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GENERAL HOSPITAL

PSYCHIATRY ACADEMY

# Adolescent Substance Use Disorders

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# Disclosures



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Neither I nor my spouse/partner has a relevant financial relationship with a commercial interest to disclose.



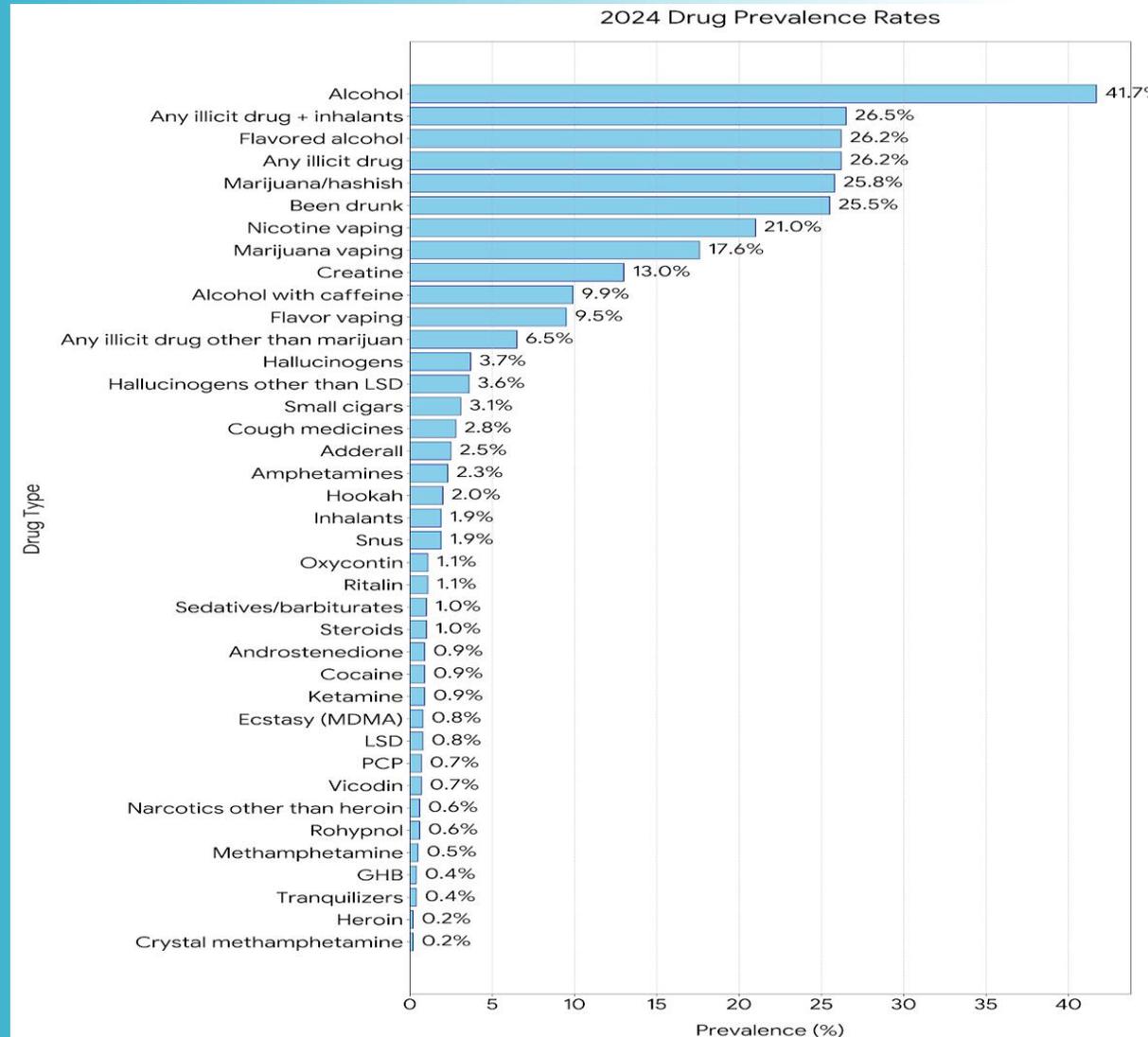
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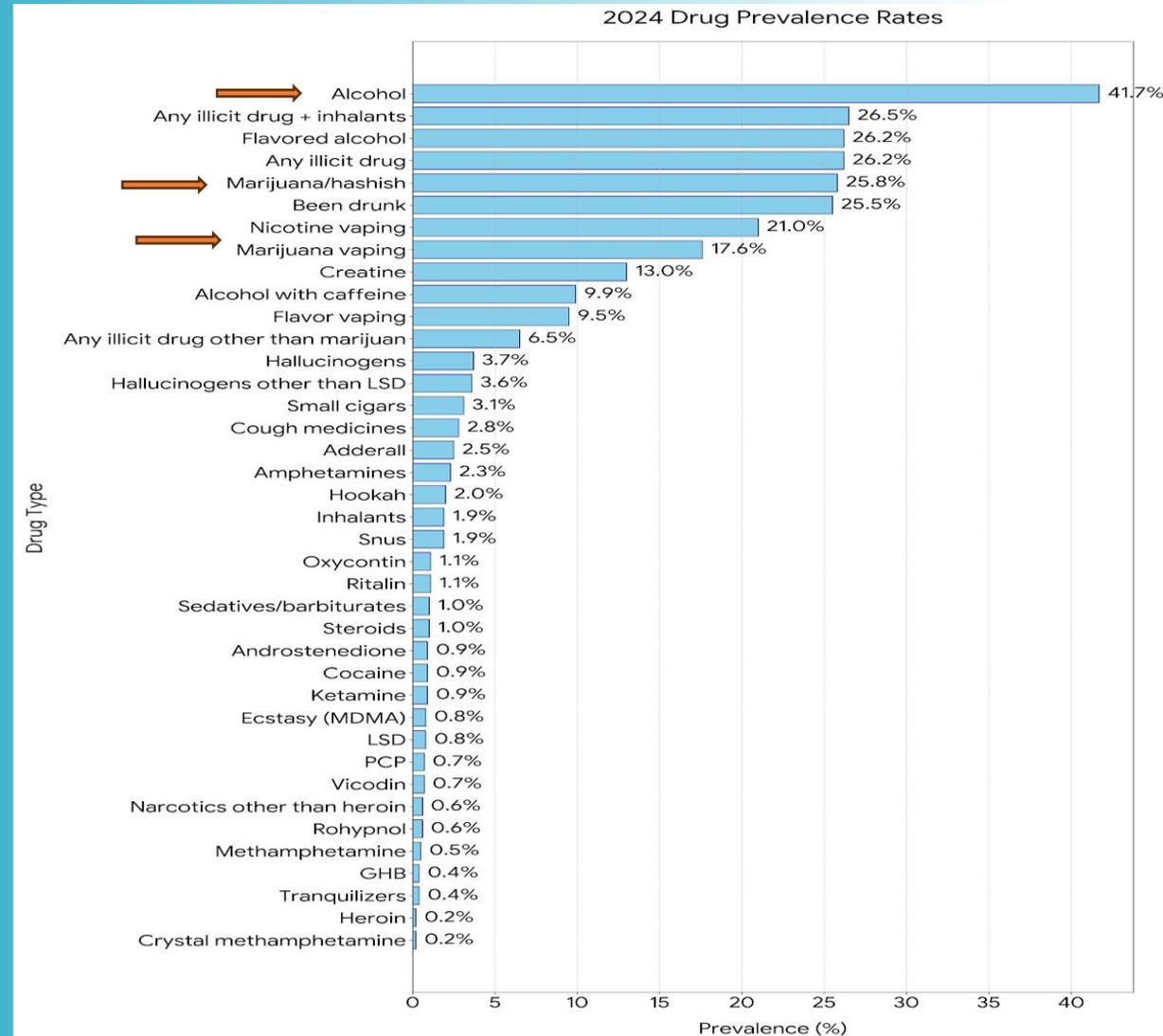
“I want to die high!”

-ARMS patient, *16 years old*

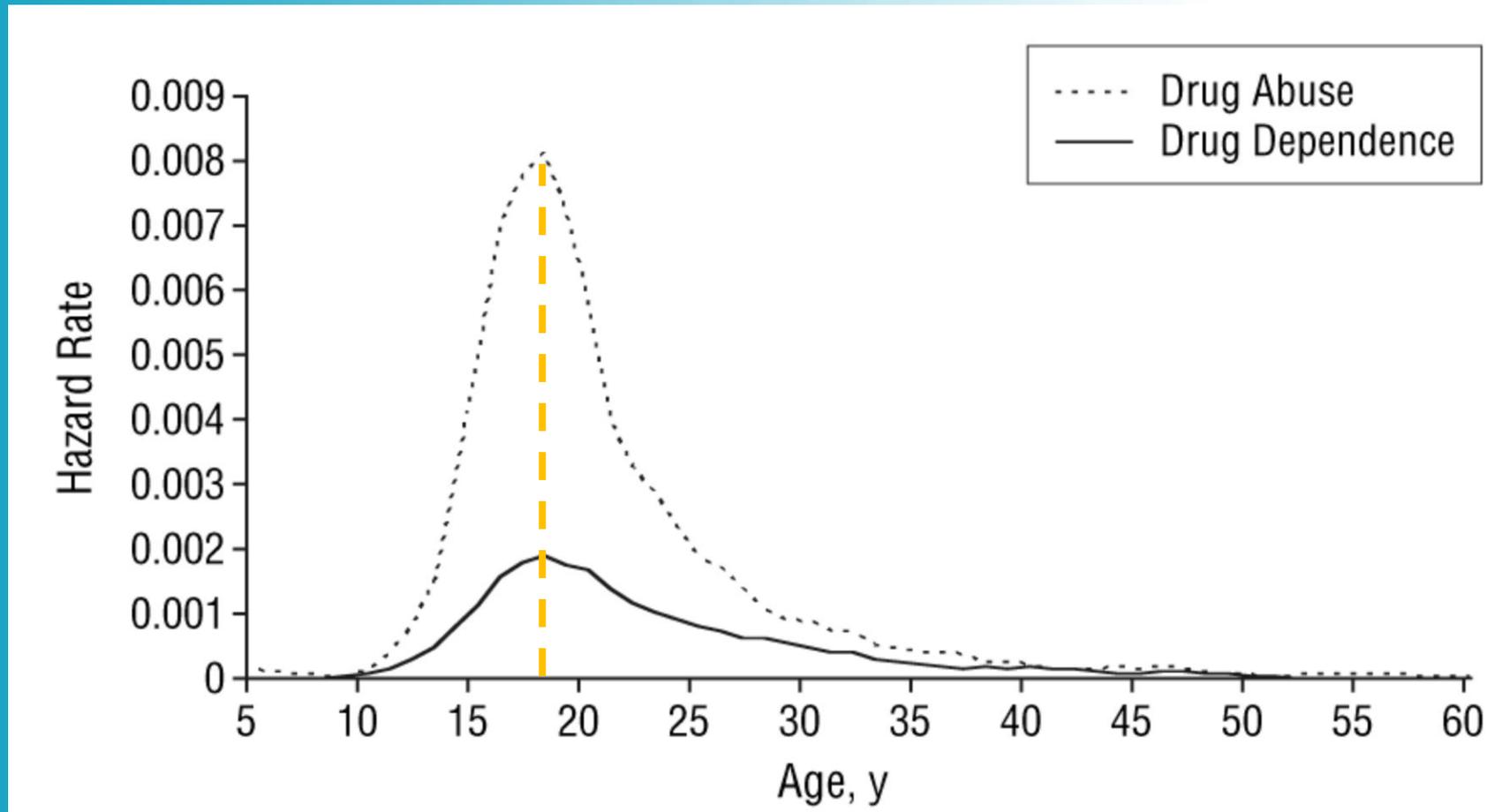
# Reported past-year drug use by H.S. seniors



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# Drug abuse and dependence starts in youth

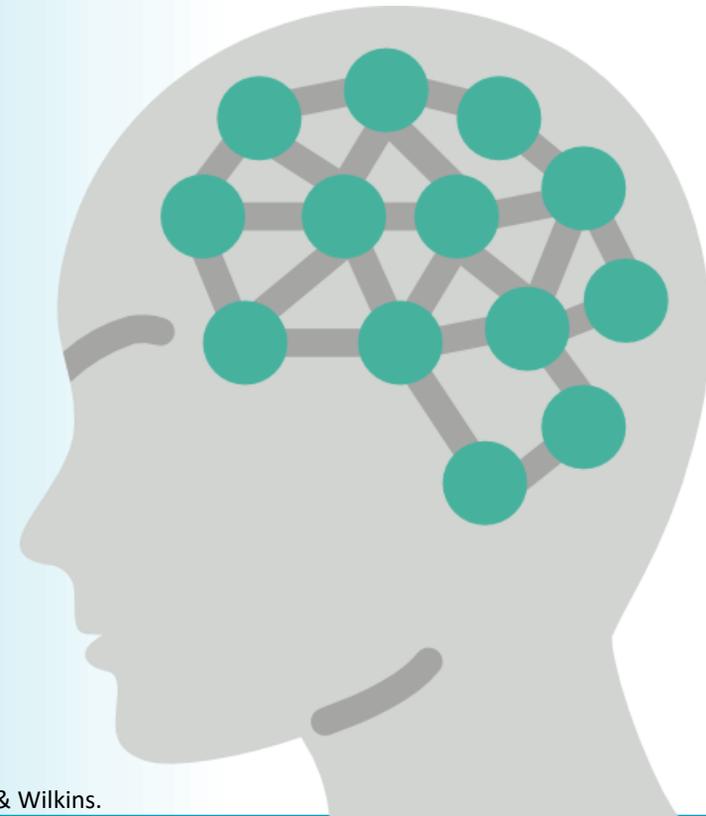


Slide adapted with permission from Dr. Tim Wilens. Compton et al. Prevalence, correlates, disability, and comorbidity of DSM-IV of drug abuse and dependence in the united states. JAMA Psychiatry. May 2007



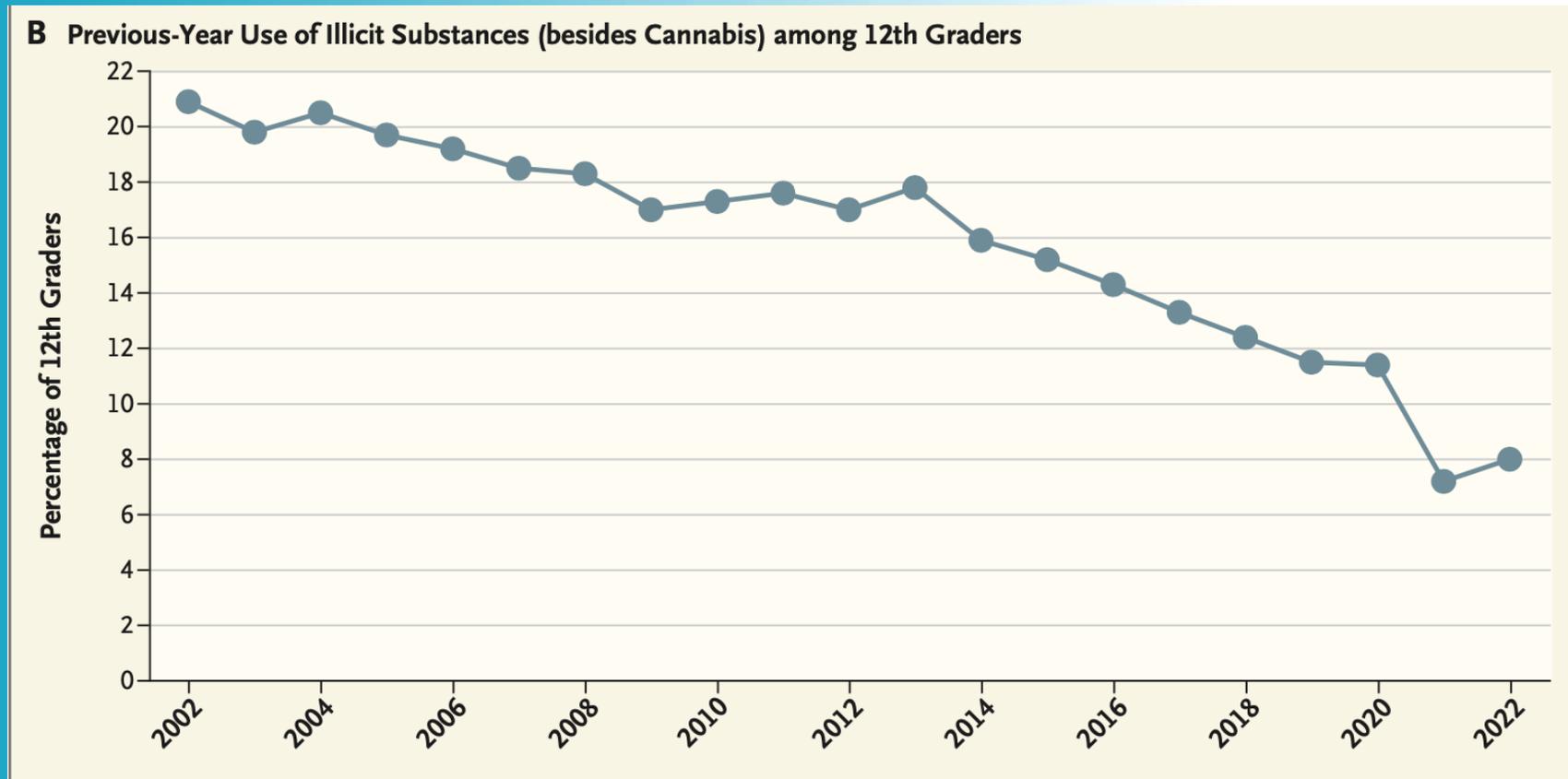
# The adolescent brain

- Brain development continues well into third decade of life
- Major “critical period”
  - Synaptic refinement
  - Myelination
- Limbic system (reward/emotion) develops early
- Prefrontal cortex develops later
  - Executive function
  - Attentional control
  - Working memory
  - Impulse inhibition
  - Risk/benefit appraisal



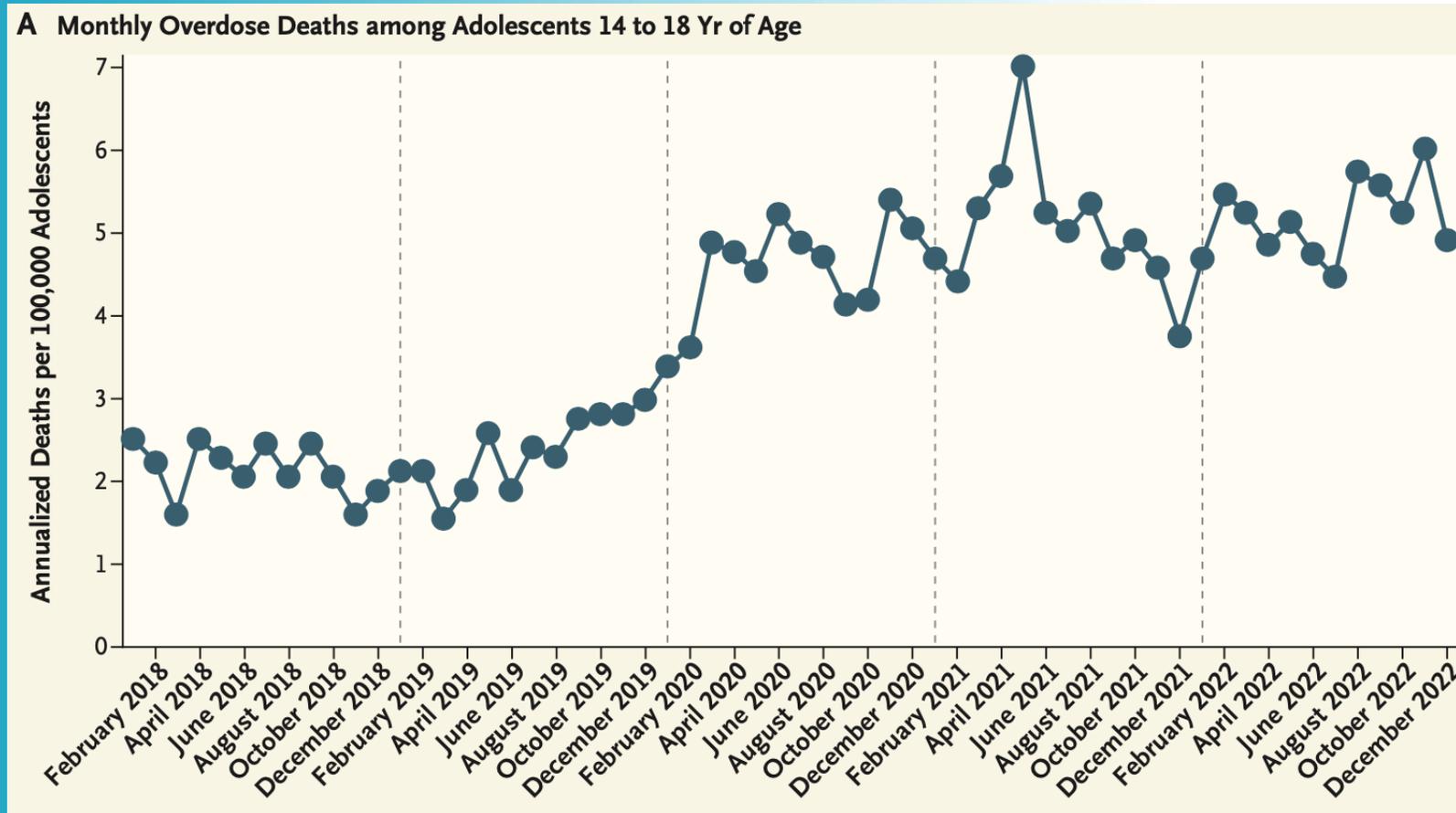


# The good news: Declining rates of substance use (ex-cannabis) among high school seniors



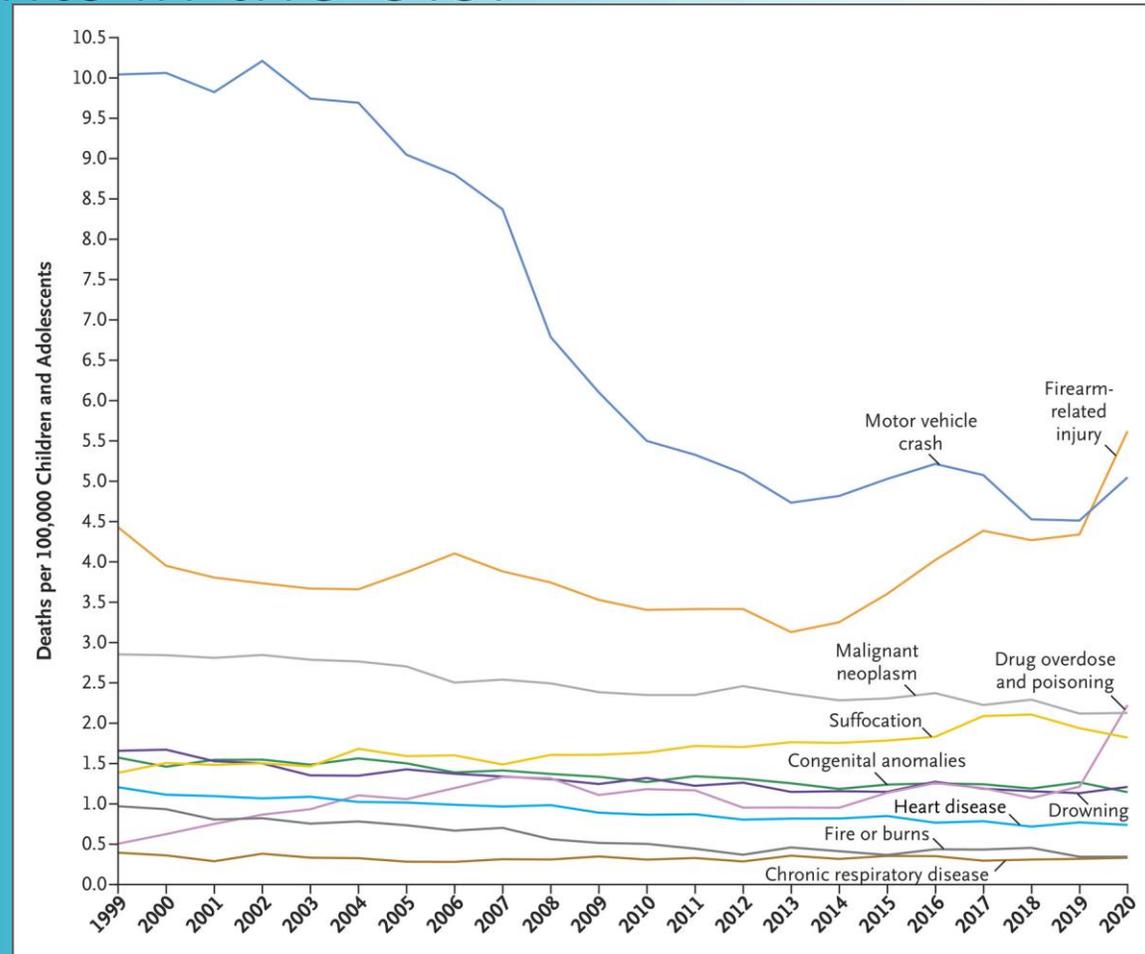
Friedman and Hadland. *The Overdose Crisis Among US Adolescents*. NEJM. Jan 2024.

# The tragic news: Overdose deaths among adolescents (14-18) have increased by >100% since 2019



Friedman and Hadland. *The Overdose Crisis Among US Adolescents*. NEJM. Jan 2024.

# Drug overdose and poisonings are now the third leading cause of death among children and adolescents in the U.S.



Goldstick et al. Current causes of death in children and adolescents in the United States. NEJM. May 2022.

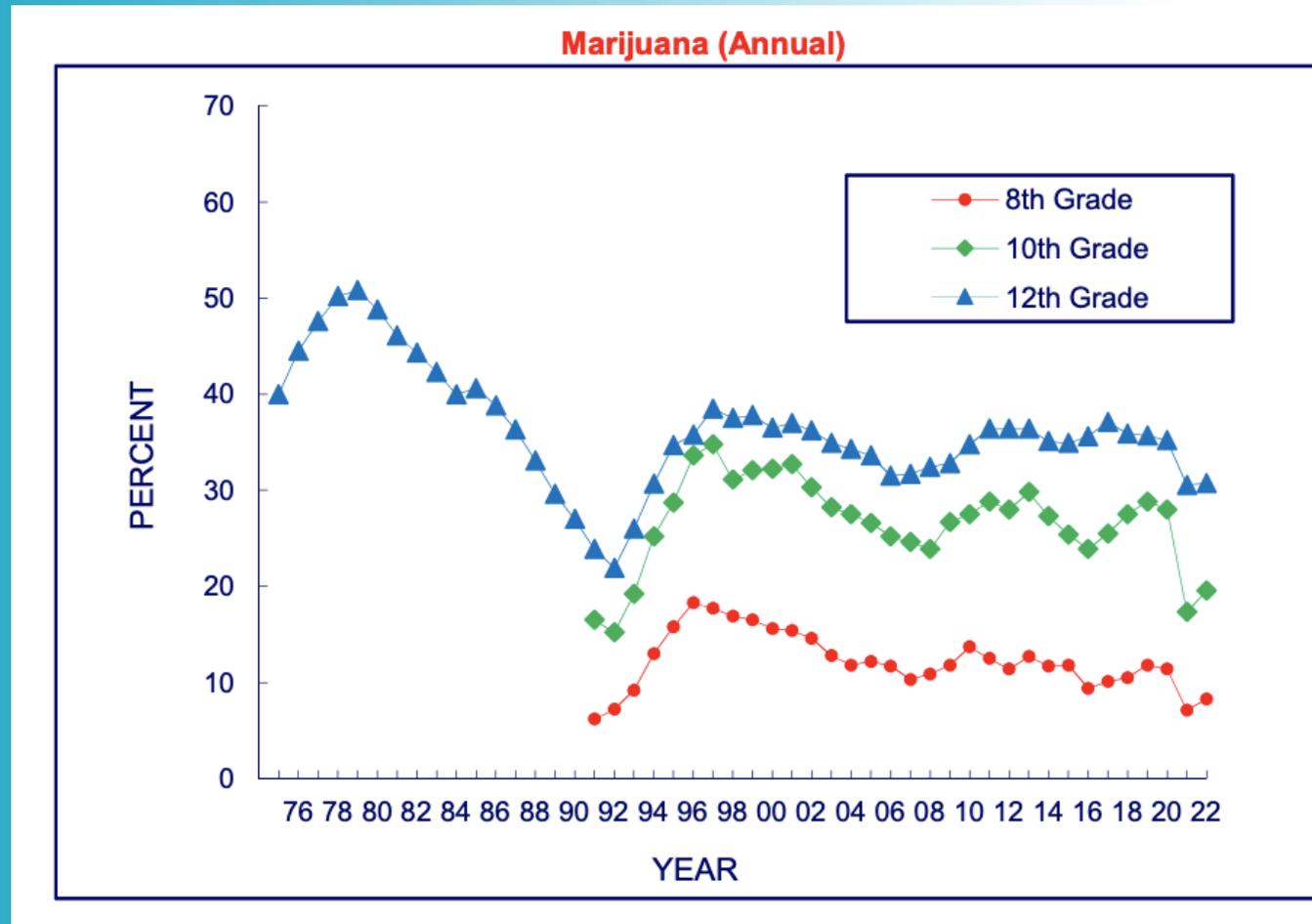


# How to put these data into perspective?

- ~one full classroom of high school students died of an overdose \*every week\* during 2022
- Fentanyl is now involved in 75% of OD deaths
- The vast majority of adolescent OD deaths are unintentional
- Fentanyl is now commonly found pressed into counterfeit pills (benzodiazepines, oxycodone, stimulants, etc.)
- Helpful to think about 3 broad categories of adolescents who are at elevated risk for opioid overdose:
  - 1) Adolescents with mental health problems who may experiment with substances
  - 2) Adolescents who use substances or have SUDs
  - 3) Adolescents with an OUD
- 41% of adolescents who died via overdose had received mental health care; only 11% had received substance use treatment
- Screen for pill use, offer anticipatory guidance, increase access to naloxone (available over the counter)

*Friedman and Hadland. The overdose crisis among US adolescents. NEJM. Jan 2024.*

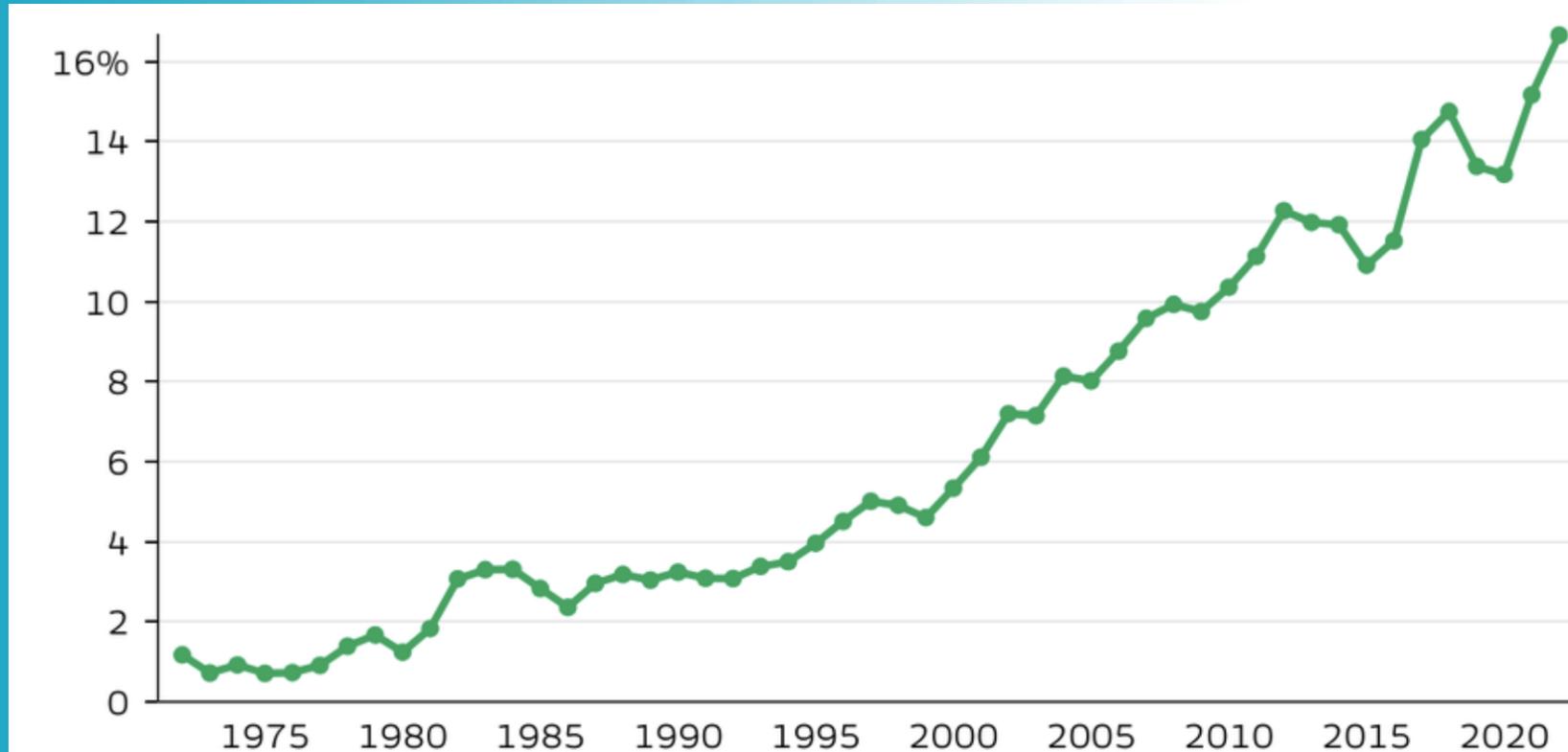
~35% of H.S. seniors have used cannabis in the past year, roughly stable for past 20 years



Miech et al. Monitoring the Future: National Survey Results on Drug Use, 1975-2022. University of Michigan Institute for Social Research. 2023.



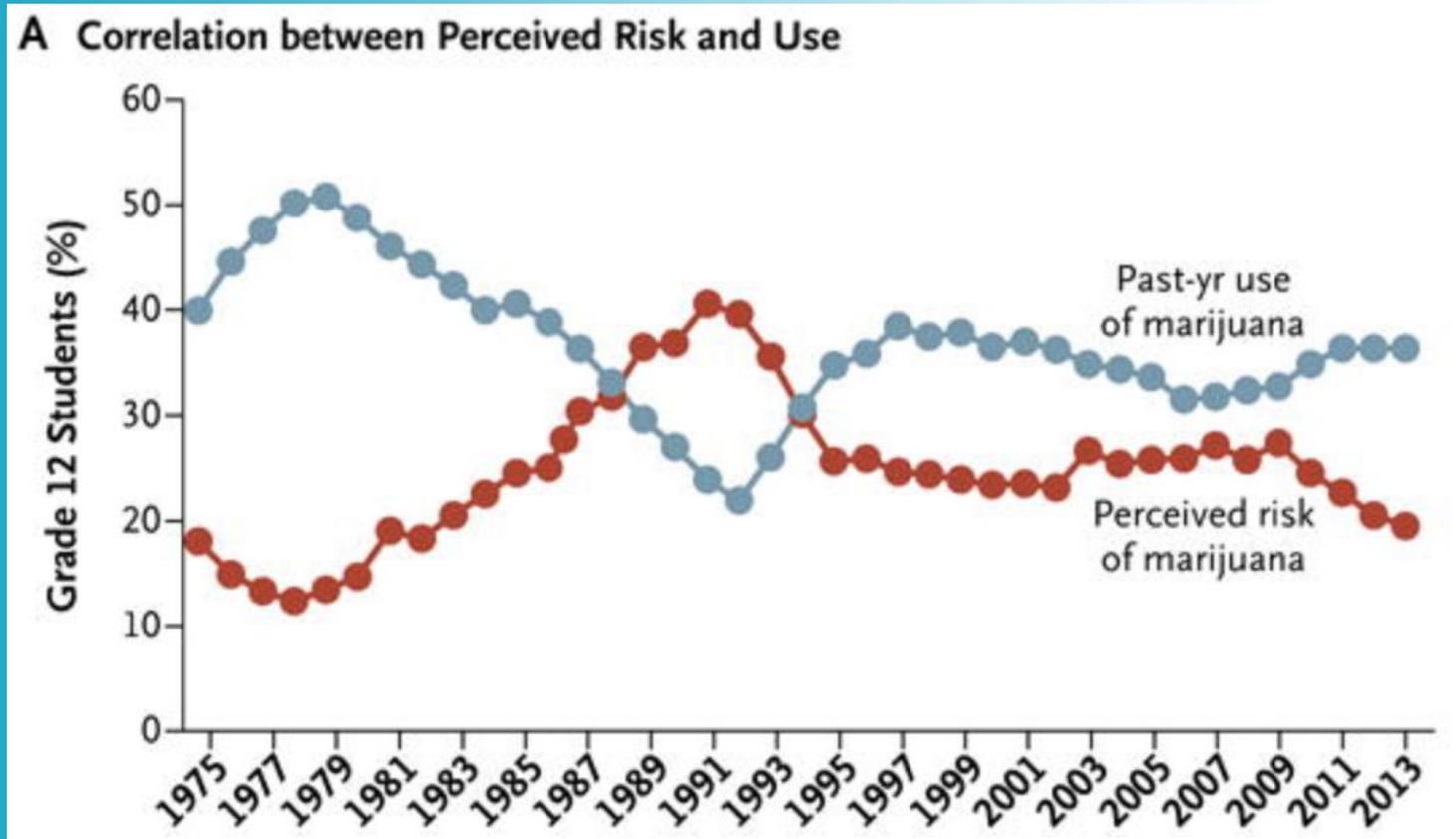
# THC potency has increased by >1,000% since the 1970s



**\*\*\*Between 2004-2011, 100% increase in cannabis associated ED visits\*\*\***

*Alexis Wnuk. Is cannabis today really much more potent than 50 years ago? New Scientist. 11 October 2023.*

# What does state legislation mean for perception of cannabis risk among high school students?



Volkow et al. Adverse health effects of marijuana use. NEJM. June 2014.

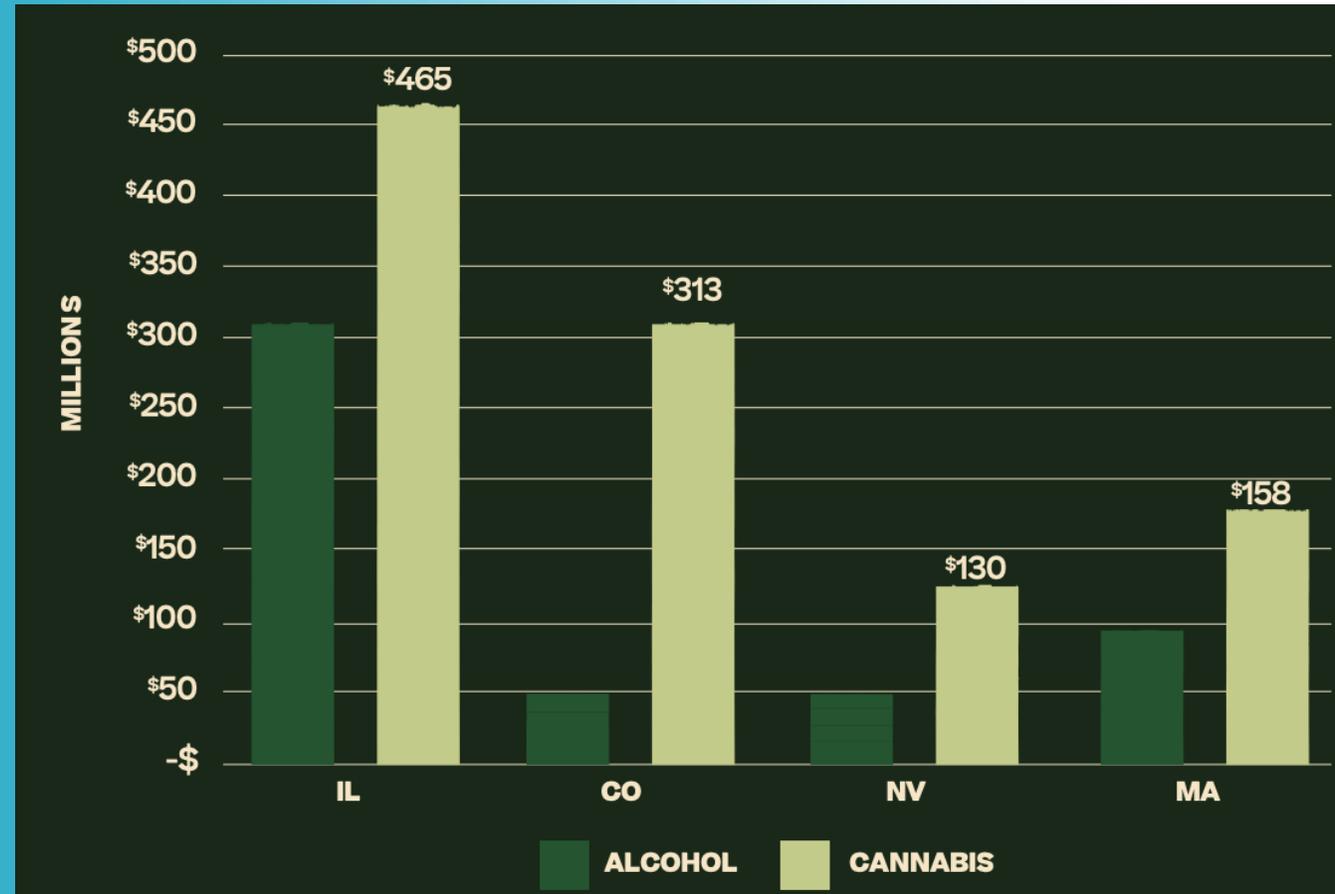


# Number of jobs in legal cannabis sector surpasses number of dentists and pilots combined



Green Thumb Industries, Investor Presentation, 2023.

# Tax revenue from cannabis exceeds alcohol in mature markets



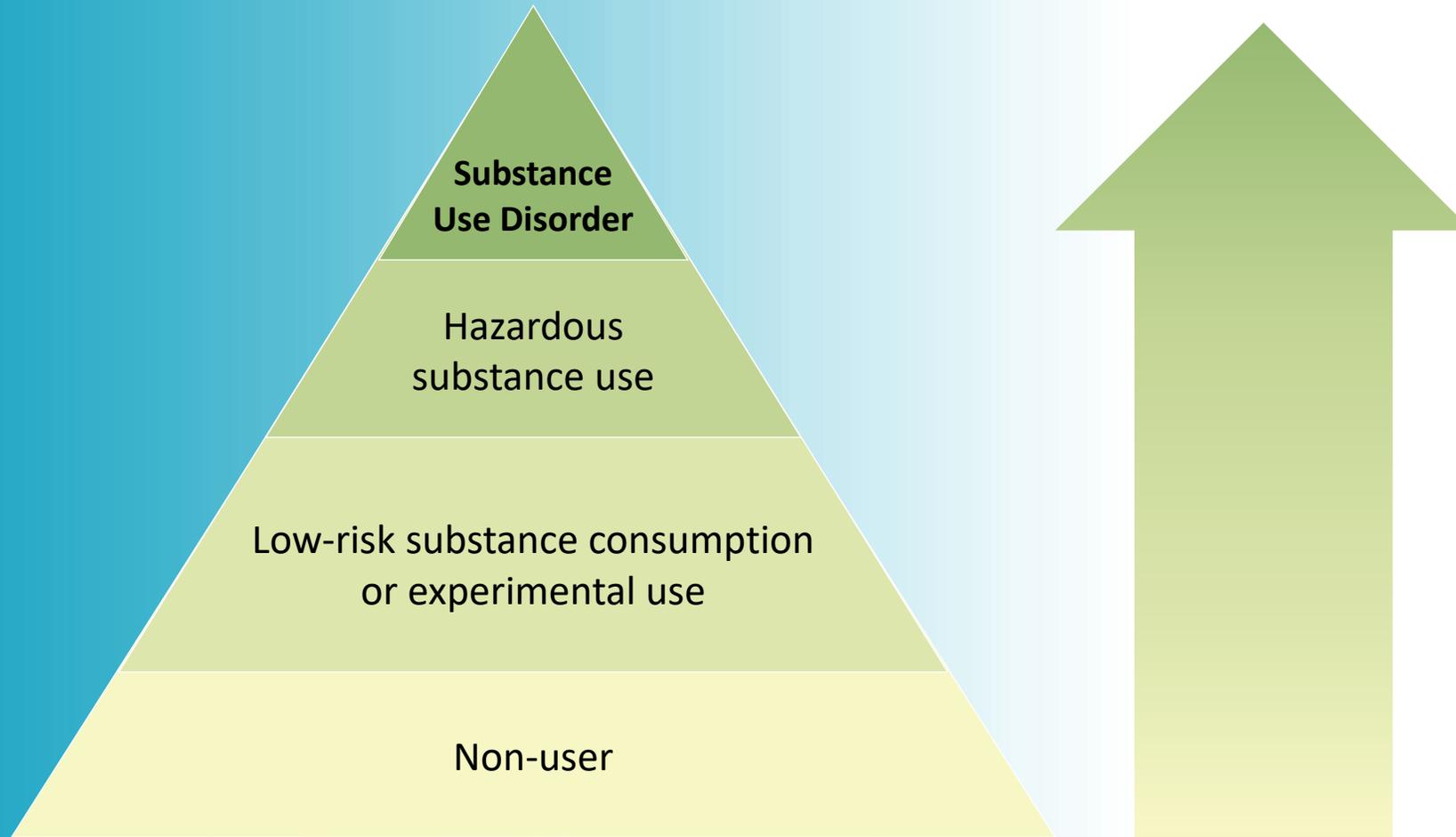
Green Thumb Industries, Investor Presentation, 2024.

# Is this developmentally normative behavior or an addiction?

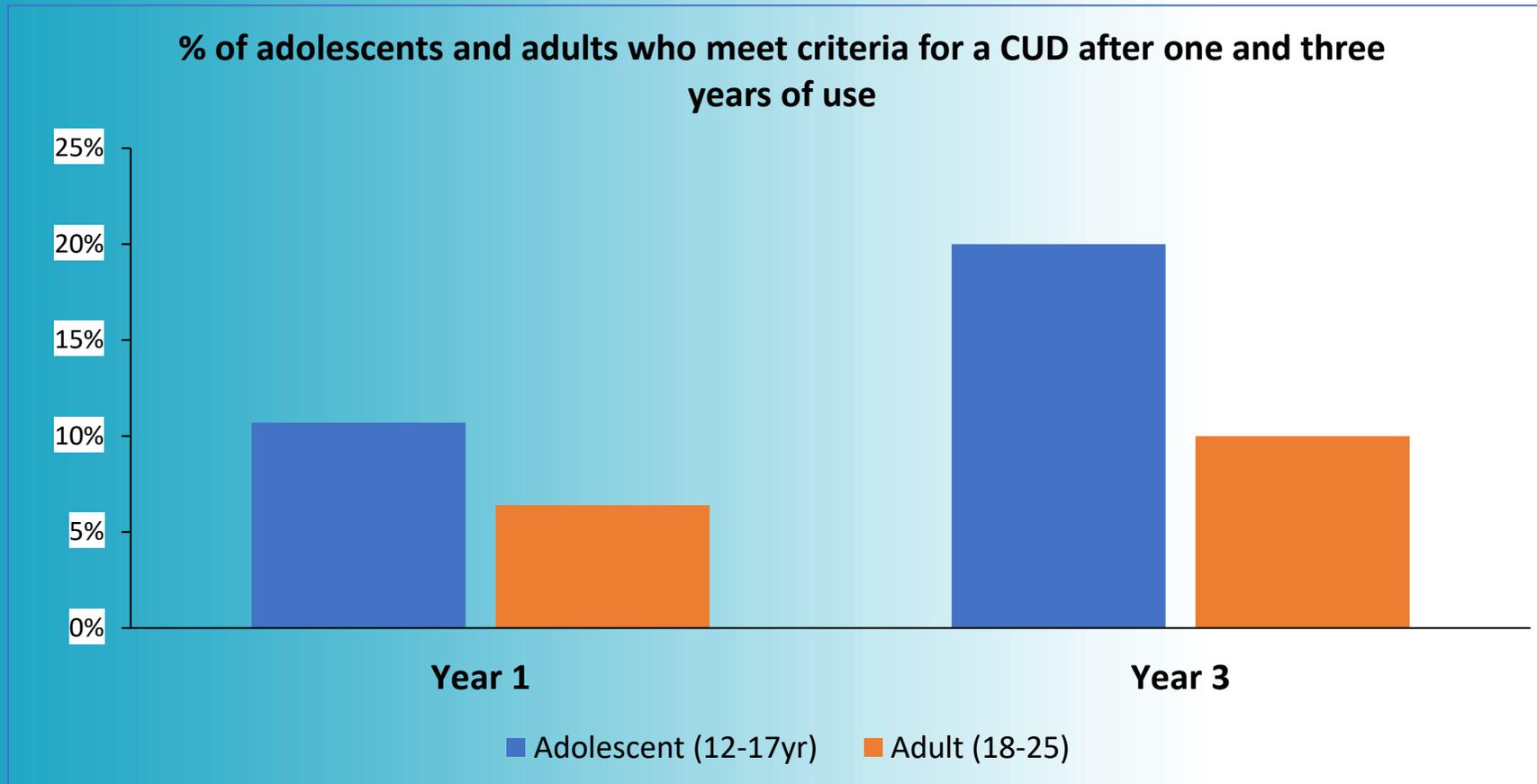


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# Risk of progression to cannabis use disorder is twice as high among adolescents compared to young adults



Volkow et al. Prevalence of substance use disorders by time since first substance use among young people in the US. JAMA Peds. 2021.

# DSM-5: Substance use disorders exist on a spectrum



*Mild: 2-3 Moderate: 4-5 Severe: 6+*

“A problematic pattern of substance use leading to clinically significant impairment or distress, as manifested by at least two of the following, occurring within a 12-month period”

**Impaired control**

**Social impairment**

**Risky use**

**Physiologic dependence**



# Multimodal treatment approach

- Treat the co-occurring disorder (very high rates of co-morbidity)
- Individual therapy (motivational interviewing, cognitive behavioral therapy)
- Groups
- Parent guidance
- Recovery coaching
- Pharmacotherapy
- Harm reduction approaches (naloxone, fentanyl test strips, lowering THC potency, etc.)



# Pharmacotherapy for opioid use disorder

- **Buprenorphine/naloxone**
  - FDA approved for patients 16 years of age and older
  - Daily sublingual; weekly, monthly injections
  - No longer requires DEA X-waiver
- **Extended-release naltrexone**
  - FDA approved for patients 18 years of age and older
  - Qmonthly injection
- **Methadone**
  - FDA approved for patients 18 years of age and older
  - Dispensed in opioid treatment program (OTP)
  - Access to adolescents is limited



# Pharmacotherapy for cannabis use disorder (off-label)

- N-acetylcysteine (NAC)
  - Target dose: 1,200mg BID
  - Mixed results in trials
- Gabapentin
  - Target dose: 300mg/300mg/600mg
  - Improvements in withdrawal symptoms, cravings, executive function
- Topiramate
  - Target dose: 200mg
  - High rates of adverse side effects

*Gray et al. A double-blind randomized controlled trial of N-acetylcysteine in cannabis dependent adolescents. Am J Psychiatry. 2012.*

*Gray et al. N-acetylcysteine for youth cannabis use disorder: randomized controlled trial main findings. Neuropsychopharmacology. 2025.*

*Mason et al. A proof-of-concept randomized controlled study of gabapentin: effects on cannabis use, withdrawal and executive function deficits in cannabis-dependent adults. Neuropsychopharmacology. 2012.*

*Miranda et al. Topiramate and motivational enhancement therapy for cannabis use among youth: a randomized placebo-controlled pilot study. Addict Bio. 2017*



## Summary

- SUDs often begin in adolescence/emerging adulthood
- Overall substance use rates are declining among high school students, but overdose deaths among adolescents have risen sharply, largely driven by fentanyl contamination and unintentional exposures
- Cannabis use remains common, with dramatically increased THC potency increasing risks of addiction, psychosis, cannabinoid hyperemesis syndrome
- Effective treatment often involves a combination of medication management, psychotherapy, and family involvement