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WPPNT Reminders

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- **Online:** <https://dhs.wi.zoomgov.com/j/1606358142>
- **Phone:** 669-254-5252
- Enter the Webinar ID: 160 635 8142#.
 - Press # again to join. (There is no participant ID)

Reminders for participants

- Join online or by phone by 11 a.m. Central and wait for the host to start the webinar. Your camera and audio/microphone are disabled.
- The evaluation survey opens at 11:59 a.m. the day of the presentation. A link to the evaluation survey is posted when the materials are posted.
- Ask questions to the presenter(s) in the Zoom Q&A window. Each presenter will decide when to address questions. People who join by phone cannot ask questions.
- Use Zoom chat to communicate with the WPPNT coordinator or to share information related to the presentation.
- [Participate live to earn continuing education hours](#) (CEHs). Complete the evaluation survey within two weeks of the live presentation and confirmation of your CEH will be returned by email.
- A link to the video recording of the presentation is posted within four business days of the presentation.
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Substance Use Trends in Adolescents

August 14, 2025

WPPNT Series

Ritu Bhatnagar, MD, MPH, FASAM, DFAPA

Disclosures

Ritu Bhatnagar, MD MPH FASAM DFAPA - no relevant disclosures to report

- Employed by UW-Madison at UHS treating transitional age youth
- Public health/ systems perspective

Objectives

At the conclusion of this talk, the participant will be able to:

- Explain the scientific basis of substance use disorder
- Describe developmentally-focused attributes of adolescents and treatment considerations
- Describe current trends in substance use among adolescents

Outline

Definitions and background

Specifics of adolescence and how it relates to substance use

Substance use trends among adolescents

Helpful approaches

What is addiction?

“Addiction is a treatable, chronic medical disease involving complex interactions among brain circuits, genetics, the environment, and an individual’s life experiences.”

Characterized by:

- Needing more of a substance to get same effect
- Withdrawal symptoms when substance is not available
- Cravings and urges for substance that interfere with social function

Involves the biological, psychological, social and spiritual aspects of a person.

<https://www.asam.org/quality-care/definition-of-addiction>

DSM-5 Criteria for Substance Use Disorder

- Tolerance
 - Withdrawal
- } **Physical Dependence ≠ Use Disorder**
- Larger amounts/ longer periods than intended
 - Craving
 - Excess time obtaining/ using/ recovering
 - Repeated unsuccessful attempts to quit/ control use
- } **Impaired Control**
- Ongoing use despite interpersonal problems
 - Neglect of major obligations
 - Important activities sacrificed
- } **Social Impairment**
- Recurrent hazardous use/ situations
 - Use despite known physical/ psychological effects
- } **Continued use despite known risk**

2-3 = mild
4-5 = moderate
≥ 6 = severe

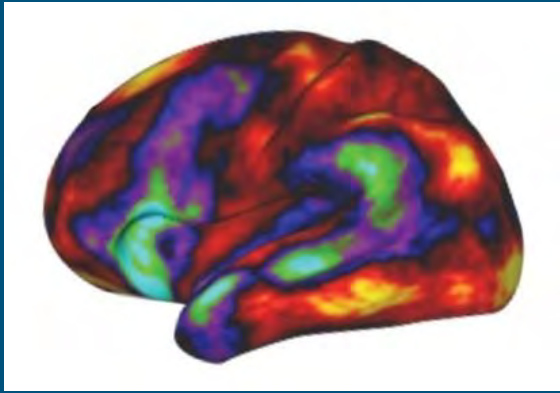


Figure 1

The Science of Addiction

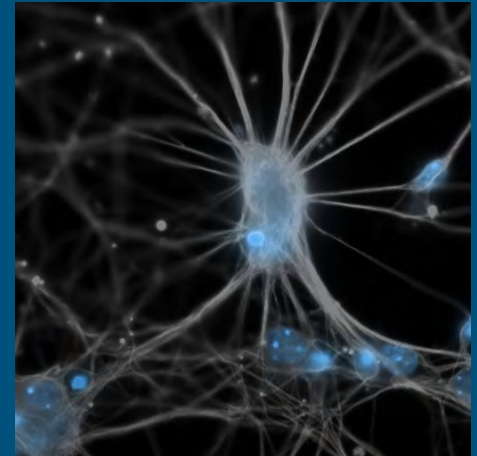
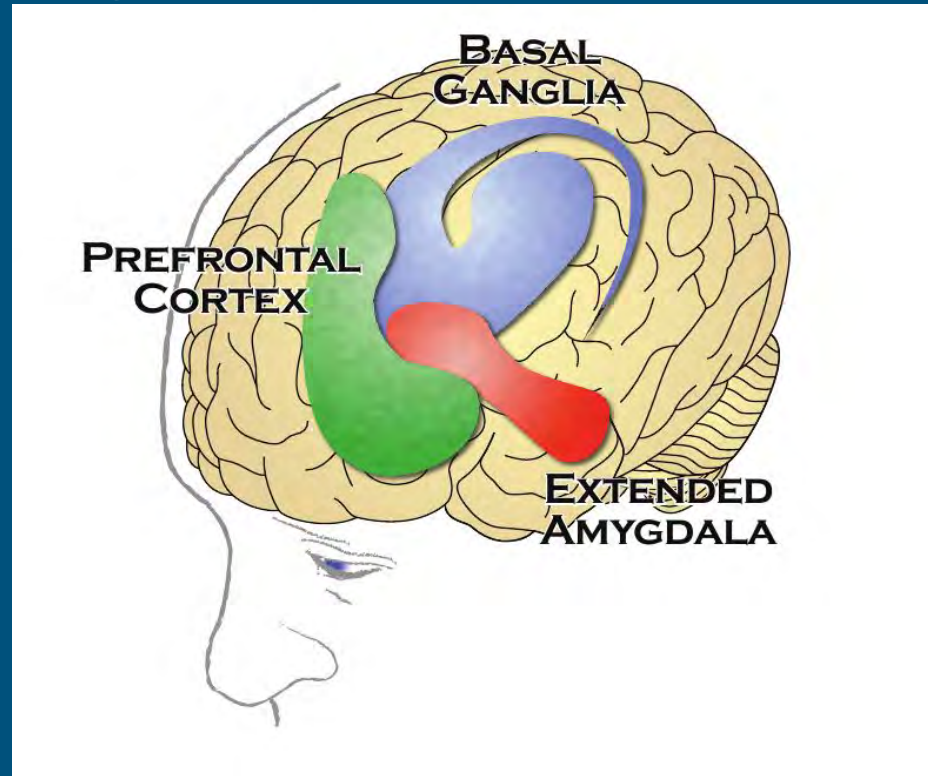


Figure 2

Brain regions associated with SUD

Control



Saliency

Memory

Figure 3

Stages of addiction cycle and brain regions

Substance use hijacks the reward circuitry and the prefrontal cortex.

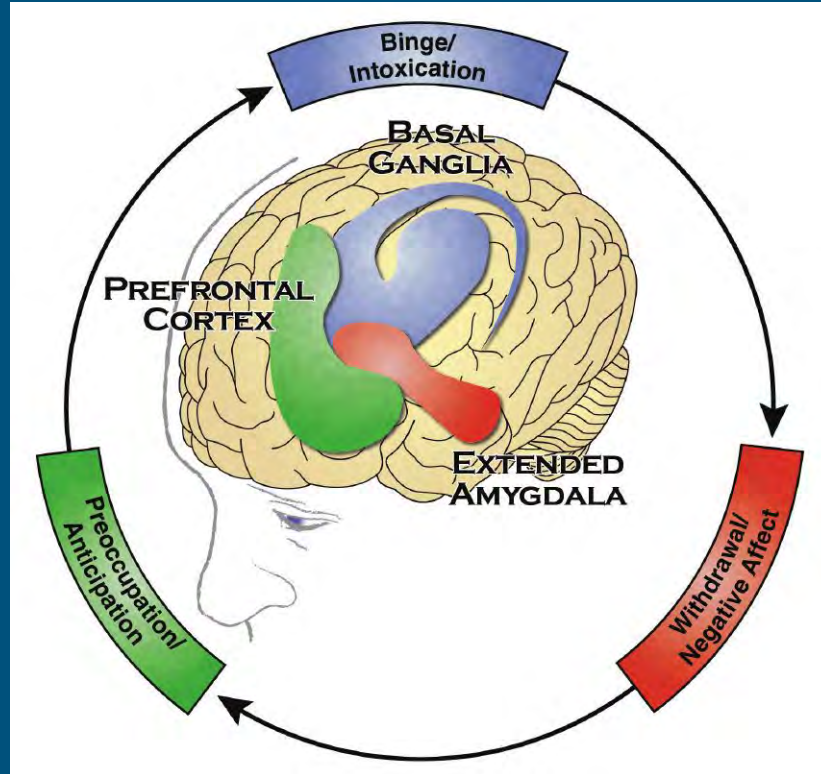
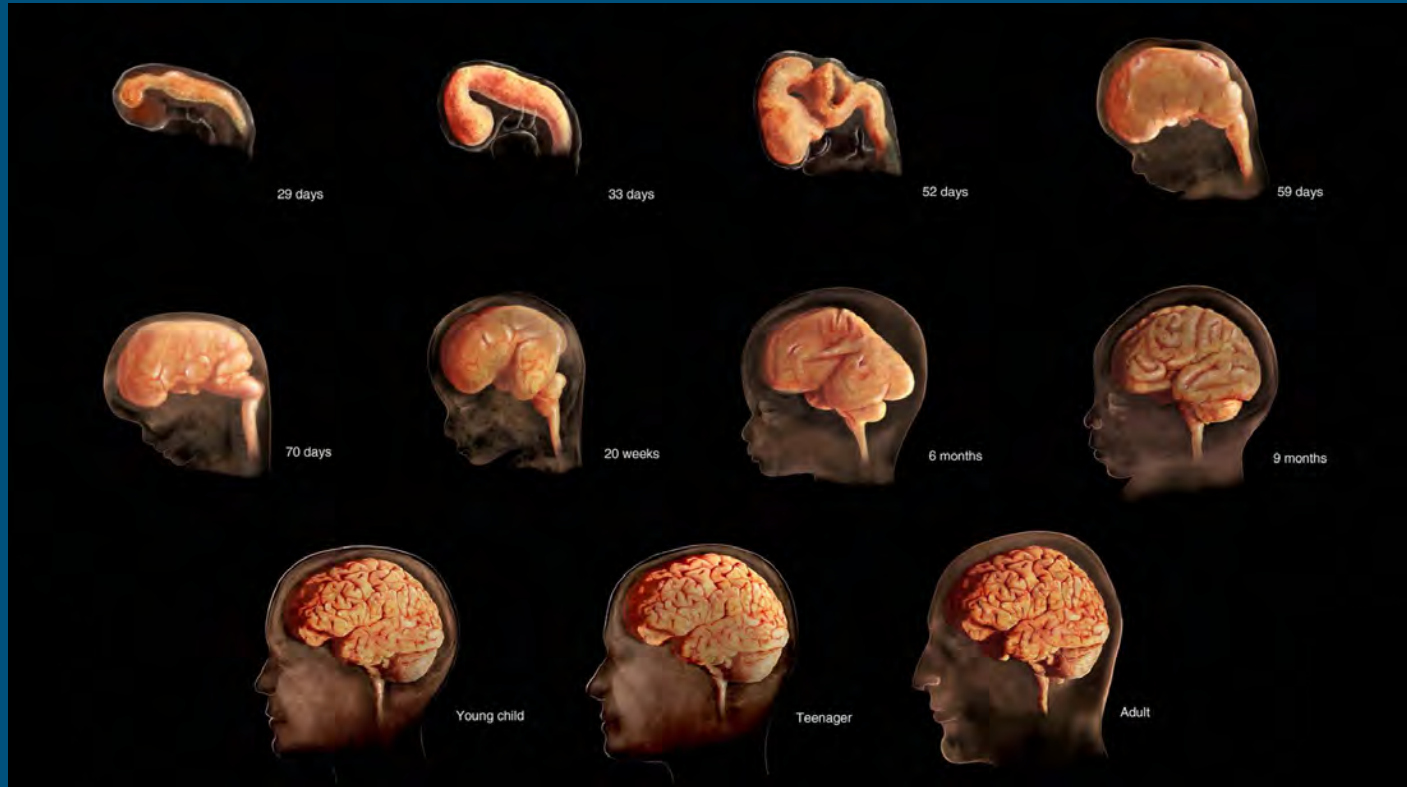
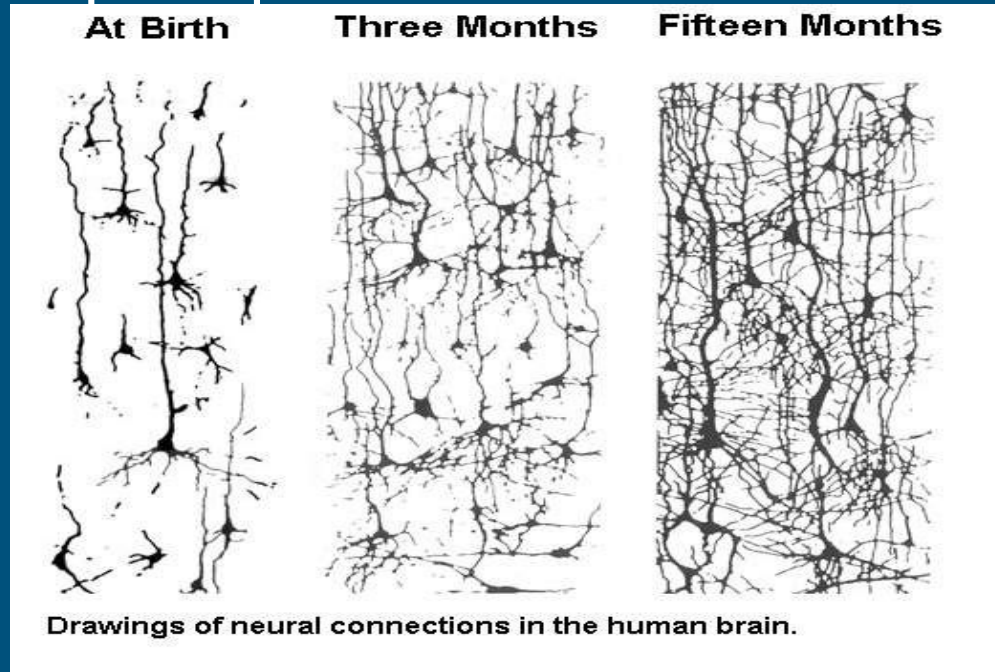


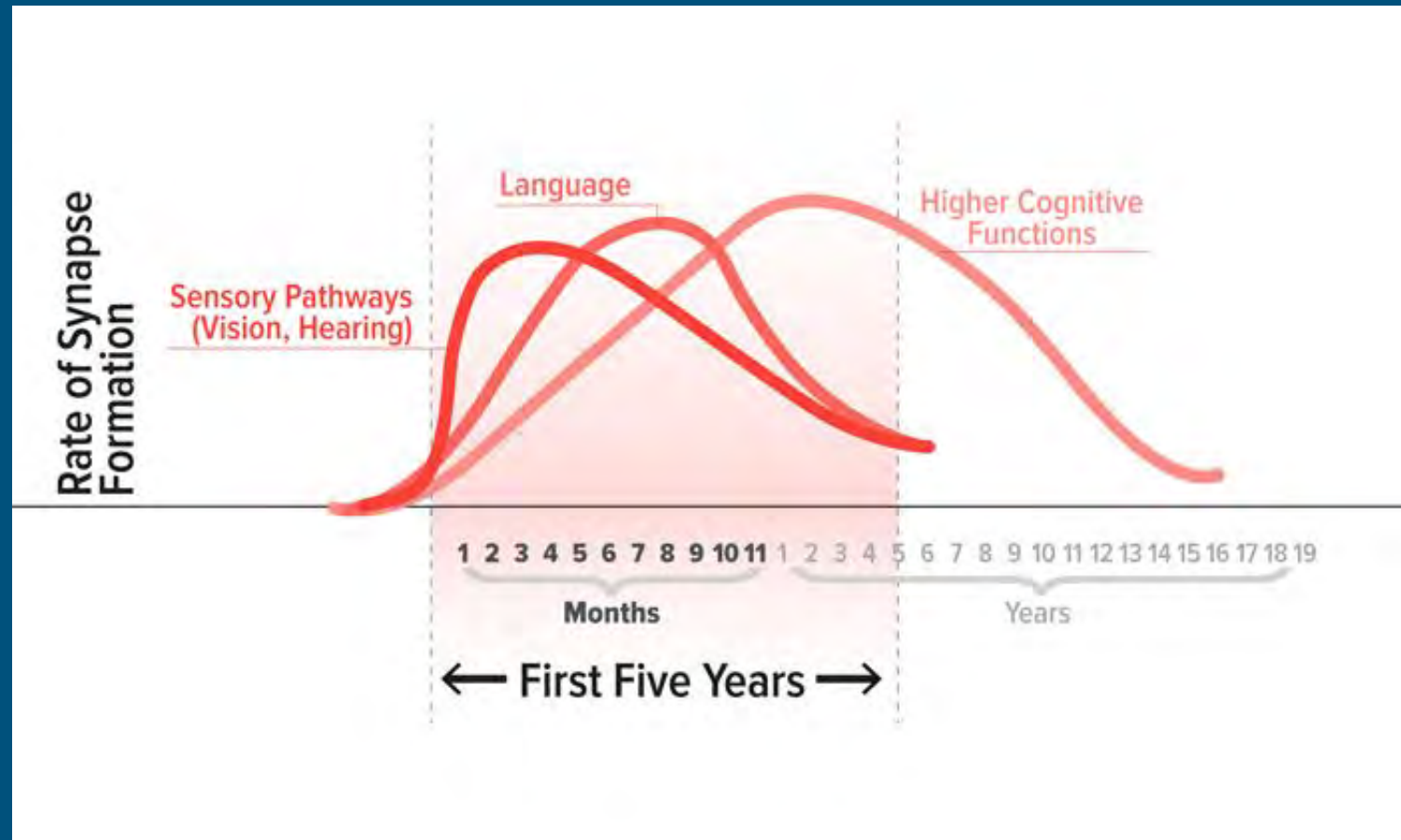
Figure 4

Developmental neuroscience



- At birth, each neuron in the cerebral cortex has approximately 2,500 synapses.
- By age two, the number of synapses is approximately 15,000 synapses per neuron.





Adapted from Nelson, C.A. (2000). The neurobiological bases of early intervention. Cambridge University Press.

Considerations in adolescents:

Developmental specifics:

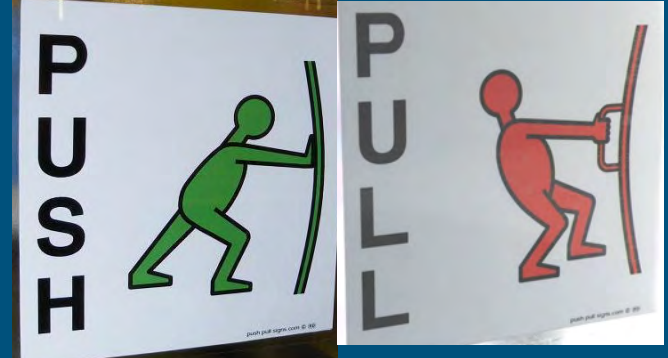
Frontal cortex still developing

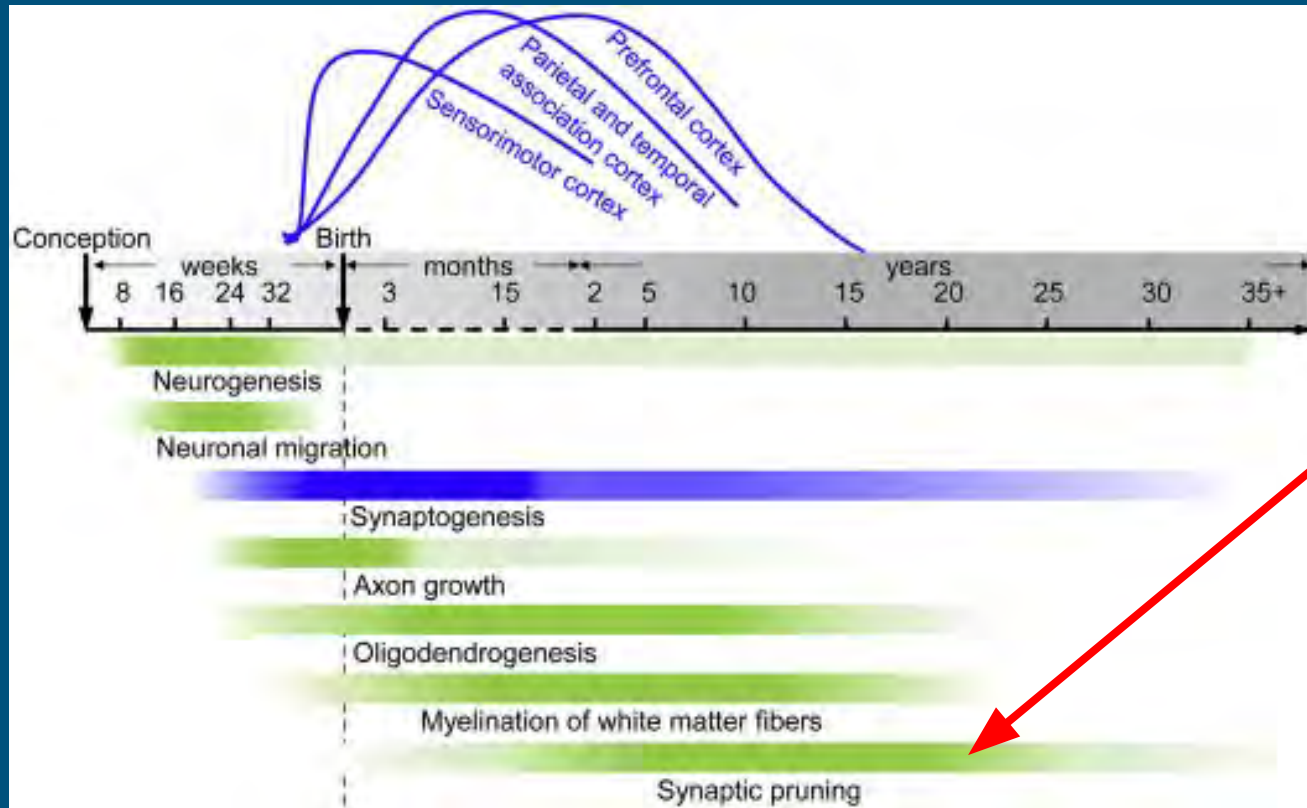
Hormonal changes

Identity vs. Conformity

Independence vs. Belonging

Novelty seeking/ Risk-taking vs. Stability

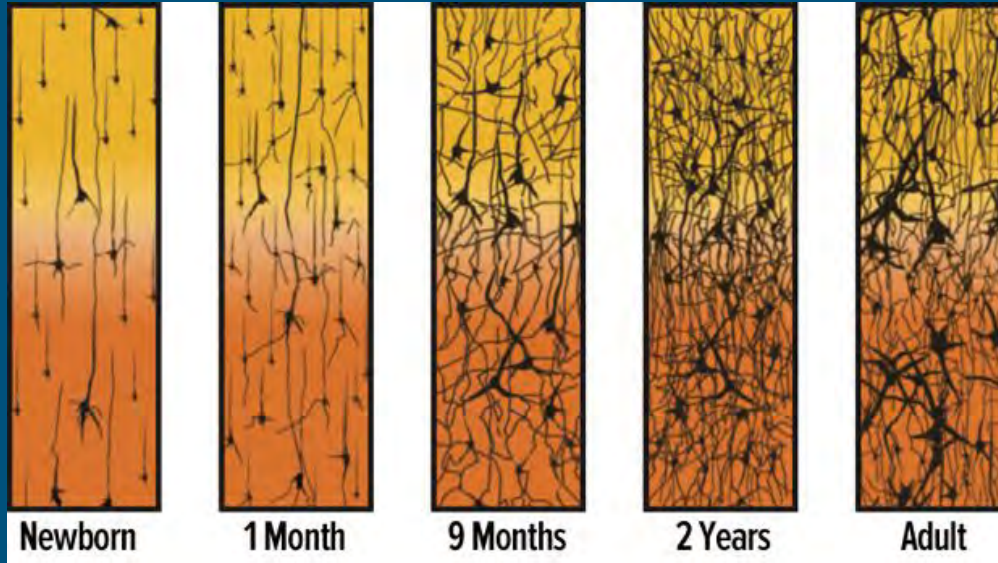


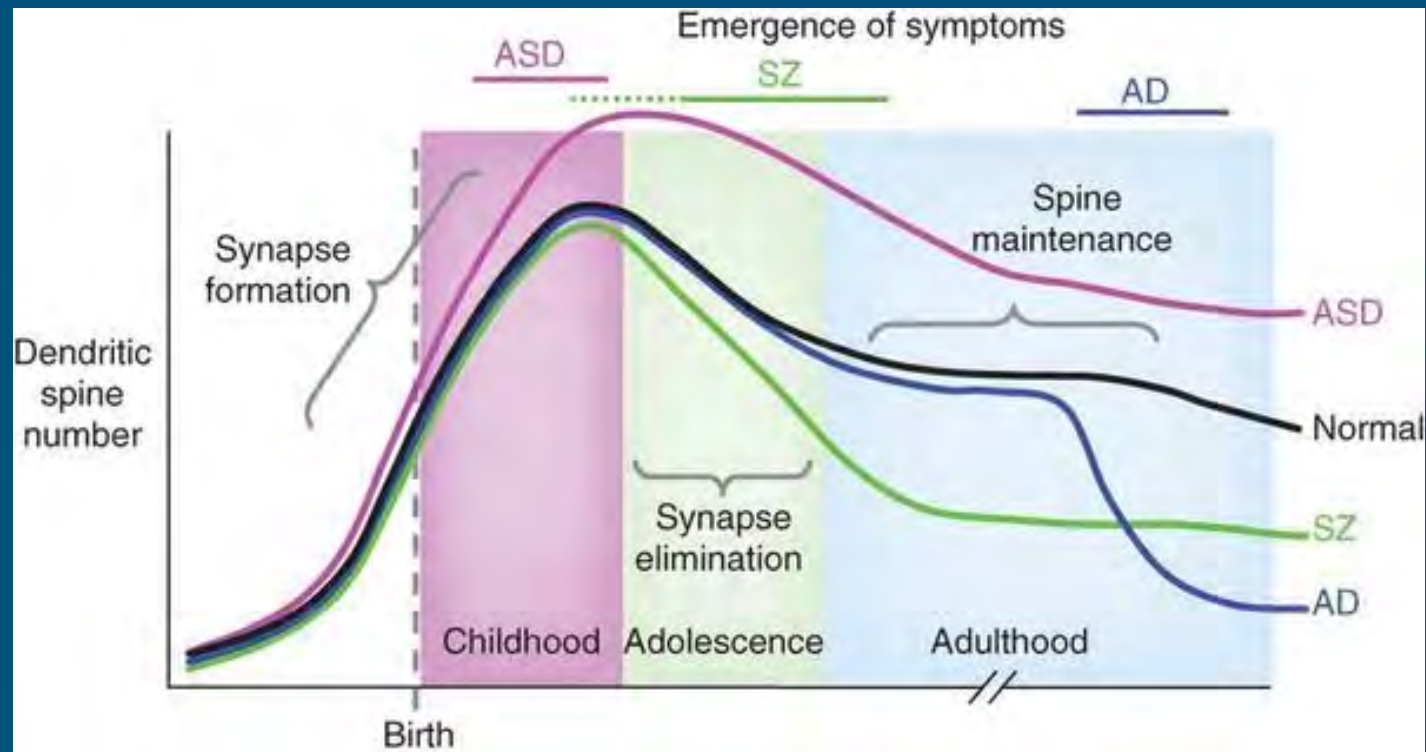


From Ouyang M, Dubois J, Yu Q, Mukherjee P and Huang H. 2019. Delineation of early brain development from fetuses to infants with diffusion MRI and beyond. *NeuroImage* 185; 836–850. Accessed from <https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/synaptogenesis>

Synaptic pruning

- Method for removing synapses that are not often used.
- Reduces the overall number of synapses
 - Adults have about 8,000.

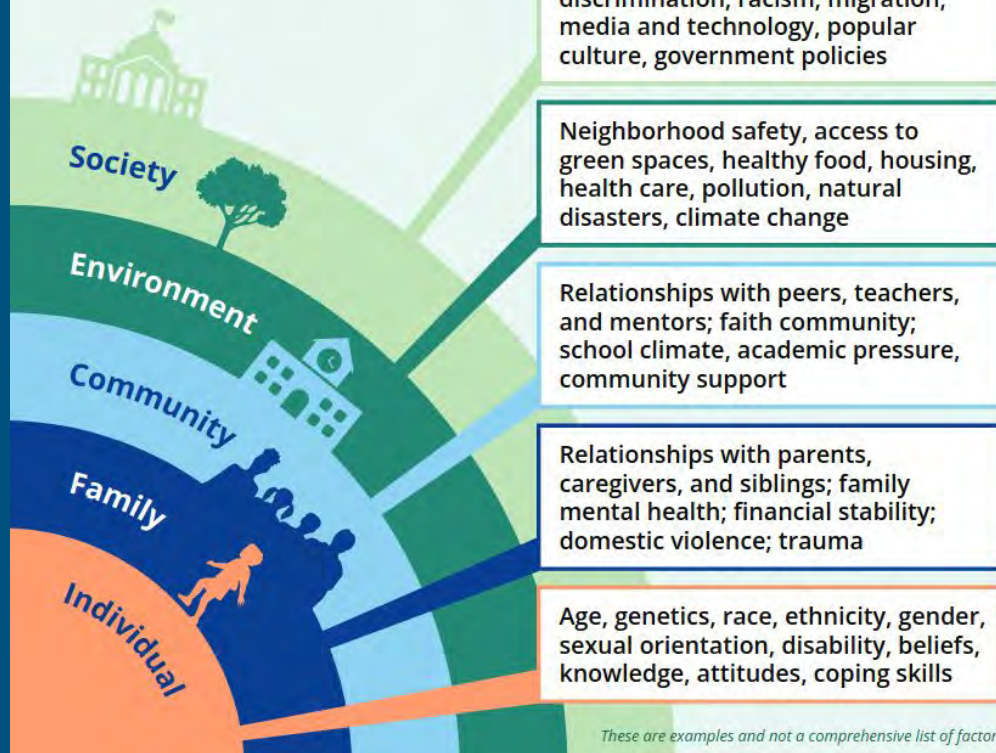




FACTORS THAT CAN SHAPE THE MENTAL HEALTH OF YOUNG PEOPLE

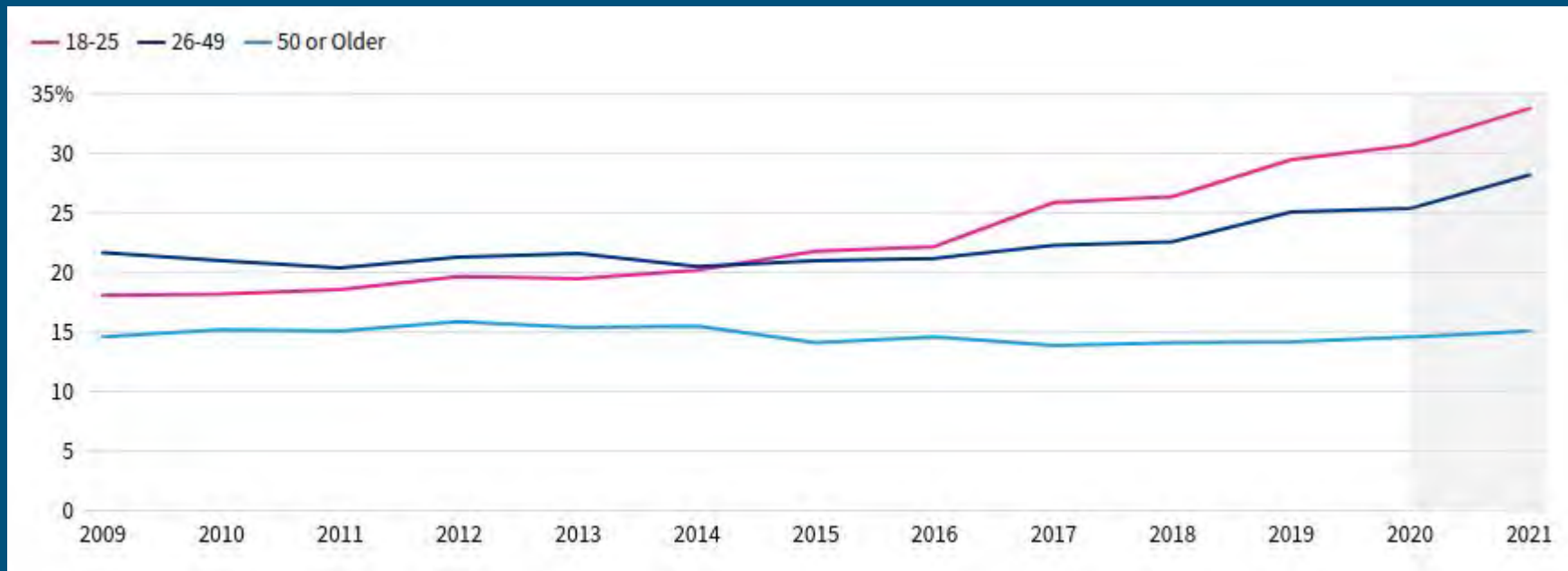


Source: Adapted from WHO's Determinants of Adolescent Health Development: An Ecological Model, 2014 and Bronfenbrenner & Ceci (1994)



These are examples and not a comprehensive list of factors

Percentage of U.S. adults with mental illness in the past year, by age group



Substance Use in Adolescents



Why we should care



Substance Use Trends

Sources of information

NSDUH (National Survey of Drug Use and Health): yearly since 1971, ages 12 +

- national, done by SAMHSA

MTF (Monitoring The Future) Survey: yearly, since 1975, students in grade 12; since 1991 grades 8, 10 and 12

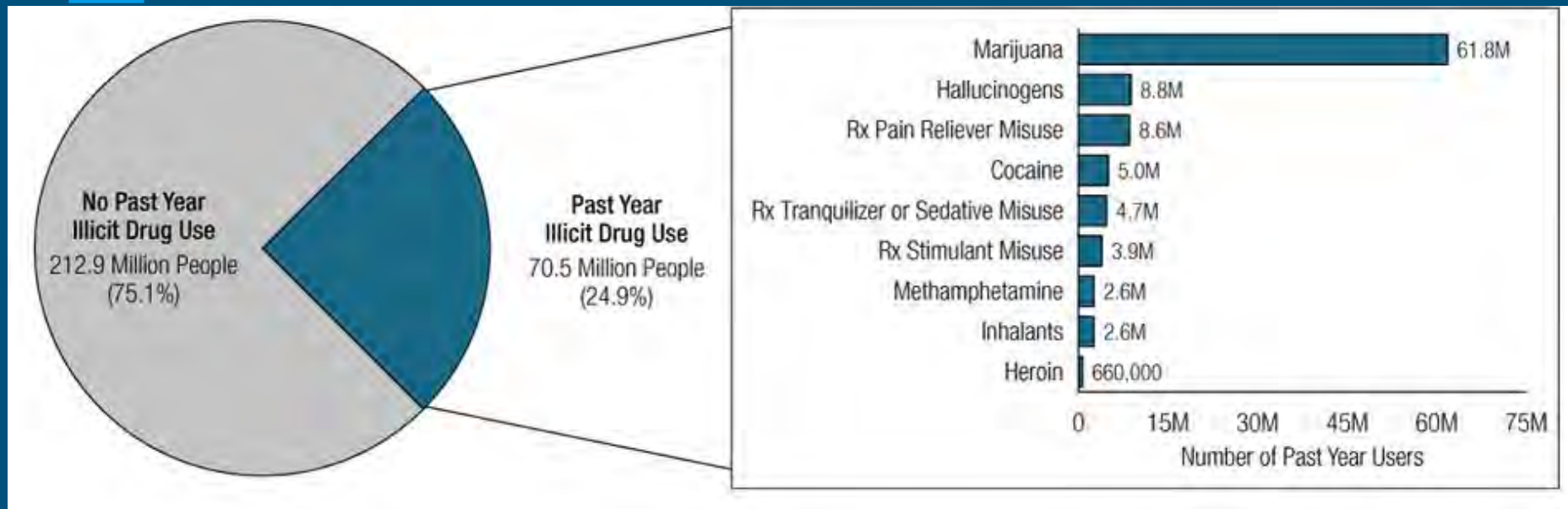
- National, funded by NIDA, performed at U Michigan

CDC Youth Risk Behavior Survey (YRBS) every other year

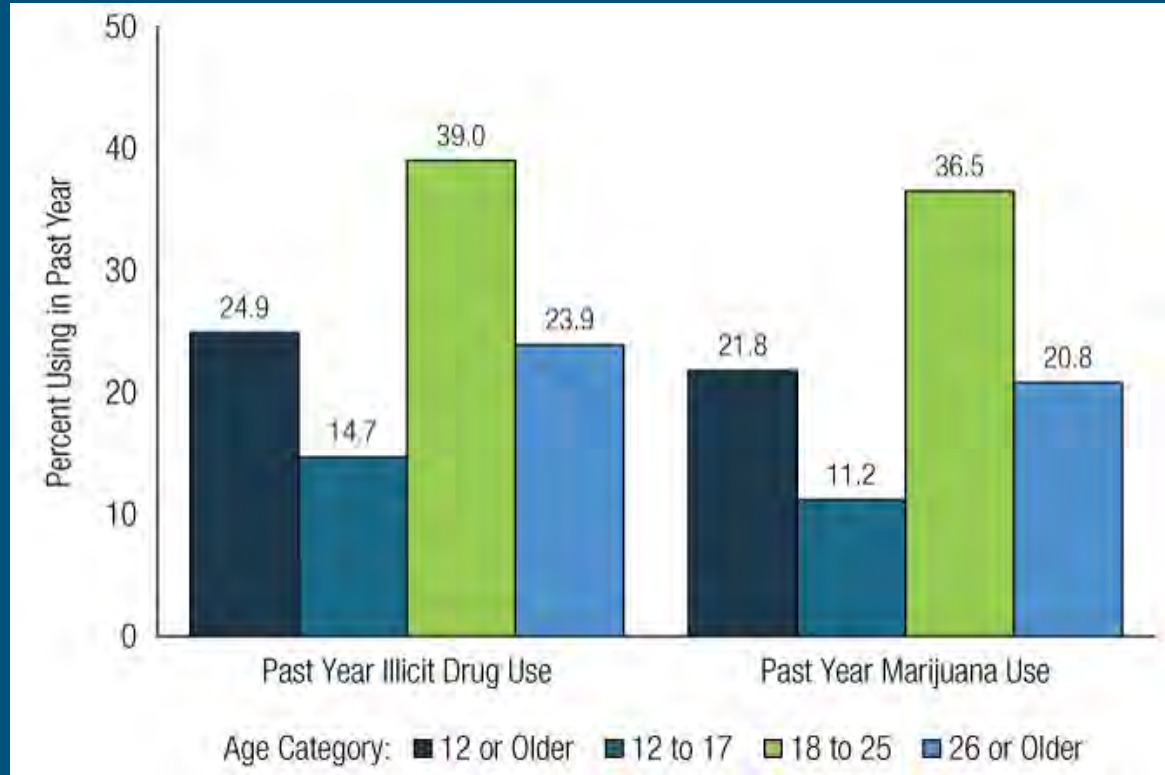
National Youth Tobacco Survey

All self-report

Past Year Illicit Drug Use: Ages 12+

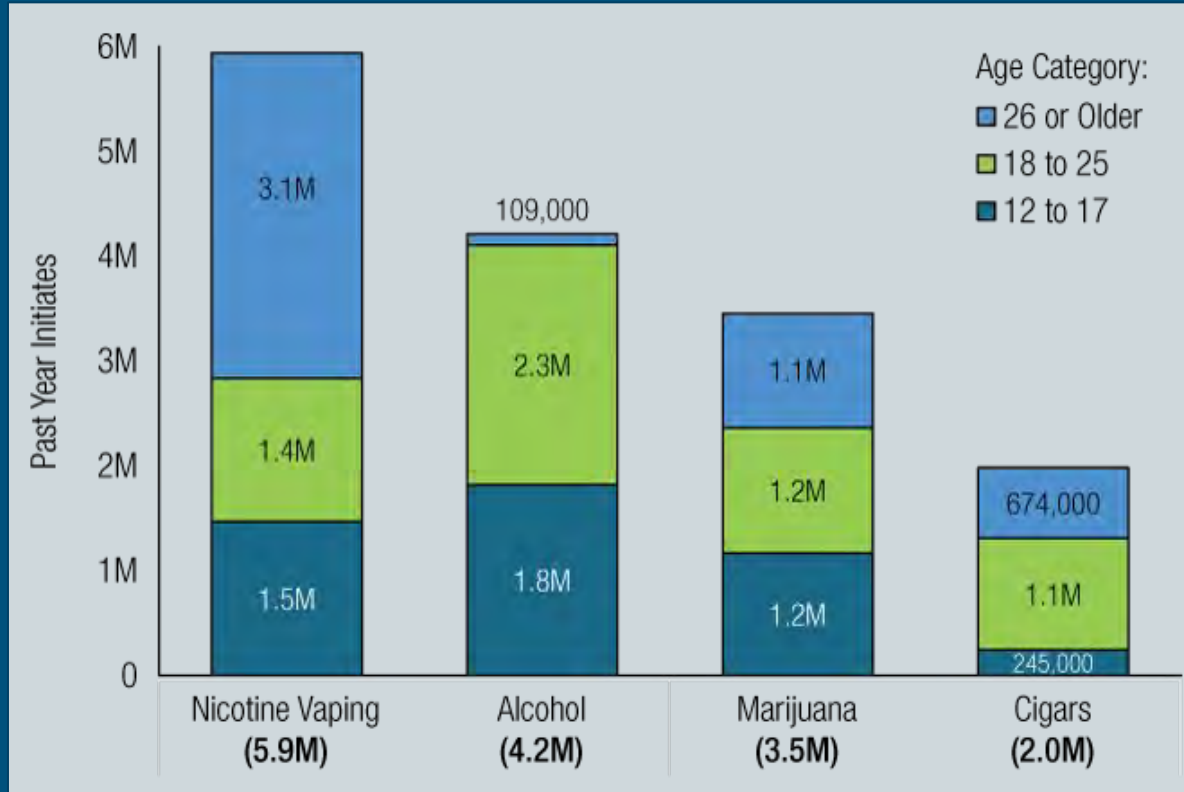


Past Year Illicit Drug Use or Marijuana Use: 2023

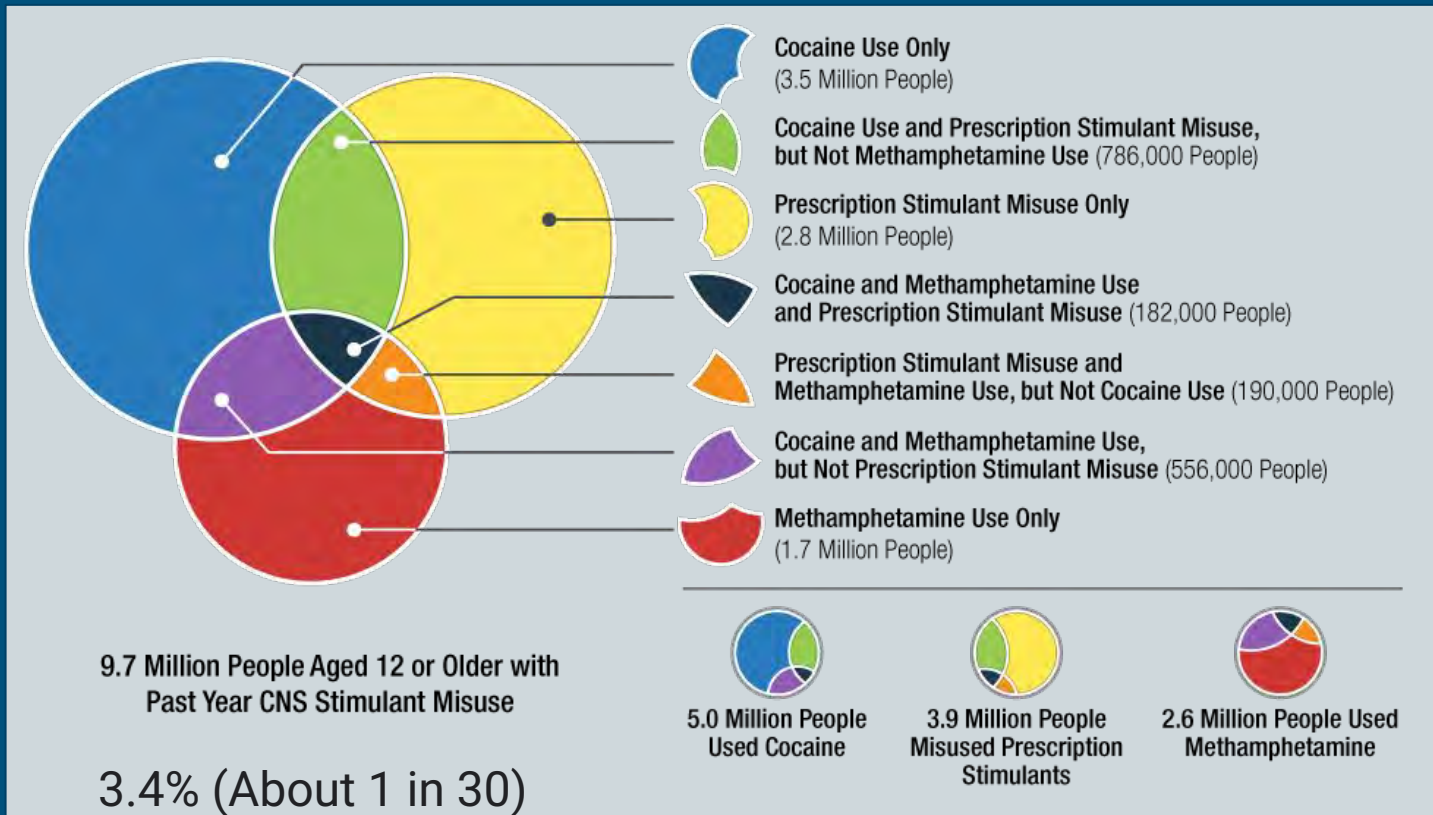


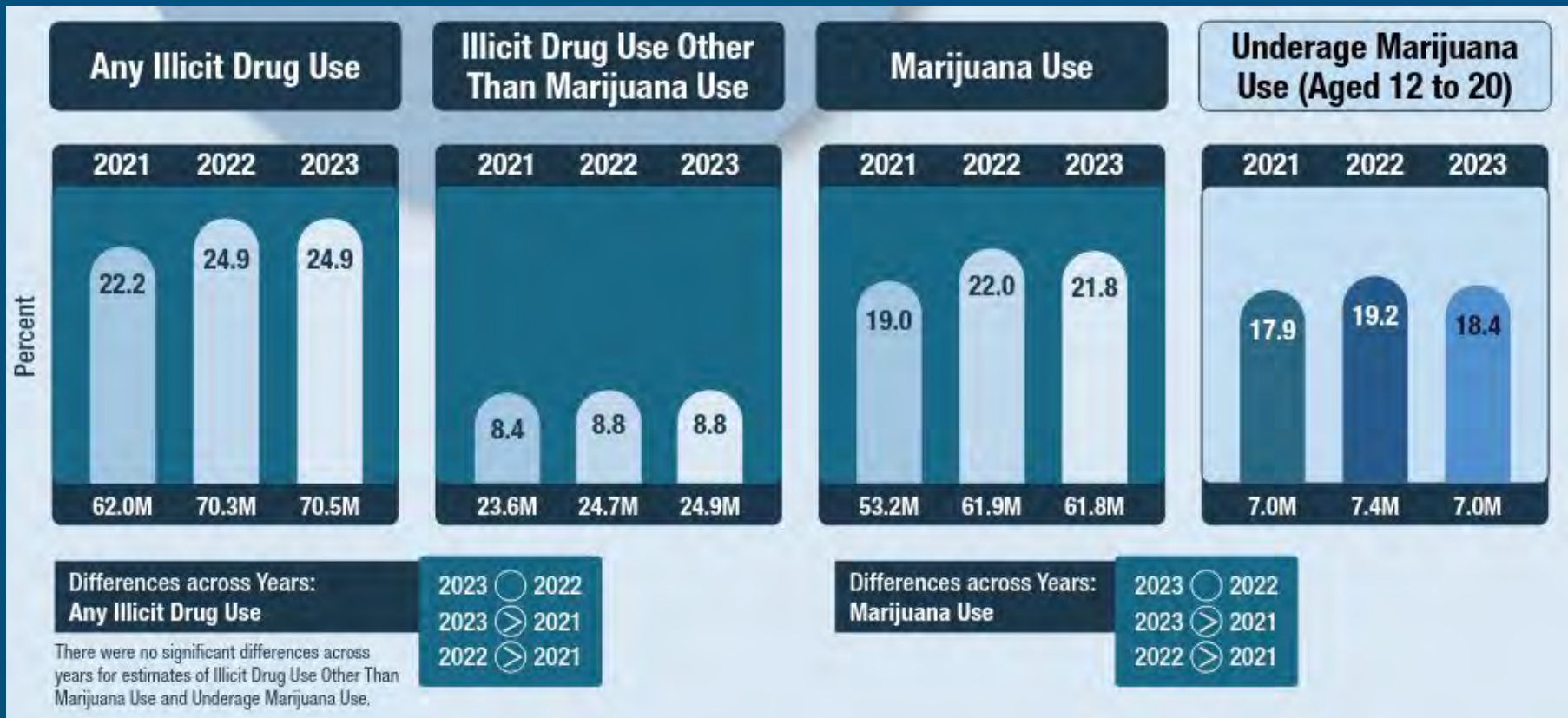
NSDUH 2023

Past year starts: NSDUH 2023



Past Year Central Nervous System (CNS) Stimulant Misuse for ages 12 or older: NSDUH 2023



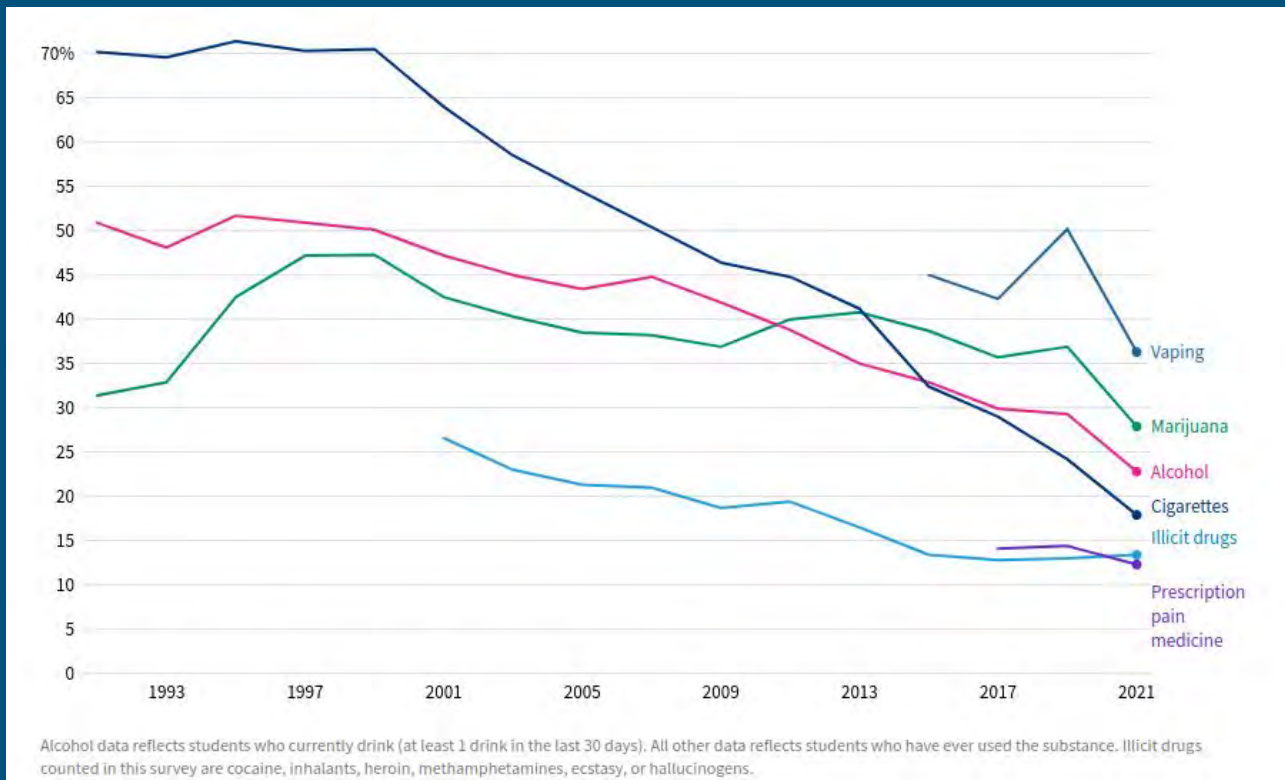


Illicit drug = marijuana, cocaine, heroin, hallucinogens, inhalants, and methamphetamine + misuse of prescription drugs (pain relievers, tranquilizers, stimulants, or sedatives). NSDUH 2023

Percent of high school students who have used select drugs or alcohol in the last 30 days

Illicit drugs =

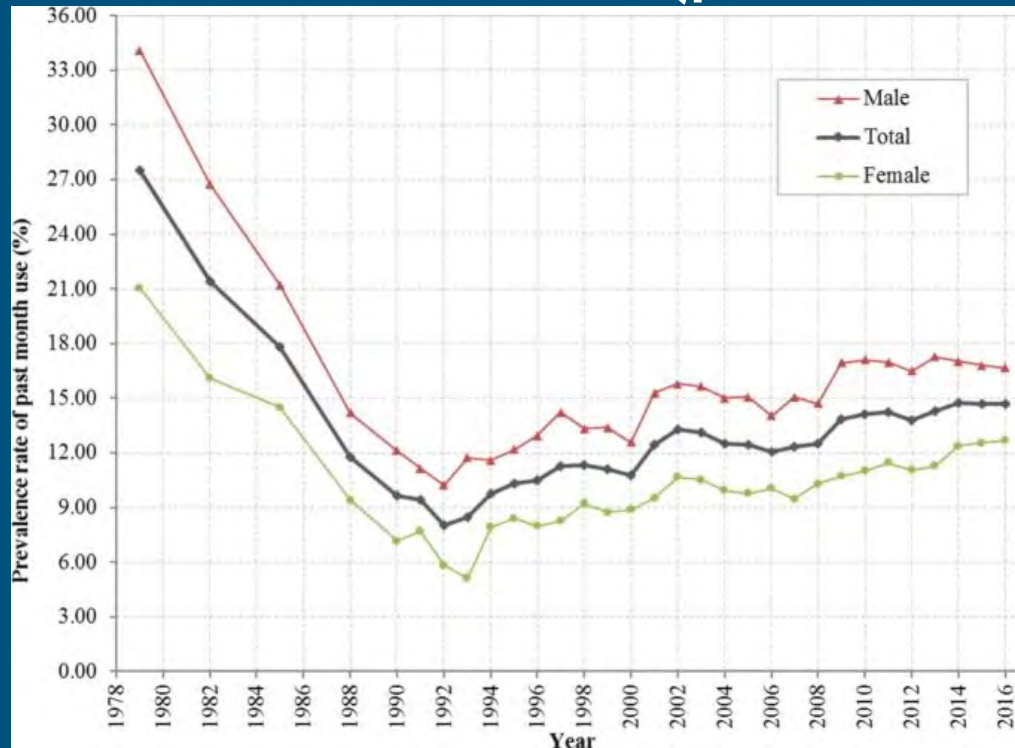
- Cocaine
- Inhalants
- Heroin
- Methamphetamines
- Hallucinogens
- Ecstasy (MDMA)



CDC. YRBS from <https://usafacts.org/articles/is-teen-drug-and-alcohol-use-declining/>

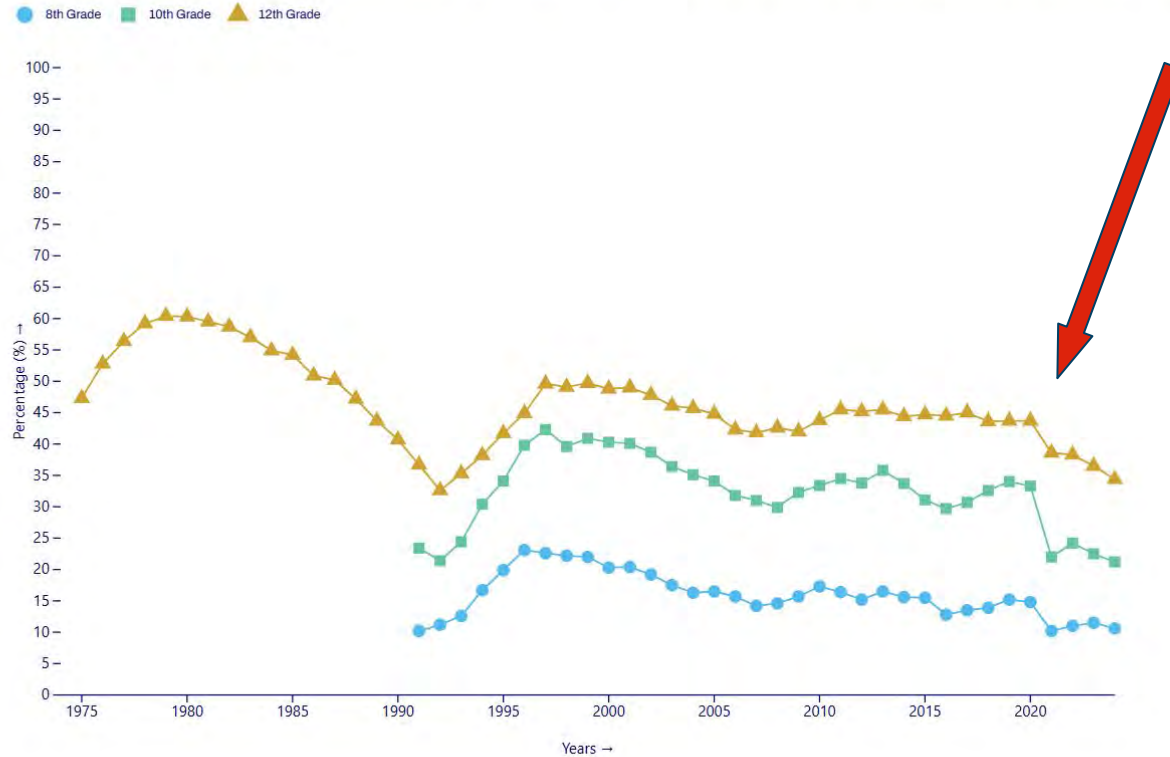
Cannabis

Cannabis use trends to 2016 (past month)



Yu, B., Chen, X., Chen, X. et al. Marijuana legalization and historical trends in marijuana use among US residents aged 12–25: results from the 1979–2016 National Survey on drug use and health. BMC Public Health 20, 156 (2020). Figures 1 and 2.

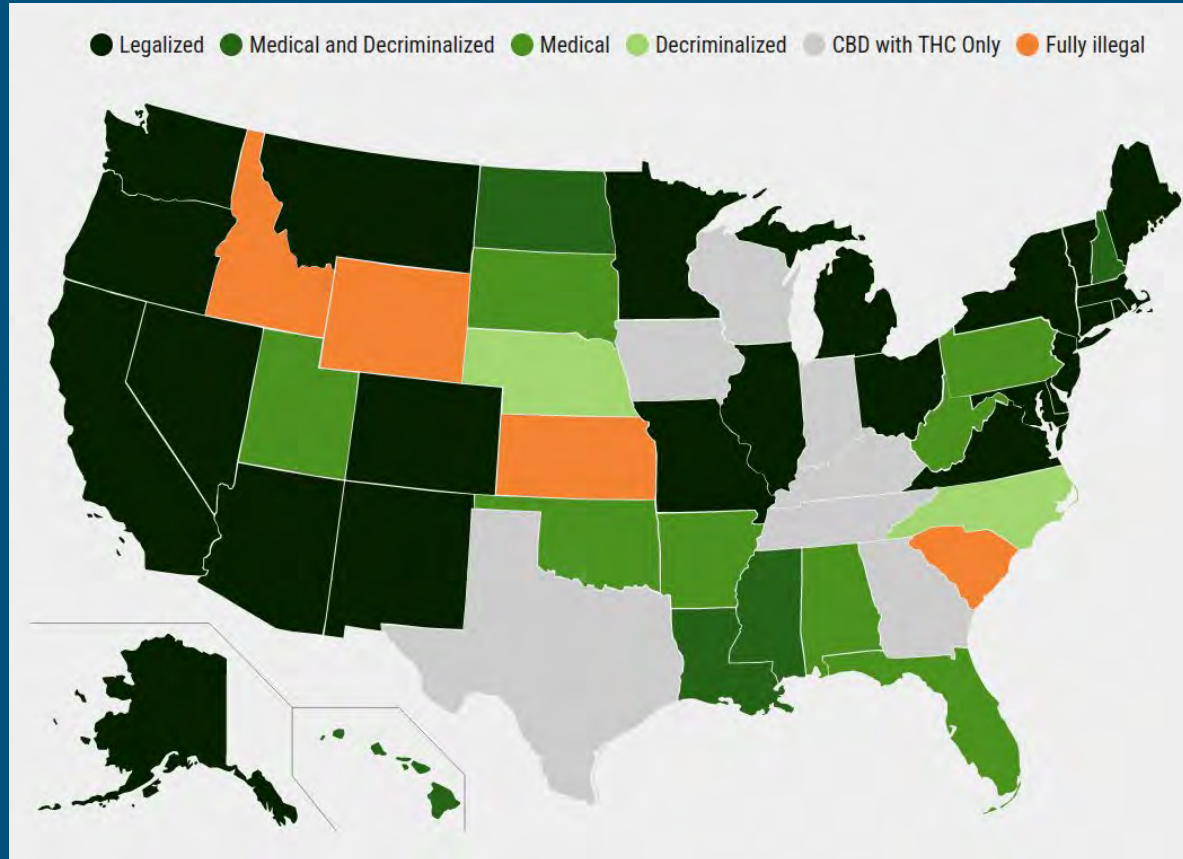
MARIJUANA (CANNABIS): Trends in Lifetime Prevalence of Use in 8th, 10th, and 12th Grade



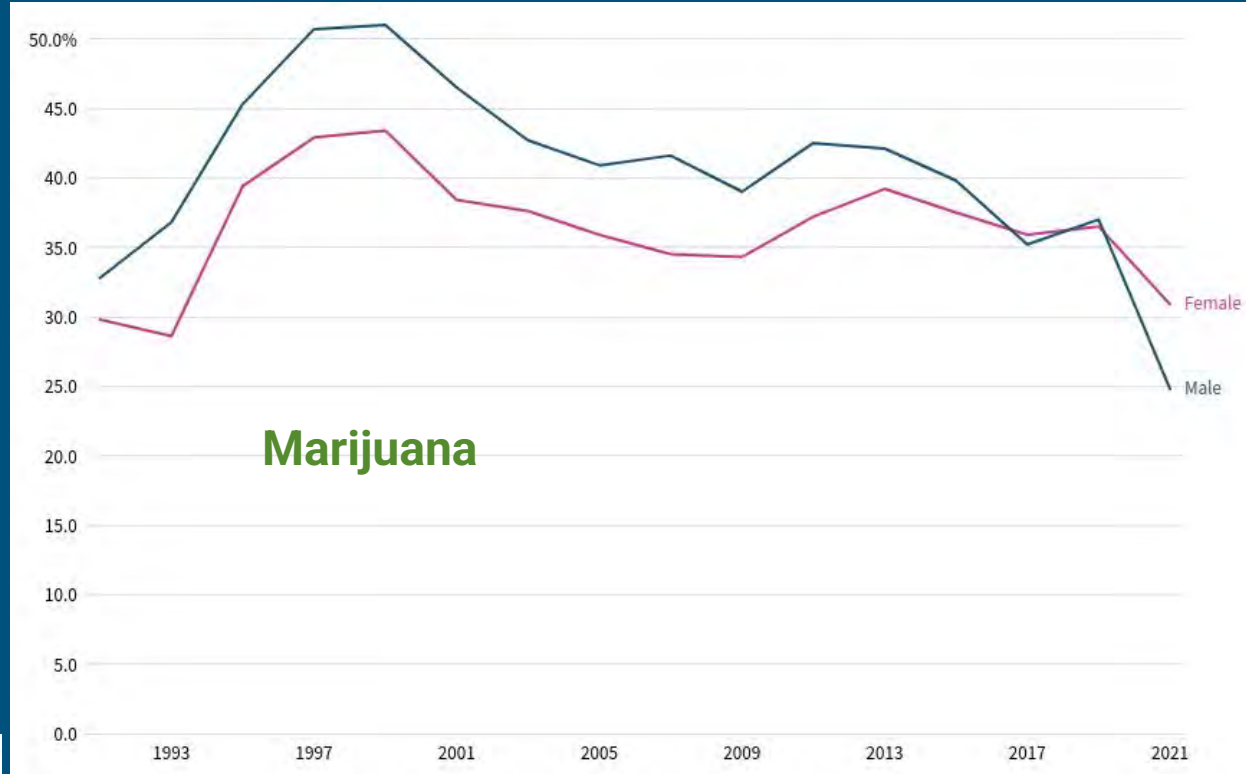
Miech, R. A., Johnston, L. D., Patrick, M. E., & O'Malley, P. M. (2025). Monitoring the Future national survey results on drug use,



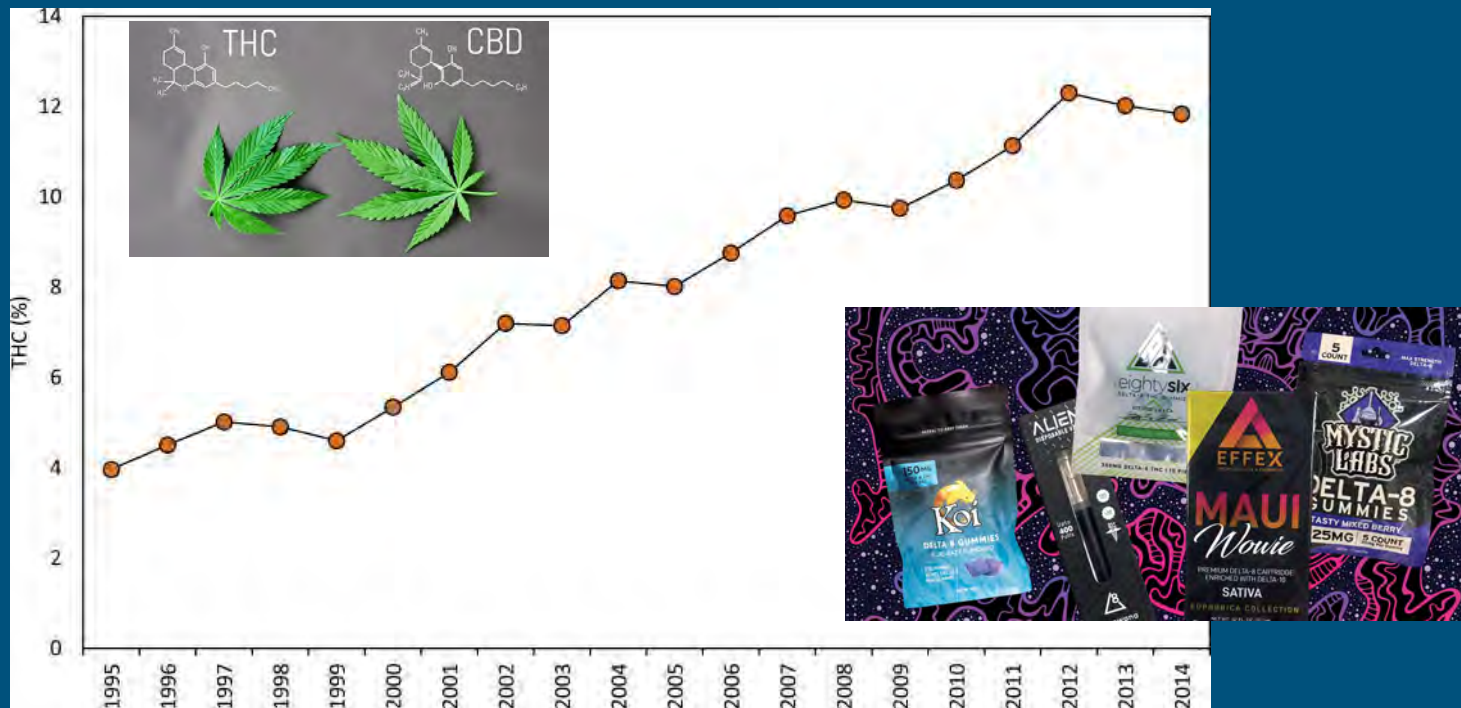
Cannabis legalization by state



High School Use Varies by gender and substance

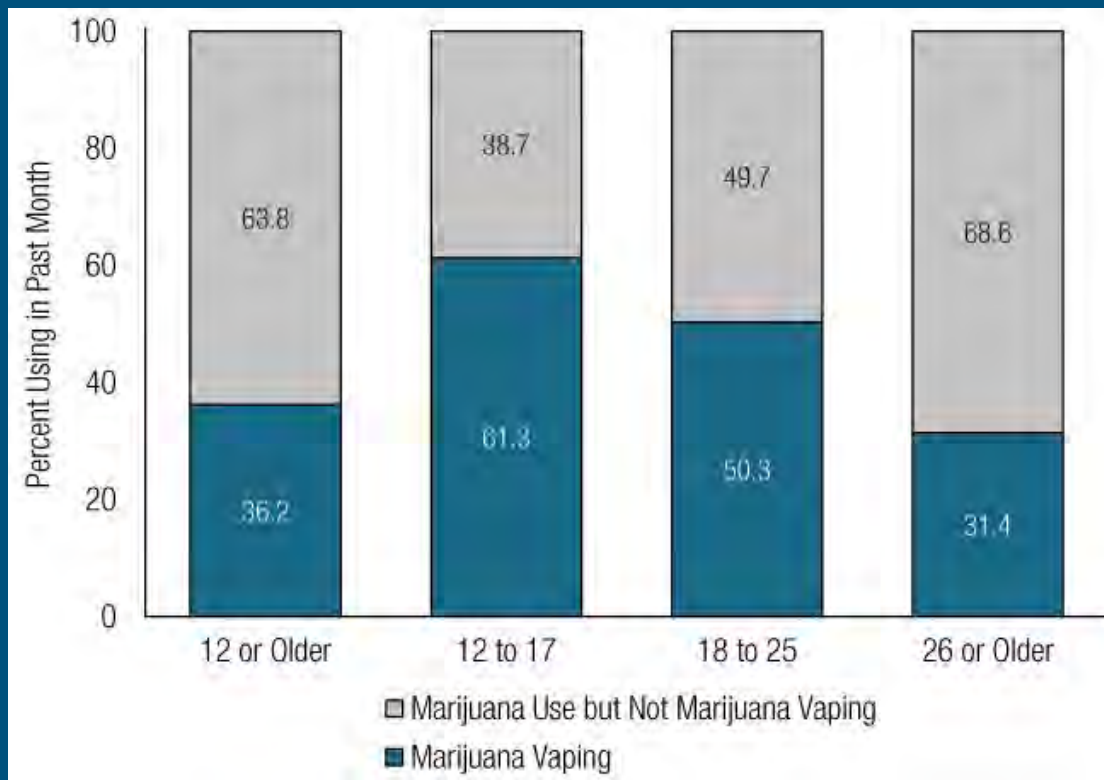


THC concentration over time: DEA specimens



ElSohly MA et al. Changes in Cannabis Potency Over the Last 2 Decades (1995-2014): Analysis of Current Data in the United States. *Biol Psychiatry*. 2016 Apr 1;79(7):613-9.

Type of Marijuana Use: Among Past Month Marijuana Users Aged 12 or Older



NSDUH 2023

Cannabis: uses and risks

Increasing evidence that there are long term demonstrable risks of long term cannabis use in midlife (Meier et al, 2022):

- Poorer learning, memory and processing speed than long-term tobacco or alcohol user (hippocampal volume reduction)

Withdrawal phenomenon: mood, appetite, sleep, headaches, cravings, chills

Can lead to psychosis, anxiety in vulnerable populations, esp as THC content has been increasing (from 20% in '60s up to 80% from dispensaries today)



<https://www.newsweek.com/what-are-cannabis-cocktails-will-they-replace-alcohol-2030717> 2/15/2025

Stimulants



1. Caffeine
2. Nicotine
3. Amphetamines
4. Methamphetamine
5. Cocaine
6. Methylphenidate
7. MDMA (Ecstasy)
8. Ephedrine
9. Pseudoephedrine
10. Dexmethylphenidate

Nicotine



E-cigs: Friend or Foe?

Most e-cigarettes contain nicotine: not clearly advertised

1 Juul™ = 1 pack cigarettes for nicotine

Marketing to teens, diminished risk of harm,
use to quit nicotine/ cigarettes?

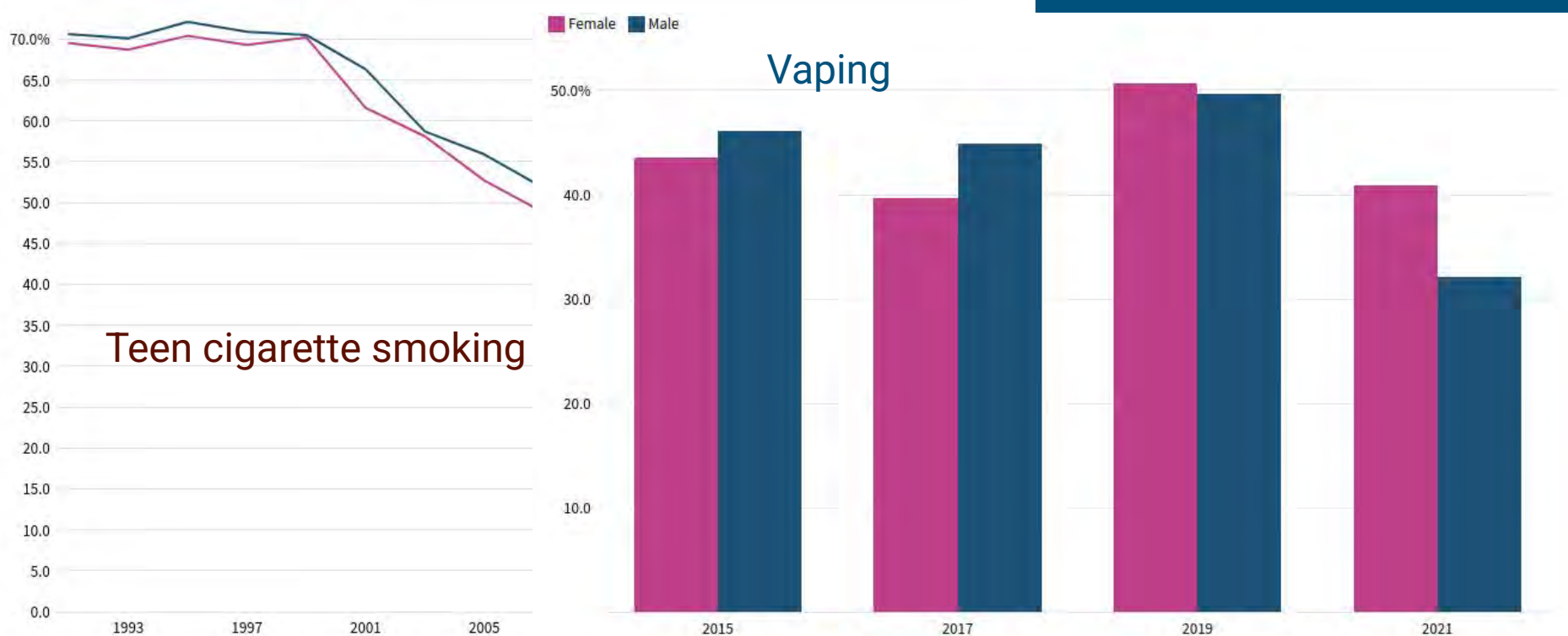
Nicotine can harm the developing brain

Mostly unregulated industry

Harmful ingredients = EVALI (CDC)



High School Use Varies by gender and substance



Type of Nicotine Use: Among Past Month Nicotine Product Users: 2023

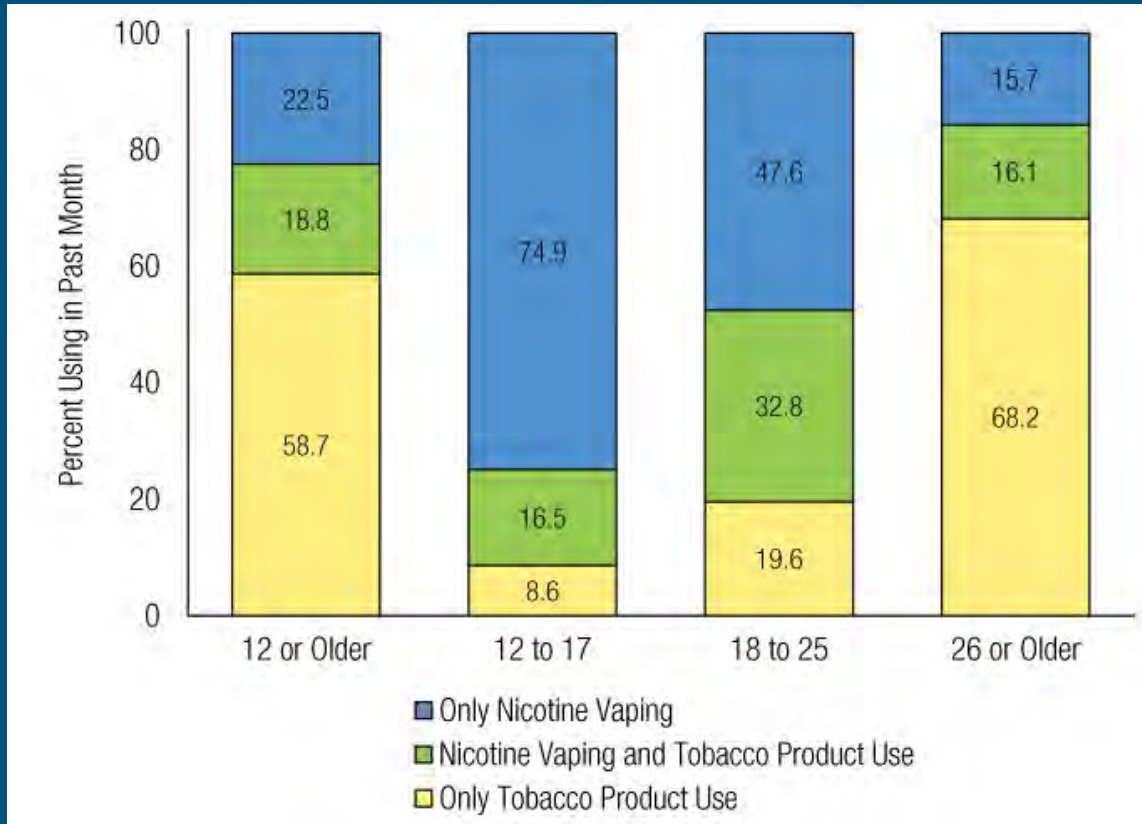
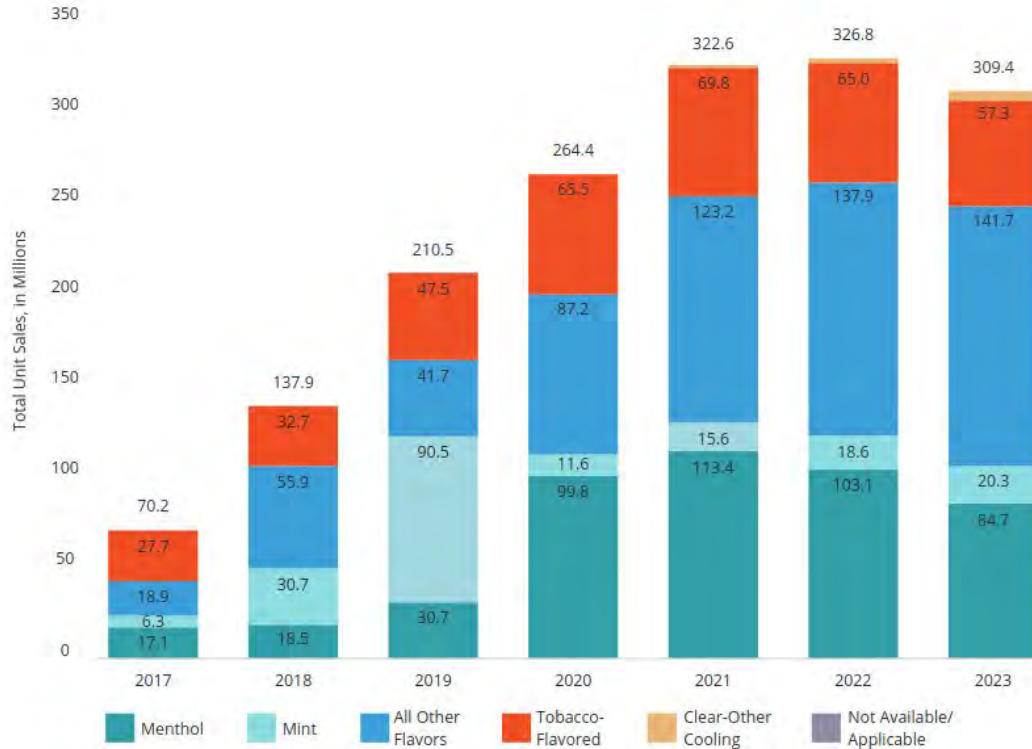


Figure 2. Current E-Cigarette Use Among High School Students, NYTS, 2011-2024

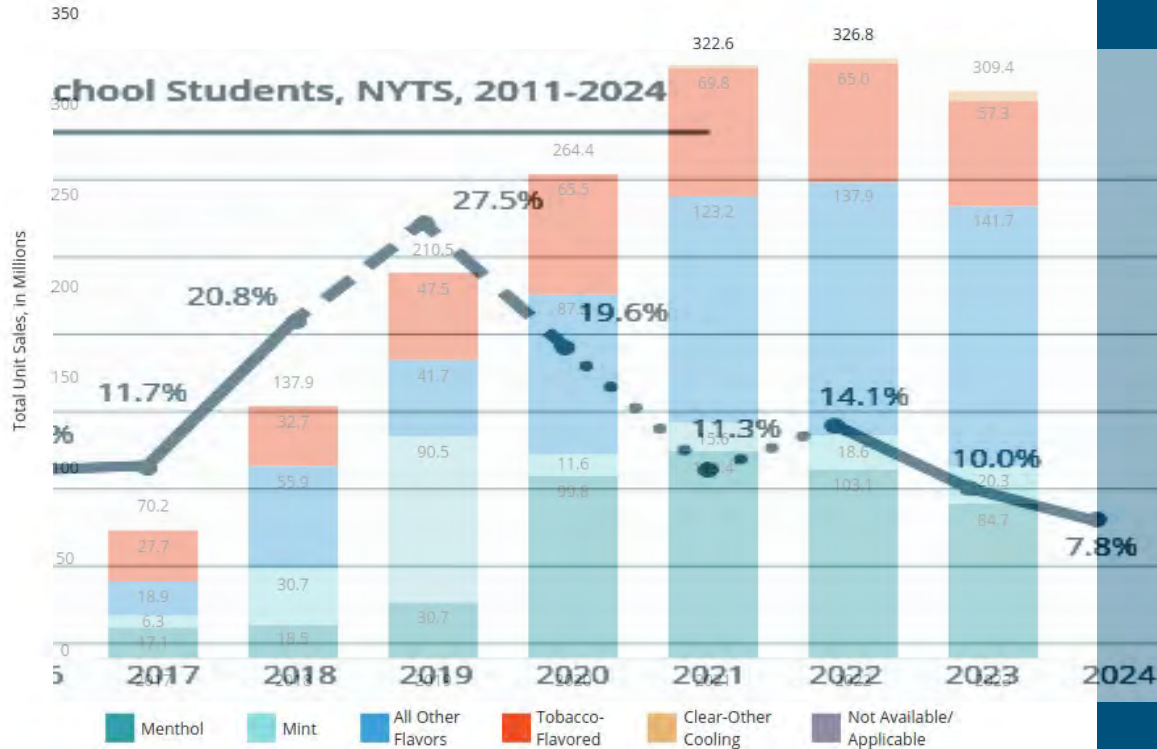


E-cigarettes have been the most used tobacco product by middle and high school students since 2014. In 2019, 27.5%

E-Cigarette Unit Sales by Flavor, Annual Estimates 2017-2023



A new perspective?



NOT ALLOWED:



The collage displays a variety of e-cigarette products. At the top left is a box of JUUL Classic e-cigarettes. Below it is a JUUL Pod box with a warning label. To the right are several JUUL Bar e-cigarettes in different flavors like Original Tobacco, Caramel French, and Vanilla. Further right are JUUL Pods in various flavors and colors. At the bottom left is a box of MOJO Disposable Pod Devices in various flavors like Mango, Lemon, and others. To the right are several MOJO Disposable Pod Devices in different colors. Each product is accompanied by a warning label stating: "WARNING: This product contains nicotine. Nicotine is an addictive chemical."

New forms, unknown harms

E-cigarettes

Vaping

Zyn pouches (now able to be marketed as of 1/16/2025)- “spitless” and “tobacco free”)

State flavor policies can be effective

- MA, CA and NY



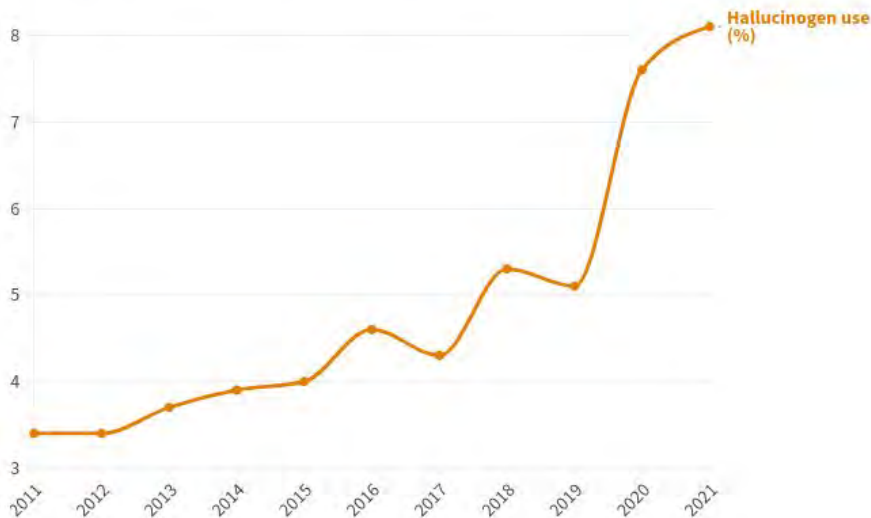


Psychedelics/ Hallucinogens

Hallucinogens

Hallucinogen use by young adults has doubled in less than a decade

Adults ages 19-30 who used a psychedelic drug in the past year.



Source: Monitoring the Future, University of Michigan

Hallucinogens

5-HT agonist, expansion, stimulating, novel experiences, unpredictable

New-ish kid on the block: Pink cocaine or Tusi

- Combo substance
- Variable effect
- Potent



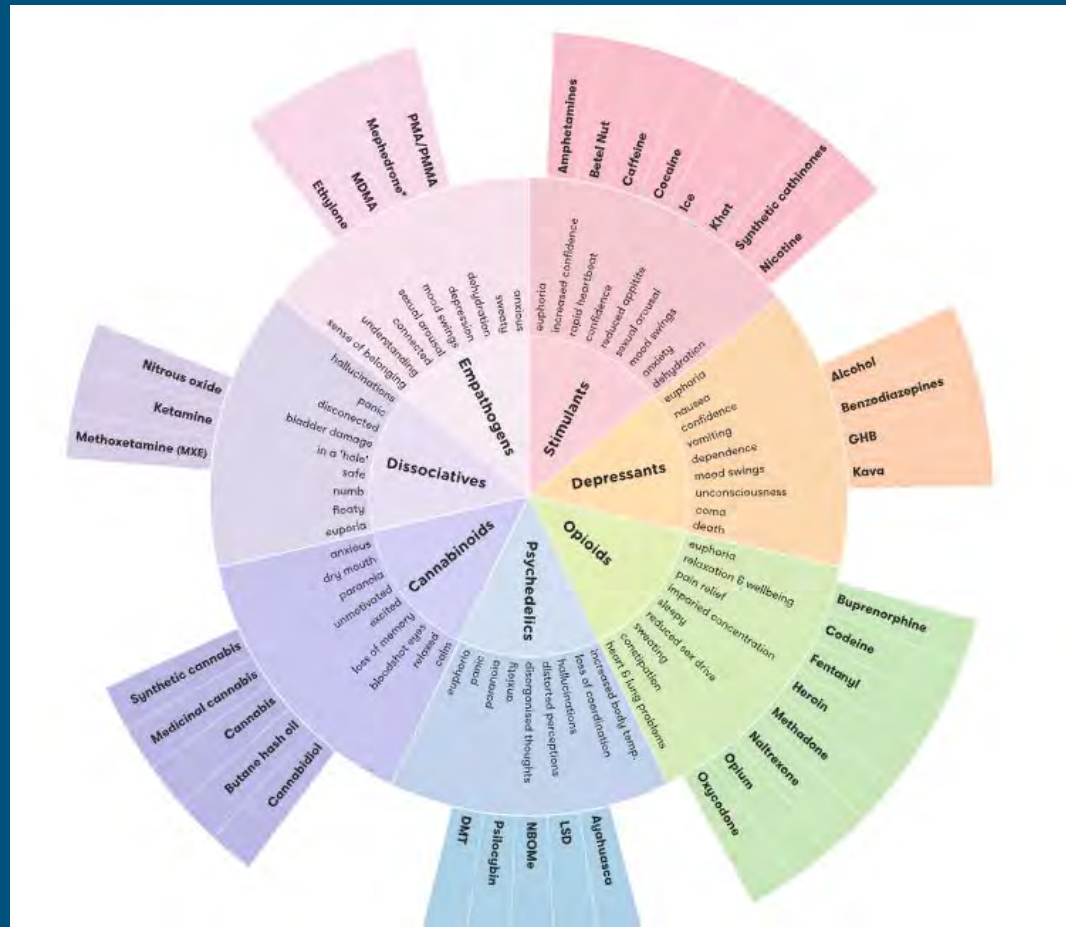
Other novel substances

Some surprises

Monitoring online discussions reveals:

- Quetiapine!
- Gabapentin
- BTMPS and other adulterants...

NDEWS <https://ndews.org/get-involved/subscribe-to-ndews/>



Why are they using?

To feel mellow, calm, or relaxed (73%): MJ, Rx pain meds, Rx sedatives

To have fun or experiment (50%): alcohol and nonprescription drug misuse

To sleep better or to fall asleep (44%): MJ and Rx sedatives

To stop worrying about a problem or to forget bad memories (44%)

To make something less boring (41%)

To help with depression or anxiety (40%)

To stay awake: Rx stimulant misuse

[Connolly S, Govoni TD, Jiang X, et al. Characteristics of Alcohol, Marijuana, and Other Drug Use Among Persons Aged 13–18 Years Being Assessed for Substance Use Disorder Treatment — United States, 2014–2022. MMWR Morb Mortal Wkly Rep 2024;73:93–98.]

With whom are they using

- With friends: alcohol, marijuana, or Rx and non-Rx drugs
- BF/GF
- Anyone who has drugs
- Alone: 50% for Rx drug misuse, less for MJ, non-Rx drugs and alcohol

Alcohol



Alcohol

Wisconsin is #1 in country for excessive drinking (America's Health Rankings)

Alcohol is responsible for more deaths than opioids, prevalence is higher (14% vs 1%) (Grant et al, 2015, Lapham et al 2020)

$\frac{2}{3}$ of people relapse after 1 year of treatment (Padula et al, 2022)

Find out more about alcohol (and free CME):

<https://www.niaaa.nih.gov/health-professionals-communities/core-resource-on-alcohol>

Important to screen for this to understand impact of substances on mental health.

- Deadly combination with alcohol/ opioids/ benzodiazepines

CDC guidelines

Moderation: Men: 2 or fewer drinks/ day,
Women: 1 or fewer/ day

Binge: Men: 5+ or Women: 4+ in 2 hours

Heavy drinking:

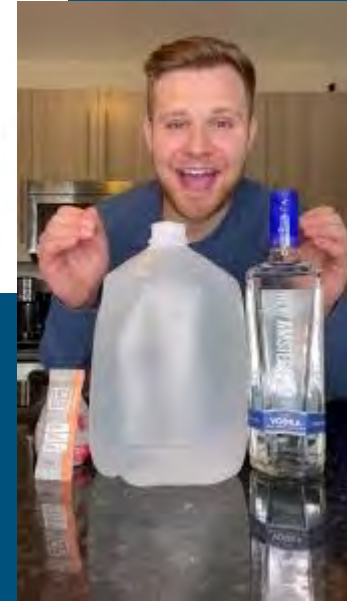
Men: 4 + on any day or >14 per week

Women: 3+ on any day or >7 per week (Rethinking Drinking)

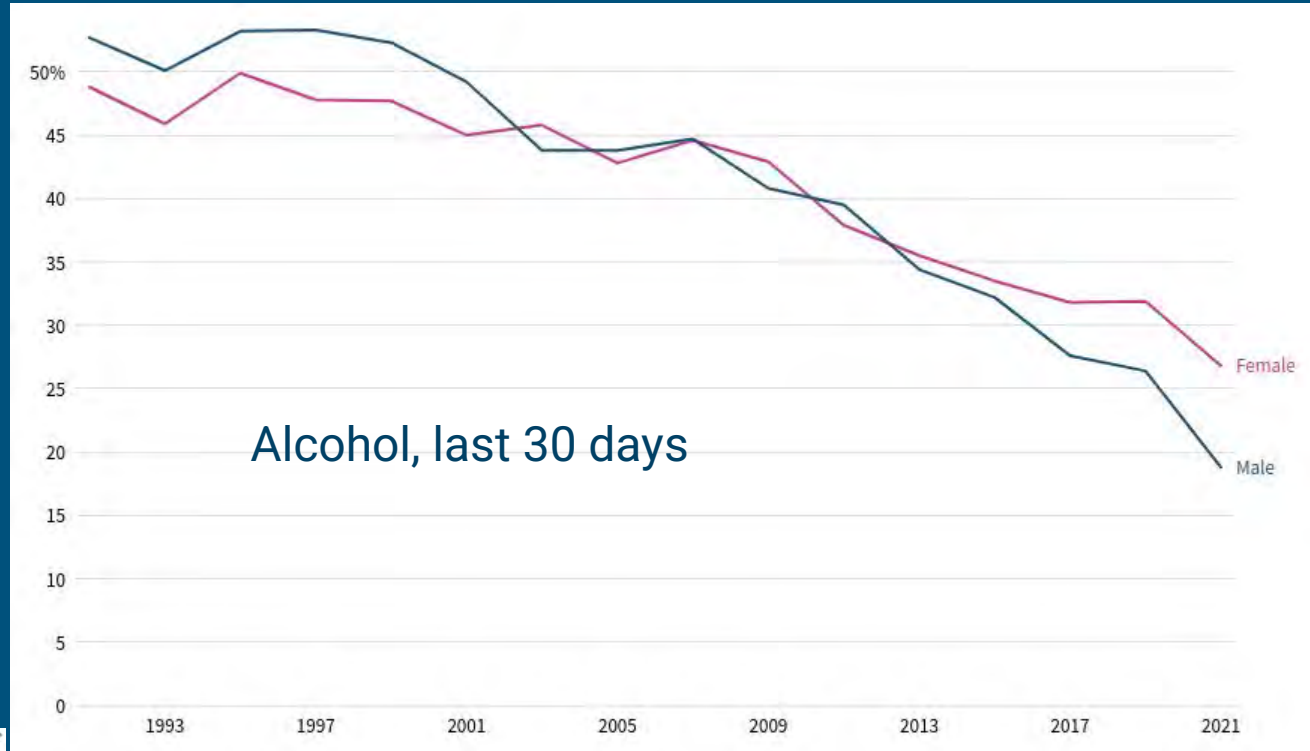
Or Binge drinking on 5 + days in the past month (SAMHSA)

BINGE and **HEAVY** drinking increases risk of alcohol use disorder

WI data: 9 drinks per occasion of drinking!



High School Use Varies by gender and substance



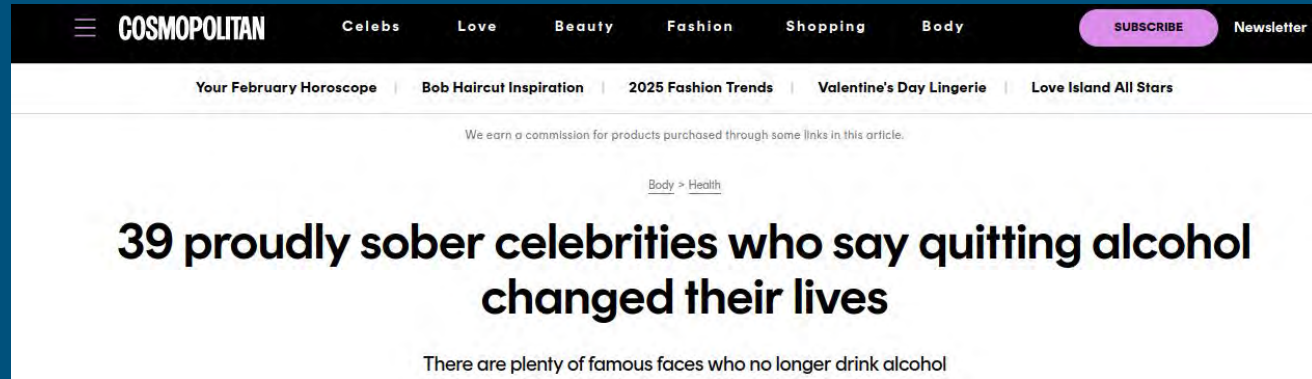
Contrast

NA options

64% of legal-drinking-age Gen Zers in the U.S.: no alcohol from Jan- May 2024

Sober curious movements

[<https://www.newsweek.com/gen-z-alcohol-sobriety-sober-curious-1912162> (6/15/2024) and
<https://www.cosmopolitan.com/uk/body/health/a33323277/sober-celebrities/> (1/1/2025)]



Recent Trends from MTF 2024: Decrease!! ??

Abstinence from alcohol, MJ, nicotine or e-cigarettes (no use in past 30 days)

67% for 12th graders (53% in 2017)

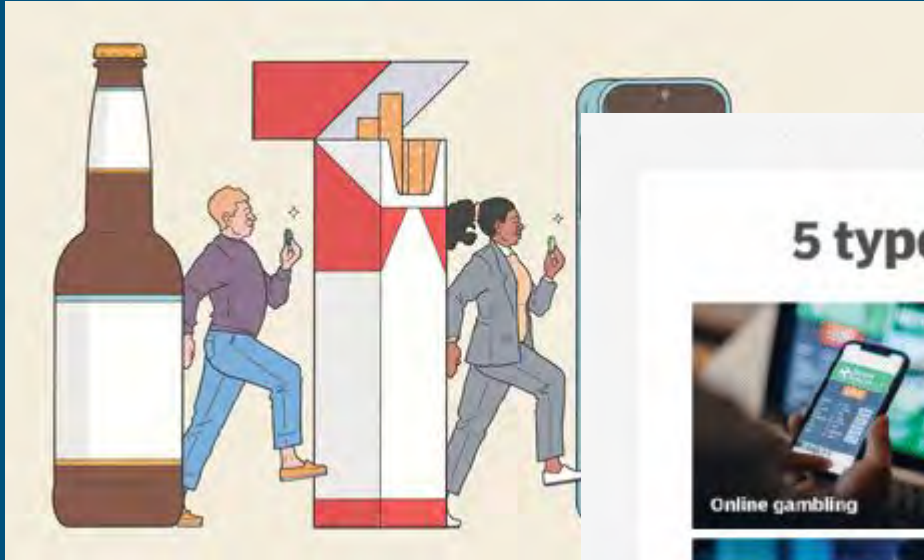
80% for 10th graders (69% in 2017)

90% in 8th graders (87% in 2017)

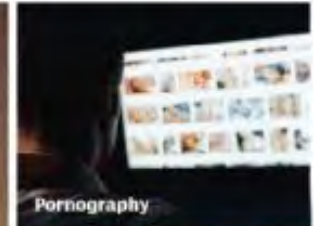
<https://nida.nih.gov/research-topics/trends-statistics/monitoring-future>

<https://monitoringthefuture.org/wp-content/uploads/2024/12/mtf2025.pdf>

The next wave?



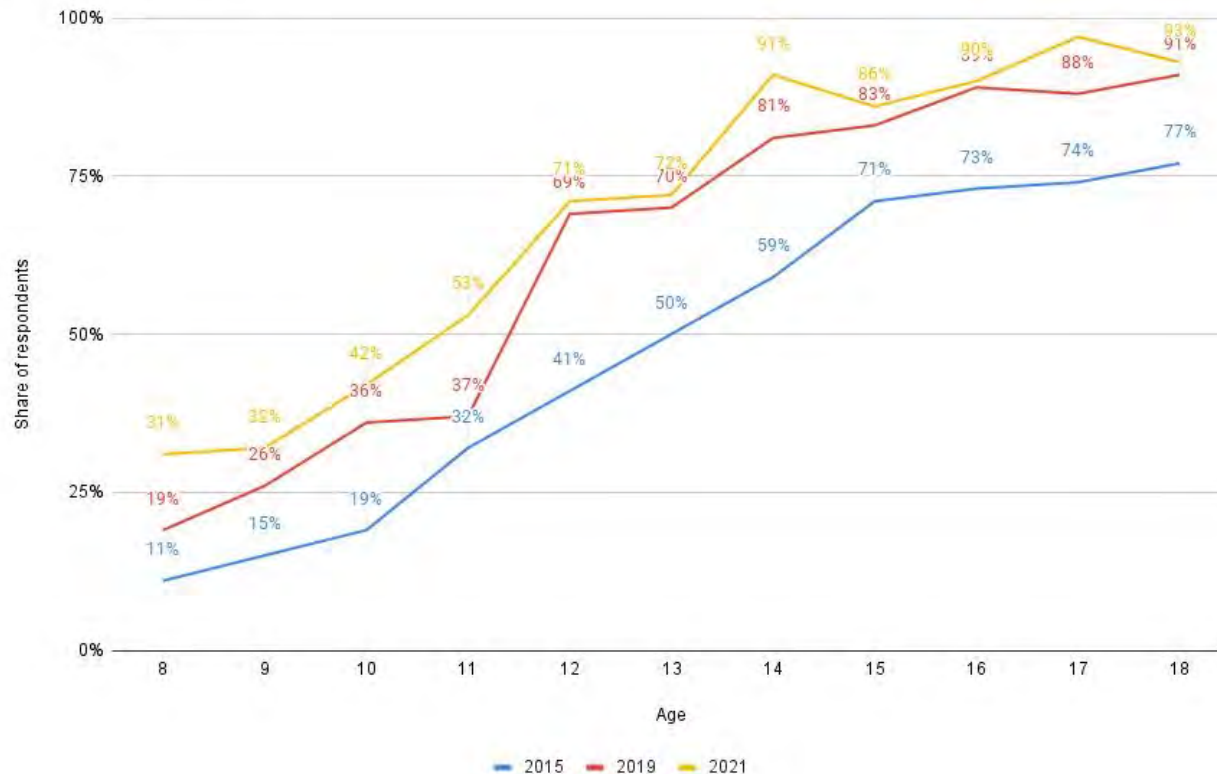
5 types of technology addiction



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SHARE OF CHILDREN OWNING A SMARTPHONE IN THE UNITED STATES IN 2015, 2019 AND 2021, BY AGE



Approaches to SUD in Adolescents

Adolescence

A time of trying to find balance between many conflicting wants and needs.



What can you do?

A useful approach to care of adolescents

HARM REDUCTION

What is it?

An approach that is geared towards reducing the negative personal and public health impacts of behavior associated with _____ at both the individual and community level (SAMHSA).

- alcohol and other substance use **or** anxiety **or** schizophrenia

Harm Reduction in clinical practice

HONESTY, NOT PERFECTION

Goal is to keep person engaged in treatment to reduce negative outcomes.

“Meet people where they are”

- Don't leave them there! (Maia Szalavitz)

Bring attitude of curiosity to the interaction.

Benefits of harm reduction

Can reduce negative effects of substance use disorders on health and social wellbeing:

- Decreased rate of infectious diseases
- Reduced sharing of substance use equipment
- Reduced stigma, increase chances of people seeking treatment
- Increased referrals to support programs
- Reduced overdose deaths (SAMHSA)
- **For adolescents: even more relevant to respect individuals/ keep young people engaged**

Your attitude matters!

Monitor self and staff for implicit and explicit bias that may show in policies or procedures.

- Only asking people you suspect about their substance use rather than screening *everybody* in your care
- Only requesting a urine drug screen for certain people rather than based on medications or other objective clinical criteria

Address biases by screening routinely



NIDA Quick Screen

NIDA Quick Screen Question:

In the past year, how often have you used the following?

Never
Once or
Twice
Monthly
Weekly
Daily or
Almost
Daily

Alcohol

- For men, 5 or more drinks a day
- For women, 4 or more drinks a day

Tobacco Products

Prescription Drugs for Non-Medical Reasons

Illegal Drugs

Concluding thoughts

Attitudes towards substance use by 8th grade have long lasting effects- peers matter!

Teen Substance use is declining overall, but girls > boys?

Lower use of most substances continues- except nicotine, marijuana and psychedelics

More dangerous/ extreme drug use is emerging for those who are still using

Polysubstance use is more the norm than the exception in overdoses.

- Be aware of other Rx drugs that could be misused (quetiapine, gabapentin)

Substances are changing. Adolescent brain is changing. Impact on mental health?

Need to be aware of other ways to numb emotions (technology overuse)

Be part of the solution

Maintain attitude of gentle curiosity

Screen everyone for substance use disorders (and technology use?)

Thanks!



References

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<https://www.samhsa.gov/find-help/harm-reduction>.

America's health rankings.

<https://www.americashealthrankings.org/explore/annual/measure/ExcessDrink/state/WI>

References, cont

Padula, C, et al. (2022). Targeting the Salience Network: A Mini-Review on a Novel Neuromodulation Approach for Treating Alcohol Use Disorder. *Frontiers in Psychiatry*, 13, 893833. <https://doi.org/10.3389/fpsy.2022.893833>

NIH News Release.

<https://www.nih.gov/news-events/news-releases/marijuana-hallucinogen-use-among-young-adults-reached-all-time-high-2021>

Meier et al (2022). Long-Term Cannabis Use and Cognitive Reserves and Hippocampal Volume in Midlife. *Am J Psych* 179: 5: 362-374.

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Barenholtz E, et al (2021). ,Online surveillance of novel psychoactive substances (NPS): Monitoring Reddit discussions as a predictor of increased NPS-related exposures, *International Journal of Drug Policy*, 2021:98. 103393, <https://doi.org/10.1016/j.drugpo.2021.103393>.

Figures

1:

<https://nida.nih.gov/publications/drugs-brains-behavior-science-addiction/advancing-addiction-science-practical-solutions>

2: https://commons.wikimedia.org/wiki/File:A_Cortical_Neuron_In_Conversation.jpg

3: Substance Abuse and Mental Health Services Administration (US); Office of the Surgeon General (US). Facing Addiction in America: The Surgeon General's Report on Alcohol, Drugs, and Health. Chapter 2, page 5. Washington (DC): US Department of Health and Human Services; 2016 Nov.

4: Substance Abuse and Mental Health Services Administration (US); Office of the Surgeon General (US). Facing Addiction in America: The Surgeon General's Report on Alcohol, Drugs, and Health. Chapter 2, page 7. Washington (DC): US Department of Health and Human Services; 2016 Nov.

A Radical Approach That Works

Positive development over 20 years (10th grade students)

Substance use in Iceland 1997-2018

