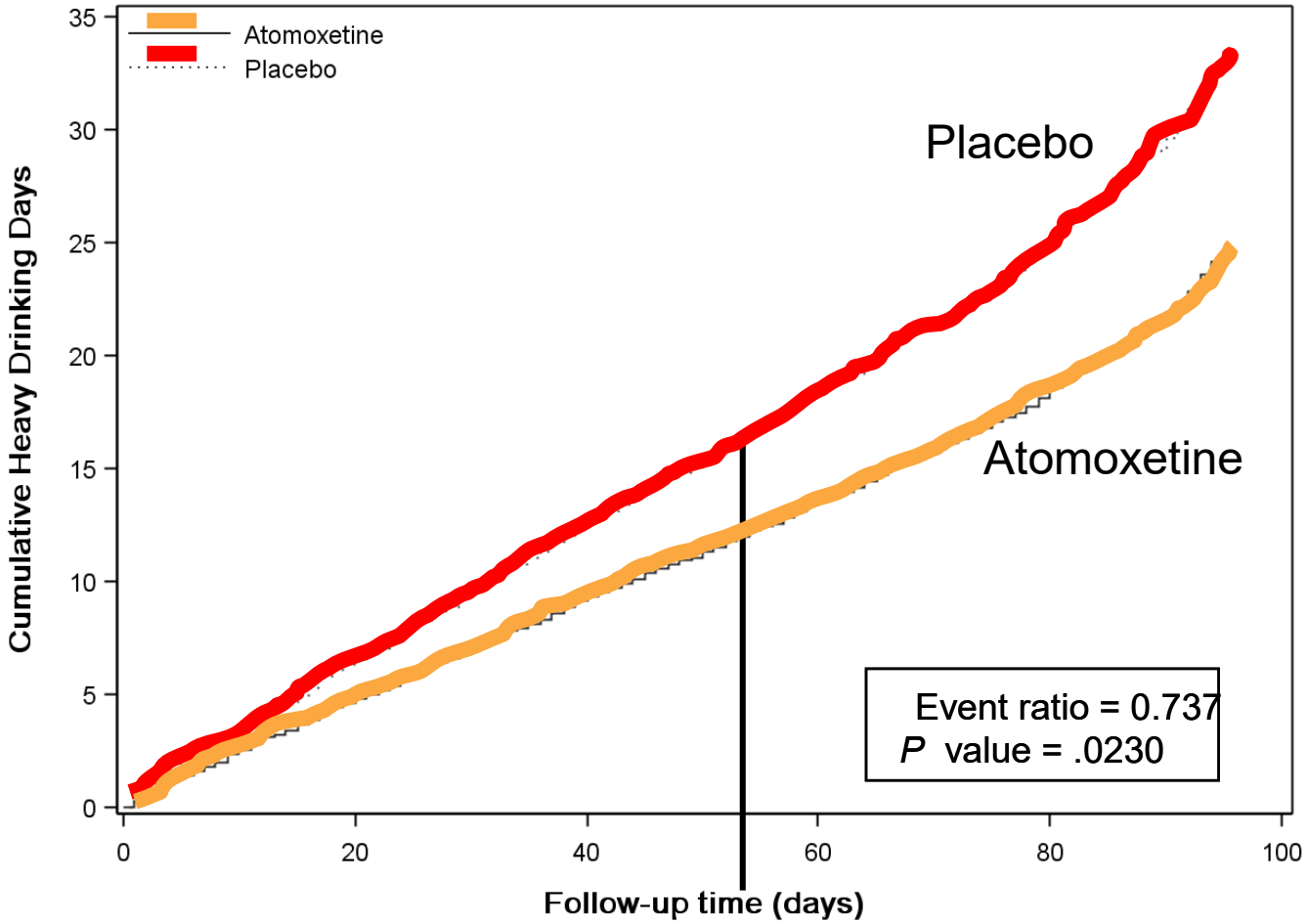


Figure 2. Change in self-rated ADHD symptoms (95% CI:-13.78 to -1.91, *P*=0.011).

Konstenius M, et al. *Addiction*. 2014;109(3):440-449.

Atomoxetine Improves Heavy Drinking in Recently Abstinent Adults



An event ratio of .737 indicates that, relative to patients treated with placebo, atomoxetine-treated patients experienced an approximately 26.3% greater reduction in the rate of heavy drinking. Separation between groups first occurred at day 55.

Wilens TE, et al. *Drug Alcohol Depend*. 2008;96(1-2):145-154. Adler L, et al. *Am J Addict*. 2009;18(5):393-401.

Strategies for ADHD and SUD

In context to SUD, ADHD treatment should be considered

If misuse or less severe SUD, treat ADHD concomitantly (e.g. smoking MJ sometimes)

More severe SUD --> address SUD (e.g. daily MJ)

If unable to address or recalcitrant SUD ->use CBT, nonstimulants, extended-release stimulants (may need higher dose)

Careful with IR stimulants, use abuse-deterrent stimulants when available

Taubin, Wilson and Wilens, ADHD and SUD in Young People, in *Updates in Pharm of ADHD*, Child Adolesc Psych Clin N America, Newcorn and Wilens (eds), Elsevier Press, 2022.

Kaminski and Wilens, Overlap of ADHD and SUD, in Textbook of SUD, 2019

Controversies Related to Treating ADHD in Incarcerated Individuals

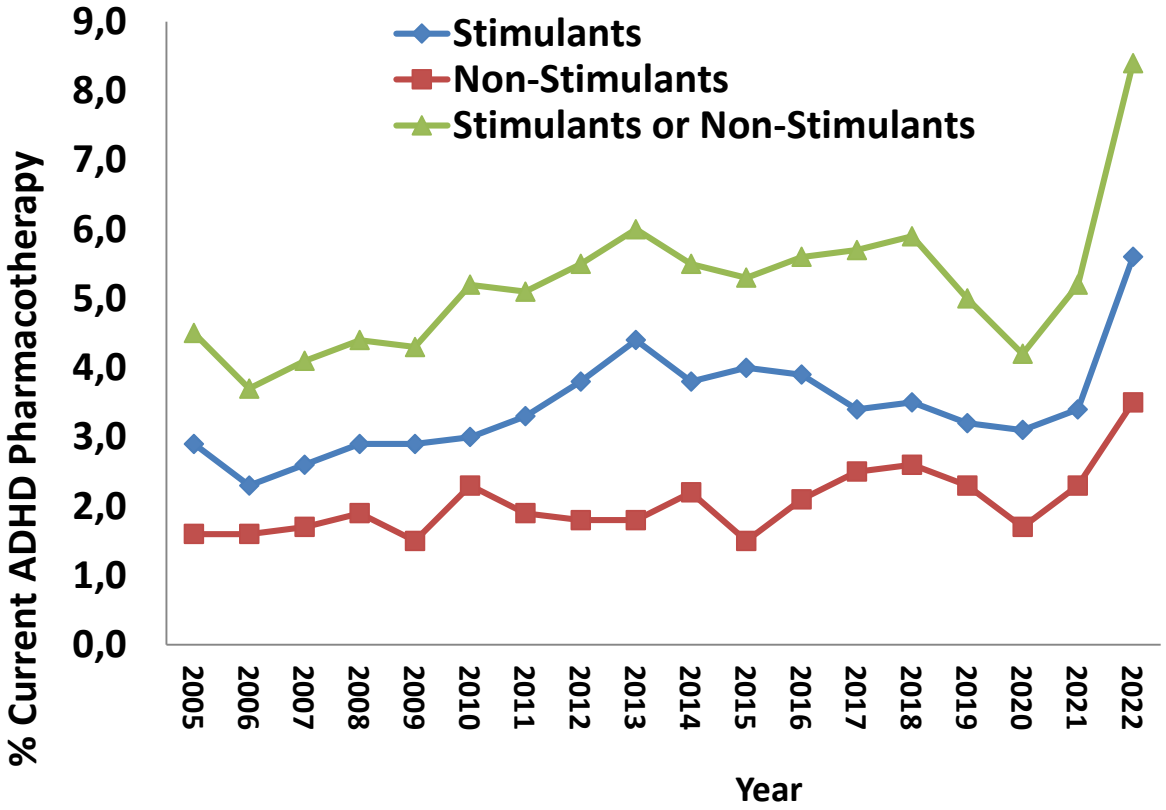
For using stimulants:
- Stimulants are most effective treatments for ADHD (Childress, 2022)
- Concerns that it is unethical to withhold stimulants from people who are incarcerated, since they are an accepted standard of treatment in the general population (Young & Cocallis, 2019)
- Other authors support stimulants as first-line treatments, but recommend using non-stimulants when SUDs are present (Young et al., 2011, 2018; Young & Cocallis, 2019)

Against using stimulants:
- Stimulants have abuse liability and potential
- Concerns that it is unethical to provide stimulant treatment to people who are incarcerated with the current evidence available (Tully, 2022)
- Others argue that the high prevalence of SUDs in people who are incarcerated is reason enough to avoid the use of stimulants (Burns, 2009)

From: Byrne C & Guenter D. Treatments for ADHD in adults in jails, prisons and correctional settings: a scoping review of the literature. Health Justice. 2023 Dec; 11: 36. Published online 2023 Sep 7. doi: 10.1186/s40352-023-00234-9

What do we know about stimulant misuse (Nonmedical Use of Stimulants)?

Trend: 12th Grade Current ADHD Pharmacotherapy

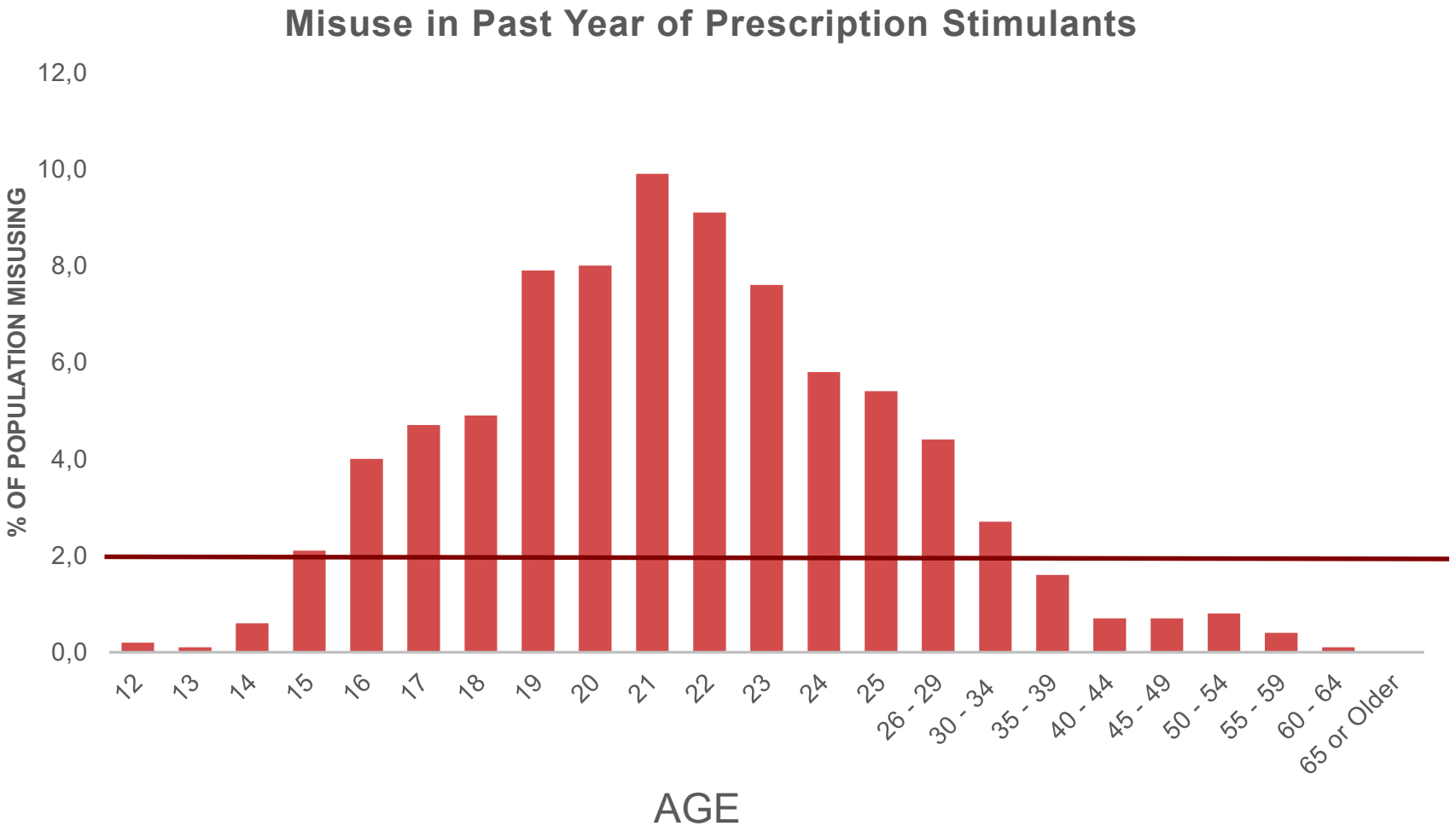


* Reflects significant difference between 2022 vs 2021

* Reflects significant difference between 2022 vs 2021

Source: Miech RA, Johnston LD, Patrick ME, O'Malley PM, Bachman JG, Schulenberg JE. 2023. Monitoring the Future National Survey Results on Drug Use, 1975-2022: Secondary School Students. Monitoring the Future Monograph Series. Ann Arbor: Institute for Social Research, The University of Michigan.

Stimulant Misuse Peaks at Age 21
10% of the Population Reporting Lifetime Stimulant Misuse



Source: SAMHSA, Center for Behavioral Health Statistics & Quality, National Survey on Drug Use and Health, 2015

Stimulant Misuse and Diversion

- N > 120 studies; mostly survey studies in college students (80%)
- 10% to 20% prevalence of nonmedical use of stimulants
- 65% to 85% of stimulants diverted from "friends"
  - Majority not "scamming" local practitioners
  - Not seen as potentially dangerous

McCabe SE, et al. *Addiction*. 2005;100(1):96-106. Arria AM, et al. *Subst Abus*. 2008;29(4):19-38. Wilens TE, et al. *J Am Acad Child Adolesc Psychiatry*. 2006;45(4):408-414. Wilens TE, et al. *J Am Acad Child Adolesc Psychiatry*. *J Am Acad Child Adolesc Psychiatry*. 2008;47(1):21-31. Wilens TE, et al. *J Clin Psychiatry*. 2016;77(7):940-947. : Faraone et al. J Am Acad Child Adoles Psych, 2020).

What are the characteristics of those who misuse prescription stimulants?

Reasons for Misusing Stimulants (N=100)

To help concentrate or focus better	79%
To stay awake	62%
To reduce distraction	56%
To get more energy	48%
To experiment – to see what it's like	42%
To have a good time with my friends	22%
To feel good or get high	21%
To get through the day	12%

(Wilens et al. Am J Addictions 2020)

Motivations for Prescription Stimulant Misuse (PSM)

- **Objective:** While prescription stimulant misuse (PSM) is common in adolescents and young adults (AYAs), PSM motives are poorly understood. We examined a number of PSM motives across the AYA age spectrum using the 2015-18 National Survey on Drug Use and Health.
- **Methods:** In all, 102,088 AYAs (14-25 years) were included. Individual M motives (e.g., to study) and motive categorie , weight loss only, combined motives) w xamined links between individual motives or e use, SUD, and mental health correlates.
- **Results:** Differences only (14 years=40.4%; 24/25 years=71.2%) a =9.8%) or combined PSM motives, (14 yea nd graduates had particularly high rates aduates=74.7%; non-college=63.5%). Recu itly elevated in AYAs with any past-year SU e with SUD). While any PSM was associated es, including suicidal ideation, odds were h
- **Conclusion**: Cognitiv ng adults compared to adolescents; college those not in school; and the presence of a suicidal ideation, and other psychopatholog ning and intervention among AYA is highly r

Cognitive enhancement with stimulant misuse

-Young adults > adolescents

- College > non-college

- Linked with psych, SI, SUD

- Prevention in adolescents & screening in adults is recommended

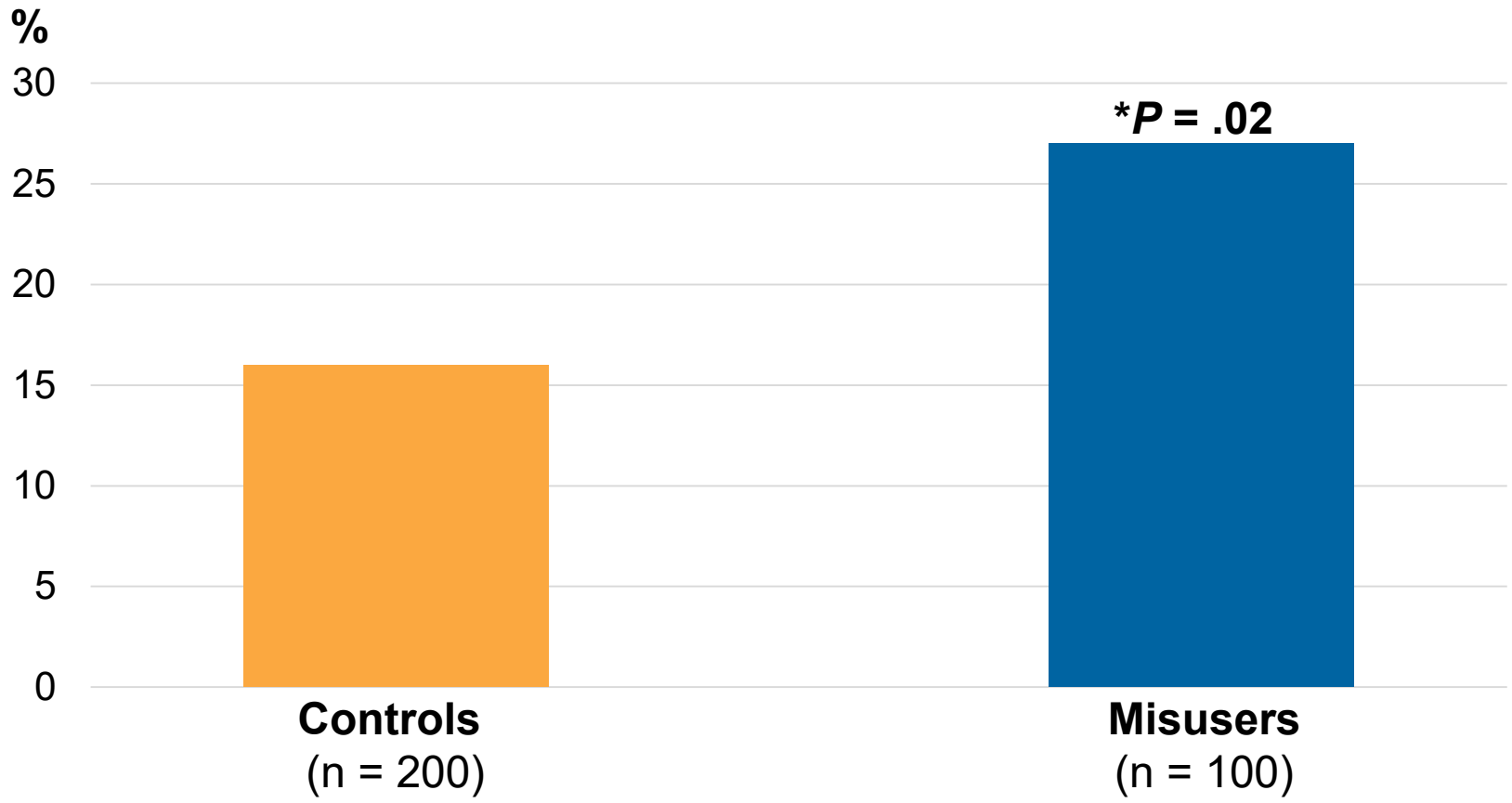
Schlepis, McCabe, Ford & Wilens TE *J Clin Psychiatry*. 2020;81(6):20m13302. doi: 10.4088/JCP.20m13302..

Does Cognitive Enhancement Occur with Prescription Stimulants in Healthy Young People? Probably NOT

Study	N	Design/Med	Findings	Comments
Weydant 2018	13	RCT X-over ≤30 mg AMPH	Minimal improvement-attention performance, impaired working memory	Effects on emotions autonomics, & expectations
MacQueen 2018	71	RCT Parallel 10, 20 mg AMPH	Dose dependent improvement in CPT	
Cropsey 2017	39	RCT X-over 10 mg AMPH	No effect	Expectation linked to cognitive improvement
Agay 2017	39	RCT X-over 0.3 mg/kg MPH	Improved attention and working memory	Lower baseline-> more improvement
Linssen 2012	19	RCT X-over 10, 20, 40 mg MPH	Dose dependent improved memory, set shifting; no effect WM, planning	
Looby 2011	96	Placebo parallel No stimulant	No effect	Expectation linked to improved mood

Wilens T, Kaminski T. *Stimulant Misuse and Cognitive Enhancement*. In L. Lundahl, D. Rosenberg (Ed.), Pediatric Clinics of North America. 2019; (66)6

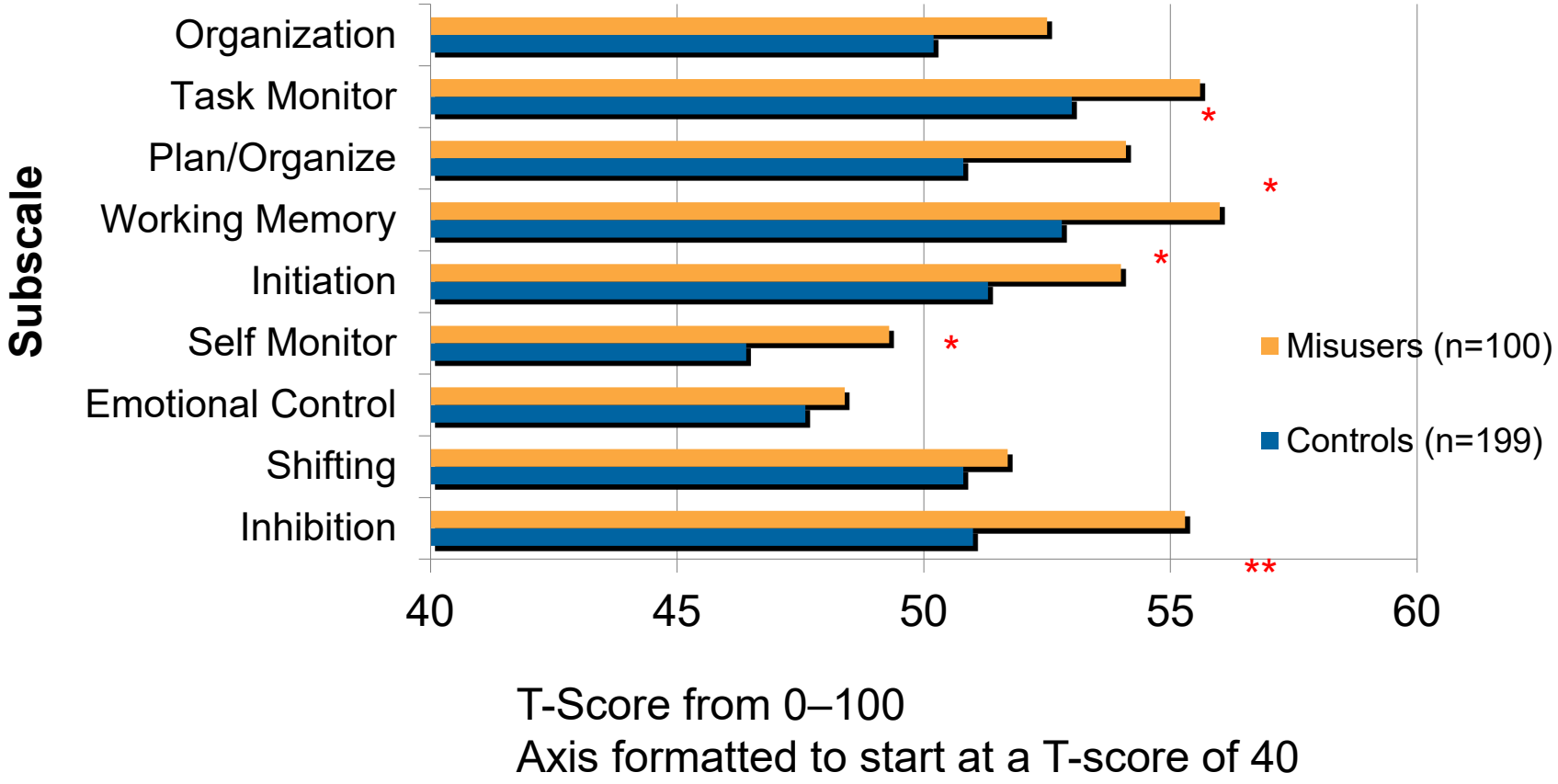
Rates of ADHD are Higher in College Students Who Misuse Stimulants Compared to Controls



N = 300. *Subthreshold + full diagnosis of ADHD.
Wilens TE, et al. *J Clin Psychiatry*. 2016;77(7):940-947

More Executive Dysfunction in Stimulant Misusers

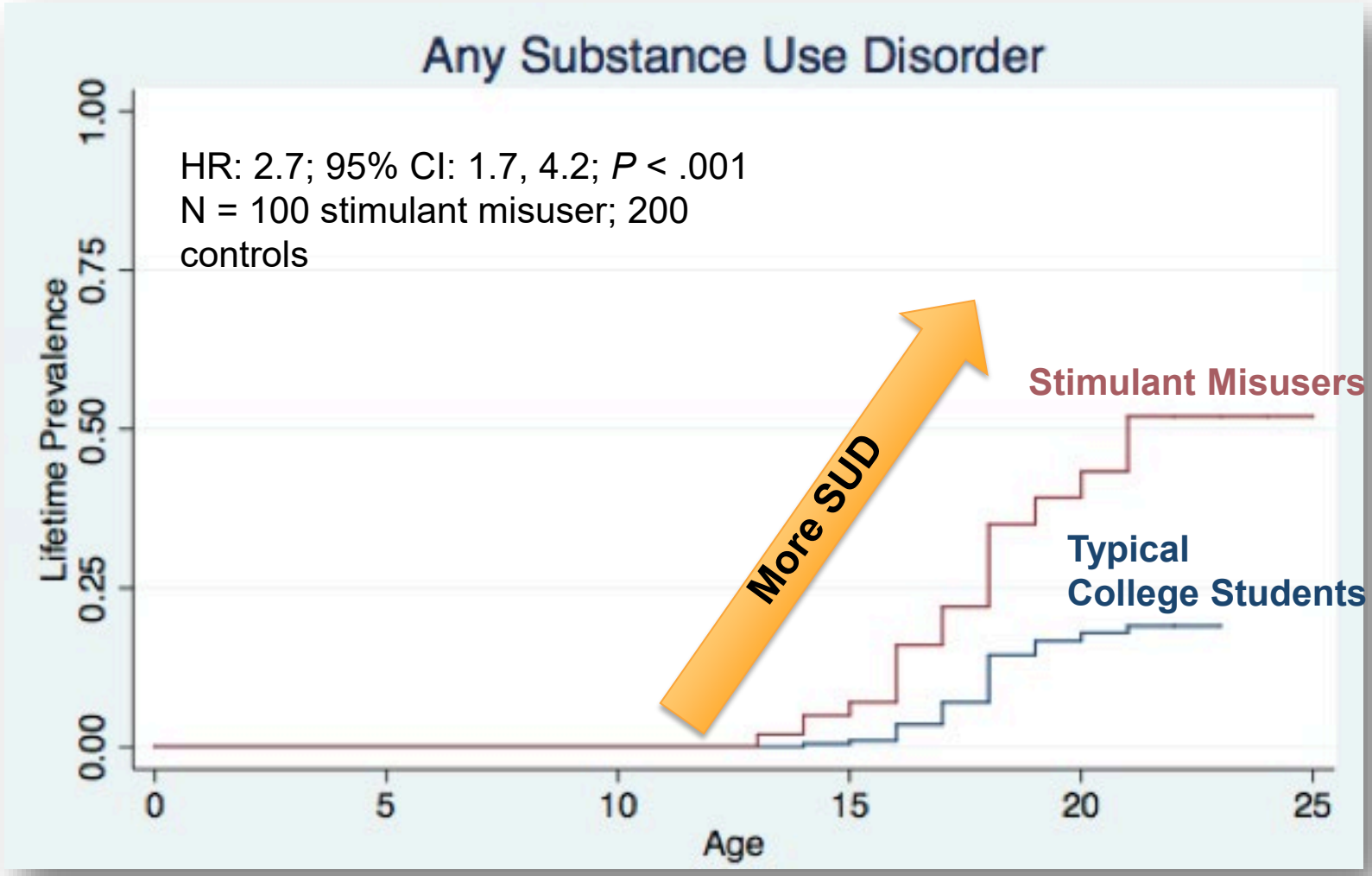
Subscales of the Self-Report Behavior Rating Inventory of Executive Functioning (BRIEF)



N = 299. *$P < .05$

Wilens TE, et al. *Am J Addict*. 2017;26(4):379-387.

College Stimulant Misusers Have Higher Rates of SUD



Wilens TE, et al. *J Clin Psychiatry*. 2016;77(7):940-947.

MGH Study: Are Stimulant Misusers with SUD Different ? *Probably Yes*

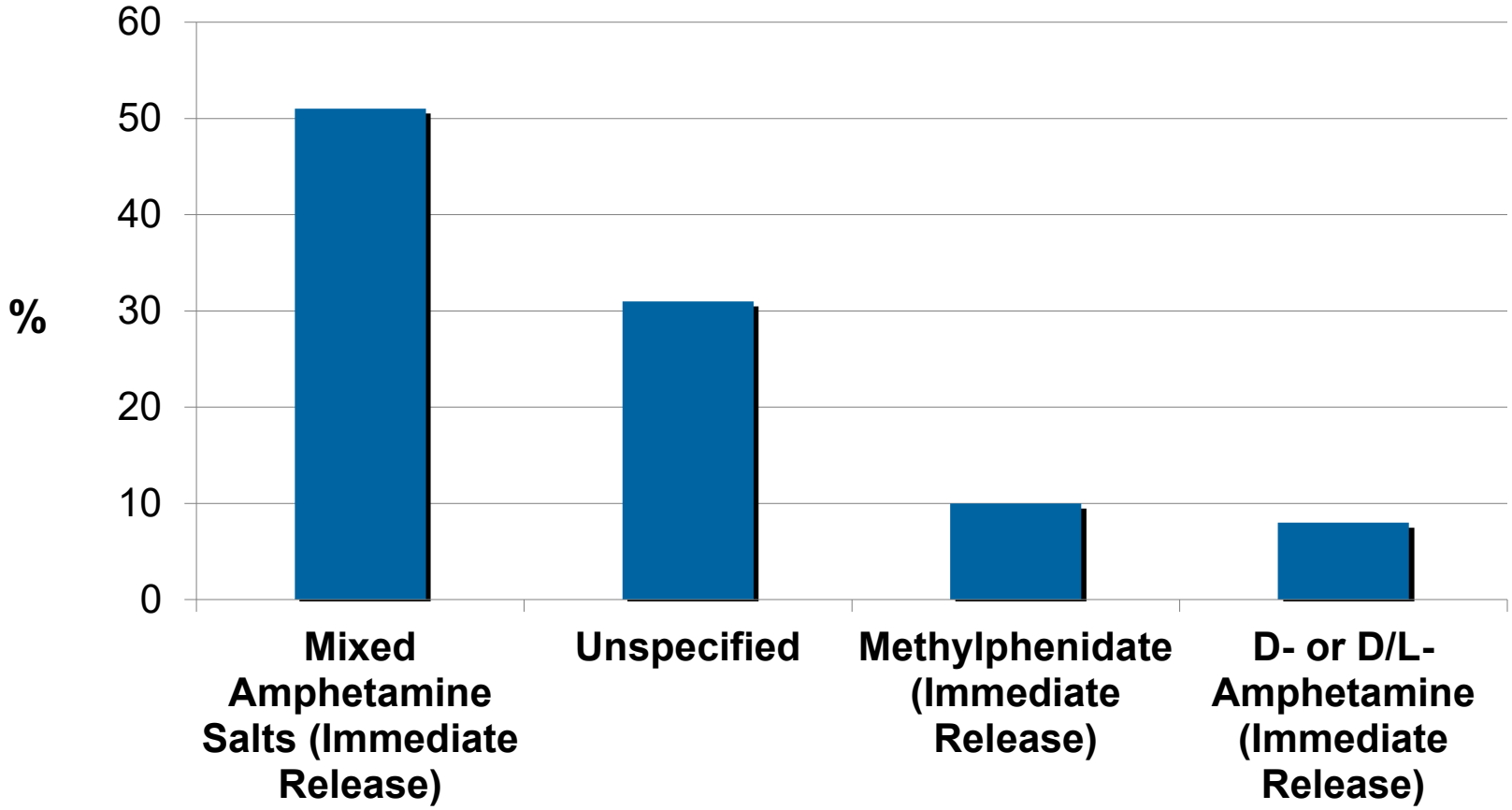
SUD History in 46% of stimulant misusers
Misusers with (vs without) SUD more likely to have

- **Bought or traded stimulants,**
- **Bought or traded in their car,**
- **Used at parties with drugs/alcohol, or**
- **Used intranasally (see later):**
  - **Misuse at parties**
  - **Use with cocaine**
  - **Use with alcohol**

(Wilens et al. Am J Addictions 2020)

Immediate-Release Stimulants are Misused by College Students with a Stimulant Use Disorder

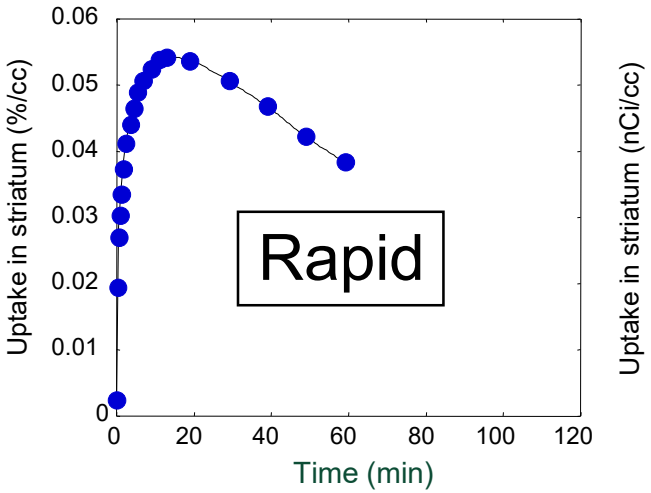
(n = 39; ~40% have a stimulant use disorder)



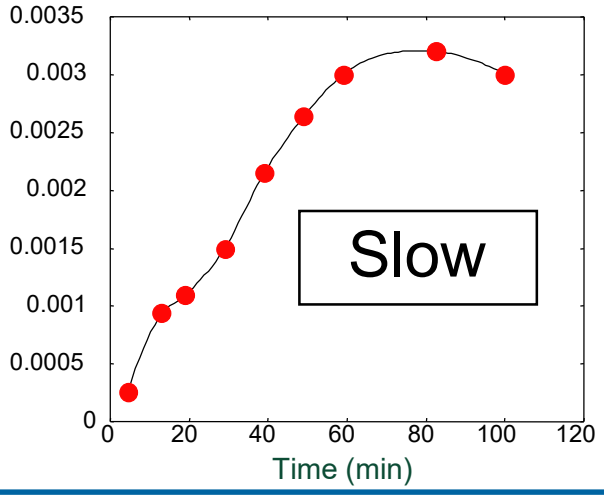
Wilens TE, et al. *J Clin Psychiatry*. 2016;77(7):940-947.

Rapidity of Uptake (?Dopamine) Drives Euphoric Effects of Stimulants (Methylphenidate)

iv MPH



oral MPH

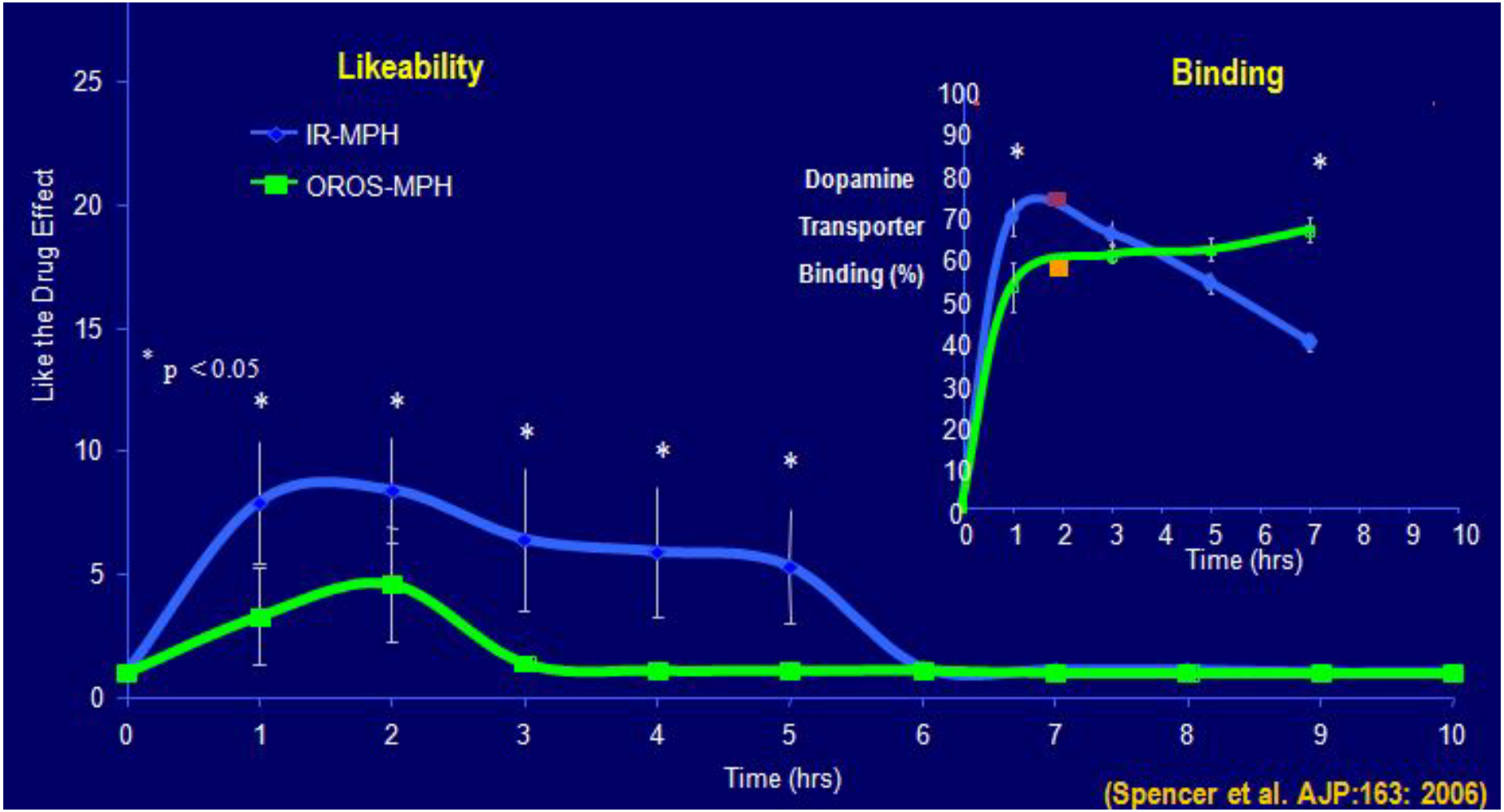


Intravenous (IV) methylphenidate leads to stronger rewarding effects (euphoria) than oral methylphenidate

Volkow et al., Arch Gen Psych 52:1995, J Neurosci 2001.

Stimulant Preparation Linked to Dopamine Transporter Binding and Likeability

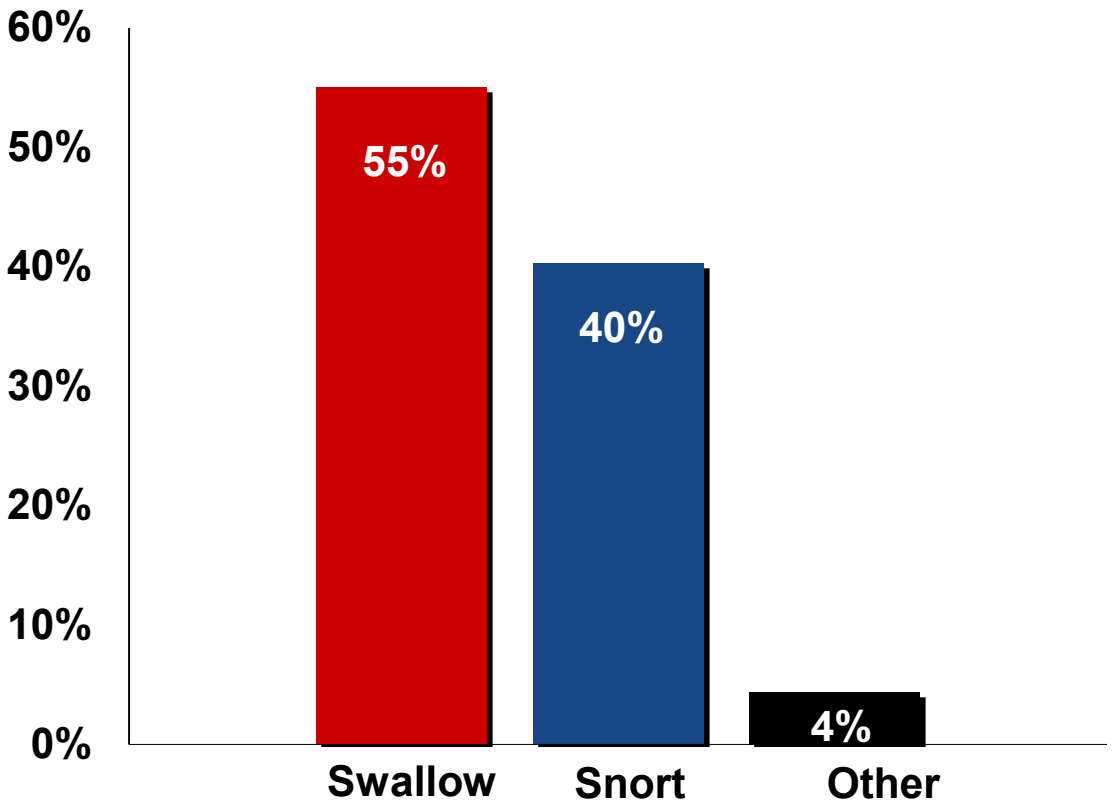
40 mg IR-MPH vs 90 mg OROS MPH



Spencer TJ, et al. *Am J Psychiatry*. 2006;163(3):387-395.

Misuse by Alternative Routes is Common: Snorting is Frequently Reported

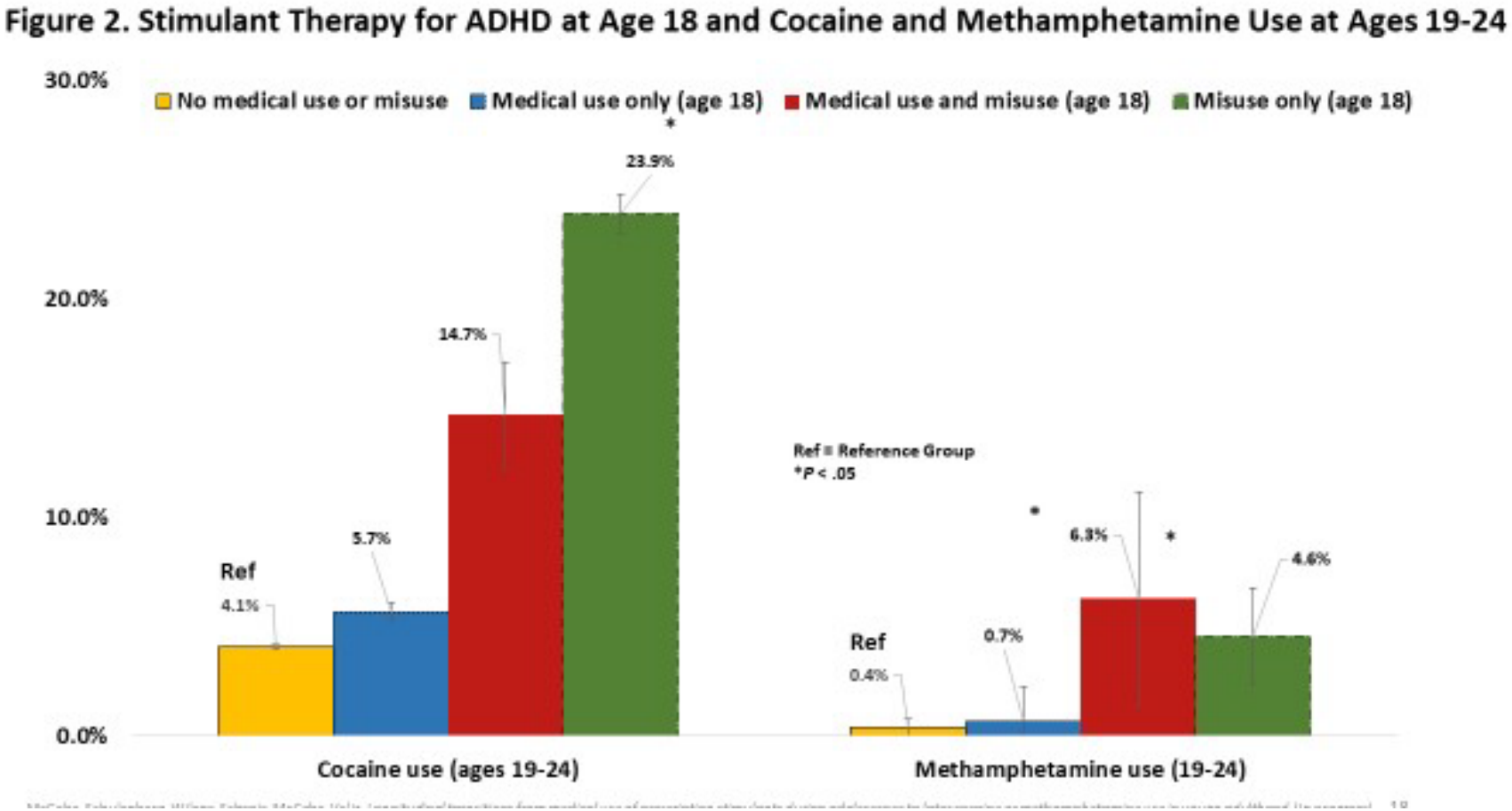
Method of Stimulant Misuse by College Students (n = 1025)



Random sample: Anonymous surveys at the University of New Hampshire administered via e-mail and paper, 1025 received out of 5000 distributed, 6.6% diagnosed with ADHD, over 16% of students abuse stimulants.

White BP, et al. *J Am Coll Health*. 2006;54(5):261-268.

Prescription Stimulant Misuse and Not Medical Use is Linked to Later Cocaine / Methamphetamine Use



National longitudinal multi-cohort panels of U.S. high school 12th graders (N=5,034) who were followed from ages 17–18 (baseline cohort years 2005–2017) to ages 23/24. At ages 17–18, an estimated 6.4% reported medical use only of prescription stimulants to treat ADHD, 3.8% indicated both medical use and misuse, 14.6% reported misuse only, and 75.2% of adolescents did not report medical use or misuse of prescription stimulants (population controls).

McCabe SE, Schulenberg JE, Wilens TE, Schepis TS, McCabe VV, Veliz PT. JAMA Netw Open. 2023 Jul 3;6(7):e2322650. doi: 10.1001/jamanetworkopen.2023.22650.

J Am Acad Child Adolesc Psychiatry. 2019 Jul;58(7):681-691. doi: 10.1016/j.jaac.2018.11.018. Epub 2019 Mar 27.

Sources of Nonmedical Prescription Drug Misuse Among US High School Seniors: Differences in Motives and Substance Use Behaviors

Sean Esteban McCabe [1], Philip Veliz [2], Timothy E Wilens [3], Brady T West [4], Ty S Schepis [5], Jason A Ford [6], Corey Pomykacz [6], Carol J Boyd [2]

Affiliations + expand

PMID: 30926573 PMCID: PMC7071946 DOI: 10.1016/j.jaac.2018.11.018

- **N= 18,549 HS Seniors**
- **11% with nonmedical use of prescription medications**
- **Boys → more likely purchased meds**
- **Girls → more likely overused their own**
- ***Reservoirs of medication supplies (e.g. excess # pills/caps) resulted in the most diversion***

Stimulant prescribing via telehealth

Does receiving a stimulant prescription from a provider whom the patient has never seen in person increase the risk for stimulant/substance misuse?

Does starting a stimulant prescription during a telemedicine visit increase risk for stimulant/substance misuse?
(Patient may have been seen in person previously)

Methods

Data source

Electronic health records: March 1, 2020 through August 25, 2023

EPIC Medical Record across Mass General Brigham hospital system

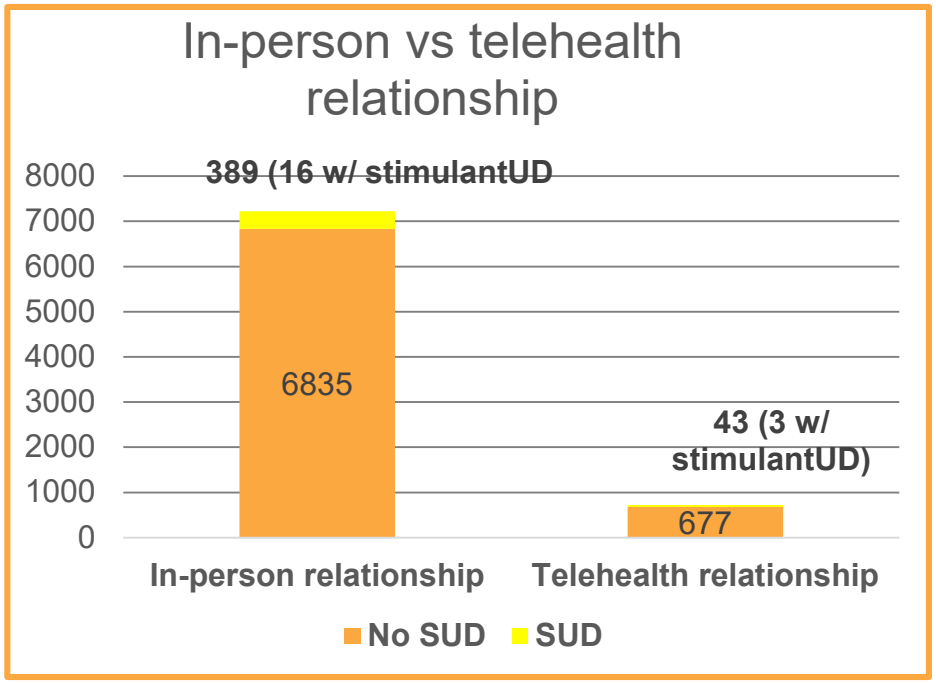
Included were Mass General Brigham patients (12+ years old) with ADHD diagnosis and any stimulant prescription

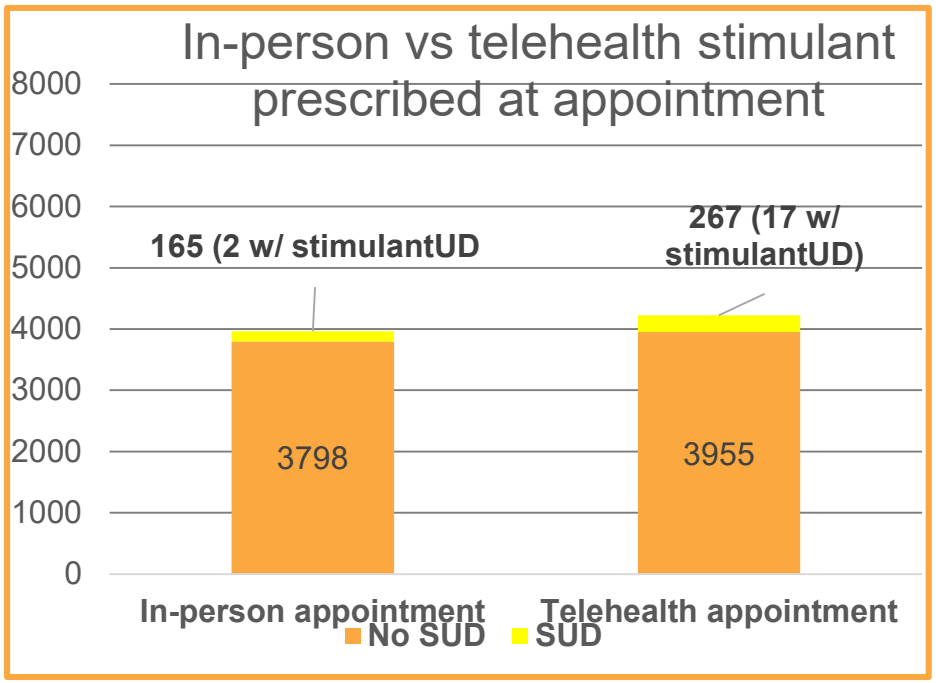
Exclusion criteria

- First ADHD dx or stimulant Rx before March 1, 2020
- First stimulant order was a "Historical med" (not ordered by prescriber)
- SUD Diagnosis (except nicotine use) prior to/at first stimulant Rx

Impact of Telehealth on Stimulant and other SUDs

(N=7944 patients)





In-person *relationship* with stimulant prescriber

	Any substance use disorder		Stimulant use disorder	
	Odds Ratio [95% CI]	p-value	Odds Ratio [95% CI]	p-value
Intercept	0.018 [0.0079, 0.042]	<0.001	0.0016 [0.0001, 0.027]	<0.001
Demographic variables				
Age 18-25	1.12 [0.86, 1.46]	0.41	2.17 [0.54, 8.74]	0.28
Age 26+	0.64 [0.50, 0.83]	<0.001	1.35 [0.35, 5.21]	0.66
Male sex	1.85 [1.50, 2.28]	<0.001	2.18 [0.83, 5.74]	0.11
Race				
Black or African American	2.63 [1.14, 6.10]	0.024	2.32 [0.20, 26.83]	0.50
White	2.64 [1.29, 5.41]	0.008	0.83 [0.11, 6.59]	0.86
Other	3.51 [1.58, 7.79]	0.002	0.99 [0.061, 16.00]	0.99
Unavailable	2.58 [1.10, 6.03]	0.029	2.28 [0.20, 26.31]	0.51
Median income in zip code of residence	0.97 [0.87, 1.075]	0.55	1.17 [0.75, 1.81]	0.50
Mental health diagnoses				
Antisocial personality disorder/ Conduct disorder	1.26 [0.43, 3.72]	0.68	0.50 [3.68E-05, 6667]	0.88
Anxiety disorder	1.34 [1.07, 1.68]	0.01	0.81 [0.29, 2.27]	0.69
Bipolar disorder	1.87 [1.19, 2.93]	0.007	5.76 [1.52, 21.89]	0.01
Depressive disorder	1.61 [1.29, 2.02]	<0.001	1.52 [0.53, 4.32]	0.43
Eating disorder	1.05 [0.65, 1.69]	0.86	1.35 [0.17, 10.60]	0.78
Clinical characteristics				
Stimulant rx from behavioral health specialist	2.04 [1.63, 2.55]	<0.001	2.28 [0.82, 6.35]	0.11
Observation time in study	1.00 [1.00, 1.00]	<0.001	1.00 [1.00, 1.00]	0.10
Any in-person relationship with prescriber	1.18 [0.84, 1.67]	0.35	0.78 [0.21, 2.94]	0.71

In-person *appointment* with stimulant prescriber

	Any substance use disorder		Stimulant use disorder	
	Odds Ratio [95% CI]	p-value	Odds Ratio [95% CI]	p-value
Intercept	0.02 [0.009, 0.044]	<0.001	0.002 [0.0001, 0.026]	<0.001
Demographic variables				
Age 18-25	1.11 [0.85, 1.46]	0.43	2.02 [0.50, 8.21]	0.32
Age 26+	0.64 [0.50, 0.83]	<0.001	1.29 [0.33, 5.00]	0.72
Male sex	1.87 [1.51, 2.30]	<0.001	2.26 [0.86, 5.94]	0.097
Race				
Black or African American	2.62 [1.13, 6.07]	0.025	2.28 [0.20, 26.40]	0.51
White	2.63 [1.28, 5.39]	0.008	0.80 [0.10, 6.35]	0.84
Other	3.52 [1.58, 7.80]	0.002	0.99 [0.061, 16.15]	1.00
Unavailable	2.57 [1.10, 6.03]	0.030	2.24 [0.19, 25.91]	0.52
Median income in zip code of residence	0.96 [0.87, 1.07]	0.47	1.12 [0.72, 1.75]	0.61
Mental health diagnoses				
Antisocial personality disorder/ Conduct disorder	1.28 [0.44, 3.79]	0.65	0.58 [1.5E-05, 22397]	0.92
Anxiety disorder	1.32 [1.05, 1.65]	0.016	0.73 [0.26, 2.03]	0.55
Bipolar disorder	1.83 [1.17, 2.88]	0.009	4.77 [1.25, 18.26]	0.023
Depressive disorder	1.59 [1.27, 2.00]	<0.001	1.38 [0.48, 3.92]	0.55
Eating disorder	1.03 [0.64, 1.67]	0.90	1.26 [0.16, 9.97]	0.83
Clinical characteristics				
Stimulant rx from behavioral health specialist	1.96 [1.55, 2.49]	<0.001	1.70 [0.60, 4.80]	0.32
Observation time in study	1.00 [1.00, 1.00]	<0.001	1.00 [1.00, 1.00]	0.24
Any in-person appointments prior to initial stimulant rx	1.20 [0.94, 1.54]	0.14	1.58 [0.49, 5.11]	0.45
Initial stimulant prescribed during in-person appointment	0.87 [0.69, 1.09]	0.22	0.16 [0.035, 0.74]	0.019

Limitations

Northeast United States healthcare system
Non-profit – may not generalize to for-profit
Academically affiliated system (Harvard Medical School)
-High standard of care
Longitudinal data to 3.5 years
Small number of stimulant use disorder development
Limited capacity to examine prescription stimulant misuse

Conclusions

Telehealth – related prescribing of stimulant medications for ADHD is not associated with increases in the subsequent development of substance use disorders

Things Practitioners Can Do to Curtail Prescription Drug Misuse

- **Educate adolescents, young adults, and yourself about prescription drug misuse**
- **Communicate about the medical, psychological, addictive, legal issues of prescription drug misuse**
- **Prescribe nonstimulants and extended-release or prodrug stimulants (lisdexamfetamine, serdexmethylphenidate)**
- **Don’t overprescribe quantity (e.g., stockpile, reservoir)**
- **Safe storage (*not in medicine cabinets*)**
- **Confidentiality: “don’t advertise you are on stimulants**

Summary

- Since ADHD is a risk factor for cigarette smoking and SUD, teenagers and young adults with ADHD should be queried for both potential problems
- ADHD should be considered in adolescents and adults who smoke cigarettes and/or have SUD
- Treating ADHD helps protect against the onset of cigarette smoking, SUD, and SUD-related criminality
- Strategies exist for management of substance use and use disorder in ADHD
- Since stimulants can be misused, in high risk groups consider mitigation strategies (e.g. ER vs IR stimulants, education and monitoring)

QUESTIONS?