Substance Use Disorder 101

SHUCHIN SHUKLA MD MPH

Presented By:

Shuchin Shukla MD MPH

DISCLOSURE: Chief Medical Officer for Goldie Health

- The *North Carolina Technical Assistance Center* is a statewide initiative to provide FREE technical assistance to programs that support individuals at risk of incarceration and overdose.

Join our mailing list, request TA and browse resources
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AREAS OF EXPERTISE

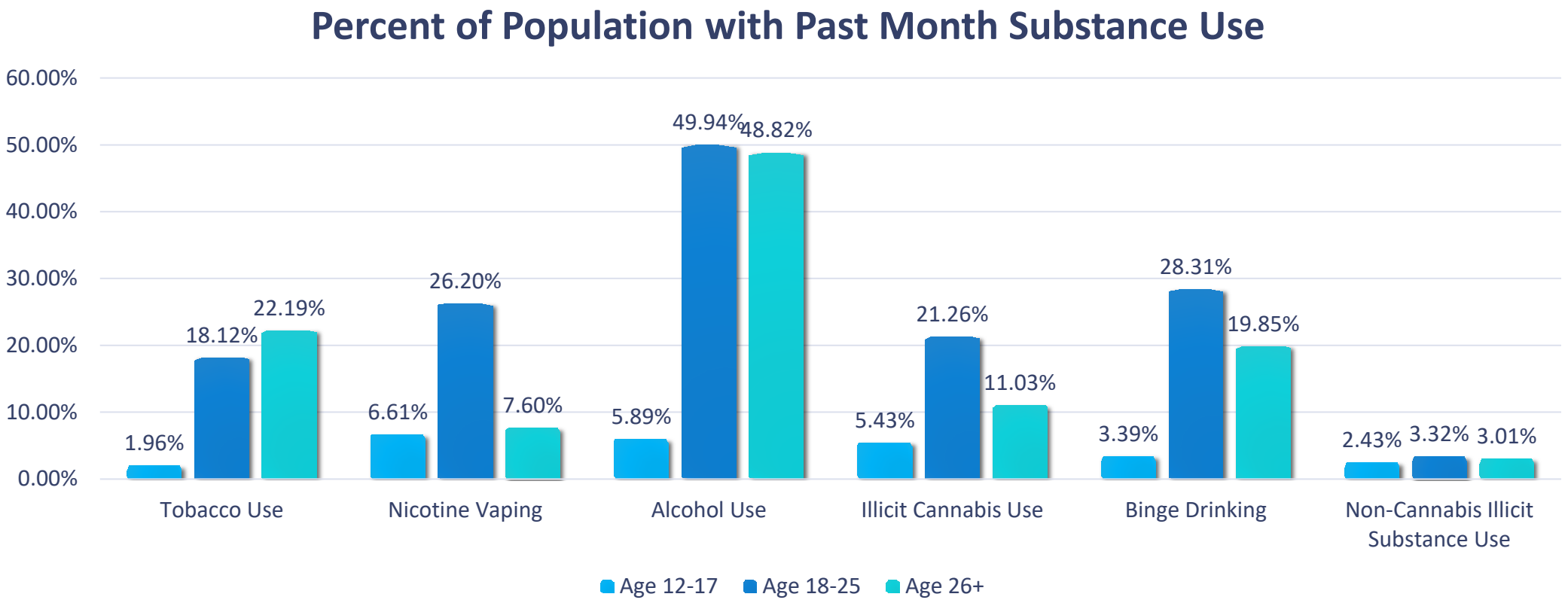
- Harm reduction
- Reentry from incarceration
- Diversion/Deflection, including Law Enforcement Assisted Diversion (LEAD)
- Jail-based Medication for Opioid Use Disorder (MOUD)
- Naloxone access and distribution
- Program evaluation
- Data management

AGENDA

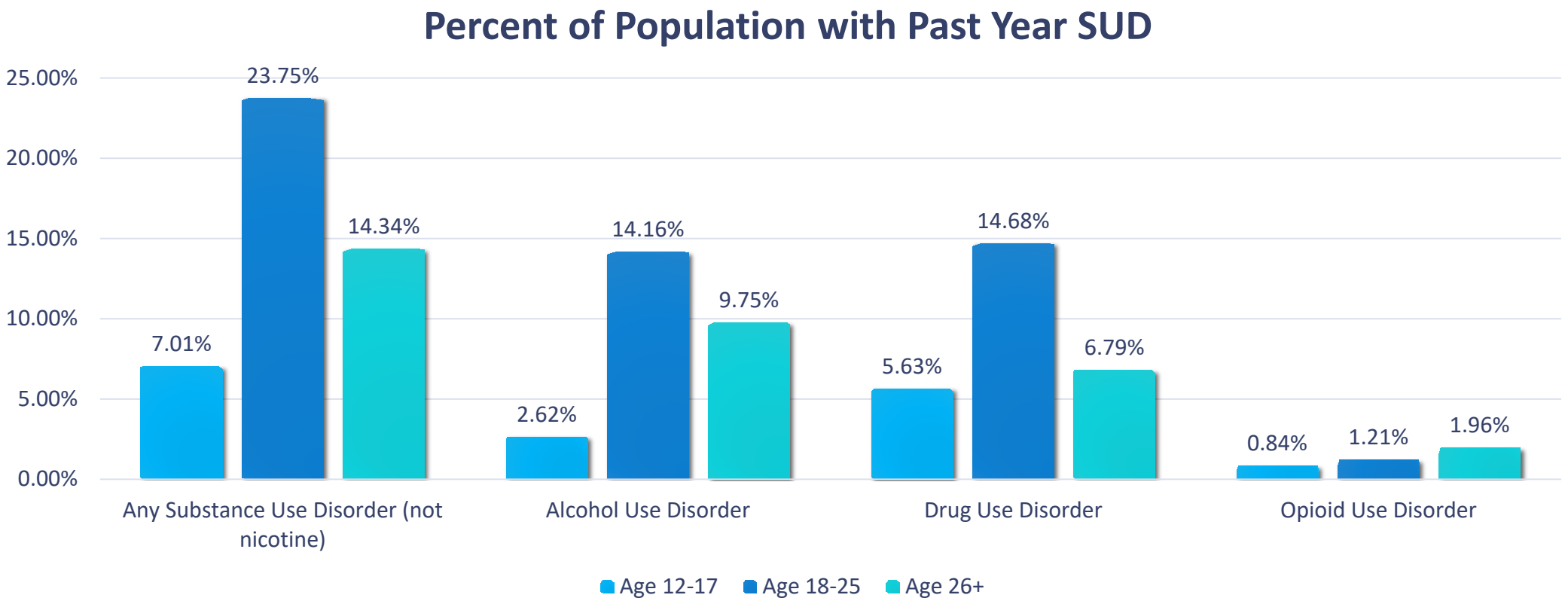
1. Substance Use in NC
2. Substance Use vs Substance Use Disorder
3. Substance Use Disorder and Brain Science
4. How to Help Someone with a Substance Use Disorder
5. Panel Discussion
6. Question-and-Answer Discussion

Substance Use in NC

What people are doing: Substance Use in NC 2023-2024



When it becomes a problem: Substance Use Disorder in NC 2023-2024



What is Substance Use?

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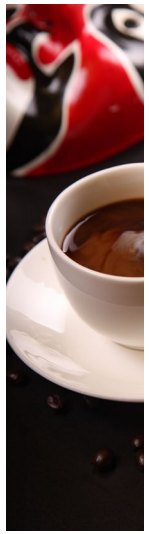
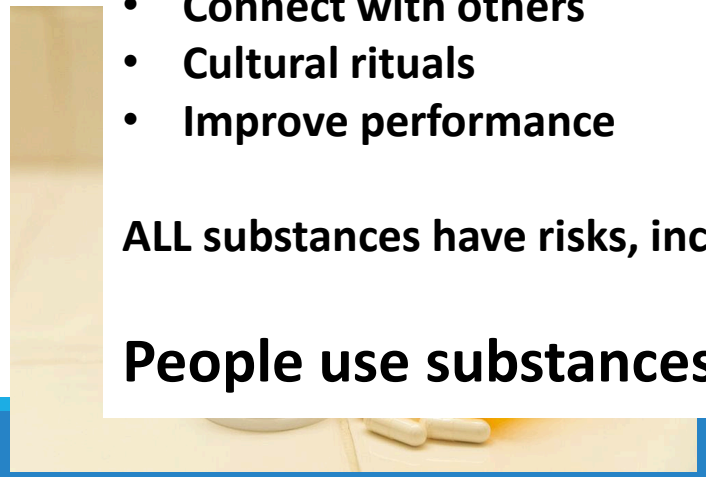


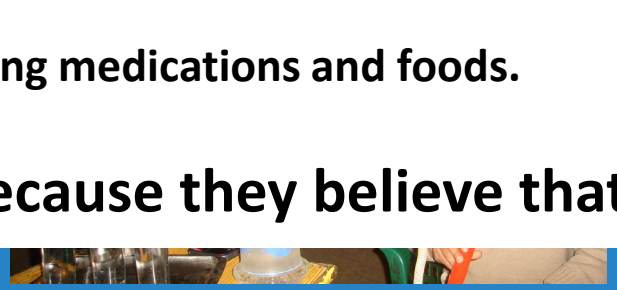
Humans have used substances for thousands of years. Even animals use substances.

Why?

For various benefits:

- **Feel good**
- **Fix problems**
- **Improve health**
- **Relax**
- **Have fun**
- **Connect with others**
- **Cultural rituals**
- **Improve performance**





ALL substances have risks, including medications and foods.

People use substances because they believe that the benefits outweigh the risks.

What is Substance Use Disorder?

Physiologic	Risk/Harm	Lack of Control

• Tolerance:
  • (a) a need for markedly increased amounts of substances to achieve intoxication or desired effect, or
  • (b) markedly diminished effect with continued use of the same amount of an substance
• Withdrawal:
  • (a) the characteristic substance withdrawal syndrome, or
  • (b) the same (or a closely related) substance are taken to relieve or avoid withdrawal symptoms
• **tolerance and withdrawal cannot be the only criteria for SUD diagnosis*
	• Recurrent substance use resulting in failure to fulfill major role obligations at work, school or home
	• Continued substance use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of substances
	• Important social, occupational or recreational activities are given up or reduced because of substance use
	• Recurrent substance use in situations in which it is physically hazardous
	• Continued use despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by opioids
		• Substance is often taken in larger amounts or over a longer period than was intended
		• Persistent desire or unsuccessful efforts to cut down or control use
		• Great deal of time is spent in activities necessary to obtain substance, use substance, or recover from its effects
		• Craving, or a strong desire to use substance

What is Substance Use Disorder?

Chronic, relapsing medical condition. Not a moral failing.

Criteria:

1) Changes to brain/nerve cells:

- **Need more of substance to get same effect**
- **Withdrawal symptoms when stop using substance regularly**

2) Risk and harm

- **Negative effects to career, finances, family life, relationships, physical health, mental health, safety**

3) Loss of control

- **Using more than you want, or for longer time (“taking over your life”)**
- **Wanting to cut back or stop, but can’t**
- **Craving or strong desire to use**

Types of Substances That Can Cause a Disorder

1) Nicotine – cigarettes, cigars, vape, chewing tobacco, pouches

2) Alcohol – beer, wine, liquor

3) Stimulants – cocaine, methamphetamine, khat, shabu, yaba, captogon, ecstasy/mdma

4) Opioids – pain medicines like oxycodone, hydrocodone, Percocet, morphine, codeine, fentanyl, Dilaudid, Demerol, heroin

5) Cannabis – gummies, plant, vape, foods, drinks, oils, hashish

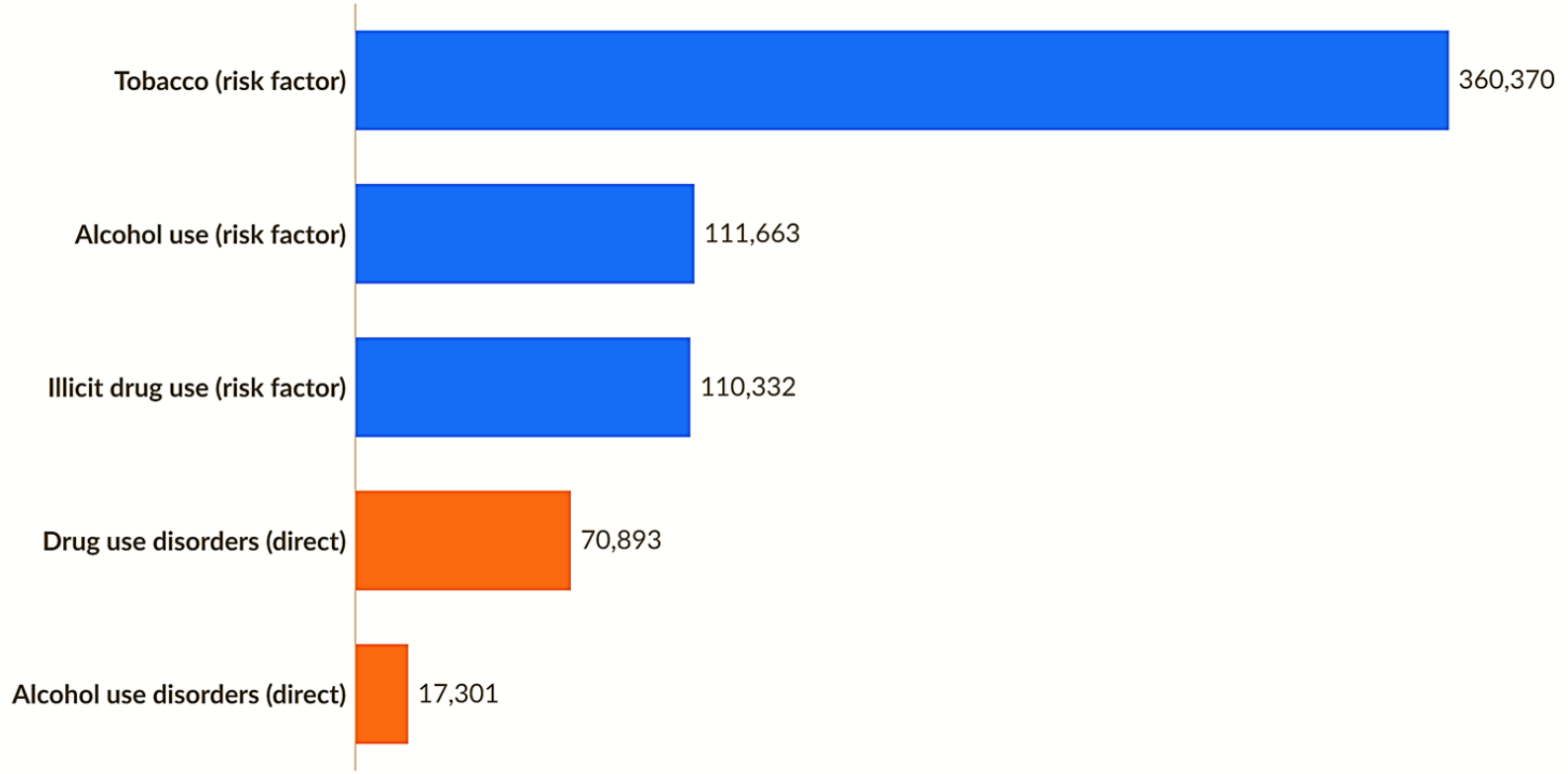
6) Sedatives – sleep/anxiety medicines ("benzodiazepines": Xanax, Valium, Klonopin, Ativan), barbiturates

7) Other: kratom, synthetic cannabis, ketamine

Deaths attributed to tobacco, alcohol and drugs, United States, 2021

Our World in Data

In blue are shown the estimated annual number of deaths attributed to tobacco, alcohol and drugs. In red are shown the estimated annual number of deaths from drugs and alcohol. The difference between both is that they relate to indirect and direct causes of death, respectively.

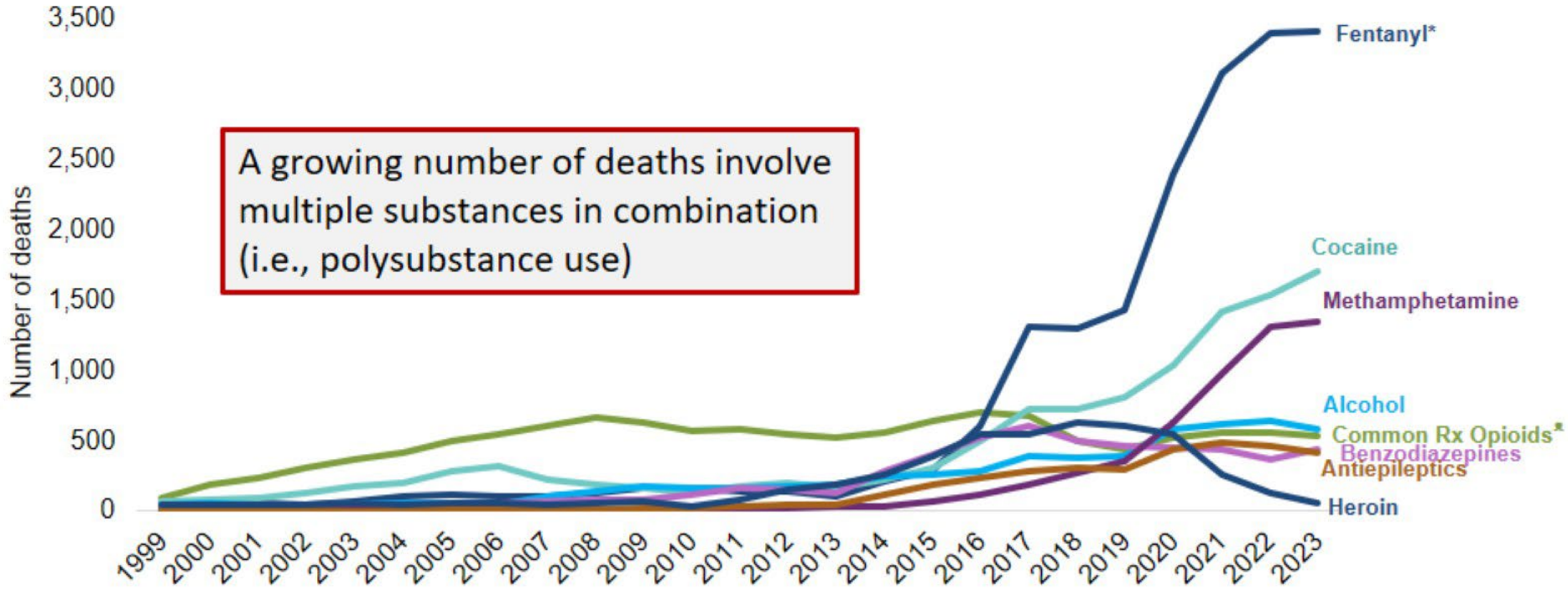


Data source: IHME, Global Burden of Disease (2024)

OurWorldinData.org/illicit-drug-use | CC BY

Note: Illicit drugs are drugs that have been prohibited under international drug control treaties. They include opioids, cocaine, amphetamines and cannabis.

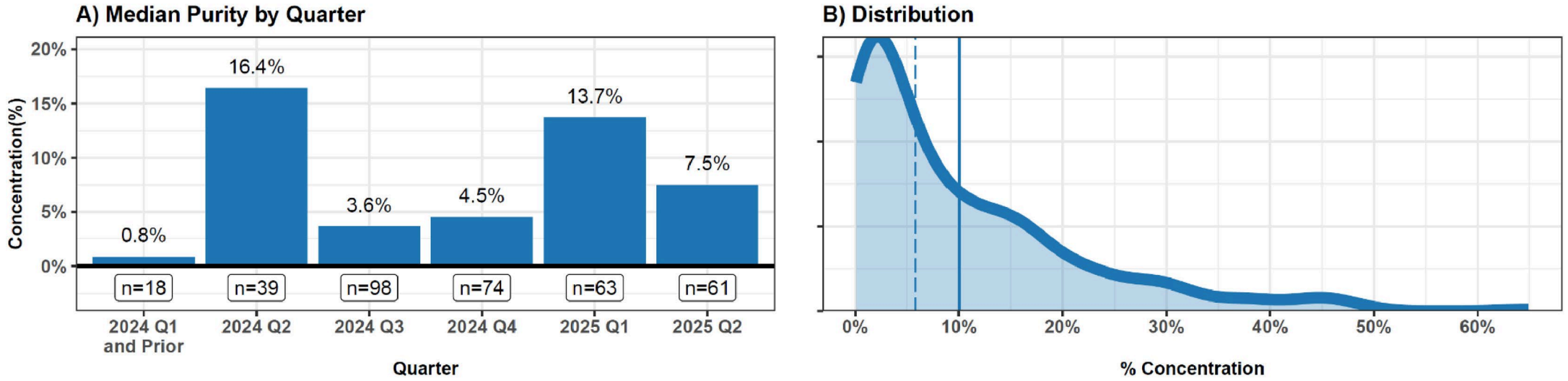
Illicitly manufactured fentanyl* remains the main contributor to overdose deaths



*Fentanyl surveillance based on Other Synthetic Narcotics (T40.4), which consists of mainly illicitly manufactured fentanyl and fentanyl analogues *Commonly Prescribed Opioid Medications

Technical Notes: These counts are not mutually exclusive; If the death involved multiple substances, it can be counted on multiple lines; Toxicology data is unable to distinguish whether the presence of multiple substances indicate intentional polysubstance use or if one substance was tainted with other drugs (e.g. cocaine laced with fentanyl); All intent medication, drug, alcohol poisoning: X40-X45, X60-64, Y10-Y14, X85 with any mention of specific T-codes by drug type; limited to NC residents
Source: Deaths-NC State Center for Health Statistics, Vital Statistics, 1999-2023
Analysis by Injury Epidemiology and Surveillance Unit

WHY IS FENTANYL SO DEADLY? Variability in Potency



Shover CL, Koncsol AJ, Godvin ME, et al. High variation in purity of consumer-level illicit fentanyl samples in Los Angeles, September 2023-April 2025. *Int J Drug Policy*. Published online August 30, 2025. doi:10.1016/j.drugpo.2025.104977

Every day, North Carolina experiences:

16 deaths due to alcohol use
(over 5,800 per year)

180 alcohol-related emergency department visits
(over 66,000 per year)

A loss of $41.2 million due to excessive alcohol use
($15.0 billion per year)

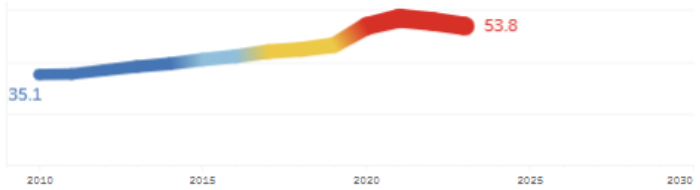
On average, every day in North Carolina, there are…

12	Overdose Deaths
32	Overdose Hospitalizations
47	Overdose Emergency Department (ED) Visits
34	Emergency Medical Services (EMS) Encounters for suspected overdose
46	Overdose reversals by a community member administering naloxone

Technical Notes: Medication and drug overdose: X40-X44, X60-X64, Y10-Y14, X85; Limited to NC residents; ED Visits are based on initial encounter, unintentional and undetermined intent cases, for ICD10CM overdose codes of drugs and medications with dependency potential within T40, T42, T43, T50.7, and T50.9, NC residents, ages 15-65 years. EMS data available for January to May 2023, calculation made by prorating data for one year.
Source: Deaths-NC State Center for Health Statistics, Vital Statistics, 2023; Hospitalizations- North Carolina Healthcare Association, 2023; ED Visits-NC DETECT, 2023; EMS encounters-NC DETECT, Jan-May 2023; Community naloxone reversals-NC Division of Public Health, Safer Syringe Initiative Annual Report, July 2022-June 2023; Analysis by Injury Epidemiology and Surveillance Unit

Alcohol-Attributable Deaths

The Total alcohol-attributable death rate in NC was 53.8 out of 100,000 residents in 2023, representing 5,828 people who died from an alcohol-attributable death (i.e, from both acute and chronic causes).

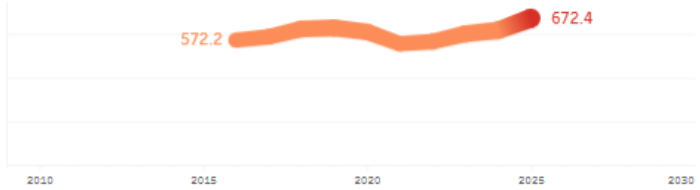


Alcohol-attributable deaths include 58 causes of death due to immediate and long-term alcohol use.

Alcohol-Related ED Visits

The estimated Alcohol-related ED visit rate in NC is 672.4 per 100,000 residents in 2025, representing (projected) 74,272 ED visits involving 100% alcohol-related conditions (e.g., immediate issues, such as alcohol intoxication, as well as long-term conditions, such as liver cirrhosis).

Partial year: n=61,893 at 10/12 months

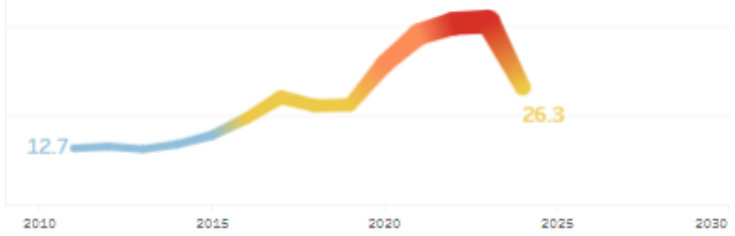


Alcohol-related ED visits include visits caused by immediate issues, such as alcohol intoxication, as well as long-term conditions, such as liver cirrhosis.

Overdose Deaths

The estimated Overdose Death rate in NC is 26.3 out of 100,000 residents in 2024, representing (projected) 2,908 people who died of an overdose.

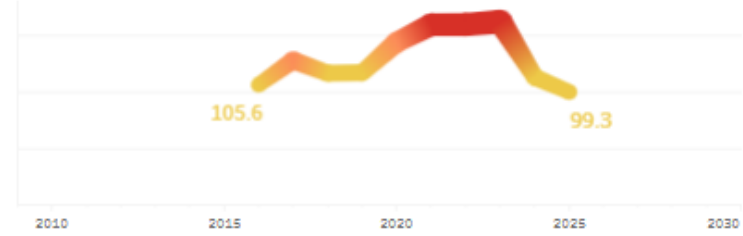
Partial year: n=2,423 at 10/12 months

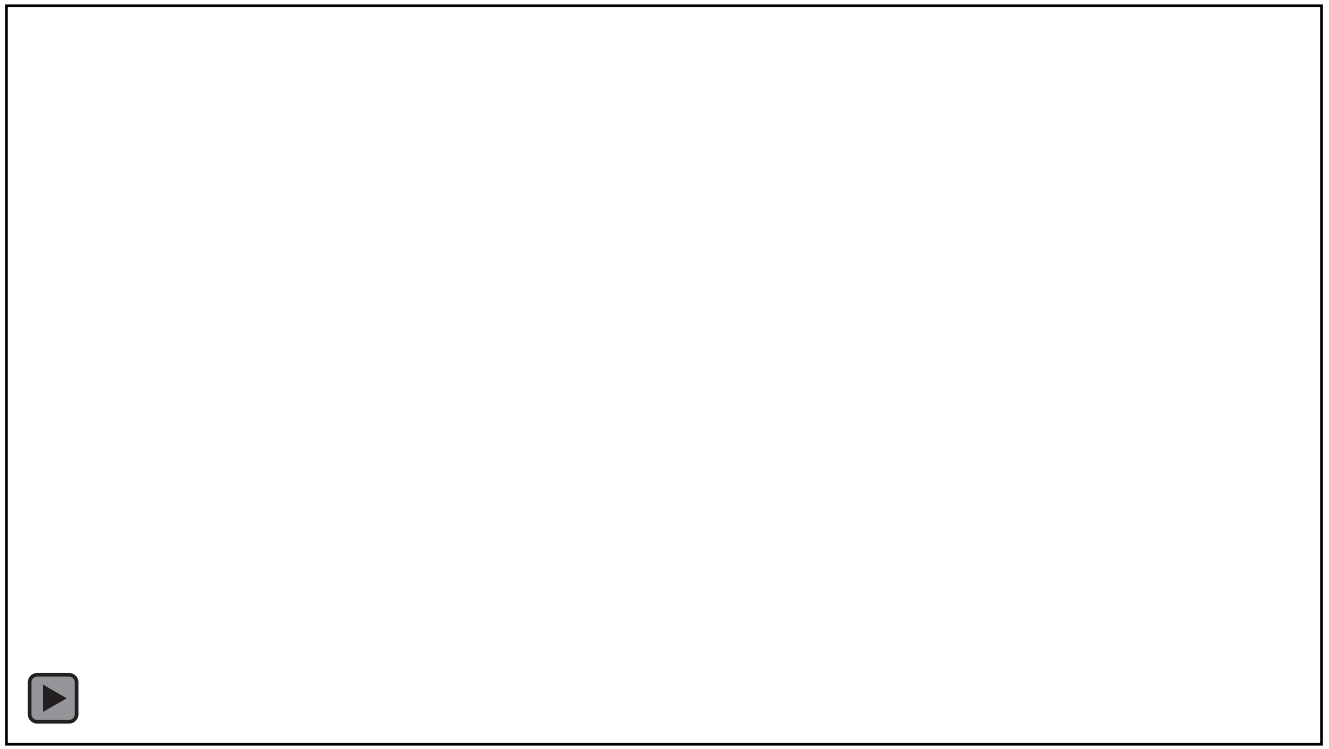


Overdose Emergency Department Visits

The estimated Overdose ED Visit rate in NC is 99.3 per 100,000 residents in 2025, representing (projected) 10,964 ED visits for an overdose.

Partial year: n=9,137 at 10/12 months





HOW DOES IT ALL BEGIN? Substance use and Brain Science

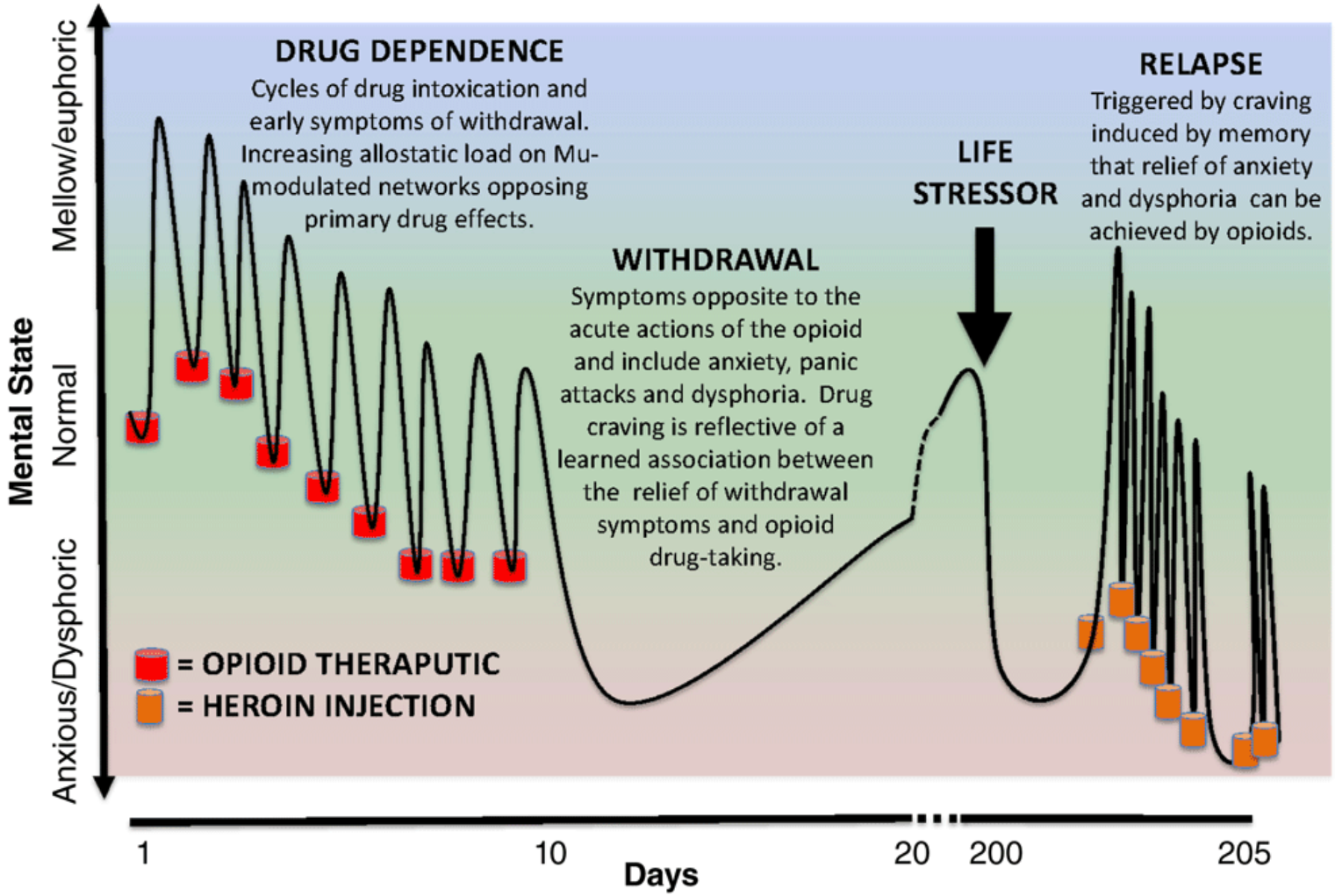
Why do adolescents start to use substances?

TABLE. Motivations for drug use among persons aged 13–18 years being assessed for substance use disorder treatment who reported use of alcohol, marijuana, or other drugs during the previous 30 days and persons with whom they used substances — National Addictions Vigilance Intervention and Prevention Program Comprehensive Health Assessment for Teens, United States, 2014–2022

Measure	No. (%) Overall* 9,543 (100)
Motivation* **	
To feel mellow, calm, or relaxed	6,968 (73)
To sleep better or fall asleep	4,216 (44)
To stay awake	1,212 (13)
To feel less shy or more social	2,056 (22)
To stop worrying about a problem or forget bad memories	4,169 (44)
To have fun or experiment	4,771 (50)
To be sexier or make sex more fun	1,033 (11)
To lose weight	400 (4)
To make something less boring	3,893 (41)
To improve or get rid of the effects of other drugs	1,008 (11)
To concentrate better	2,126 (22)
To deal with chronic pain	1,326 (14)
To help with depression or anxiety	3,787 (40)
To fit in	1,144 (12)
Other reason	2,149 (23)

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. DOI: http://dx.doi.org/10.15585/mmwr.mm7305a1.

Why do people keep using substances?



Evans CJ and Cahill CM. Neurobiology of opioid dependence in creating addiction vulnerability [version 1]. F1000Research 2016, 5:1748 (doi: 10.12688/f1000research.8369.1)

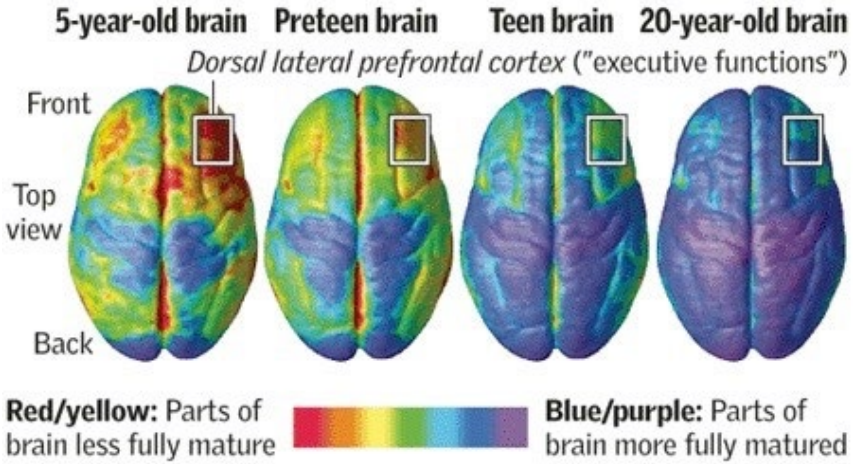
Brain and Substance Exposure

- **Most adults with SUD had adolescent substance exposure PLUS trauma exposure…**
- **But only some people with SU will develop SUD… WHY?**

Earlier exposure of all substances is associated with ongoing use and disorder

Gateway drugs include nicotine…

More *severe* substance use in adolescence predicts future SUD

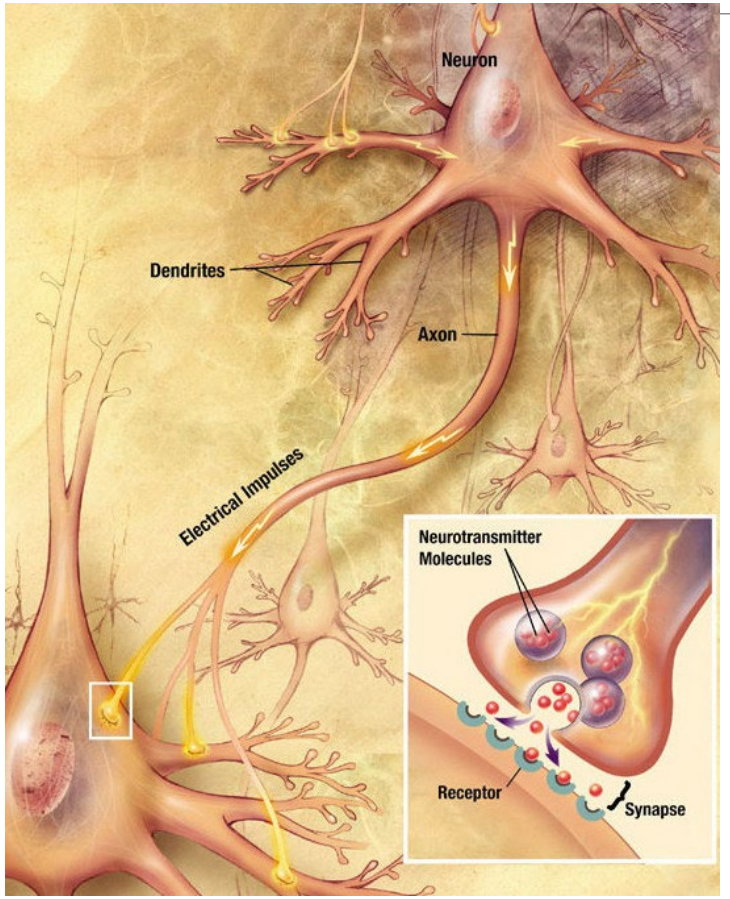


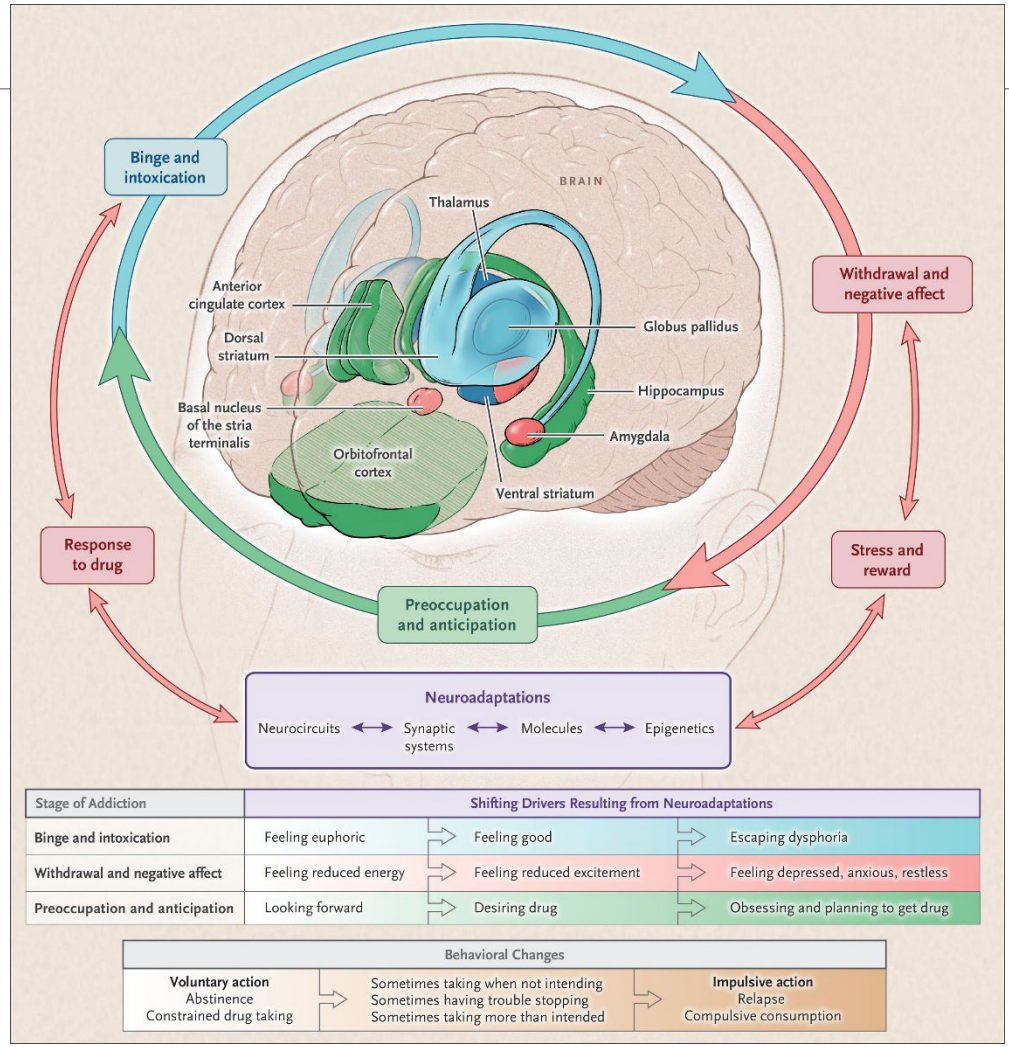
Garofoli M. Adolescent Substance Abuse. *Prim Care*. 2020;47(2):383-394. doi:10.1016/j.pop.2020.02.013

ND Volkow, EM Wargo. Association of Severity of Adolescent Substance Use Disorders and Long-term Outcomes(link is external). *JAMA Network Open*. DOI: 10.1001/jamanetworkopen.2022.5656 (2022)

DAA Baranger, et al. Association of Mental Health Burden With Prenatal Cannabis Exposure From Childhood to Early Adolescence: Longitudinal Findings From the Adolescent Brain Cognitive Development (ABCD) Study. *JAMA Pediatrics*. DOI: 10.1001/jamapediatrics.2022.3191

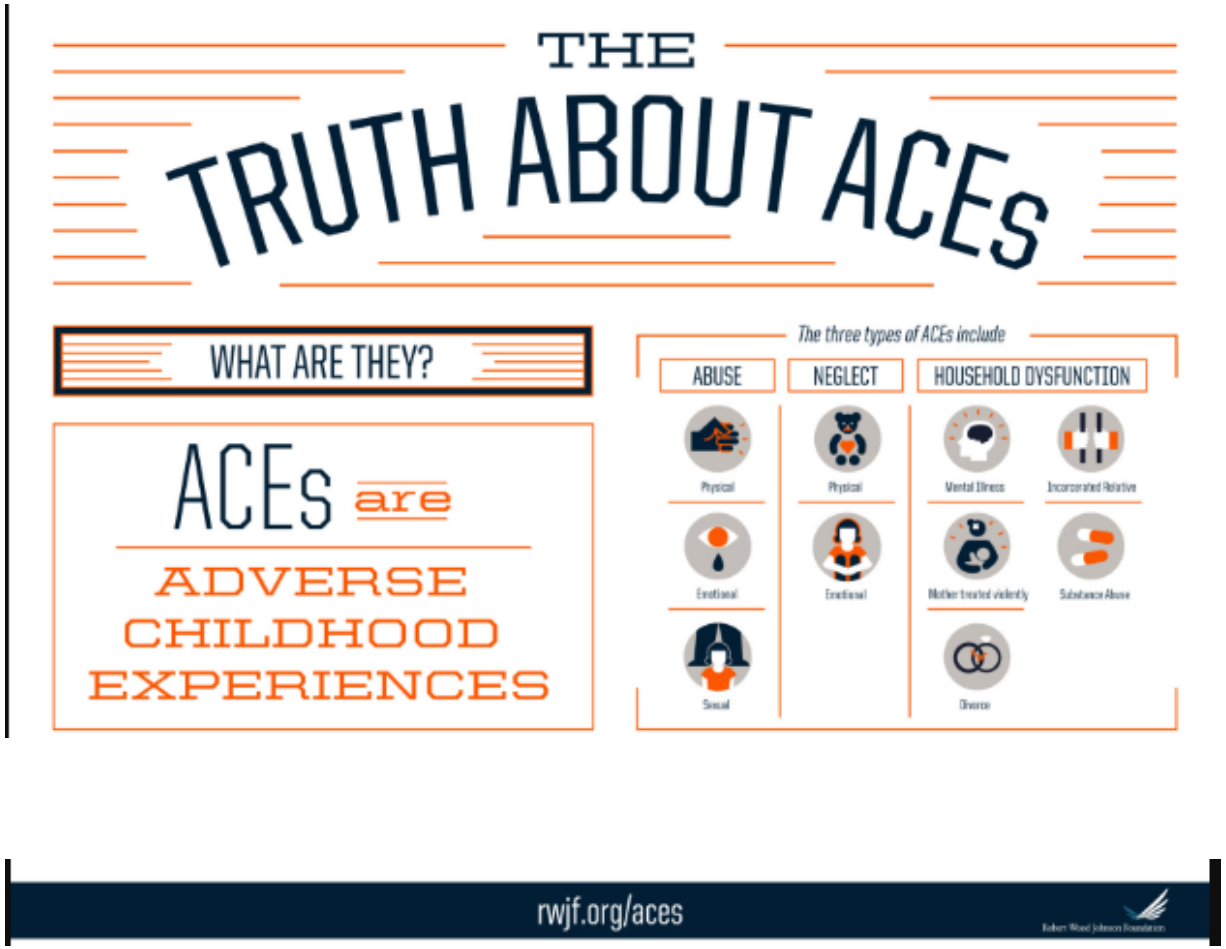
Neurochemistry and Neuroanatomy

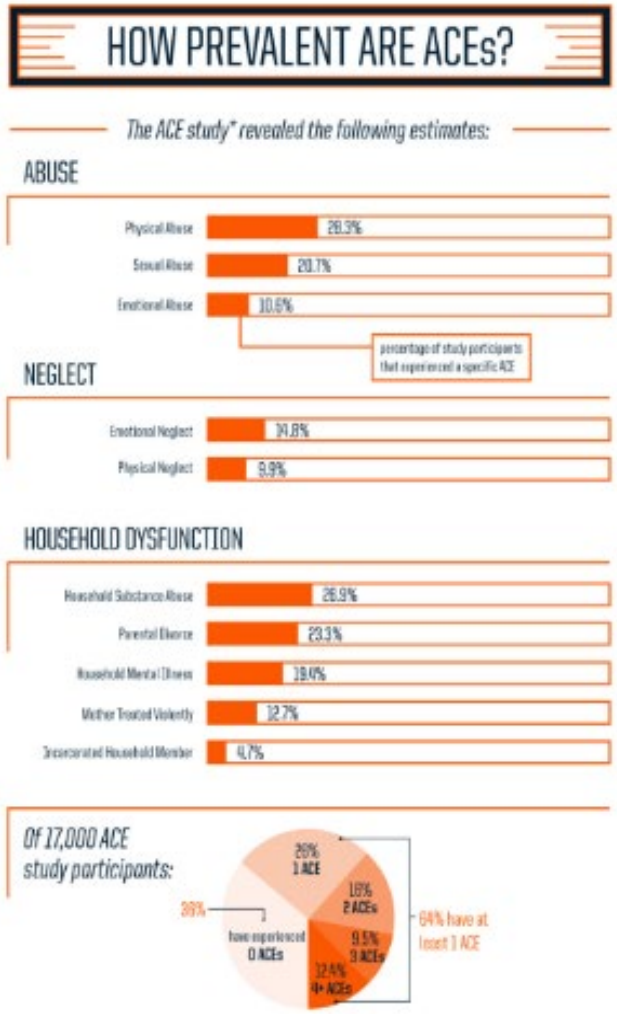


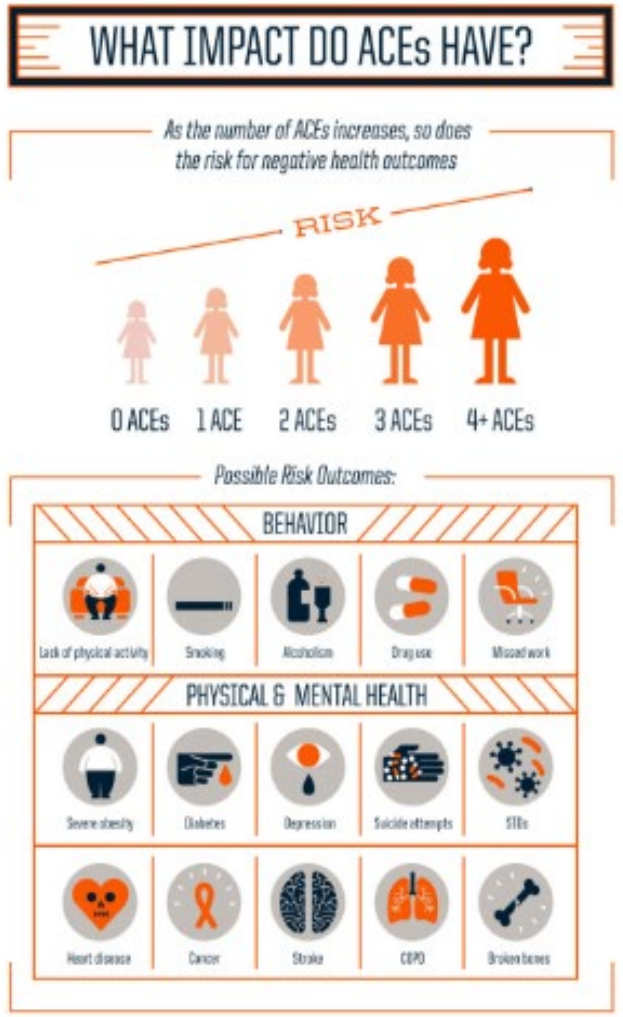


Volkow ND, Koob GF, McLellan AT. Neurobiologic Advances from the Brain Disease Model of Addiction. *N Engl J Med*. 2016;374(4):363-371. doi:10.1056/NEJMra1511480

THE ROLE OF TRAUMA







The Role of Community and Environment

Other Contributors

Lead exposure (prenatal and childhood)

Traumatic brain injury (concussion, accidents, sports, explosives, machinery)

Prenatal exposures: substances (alcohol), stress, natural disasters

Neurodivergence – ADHD, autism

HOW CAN WE HELP PEOPLE WITH SUBSTANCE USE DISORDER?

What is Recovery

Per SAMHSA:

A process of change through which individuals improve their health and wellness, live a self-directed life, and strive to reach their full potential.

Recovery

Recovery from a Substance Use Problem

NSDUH asked respondents aged 18 or older whether they thought they ever had a problem with their use of drugs or alcohol. Respondents were then asked whether they thought they had recovered or were in recovery.

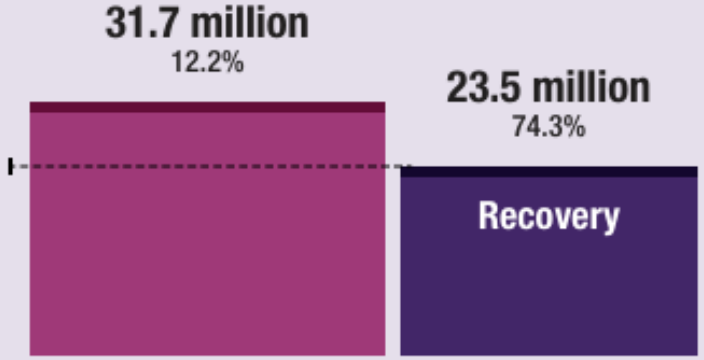
Ever Had a Substance Use Problem

2024

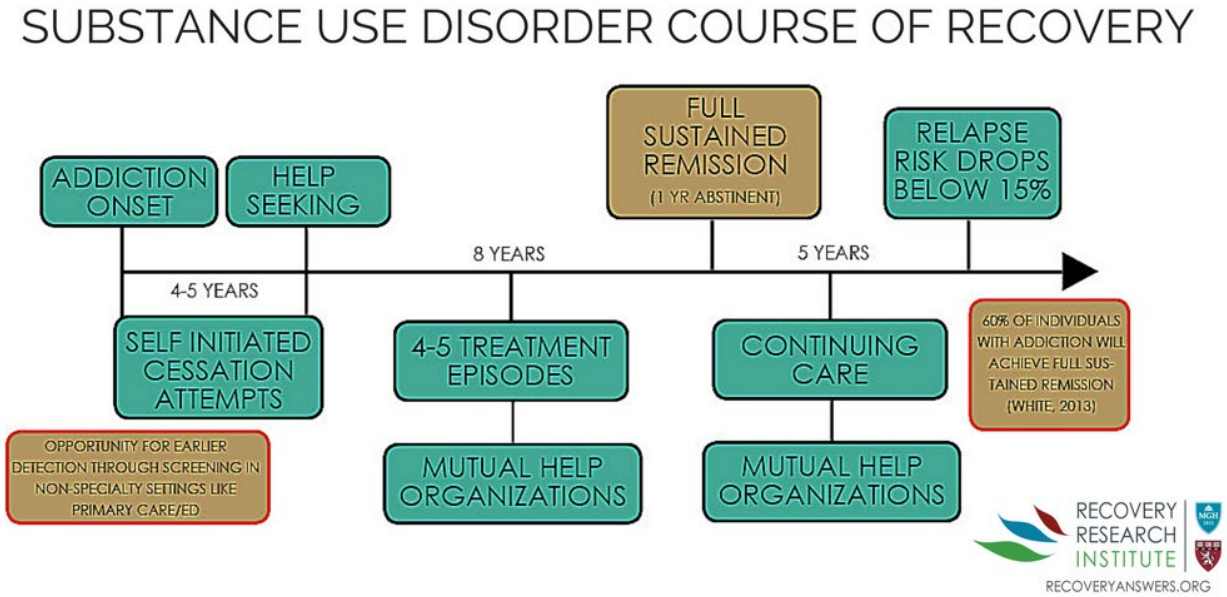
Among the **31.7 million adults** who perceived ever having a substance use problem, **23.5 million adults** (**74.3%**) considered themselves to have recovered or to be in recovery.

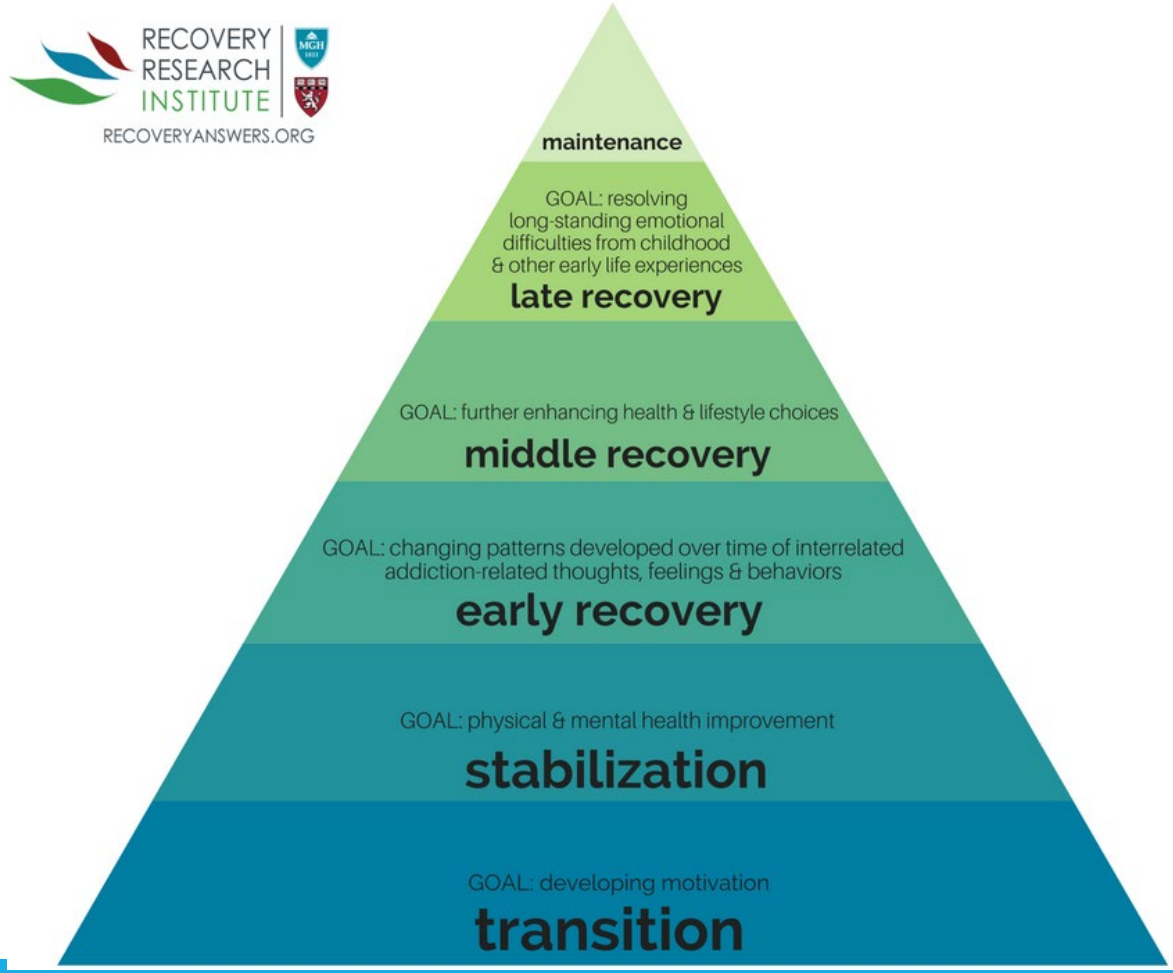
Overall Trend: **Ever Had a Substance Use Problem**

No change



Recovery Timeline





What to do if someone you love has substance use disorder?

The opposite of addiction is connection.

Talk to them, and mostly listen. Show them love and compassion.

Don't judge or shame them. Remember, they are probably dealing with a lot of old trauma and ongoing trauma.

Be a good friend/parent/sibling/cousin/uncle/auntie. Tell them that you care about them, and show them you care about them.

Encourage help but DON'T force them to do something they are not ready to do. Ask them how you can help them. Normalize treatment as healthcare- because that is what it is.

Remember, they may have a complicated relationship with substances: good effects and bad effects. Their motivations may change day to day.

Treatment works.

Treatment Options

1) Medications are VERY effective and safe. LOTS of research proves it.

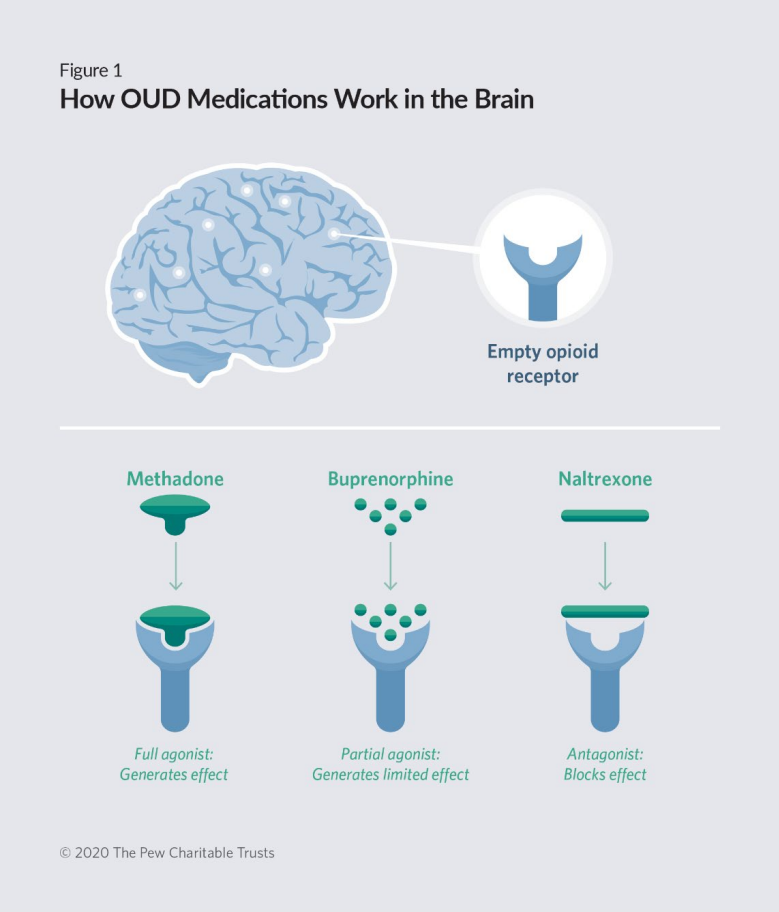
- **For alcohol use disorder**
- **For nicotine use disorder**
- **For opioid use disorder**
- **Without medications, many people will feel EXTREMELY SICK if they stop using their substance, and so they cannot stop. Even if they stop, their brain is now changed and will cause them CRAVINGS.**

2) Talk Therapy can help. Formal counseling, peer support, group support, etc.

3) Reducing harm can help make the person healthier even if they use substances.

- **Using less, even if not stopping completely**
- **Eating healthy, staying hydrated, getting enough sleep**
- **Having a safe place to live**
- **Using alone is DANGEROUS**

MOUD: Medication for Opioid Use Disorder



OTP = opioid treatment program

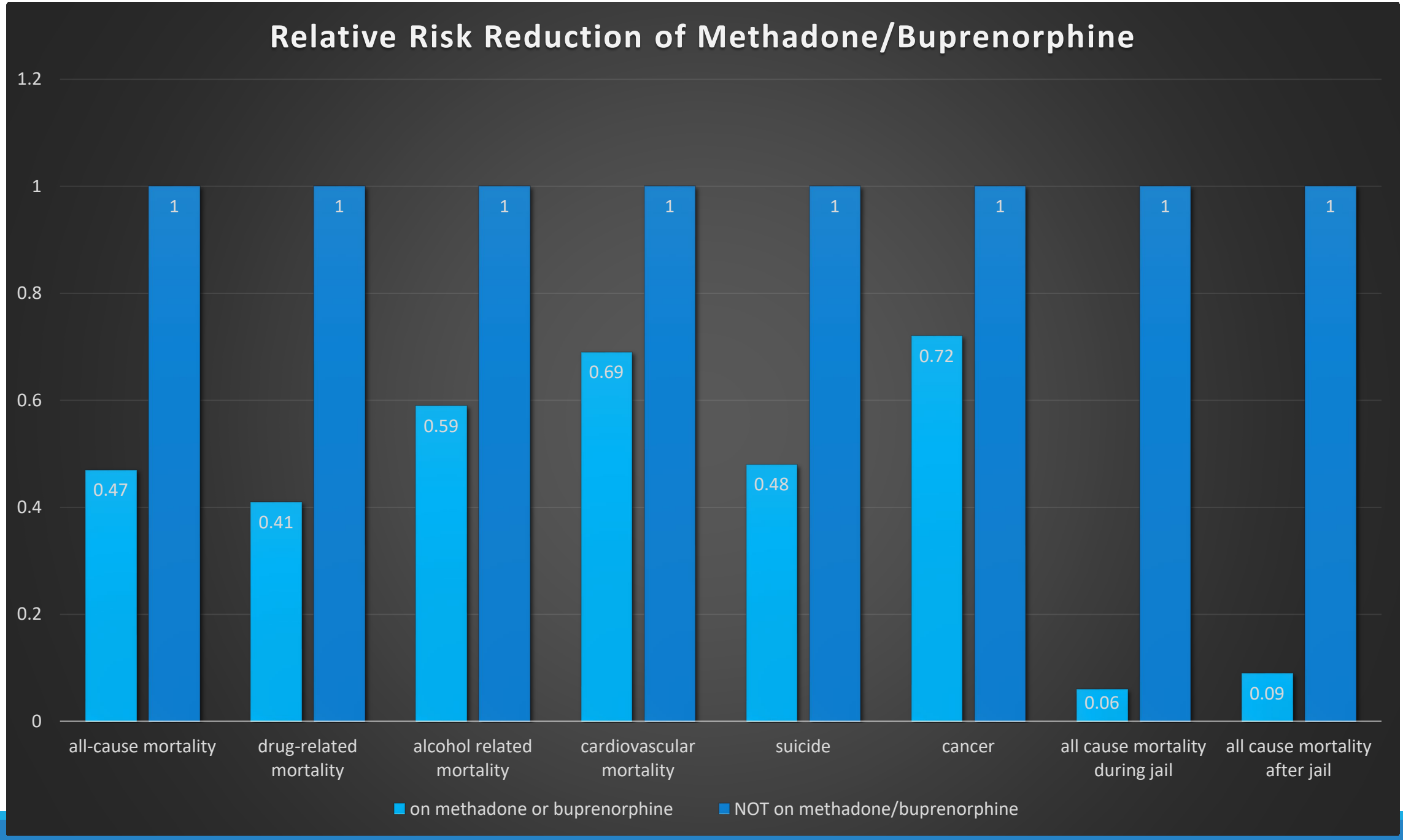
- **Only possible site for methadone treatment**
- **Meds *administered or dispensed*, never prescribed: daily observed dosing initially, and increasingly longer "take-homes"**
- **Slow dose titration due to higher risks**
- **Buprenorphine also available**
- **Regular counseling required**

OBOT = office based opioid treatment

- **Anyone with a DEA can prescribe buprenorphine**
- **Counseling optional**
- **Often integrated with other health services (primary care, psychiatry, OBGYN)**

Both utilize drug testing

Relative Risk Reduction of Methadone/Buprenorphine



Santo T, Clark B, Hickman M, et al. Association of Opioid Agonist Treatment With All-Cause Mortality and Specific Causes of Death Among People With Opioid Dependence: A Systematic Review and Meta-analysis. *JAMA Psychiatry*. 2021;78(9):979–993. doi:10.1001/jamapsychiatry.2021.0976

What Does Treatment Do?

Reduces the risk of death.

Improves physical health.

Improves mental health.

Improves chances to reducing or stopping using substances.

Improves quality of life.

What doesn't work?

Original Investigation | Substance Use and Addiction

March 19, 2025

Law Enforcement Drug Seizures and Opioid-Involved Overdose Mortality

Alex H. Kral, PhD[1]; Jamie L. Humphrey, PhD[1]; Clyde Schwab, BS[1]; et al

» Author Affiliations | Article Information

JAMA Netw Open. 2025;8(3):e251158. doi:10.1001/jamanetworkopen.2025.1158

Key Points

Question Is there a geospatial association between opioid-involved overdose mortality and law enforcement drug seizures in San Francisco?

Findings This cross-sectional study included 2653 drug seizure crime events. Within the surrounding 100, 250, and 500 meters, drug seizures were associated with a statistically significant increase in the relative risk for fatal opioid overdoses 1, 2, 3, and 7 days following law enforcement drug seizure events.

Meaning These findings suggest that the enforcement of drug distribution laws to increase public safety for residents in San Francisco may be having an unintended negative consequence of increasing opioid overdose mortality.

ELSEVIER

International Journal of Drug Policy

Volume 28, February 2016, Pages 1-9

Editors' Choice

The effectiveness of compulsory drug treatment: A systematic review

D. Werb [a b], A. Kamarulzaman [c], M.C. Meacham [b], C. Rafful [b], B. Fischer [d], S.A. Strathdee [b], E. Wood [a b e]

Conclusion

There is limited scientific literature evaluating compulsory drug treatment. Evidence does not, on the whole, suggest improved outcomes related to compulsory treatment approaches, with some studies suggesting potential harms. Given the potential for human rights abuses within compulsory treatment settings, non-compulsory treatment modalities should be prioritized by policymakers seeking to reduce drug-related harms.

Where to go for help?

Call 988. It's a 24/7 helpline with interpreters.

Talk to a medical doctor or counselor. Ideally a specialist in addiction.

ANY QUESTIONS?

THANKS!

Shuchin@email.unc.edu

NC-TAC

SUPPORTING PROGRAMS FOR PEOPLE AT RISK OF INCARCERATION & OVERDOSE

- The *North Carolina Technical Assistance Center* is a statewide initiative to provide FREE technical assistance to programs that support individuals at risk of incarceration and overdose.

AREAS OF EXPERTISE

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