ASAM REVIEW COURSE 2024

Epidemiology: Core Concepts and Applications

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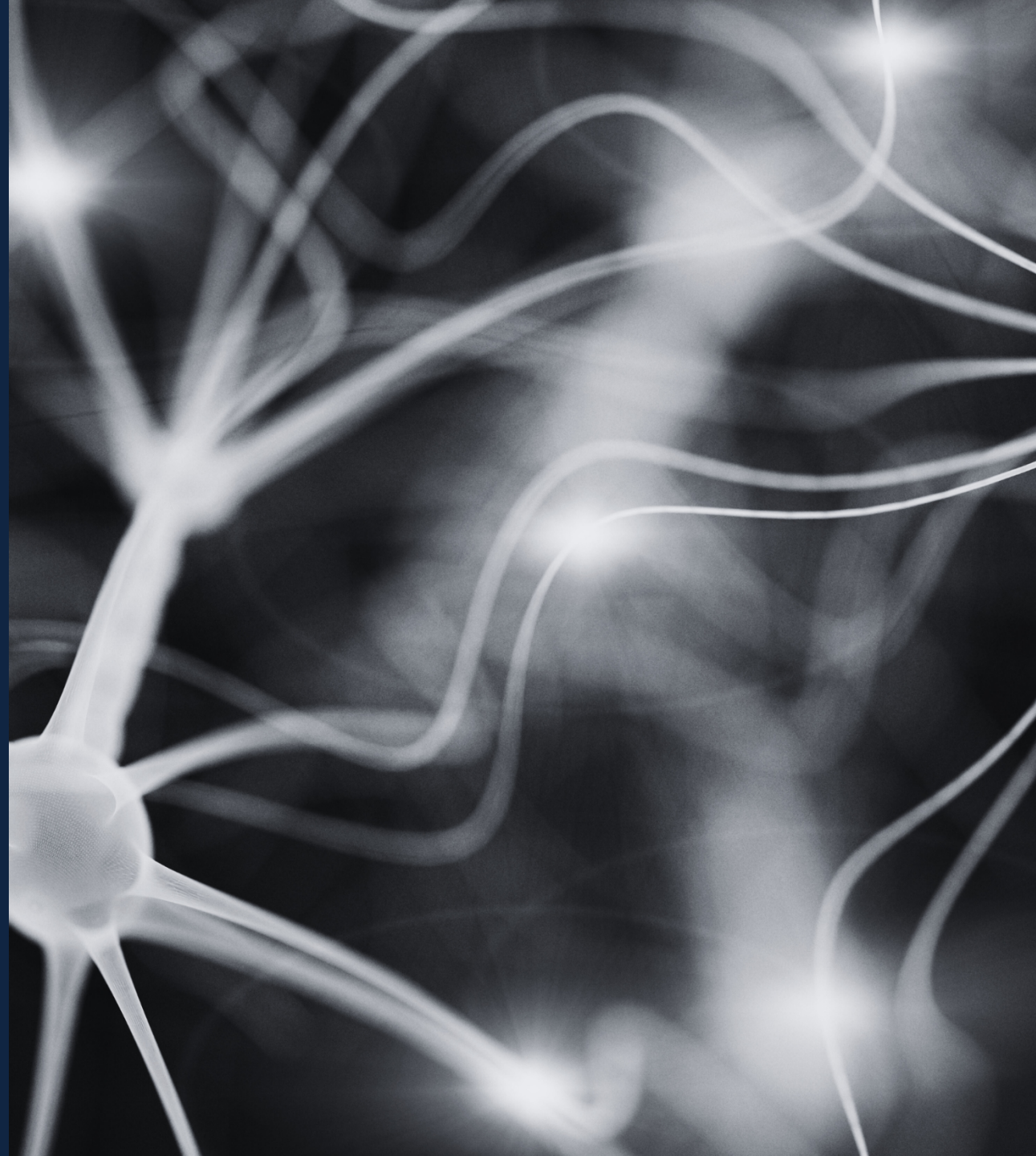


Financial Disclosure

Jeffrey J. DeVido, MD, MTS

- Equity shareholder: Altria/Philip Morris/Merck

The opinions expressed in this talk are mine and they do not represent the opinions of my employing institutions or those with whom I am professionally affiliated.

I will not be talking about off or on label medications for the treatment of any condition.

Learning Objectives

Review the dimensions of epidemiology covered in the ABPM exam: 1) basic trends, and 2) epidemiologic concepts.

Establish different approaches for (re)learning epidemiology as necessary for ongoing professional acumen as well as (unfortunately) those things needed to regurgitate on an exam.

Demonstrate epidemiologic concepts in action through 2 different common addiction epidemiological questions.

Guide participants towards resources for ongoing review of epidemiologic data

Presentation Outline

- Consider ways of thinking about and learning about epidemiology
- Cheat sheets vs. enduring learning patterns
- Highlight some important epidemiological trends AND how to find them yourselves…
- Follow two common questions in addiction medicine as a springboard for reviewing key concepts in epidemiology

Two Ways to Think about Epidemiology

- What do I need to know for the test?

- What might I need to know professionally?

The ABPM Exam and Epi

Addiction Medicine

2019 Examination Blueprint

Core Content Areas

Core Content Areas	
25%	01 – Definitions 02 – Genetics 03 – Pharmacokinetic and Pharmacodynamic Principles 04 – Ph[illegible] 05 – Neurobiology of Addiction
20%	06 – Epidemiological Concepts 07 – Epidemiological Trends of Substance Use Disorders 08 – Prevention
40%	09 – Screening, Assessment, and Brief Intervention 10 – [illegible] of Addiction Treatment 11 – Management of Inpatient and Outpatient Intoxication and Withdrawal 12 – Pharmacologic Interventions for Addictions 13 – Behavioral Interventions 14 – Co-Occurring and Medical Disorders among Patients with Alcohol and Other Drug Use and Addiction 15 – Co-Occurring Psychiatric Disorders among Patients with Alcohol and Other Drug Use and Addiction 16 – Pain and Addiction
15%	**17 – Ethical, Legal and Liability Issues in Addiction Practice**

Addiction		Target Percentage
01	Alcohol	15-20%
02	Sedatives	7-10%
03	Stimulants	7-10%
04	Opioids	10-15%
05	Cannabinoids	7-10%
06	Nicotine	15-20%
07	Hallucinogens	.5-3%
08	Dissociatives	.5-3%
09	Inhalants	.5-3%
10	Anabolic steroids	.5-3%
11	Other substances	1-3%
12	Nonsubstance addiction	1-3%
13	General/All substances combined	1-5%

https://www.theabpm.org/become-certified/exam-content/addiction-medicine-content-outline/

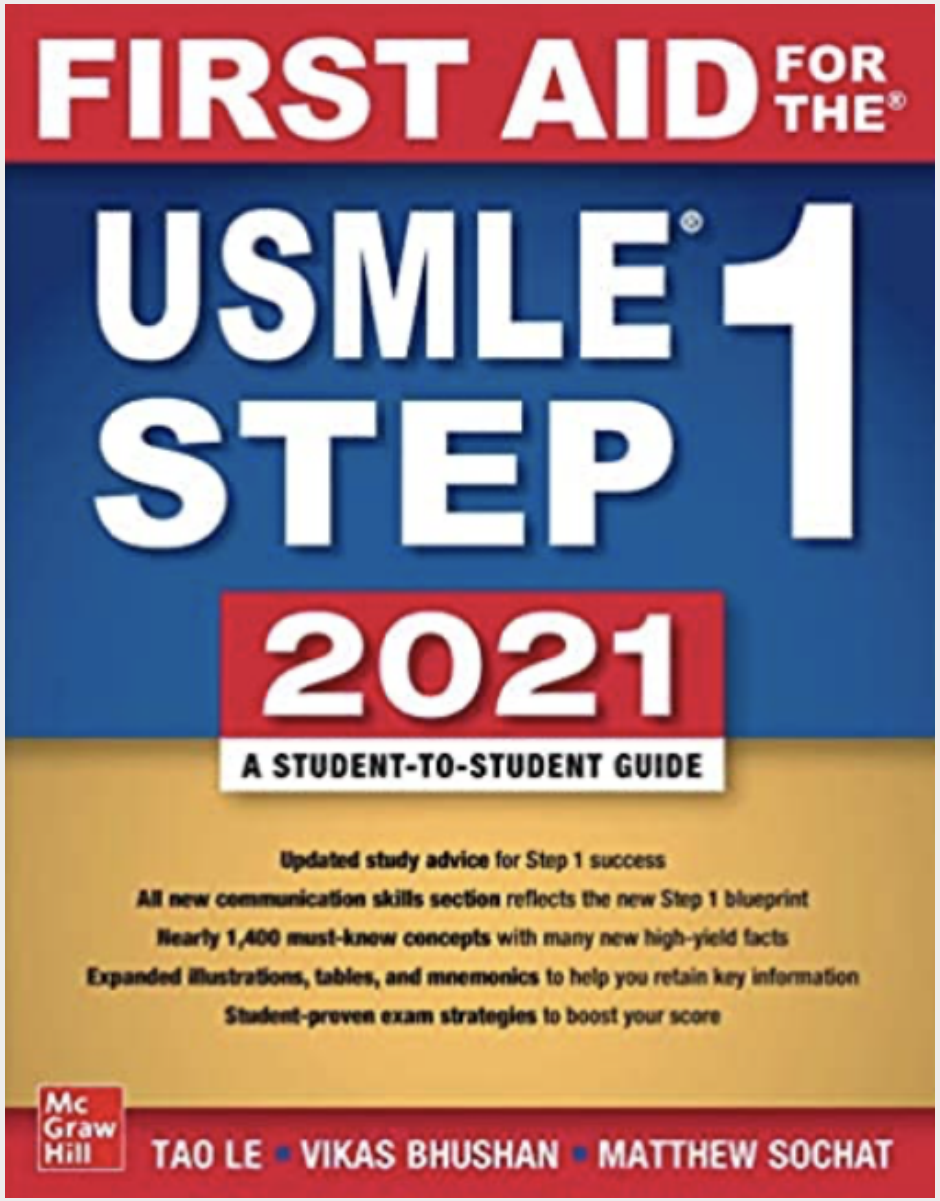
For the Test Strategy:

Some assumptions:

- All of you have had some rudimentary epidemiology/biostatistics
- Most of you have seen these concepts multiple times
- For the most part, you don't use these concepts as much as they come up on tests
- You scribble some notes on a cheat sheet to remind yourself as you're studying
- When you've been taught these concepts before, it has been shoveled to you in large amounts in short lectures

For the Test Strategy:

http://www.bishopmikelowry.com/wp-content/uploads/2013/03/drinking-from-the-firehose.jpg



https://www.amazon.com/First-USMLE-Step-2021-Thirty/dp/126046752X/ref=asc_df_126046752X/?tag=hyprod-20&linkCode=df0&hvadid=459537678676&hvpos=&hvnetw=g&hvrand=12792418851990343229&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9032089&hvtargid=pla-1113406220592&psc=1

So...

https://memegenerator.net/instance/26662134/med-student-meerkat-stay-on-your-toes

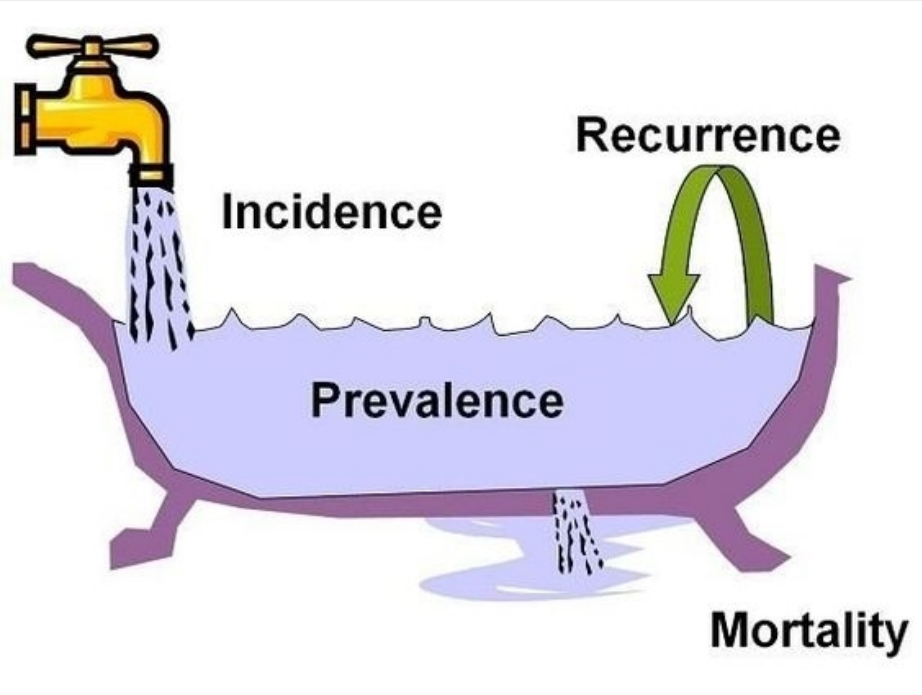
Let’s Do A Quick Matching Exercise:

- Incidence
- Prevalence

- #of existing cases/Total #of people (at a point in time)
- Rate: #new cases/#people at risk (during a specified time period)

Incidence:

- Represents the RISK of a disease: new cases coming into a population in time
- Have to see people longitudinally (in time) so these data are harder to find for SUDs—PROSPECTIVE studies
  - Example: follow-ups on Epidemiologic Catchment Area study (1980s)
    - Highest incidence in youngest population (18-29 y/o)



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Let’s Start with A Quick Matching Exercise:

- Incidence
- Prevalence

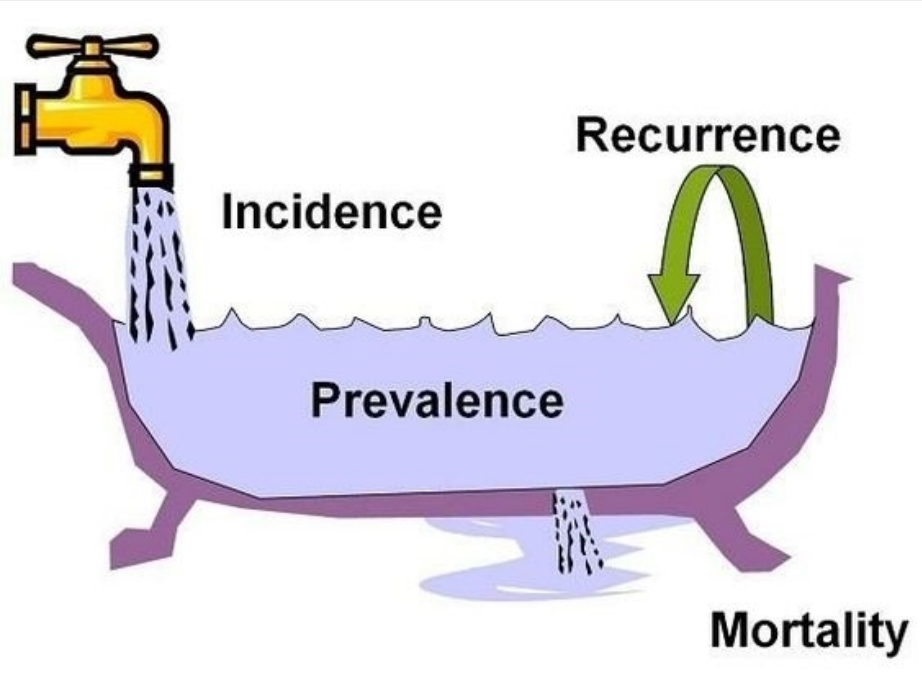
- #of existing cases/Total #of people (at a point in time)
- Rate: #new cases/#people at risk (during a specified time period)

Prevalence:

- Represents the *public health burden* of a disease at a particular time

- CROSS SECTIONAL SURVEYS

  - Example: annual National Survey on Drug Use and Health (NSDUH)
    - Tobacco products, alcohol, illicit drugs



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Let’s Start With Some Useful Basics:

Primary Prevention

Interventions designed to prevent the onset or future incidence of a specific problem

Secondary Prevention

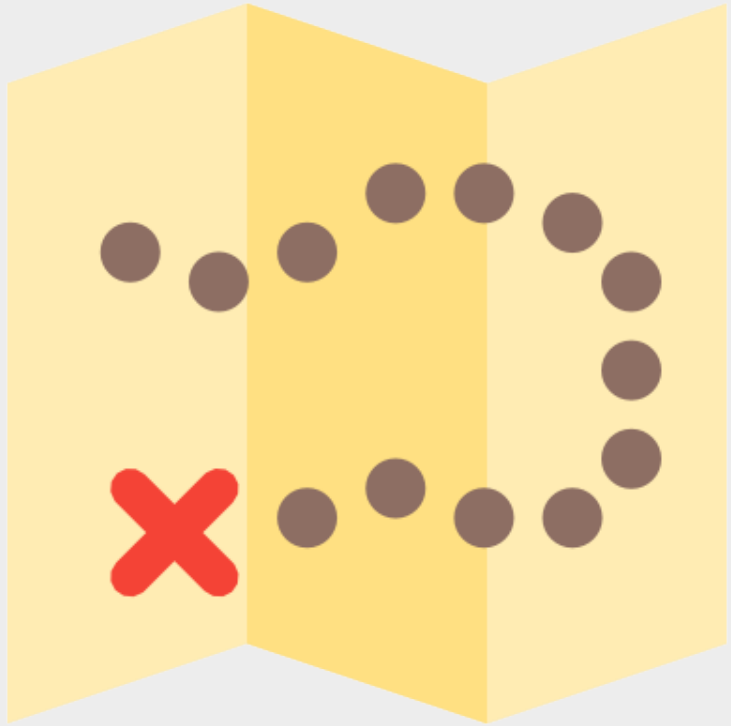
An early intervention that decreases the prevalence of a specific problem

Tertiary Prevention

Treatment designed to improve quality of life and reduce the symptoms after a disease or disorder has developed
Does not reduce incidence or prevalence

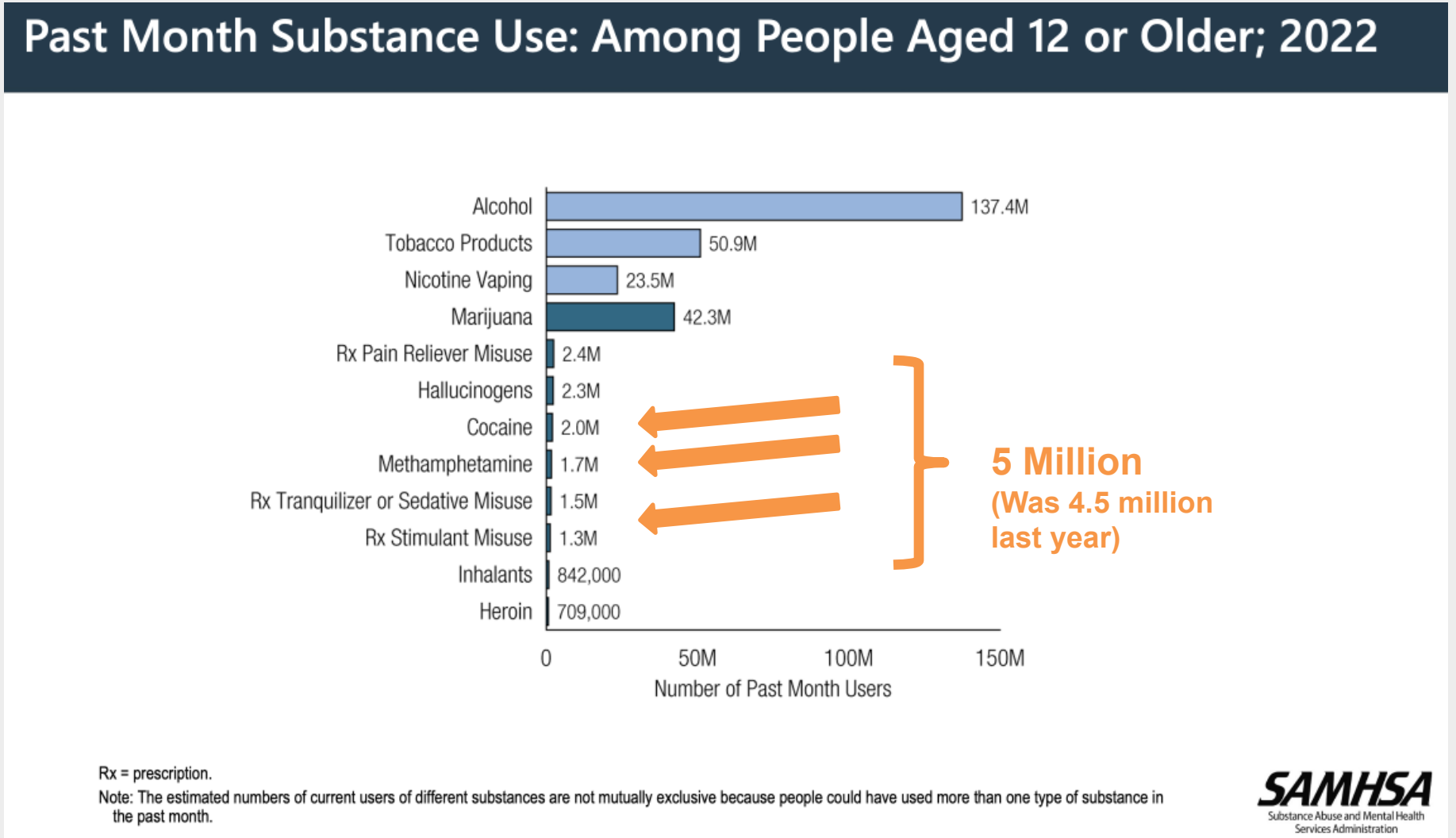
https://press.rebus.community/introductiontocommunitypsychology/chapter/prevention-and-promotion/

Let’s take a quick tour of some prevalence data and important trends to help us put the story together:



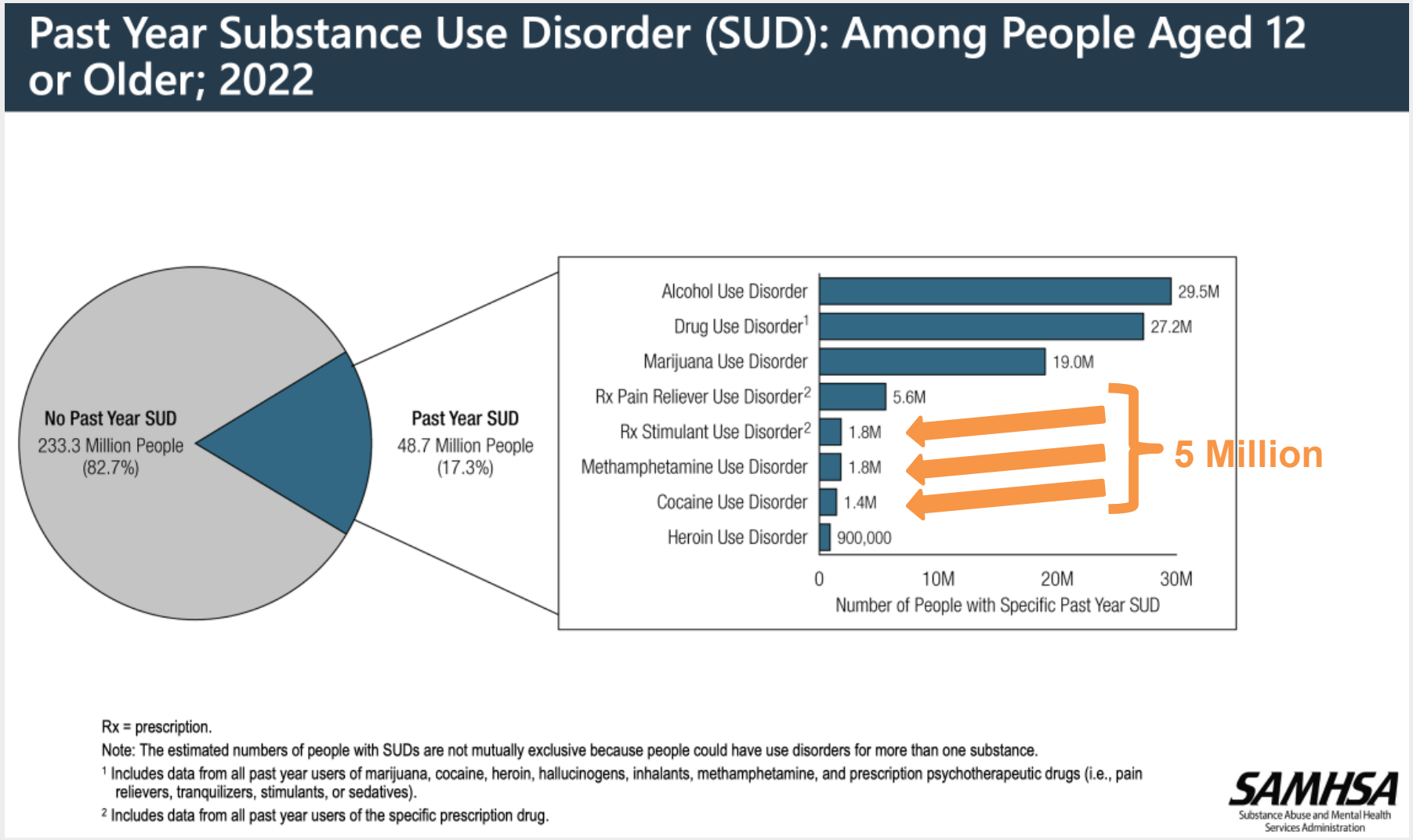
First: Big Picture

2022 NSDUH Prevalence: Past Month General Substance Use and Nicotine Vaping: Among People Aged 12 or Older; 2022



https://www.samhsa.gov/data/release/2022-national-survey-drug-use-and-health-nsduh-releases#highlighted-pop-slides

People Aged 12 or Older with a Past Year Substance Use Disorder (SUD); 2022



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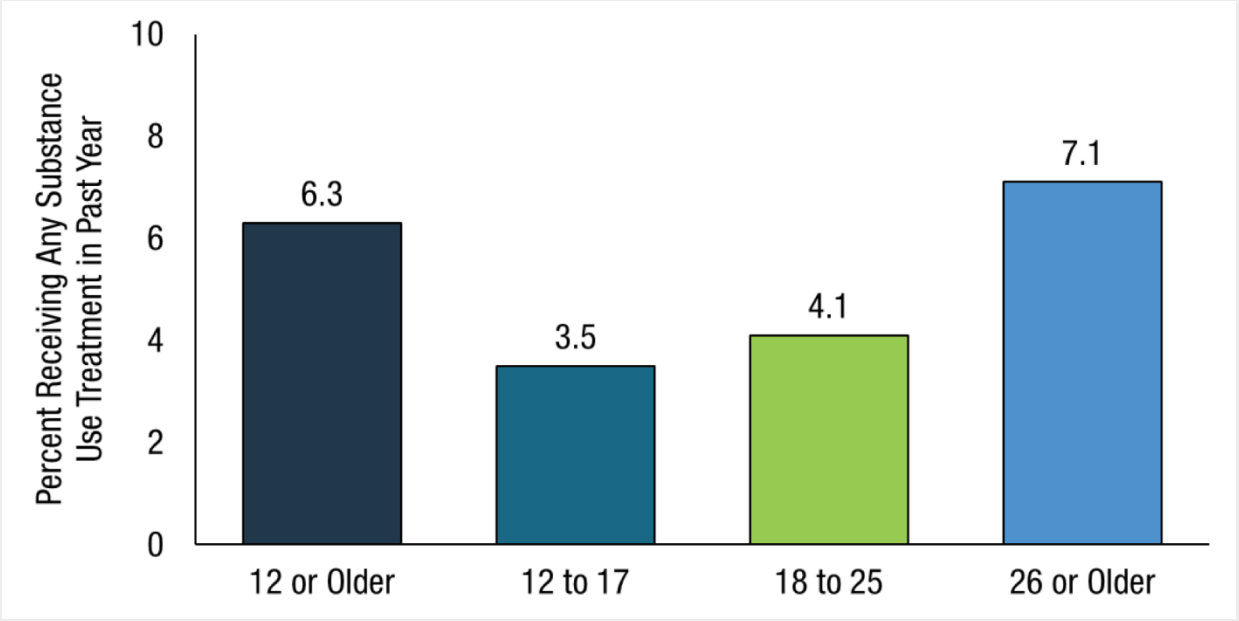
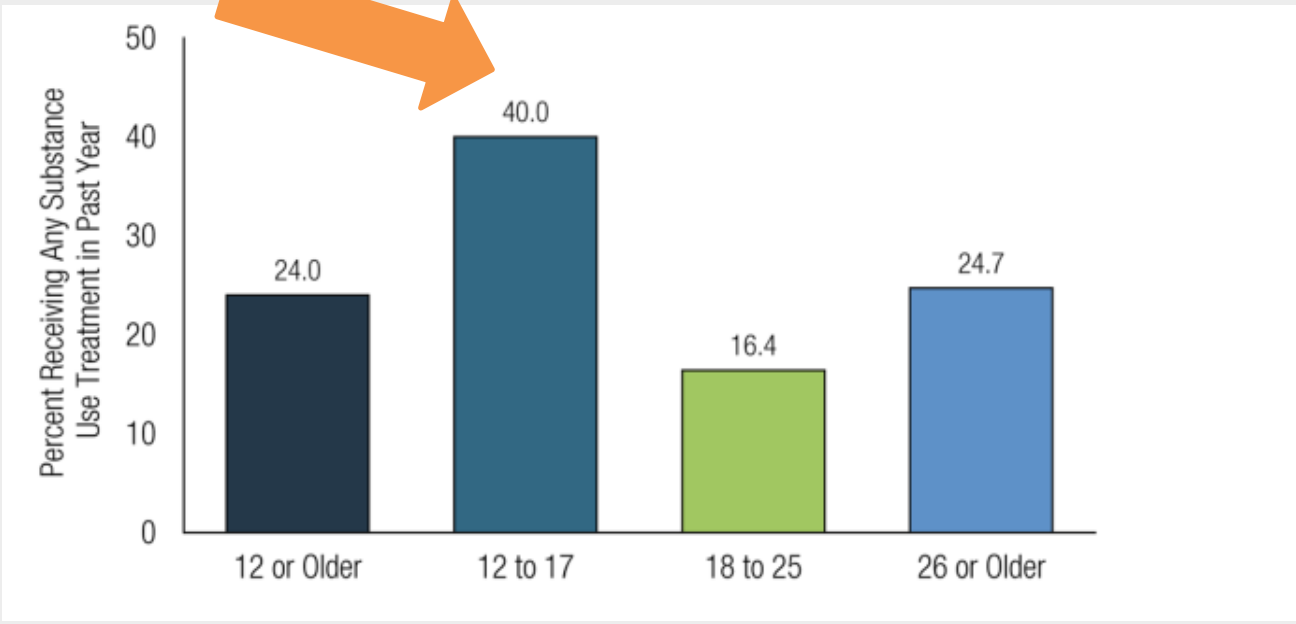
But do people get treatment?

2021



?

2022



https://www.samhsa.gov/data/sites/default/files/reports/rpt39443/2021_NNR_figure_slides.pdf

But do people get treatment?

2022

Substance use treatment = treatment received in the past year for the use of alcohol or drugs in an inpatient location; in an outpatient location; via telehealth; or in a prison, jail, or juvenile detention center; or the receipt of medication-assisted treatment (MAT) for alcohol use or opioid use.

A support group, a peer support specialist or recovery coach who works with a substance use treatment program or other treatment provider, services in an emergency room or emergency department, or detoxification or withdrawal support services from a healthcare professional. These other services were **NOT** classified as “substance use treatment.”

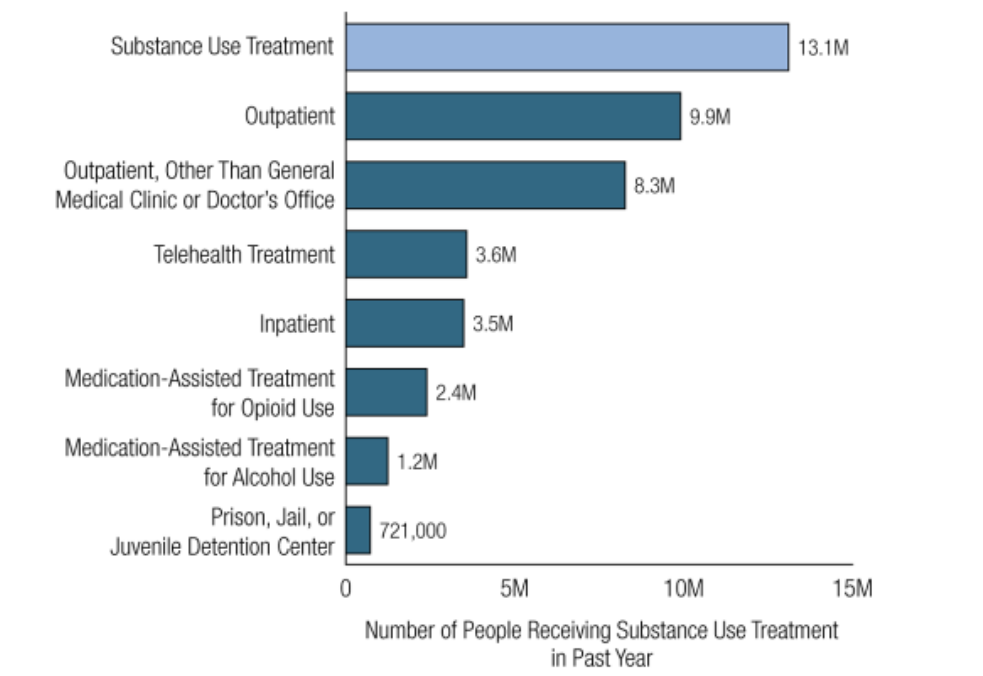
In 2022, the term “specialty facility” was dropped from 2022 NSDUH data products.

In 2022, respondents were classified as needing substance use treatment if they had a substance use disorder in the past year or received treatment for their alcohol or drug use through inpatient treatment or counseling, outpatient treatment or counseling, medication-assisted treatment, telehealth treatment, or treatment received in a prison, jail, or juvenile detention center.

https://www.samhsa.gov/data/release/2022-national-survey-drug-use-and-health-nsduh-releases#new-changed

For the people who do get “treatment” where do people get it?

Types and Locations of Substance Use Treatment in the Past Year: Among People Aged 12 or Older; 2022

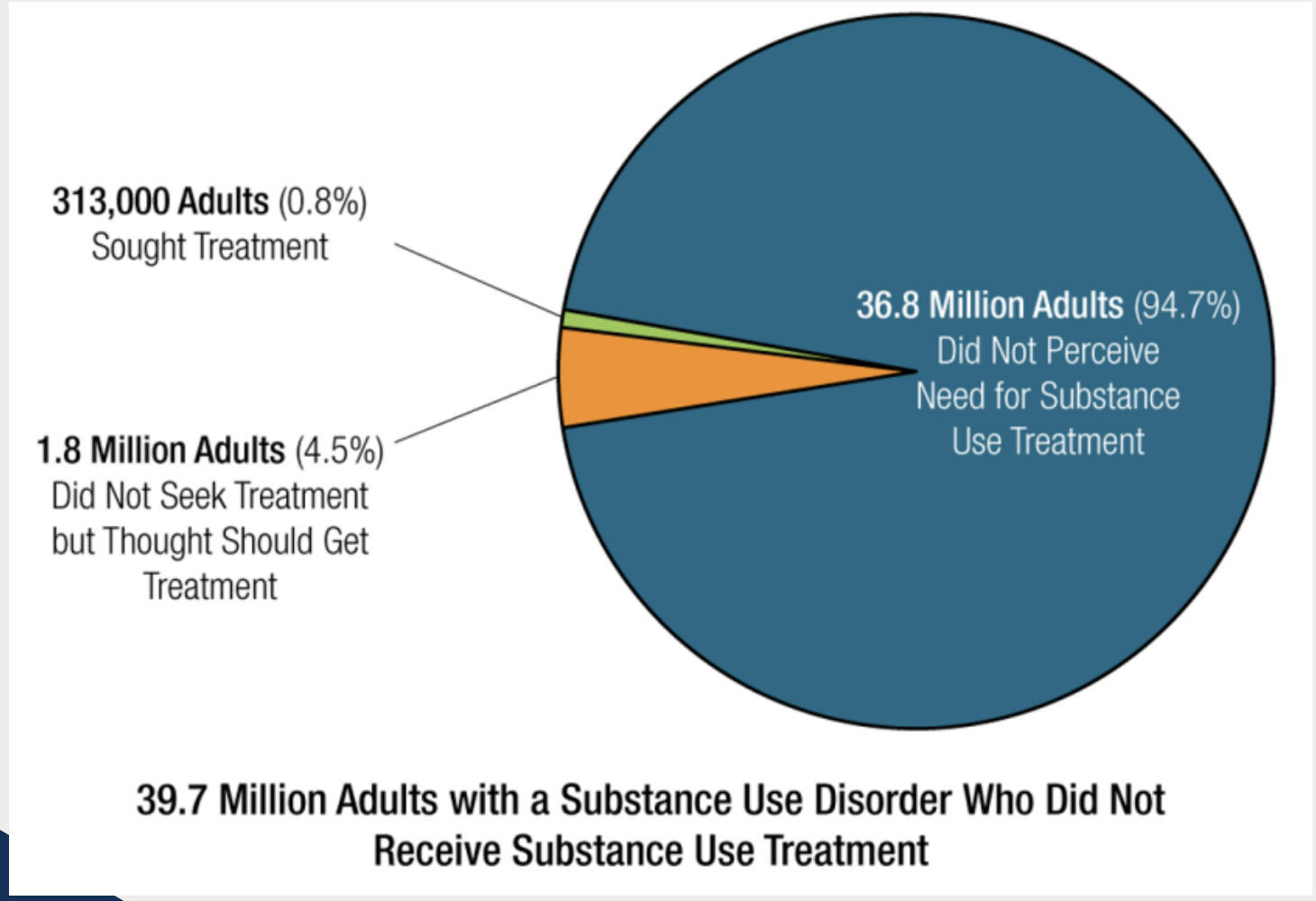


Note: Types and locations where people received substance use treatment are not mutually exclusive because respondents could report that they received treatment in more than one setting in the past year. People who received outpatient substance use treatment other than in a general medical clinic or doctor's office also are included in the estimate for outpatient substance use treatment.

Note: Substance use treatment includes treatment for drug or alcohol use through inpatient treatment/counseling; outpatient treatment/counseling; medication-assisted treatment; telehealth treatment; or treatment received in a prison, jail, or juvenile detention center. People who received outpatient substance use treatment other than in a general medical clinic or doctor's office also are included in the estimate for outpatient substance use treatment.

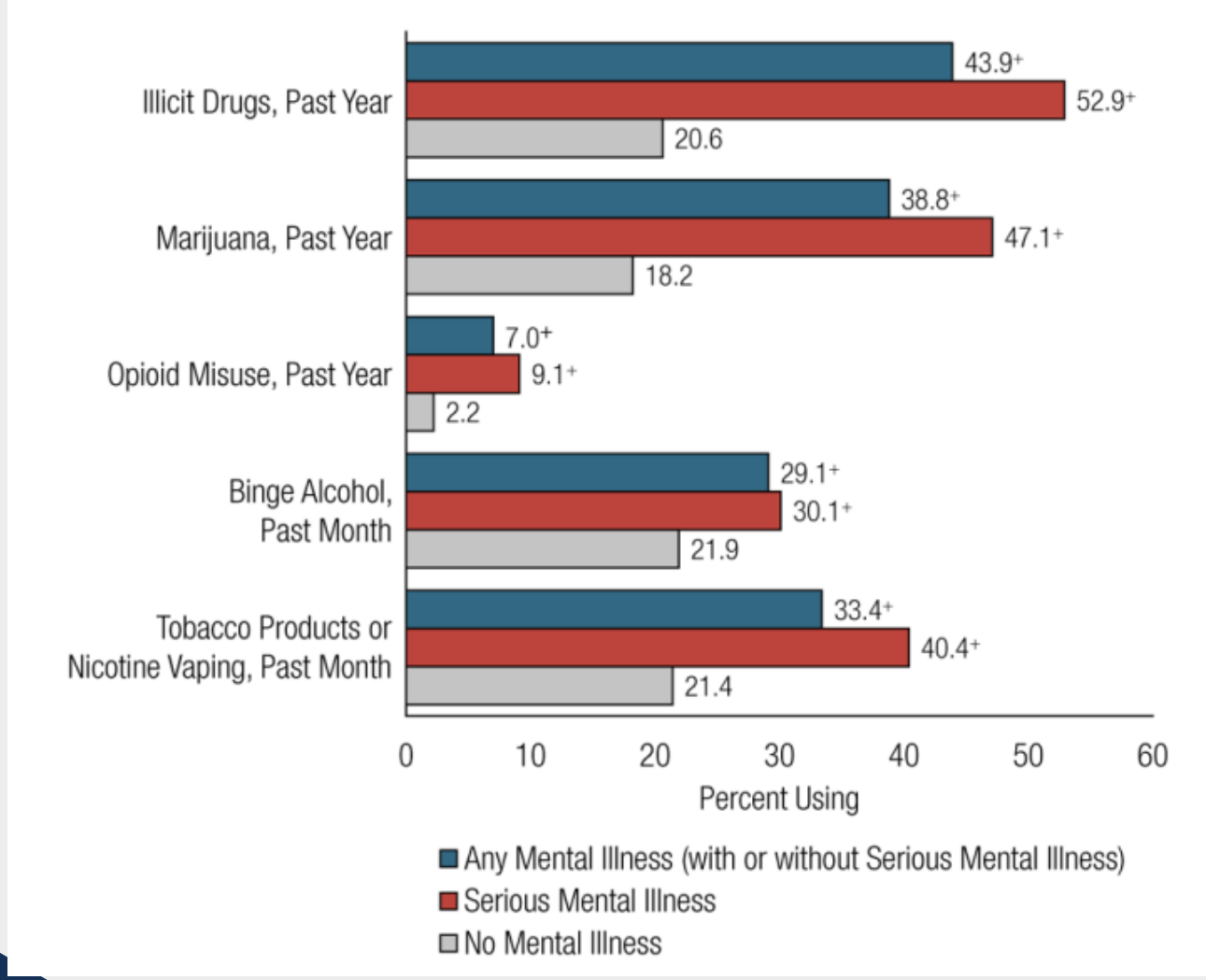
https://www.samhsa.gov/data/release/2022-national-survey-drug-use-and-health-nsduh-releases#highlighted-pop-slides

Perceived NEED for treatment (2022): 18 or older with past year SUD who did NOT receive SU treatment in past year



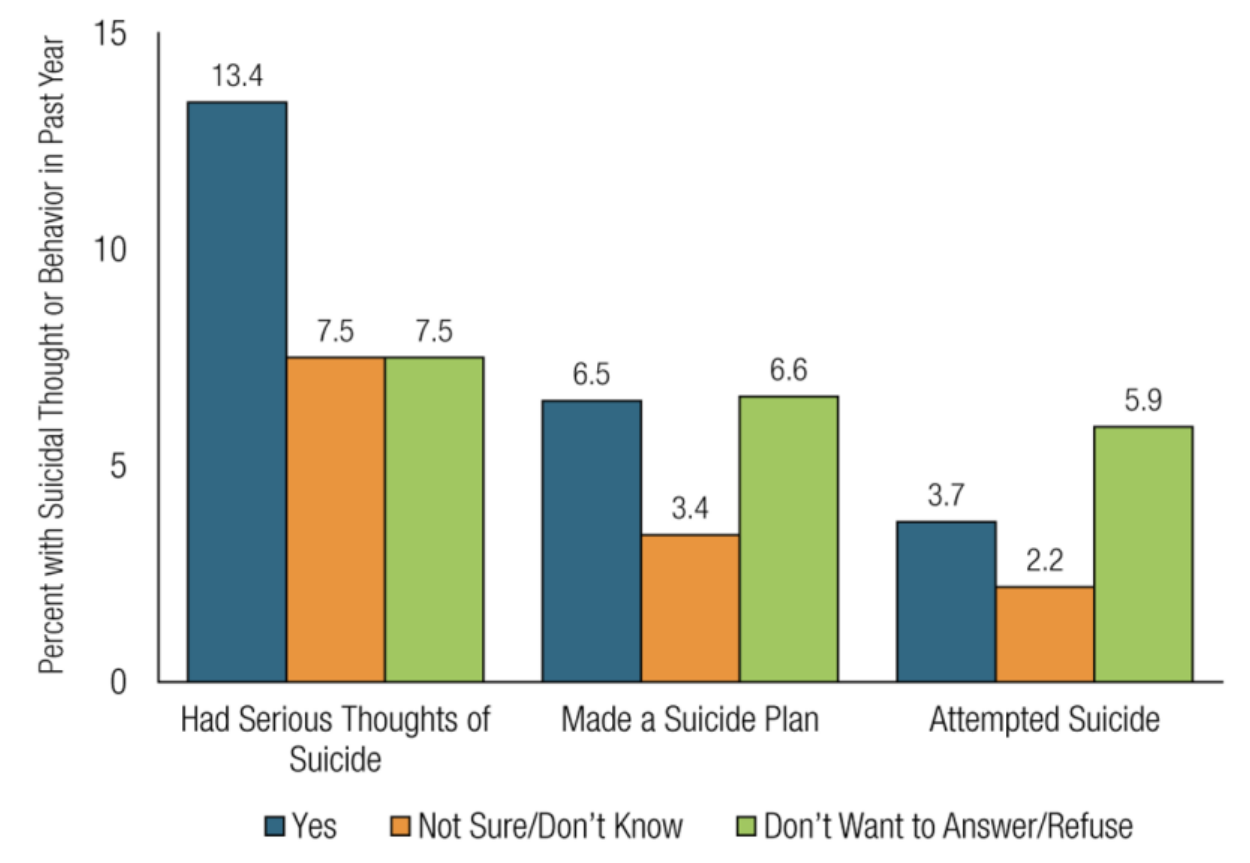
https://www.samhsa.gov/data/release/2022-national-survey-drug-use-and-health-nsduh-releases#highlighted-pop-slides

Past Year or Past Month Substance Use: Among Adults Aged 18 or Older; by Mental Illness Status, 2022



https://www.samhsa.gov/data/release/2022-national-survey-drug-use-and-health-nsduh-releases#highlighted-pop-slides

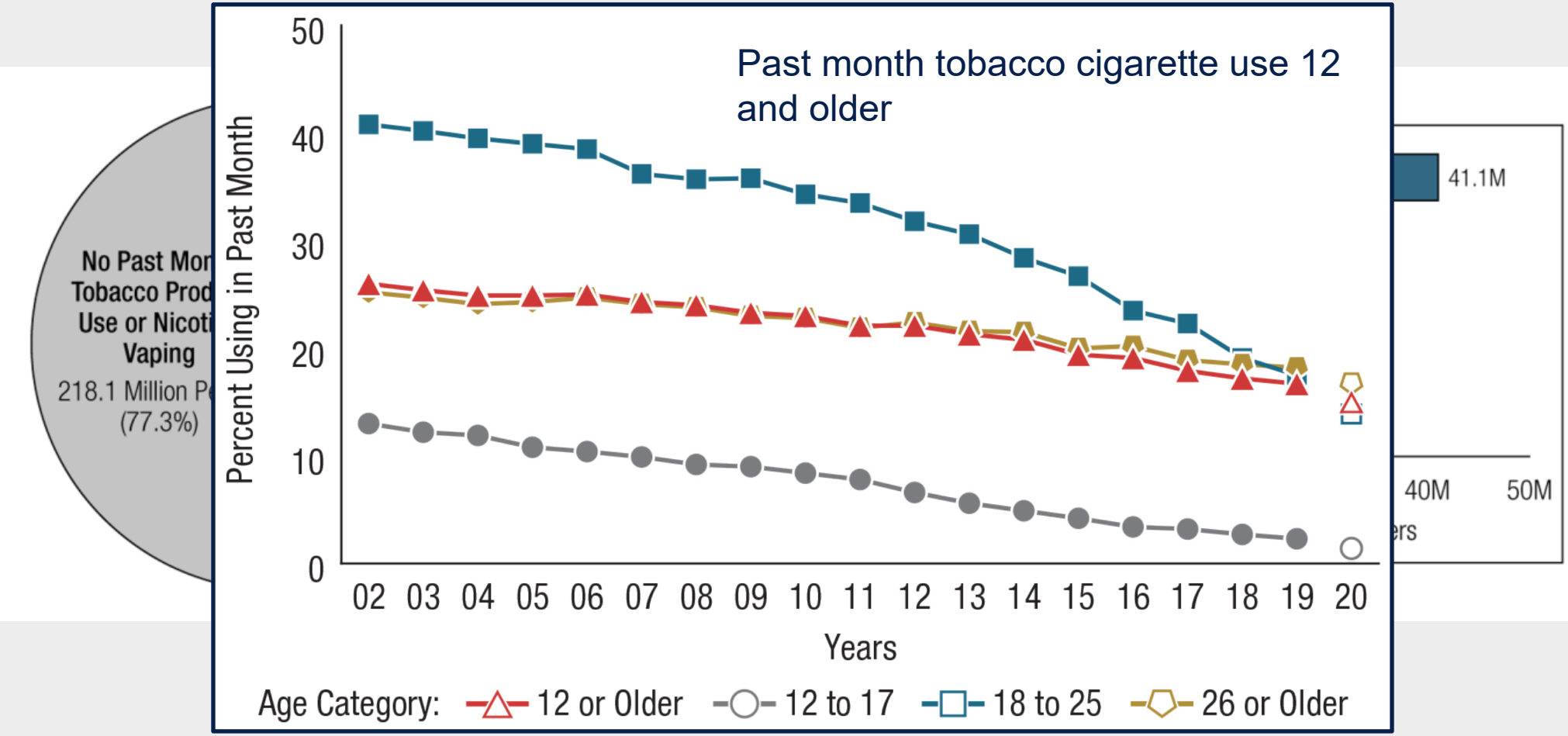
Had Serious Thoughts of Suicide, Made a Suicide Plan, or Attempted Suicide in the Past Year: Among Youths Aged 12 to 17; 2022



https://www.samhsa.gov/data/release/2022-national-survey-drug-use-and-health-nsduh-releases#highlighted-pop-slides

Second: Looking a little closer by substance

Tobacco/Nicotine



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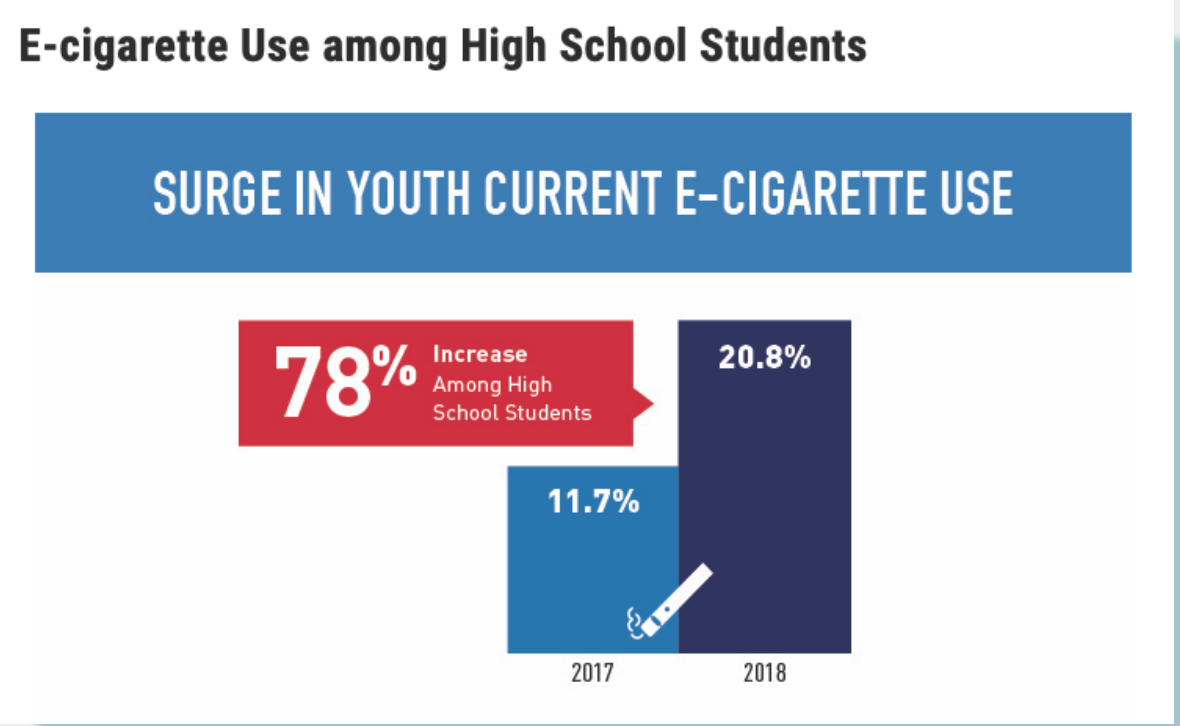
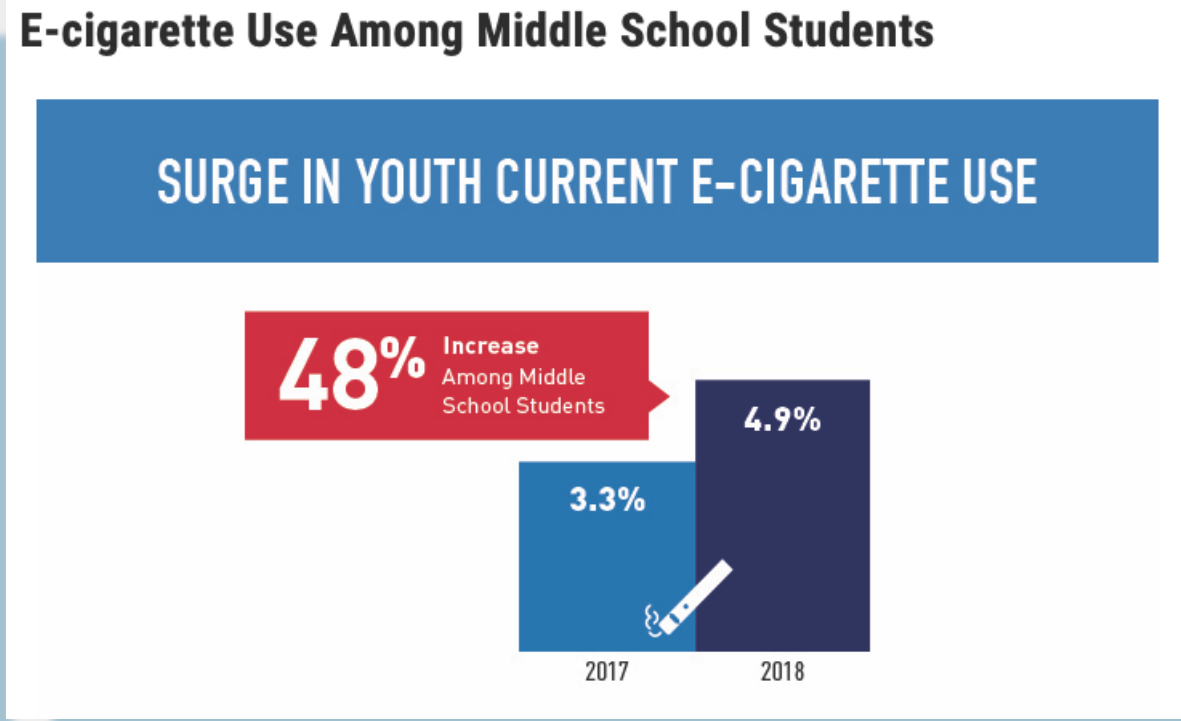
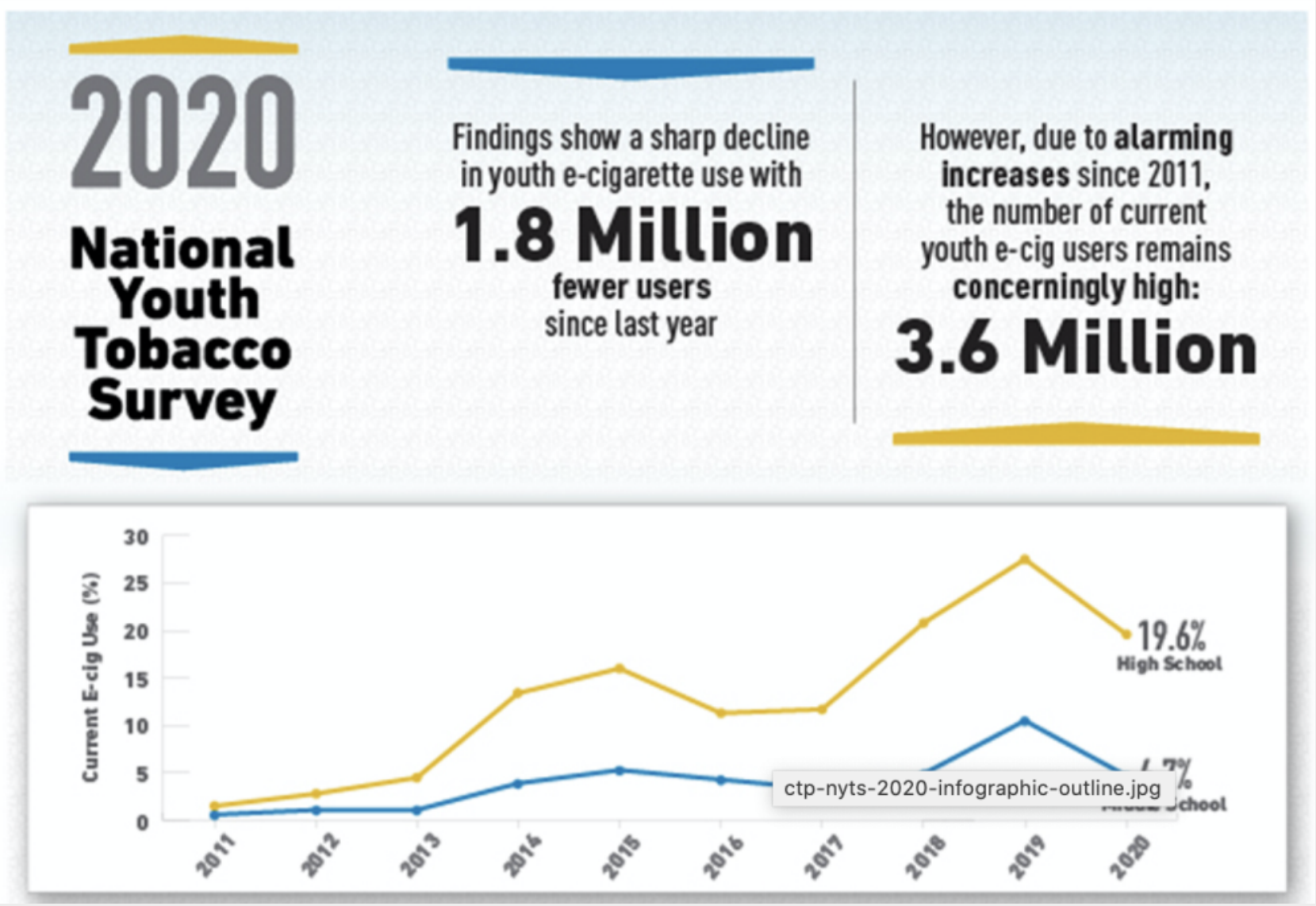
E-Cigarettes





https://www.fda.gov/tobacco-products/youth-and-tobacco/2018-nyts-data-startling-rise-youth-e-cigarette-use

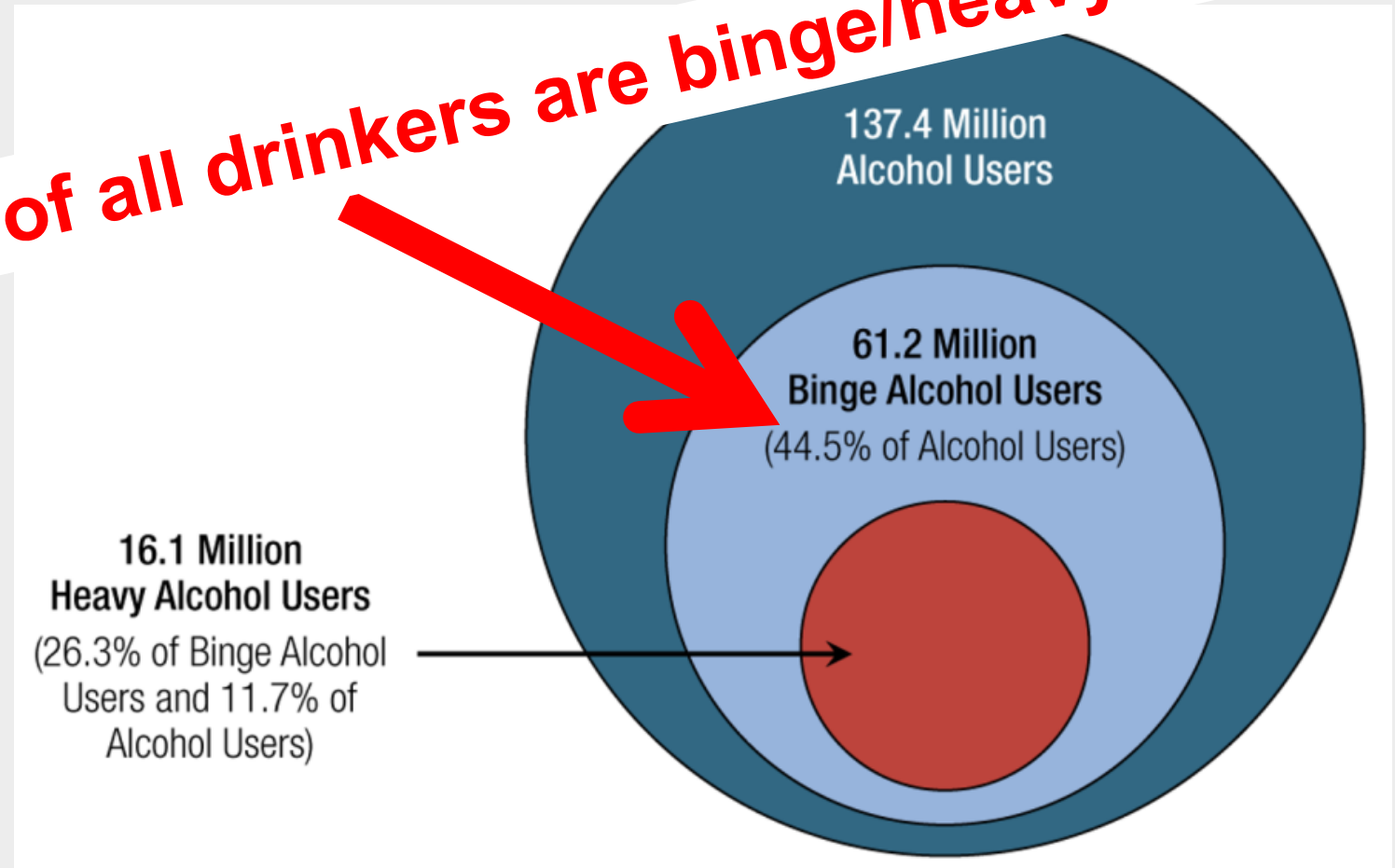
But(t):



https://www.fda.gov/tobacco-products/youth-and-tobacco/youth-tobacco-use-results-national-youth-tobacco-survey

Current, Binge, and Heavy Alcohol Use: A[illegible] People Aged 12 or O[illegible]

~Half of all drinkers are binge/heavy drinkers



60.6% of all SUDs in US are **Alcohol** (may be overlap)

Note: Binge Alcohol Use is defined as drinking five or more drinks (for males) or four or more drinks (for females) on the same occasion on at least 1 day in the past 30 days. Heavy Alcohol Use is defined as binge drinking on the same occasion on 5 or more days in the past 30 days; all heavy alcohol users are also binge alcohol users.

https://www.samhsa.gov/data/release/2022-national-survey-drug-use-and-health-nsduh-releases#highlighted-pop-slides

Alcohol deaths increase dramatically during pandemic, especially for younger adults: Research

Deaths were up 25% according to a recent study.

By **Eli Cahan**
May 10, 2022, 3:19 AM • 6 min read

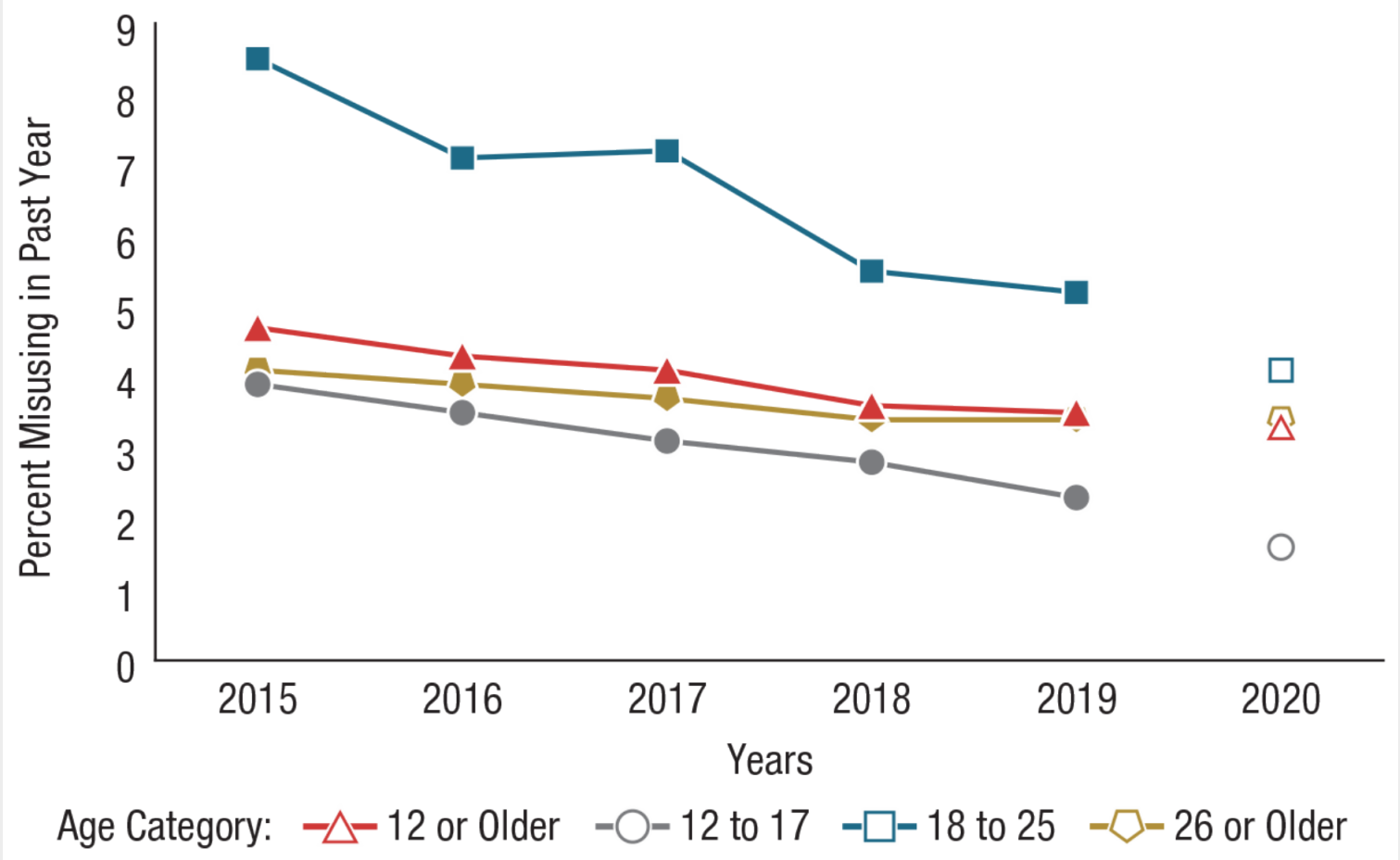
BLOG

Behind the Numbers: Alcohol is Killing More People Than the Opioid Epidemic. Why Aren't We Talking About It?

https://abcnews.go.com/Health/alcohol-deaths-increase-dramatically-pandemic-younger-adults-research/story?id=84496498

https://www.caron.org/blog/alcohol-is-killing-more-people-than-the-opioid-epidemic

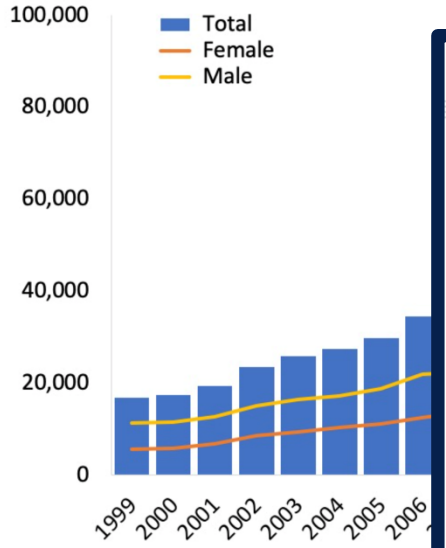
Past Year Prescription Pain Reliever Misuse: Among People Aged 12 or Older; 2015-2020



https://www.samhsa.gov/data/data-we-collect/nsduh-national-survey-drug-use-and-health

Yet…

Figure 1. National Drug-Involved Overdose Deaths*
Number Among All Ages, by Gender, 1999-2019



*Includes deaths with underlying causes of unintentional dru
poisoning (X85), or drug poisoning of undetermined intent (Y
Source: Centers for Disease Control and Prevention, National
WONDER Online Database, released 12/2020.

Society

The Guardian

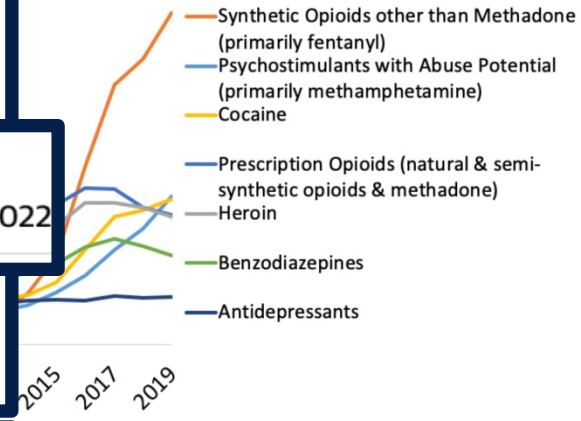
Number of fentanyl-filled pills seized by US law enforcement up 4,850%

A study found that more than 2m counterfeit pills were confiscated in the last quarter of 2021 alone

Erin McCormick
12:00 UTC Thursday, 31 March 2022

https://www.theguardian.com/society/2022/mar/31/fentanyl-overdose-us-law-enforcement

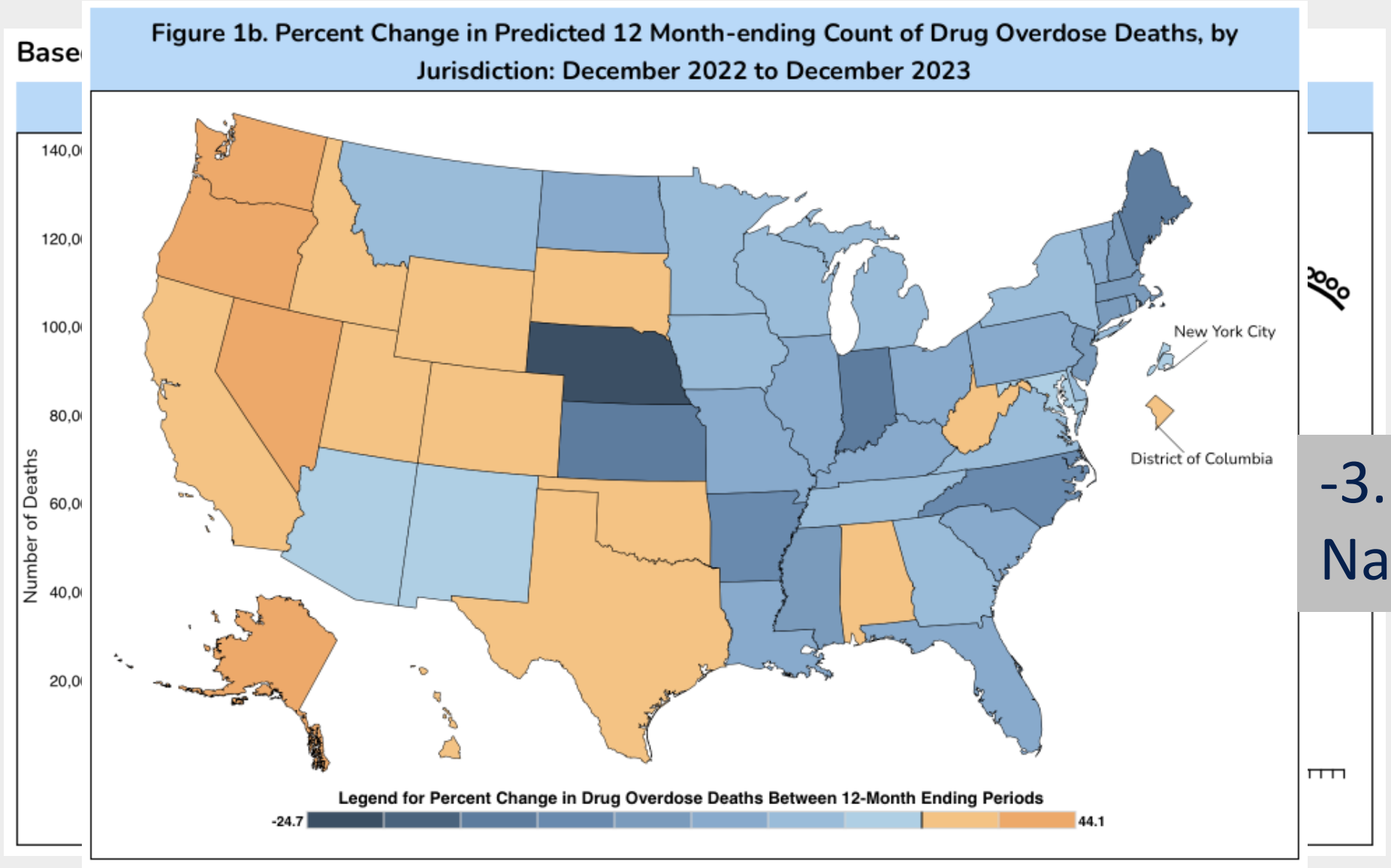
nvolved Overdose Deaths*,
All Ages, 1999-2019



ning (X40–X44), suicide drug poisoning (X60–X64), homicide drug
), as coded in the International Classification of Diseases, 10th Revision.
Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999-2019 on CDC WONDER Online Database, released 12/2020.

https://www.drugabuse.gov/drug-topics/trends-statistics/overdose-death-rates

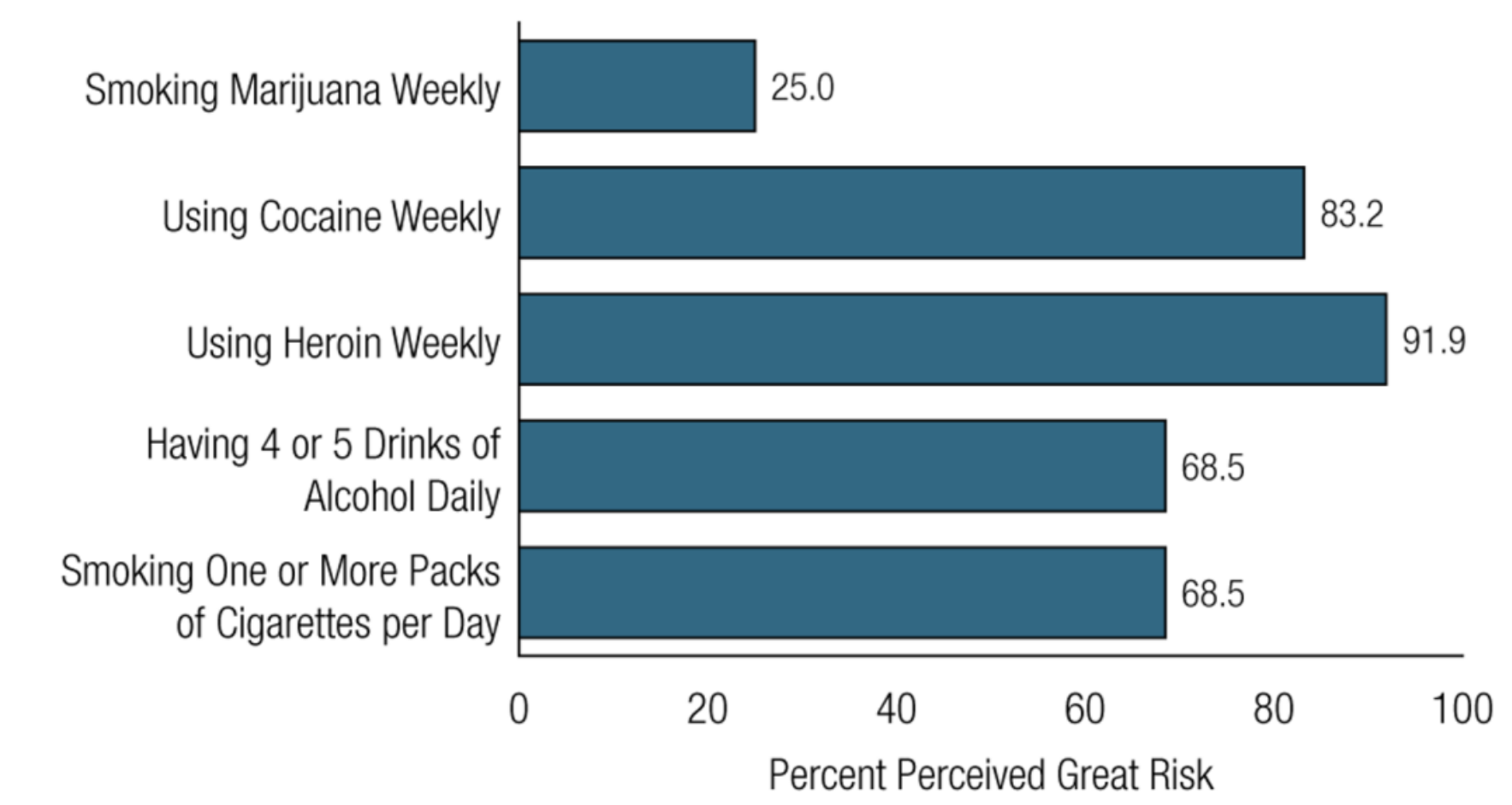
Fortunately (?)…



-3.1%
Nationwide

https://www.cdc.gov/nchs/nvss/vsrr/drug-overdose-data.htm

Perceived Great Risk from Substance Use: Among People Aged 12 or Older; 2022



https://www.samhsa.gov/data/release/2022-national-survey-drug-use-and-health-nsduh-releases#highlighted-pop-slides

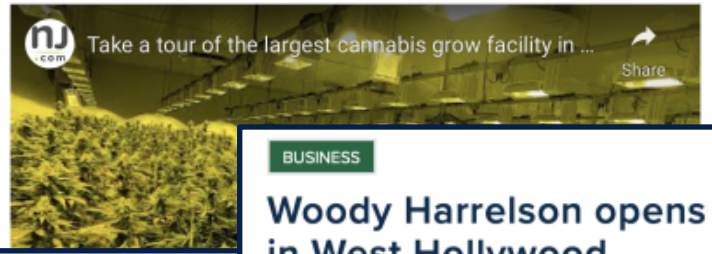
You can become a judge in High Times' "Cannabis Cup" and pick your favorite product!

by Mason Carroll | Friday, May 13th 2022

htt
car

A beginner's guide to weed: How to choose the right strain for you

Updated: Apr. 15, 2022, 11:51 a.m. | Published: Apr. 15, 2022, 9:02 a.m.



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BUSINESS

Woody Harrelson opens The Woods cannabis dispensary in West Hollywood

BY SUSAN CARPENTER | WEST HOLLYWOOD
PUBLISHED 5:00 PM PT MAY. 13, 2022

WEST HOLLYWOOD, Calif. — With a waft of marijuana swirling around him and an adoring crowd of fans, Woody Harrelson cut the ribbon on his new cannabis dispensary in West Hollywood Friday. Part retail, part lounge and 100% dedicated to selling the best marijuana grown under the California sun, The Woods opened for business Friday.

"Hopefully we've added more beauty and more good times here," Harrelson told an eclectic group that had packed onto the sidewalk on Santa Monica Blvd. moments before The Woods opened its doors. "Hopefully we can help make the West Hollywood citizens a little bit higher."

https://www.hollywoodreporter.com/lifestyle/lifestyle-news/woody-harrelson-opens-cannabis-dispensary-the-woods-west-hollywood-

HEALTH NEWS ✓ Fact Checked

FDA Warns Companies to Stop Making False Claims for THC and CBD Products

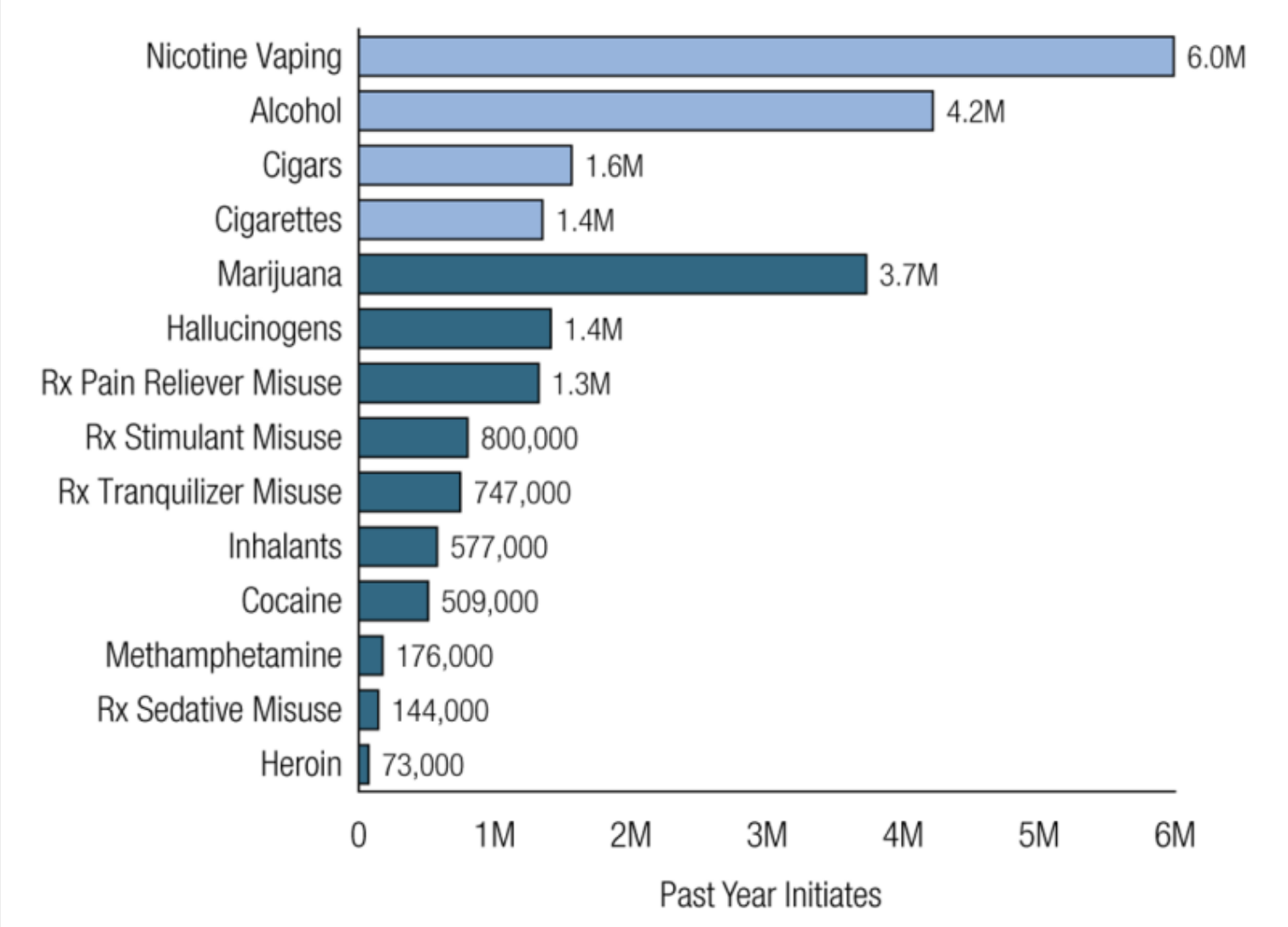
Written by Julia Ries on May 13, 2022 — Fact checked by Jennifer Chesak

ADVERTISEMENT

https://www.healthline.com/health-news/fda-warns-companies-to-stop-making-false-claims-for-thc-and-cbd-products

healthline

Past Year Initiates of Substances: Among People Aged 12 or Older; 2022



https://www.samhsa.gov/data/release/2022-national-survey-drug-use-and-health-nsduh-releases#highlighted-pop-slides

Past Year Hallucinogen Use: 2022

Hallucinogen Use:

Among adults aged 19 to 30, **8% reported past-year use of hallucinogens**, significantly higher than five years ago (**5% in 2017**) and 10 years ago (**3% in 2012**). Types of hallucinogens reported by participants included LSD, MDMA, mescaline, peyote, shrooms or psilocybin, and PCP.

Past-year hallucinogen use reached historically high prevalence among adults 35 to 50 years old, reported by **4% in 2022**. The prevalence reported in 2022 was also a substantial increase compared to the year before (**2% in 2021**) and five and 10 years ago (**no greater than 1%** in both 2017 and 2012).

https://nida.nih.gov/news-events/news-releases/2023/08/marijuana-and-hallucinogen-use-binge-drinking-reached-historic-highs-among-adults-35-to-50#:~:text=Past%2Dyear%20hallucinogen%20use%20reached,in%20both%202017%20and%202012).

People who used 'magic mushrooms' less likely to develop opioid use disorder, study finds

USA TODAY

ADRIANNA RODRIGUEZ | USA TODAY
Updated 2:58 pm EDT Apr. 7, 2022

A "shroom craze" may get even wilder after a new study that suggests a psychedelic drug found in some mushrooms may have protective benefits against addiction.

Harvard University researchers found opioid use disorders were 30% less likely among people who used psilocybin compared with those who never had it, according to the study published Thursday in Scientific Reports.

Every item on this page was chosen by a Town & Country editor. We may earn commission on some of the items you choose to buy.

Why Is Everyone Smoking Toad Venom?

How an illegal amphibian-venom-derived psychedelic became the loudest whisper at a dinner party near you.

BY ALEX KUCZYNSKI — JAN 20, 2022

BOXING

Mike Tyson Says He 'Died' After Smoking Psychedelic Toad Venom

ANDREW GASTELUM • NOV 17, 2021

https://www.townandcountrymag.com/leisure/arts-and-culture/a38687510/toad-venom-bufo-illegal-psychedelic-drug/

https://www.si.com/boxing/2021/11/17/mike-tyson-says-he-died-smoking-psychedelic-toad-venom

Third: Other Important Parts of the Story

Race/Ethnicity 2022

	National Average (%)	Black (%)	Asian (%)	American Indian/Alaska Native (%)	Hispanic (%)	Hawaiian/Pacific Islander (%)
Past Month Binge Alcohol Use (12+)	21.7	20.9	10.3	25.5	23.3	**
Past Month Heavy Alcohol Use (12+)	5.7	4.2	1.9	8.0	5.1	**
Past Year Illicit Drug Use (12+)	24.9	26.7	13.6	35.1	23.3	**
Past Year Marijuana Use (12+)	22.0	23.5	11.2	27.3	20.3	**
Past Year SUD (12+)	17.3	18.4	9.0	24.0	17.4	**
Suicidal Thinking Past Year (12+)	5.2	5.5	3.4	9.3	4.6	**

BLACK = national average
RED = ABOVE national average
BLUE = BELOW national average

https://www.samhsa.gov/data/release/2022-national-survey-drug-use-and-health-nsduh-releases#highlighted-pop-slides

Sexual Minority* 2022

	Straight (%)	Bisexual (%)	Gay (%)	Lesbian (%)
Binge Alcohol Use Past Month (18+)	22.8	32.6	29.9	29.2
Illicit Drug Use Past Month (18+)	15.2	42.2	34.9	34.3
Marijuana Use Past Month (18+)	13.9	39.1	29.8	32.5
Opioid Misuse Past Month (18+)	1.0	2.5	1.5	1.5
SUD Past Year (18+)	16.3	38.6	33.6	30.2
Suicidal Thoughts Past Year (18+)	4.0	19.9	10.8	12.8

RED = higher than national average

BLUE = Lower than national average

* Defined by SAMHSA as people who identify as lesbian, gay, or bisexual:
NSDUH began collecting data on this specific population in 2015

https://www.samhsa.gov/data/release/2022-national-survey-drug-use-and-health-nsduh-releases#highlighted-pop-slides

Gender…

- Women tend to initiate substance use later than men
- Women have accelerated course of disorder → “telescoping” (alcohol, marijuana, cocaine, prescription opioids)
- Women with SUDs → more severe impairment in employment, social/family, medical and psychiatric functioning
- Women have LOWER rates (2022) than men for binge drinking, illicit drug use, cannabis/opioid use, SUD
- Women have HIGHER rates (2022) than men for MDE, any mental illness, receipt of MH services

McHugh RK, et al. Sex and gender differences in substance use disorder. Clin Psychol Rev. 2017 Nov 10.

https://www.samhsa.gov/data/report/nsduh-2022-highlighted-population-slides

Let's Look at a Study…

- Question: Does Marijuana use cause psychosis?

Schizophrenia Bulletin vol. 42 no. 5 pp. 1262–1269, 2016
doi:10.1093/schbul/sbw003
Advance Access publication February 15, 2016

Meta-analysis of the Association Between the Level of Cannabis Use and Risk of Psychosis

Arianna Marconi[1], Marta Di Forti[1], Cathryn M. Lewis[2], Robin M. Murray[1], and Evangelos Vassos[*,2]

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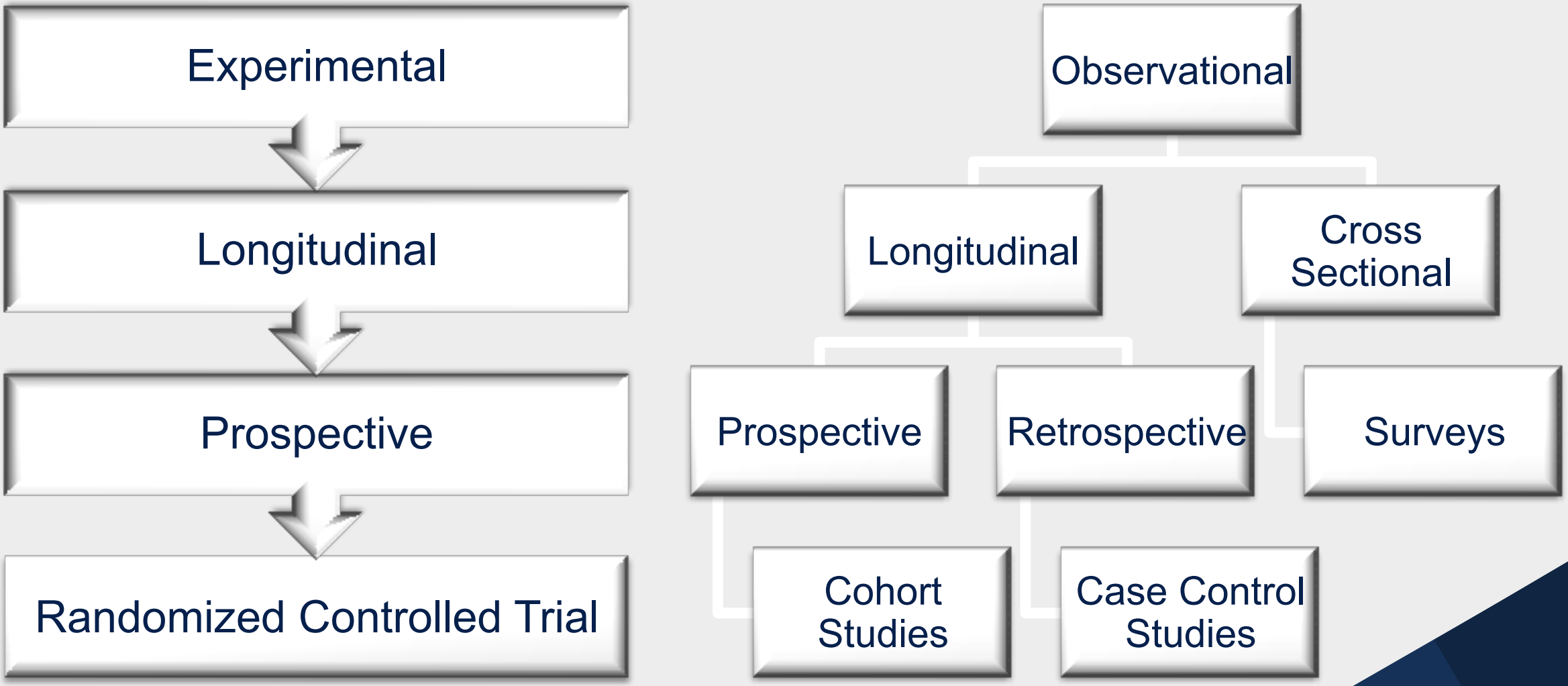
What Is This Study?

- Performed a systematic review and a meta-analysis
- Included: provided data on cannabis consumption prior to the onset of psychosis
  - 18 for systematic review and 10 for meta-analysis (66,816 individuals)
  - Continuous variable → amount of exposure
  - Cohort and cross-sectional studies included
- Findings:
  - Odds ratio 3.90 (95% confidence interval 2.84 to 5.34) for risk of schizophrenia and other psychosis-related outcomes among the heaviest cannabis users compared to non-users

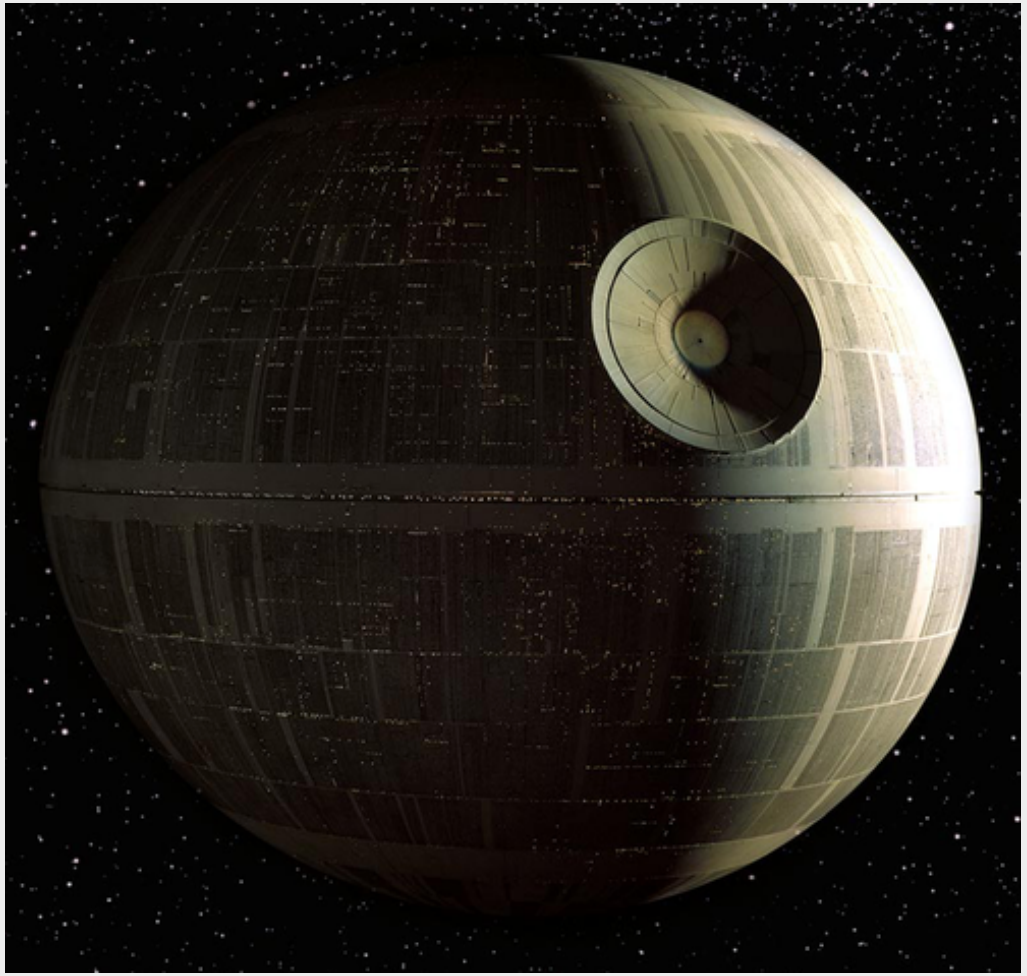
What can we say about this study?

1) Quality of evidence, based on study design.

Types of Studies



Quantifying Risk…



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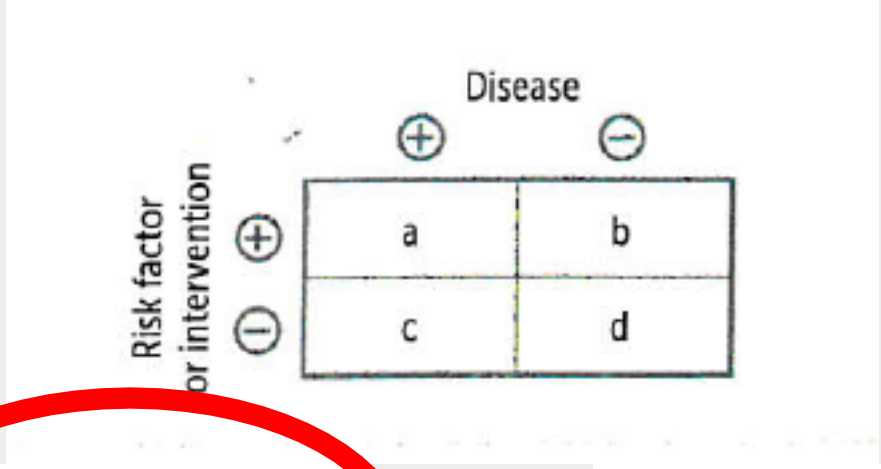

$$AR = \frac{a}{a+b} - \frac{c}{c+d}$$

$$NNH = 1/AR$$

$$OR = \frac{a/c}{b/d} = \frac{ad}{bc}$$

$$RR = \frac{a/(a+b)}{c/(c+d)}$$

$$ARR = \frac{c}{c+d} - \frac{a}{a+b}$$

$$NNT = 1/ARR$$

Odds Ratio--more

- What is an odds ratio?

Ratio of Odds

- Higher the Odds Ratio, stronger the association between the exposure and the outcome appears to be

- If Odds Ratio is 1, then that means that the ratio of the odds shows NO ASSOCIATION between the exposure and the outcome

- (those with disease who were exposed/those with disease not exposed)/(those without disease exposed/those without disease not exposed)

Odds Ratio—An Example

- Imagine: relationship between getting breast cancer and driving an American car vs. not
  - If no correlation between these two, then the ratio of those with disease who drove American cars/those with disease who didn't would be likely close to 1, and ratio of those without disease who drove American cars/those without disease who did not drive American cars would also be close to 1, and the ratio of those two would be one = no relationship

Back To The Cannabis Paper…
2) An ASSOCIATION Was Found

- Odds ratio 3.90 (95% confidence interval 2.84 to 5.34) for risk of schizophrenia and other psychosis-related outcomes among the heaviest cannabis users compared to non-users
  - Dose-response effect seen such that increasing exposure to cannabis increases risk of psychosis-related outcomes

What about Confidence Interval?

- (95% confidence interval 2.84 to 5.34)
  - This is the range of values within which the true mean of the population is expected to fall, with a specified probability
  - Probability: 95% CI basically corresponds to p=0.05
  - If this includes 1, for odds ratio or relative risk, null hypothesis is NOT rejected (no significant difference)

Oh No, Not the “Null Hypothesis”!!!

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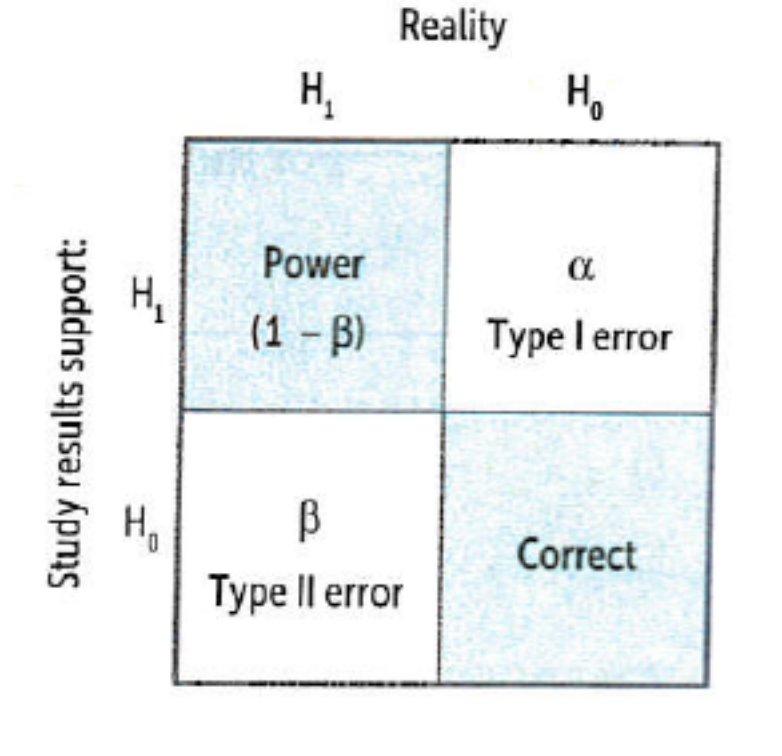
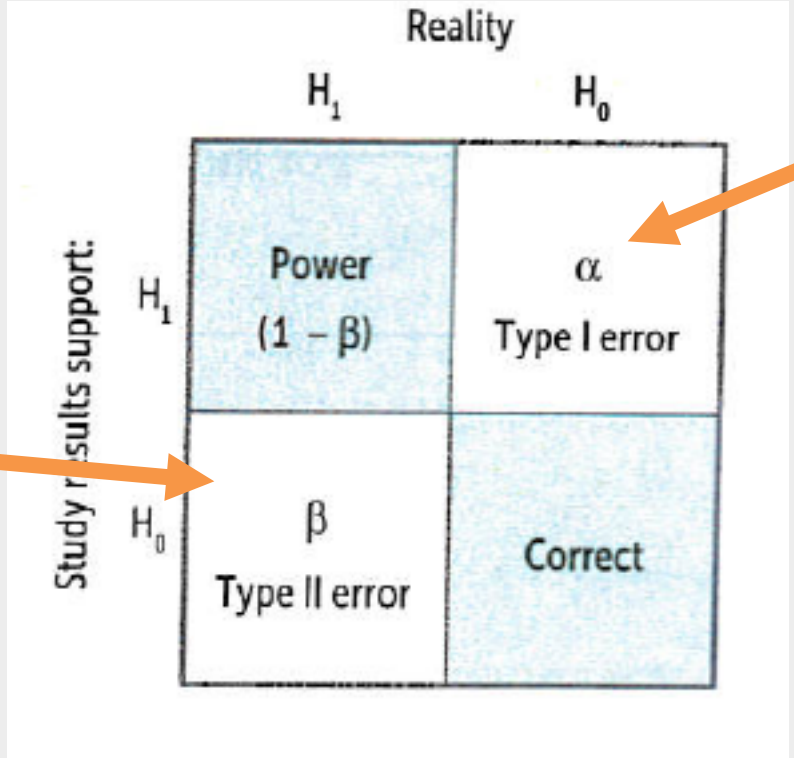


Oh No, Not the “Null Hypothesis”!!!

Stating that there is not an effect when one does exists:
False negative error



Stating that there is an effect when none exists:
False positive error

2) An Association Was Found

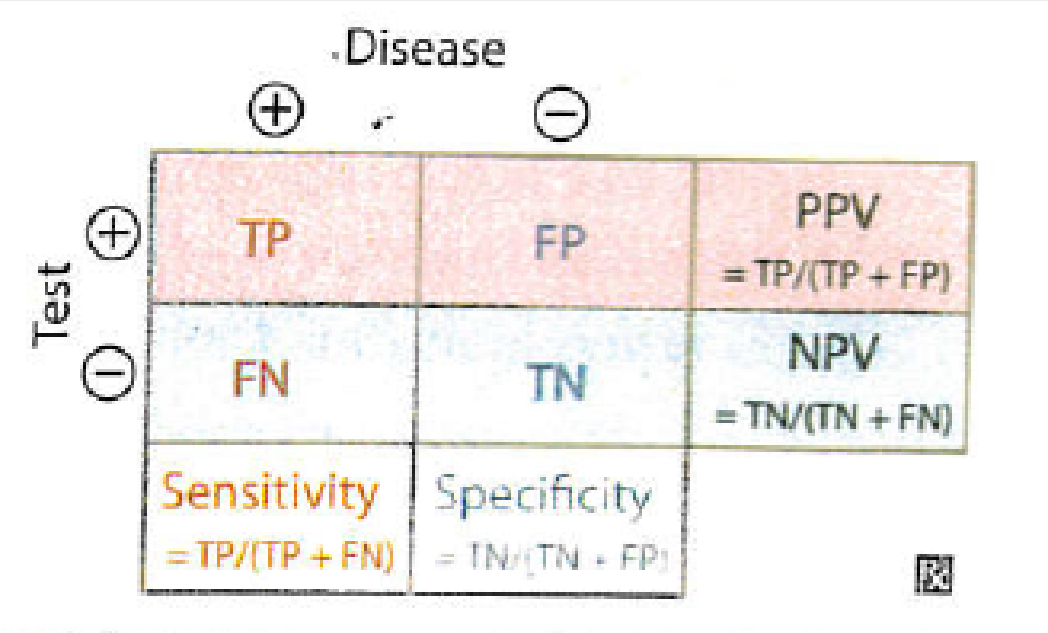
- Does this mean that cannabis CAUSES psychosis, based on this paper?

Why the heck is his urine toxicology screen negative?

Question:

Patient’s ED urine drug screen came back negative for opiates, so he must not have used the methadone he claims to be taking?

Sensitivity vs. Specificity



High sensitivity screen for opiates (those metabolized to morphine), but low sensitivity for synthetic opioids (methadone)

What We've Done

- Briefly reviewed scope of epidemiology covered on ABPM exam
- Examined trends in addictions and explored ways to find that data for future professional or personal use
- Followed two common questions in addiction medicine as a springboard for reviewing key concepts in epidemiology

Whew!....

https://animals.sandiegozoo.org/animals/meerkat

3 CME Questions

A cross sectional survey is conducted to assess how many people at a given time in a particular population have moderate amphetamine use disorder. The survey has not been previously conducted. The total population is 50,000, and the survey reveals that 5,000 people report meeting criteria consistent with moderate amphetamine use disorder. What is the incidence of moderate amphetamine use disorder in this population?

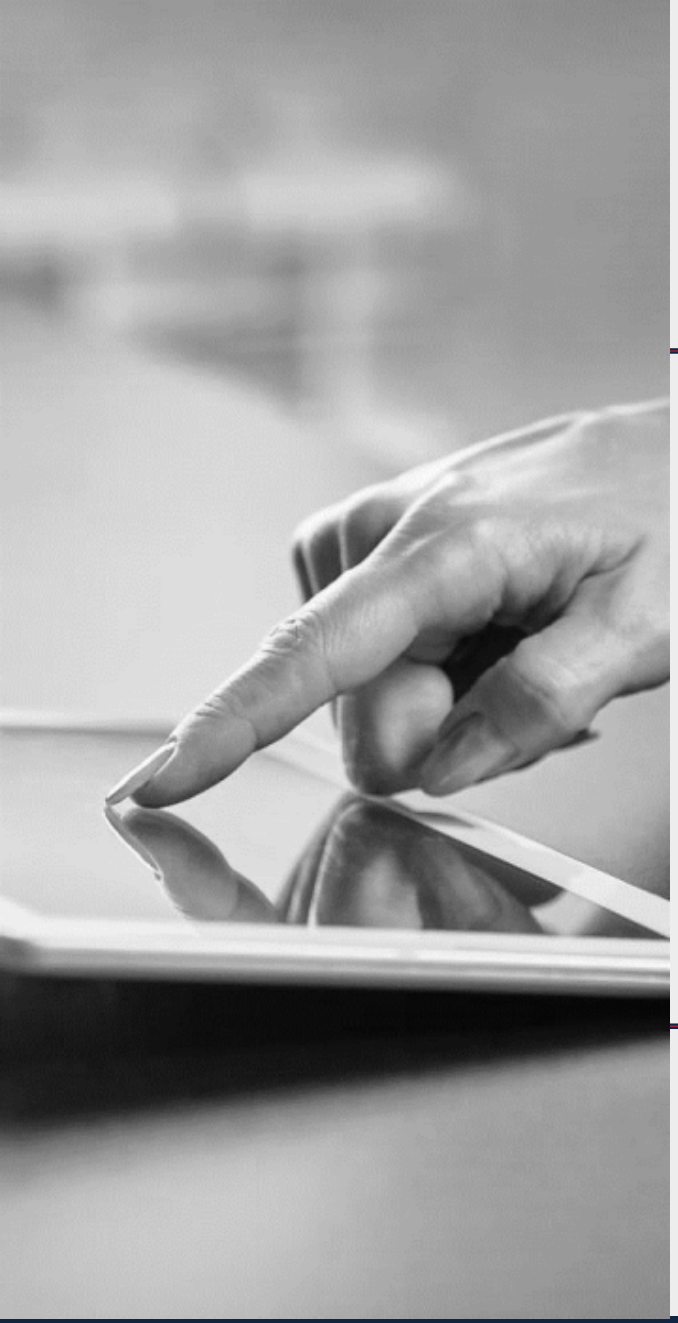
A. 10,000
B. 45,000
C. 0.5
D. Incidence cannot be calculated from single cross-sectional surveys

Which of the following is TRUE regarding epidemiologic trends in addictive disorders?

A. Tobacco use has had an overall incline from 2002 to 2019, in large part due to the spike in use of e-cigarettes (especially among younger Americans)
B. Prescription opioid use has modestly increased from 2018-2019 (heroin and prescription pain relievers)
C. Despite decreases in opioid use in recent years, substance related overdose deaths have INCREASED
D. Substance related overdose deaths have increased largely because of the increase in serious mental illness and alcohol use

A case control study finds an odds ratio of 5.5 (95% CI 0.5 to 7.5) regarding the association between an exposure and development of a condition. Which is true regarding the above comment?

A. The odds ratio of 5.5 reflects a strong association between the exposure and the development of the condition
B. The high odds ratio here conclusively means that the exposure causes the development of the condition
C. The 95% confidence interval crosses 1, meaning there is an intolerable risk that the perceived relationship (OR 5.5) is due to chance—a type 1 error (no effect/relationship exists)
D. Since case control studies generally “look forward” (i.e. are prospective), this study is likely to have a low chance of asserting a Type II (Beta) error.



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