

# EPIDEMIOLOGY

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Institute for Neurosciences

# The ASAM Review Course of Addiction Medicine

## July 2022

### Financial Disclosures

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Jeffrey DeVido, MD, MTS, FASAM

*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.

# Disclosure Information

## The ASAM Review Course in Addiction Medicine: EPIDEMIOLOGY

July 23, 2021; 08:45am CST

Jeffrey DeVido, MD, MTS, FASAM, DFAPA

**Pre-COVID Pandemic**



# Disclosure Information

## The ASAM Review Course in Addictive Medicine: EPIDEMIOLOGY

July 23, 2021; 10:45am EST

Jeffrey DeVido, MD, MTS, FASAM, DFAPA

**Pandemic Look**





# Learning Objectives

1. **Review** the dimensions of epidemiology covered in the ABPM exam: 1) basic trends, and 2) epidemiologic concepts.
2. **Establish** different approaches for (re)learning epidemiology as necessary for ongoing professional acumen as well as (unfortunately) things needed to regurgitate on an exam.
3. **Demonstrate** epidemiologic concepts in action through two different common addiction epidemiological questions.
4. **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 – Pharmacology
	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 – Management 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%

# 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:



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[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&hvrnd=12792418851990343229&hvpone=&hvptwo=&hvmqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9032089&hvtargid=pla-1113406220592&psc=1](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&hvrnd=12792418851990343229&hvpone=&hvptwo=&hvmqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9032089&hvtargid=pla-1113406220592&psc=1)

# Two Ways to Think About Epidemiology

- ◆ What do I need to know for the test?

- ◆ What might I need to know professionally?

# Some Important Epidemiological Things That Come up Often in Addictions

- ◆ What's the risk of psychosis with cannabis use?
- ◆ Why is his urine toxicology screen negative?

# So...





# 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**

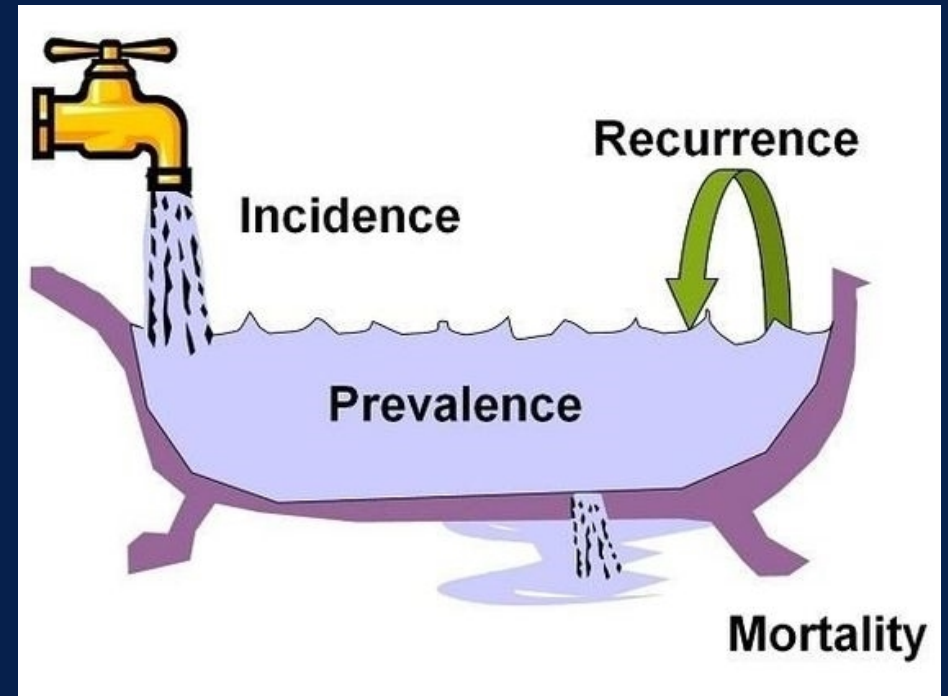
Treatment designed to improve quality of life and reduce the symptoms after a disease or disorder has developed  
Does not reduce incidence or prevalence

# 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
- ◆ 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)

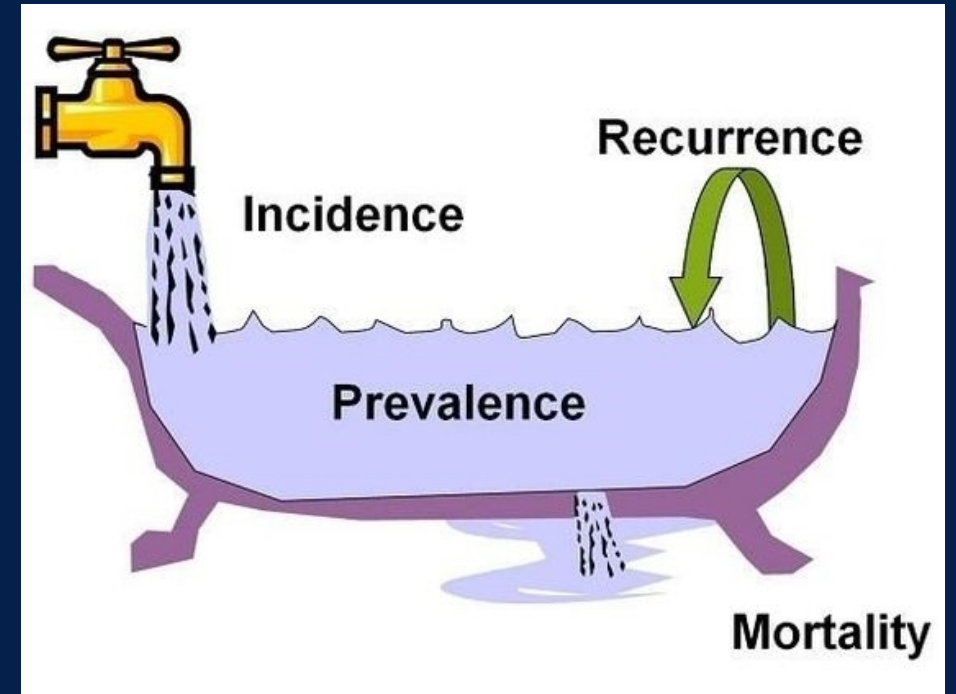


# Let's Do A Quick Matching Exercise:

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

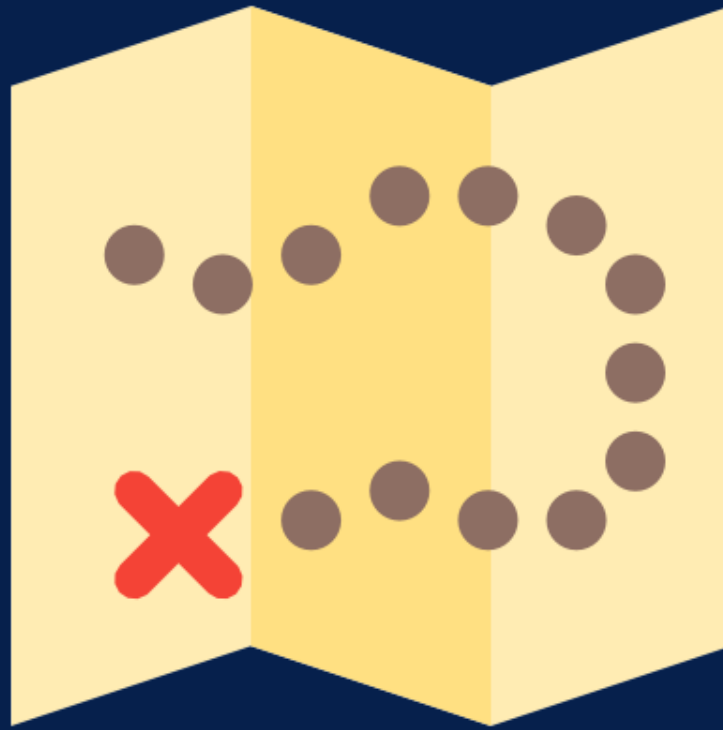
# Prevalence:

- ◆ 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





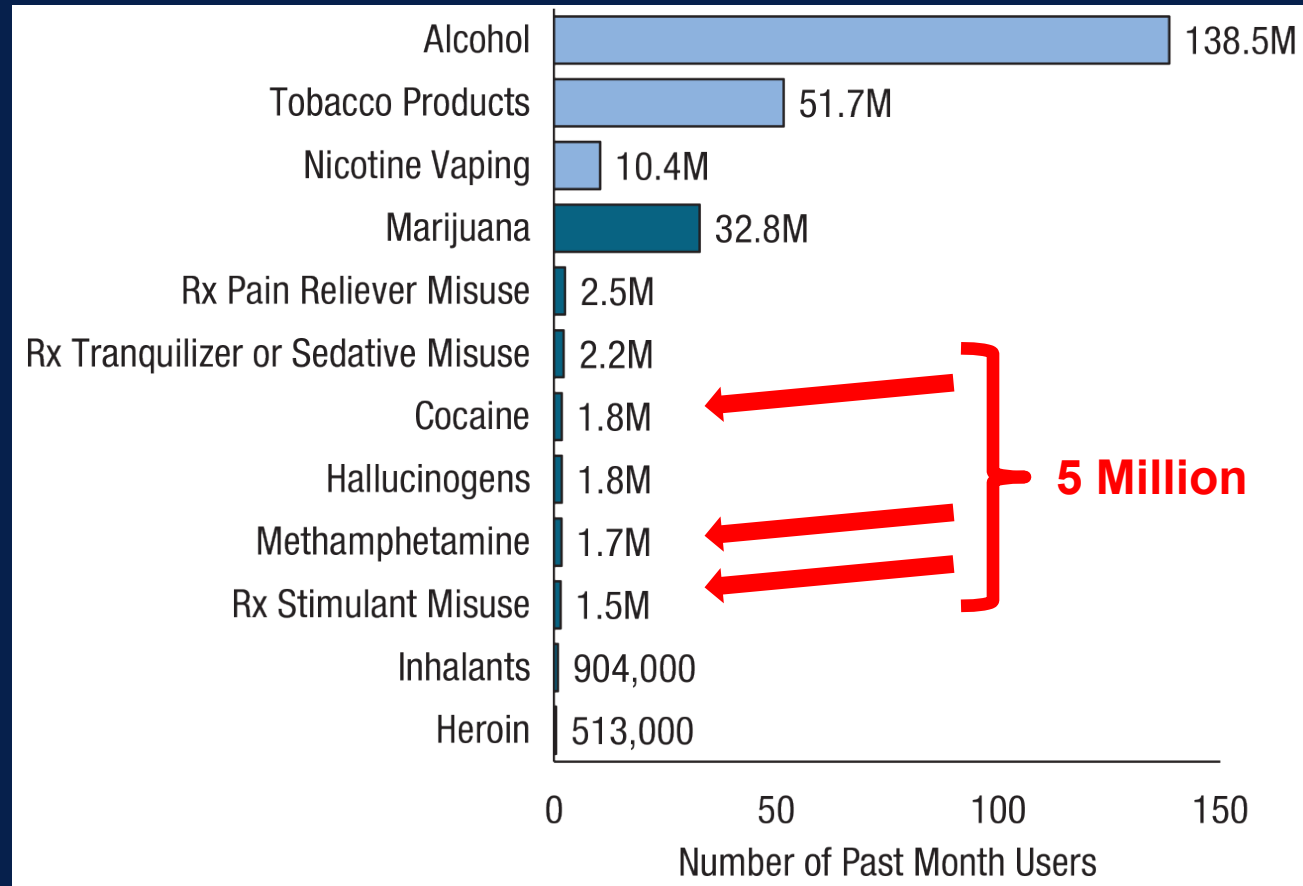
**Let's take a quick tour of some prevalence data  
and important trends to help us put the story  
together:**



# First: Big Picture



# 2020 NSDUH Prevalence: Past Month General Substance Use and Nicotine Vaping: Among People Aged 12 or Older; 2020



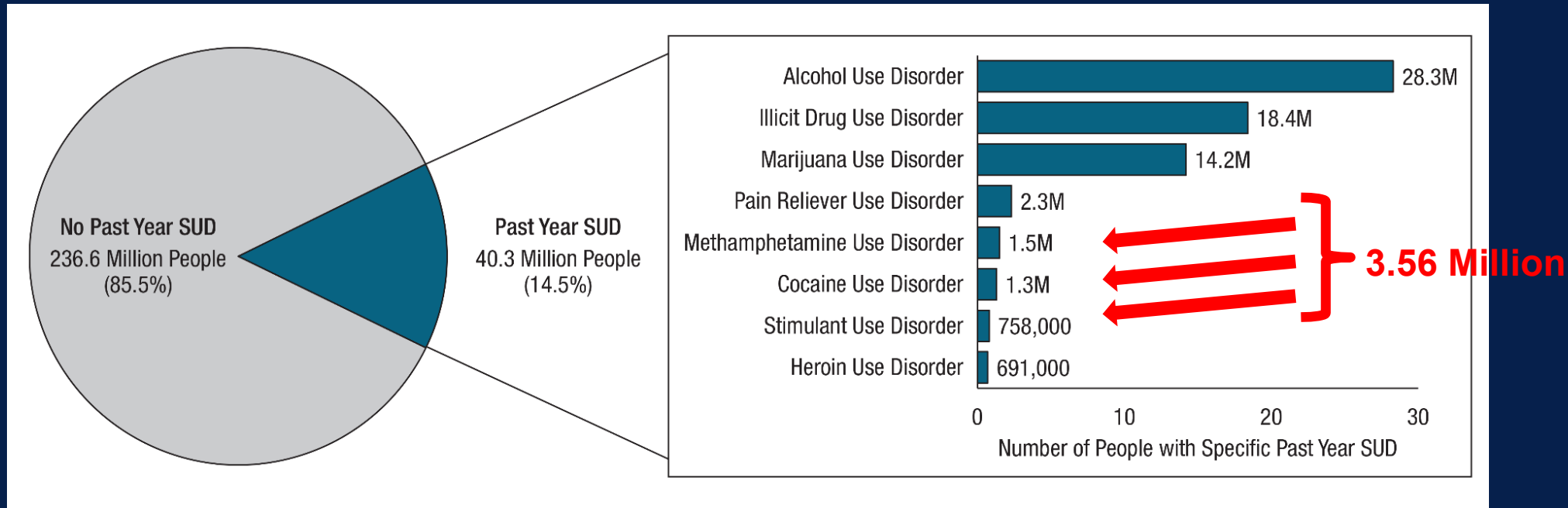
Rx = prescription.

Note: General Substance Use includes any illicit drug, alcohol, and tobacco product use. Tobacco products are defined as cigarettes, smokeless tobacco, cigars, and pipe tobacco.

Note: The estimated numbers of current users of different substances are not mutually exclusive because people could have used more than one type of substance in the past month.

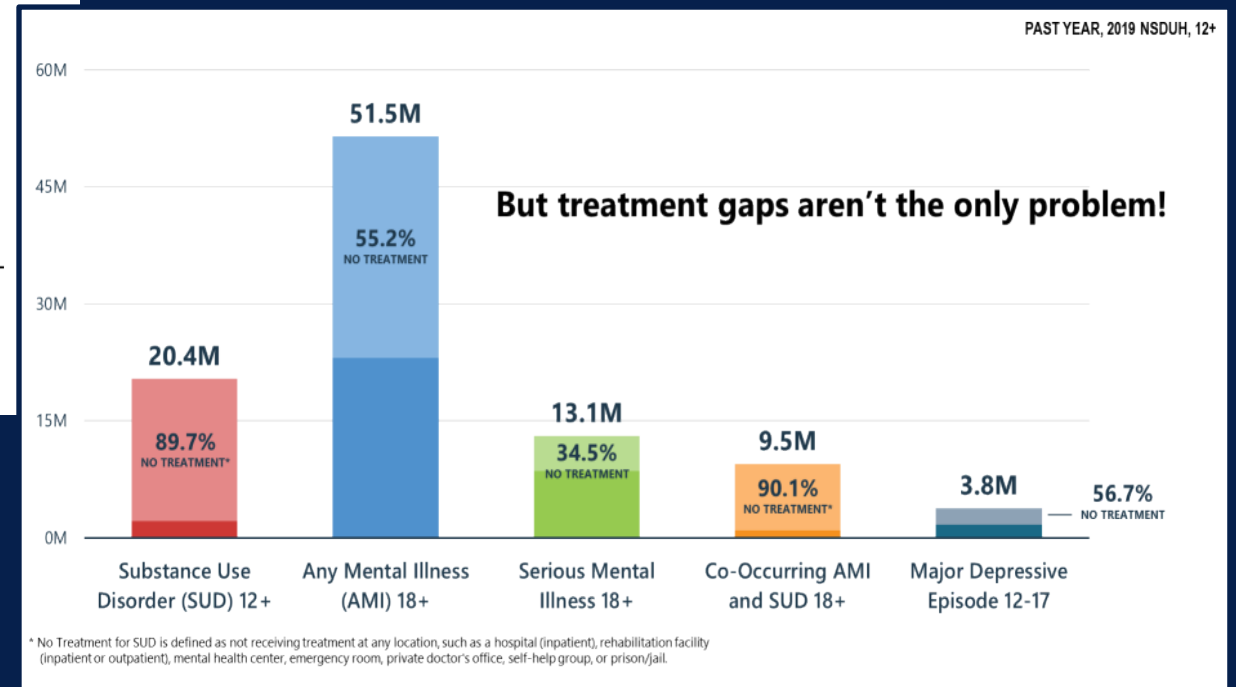
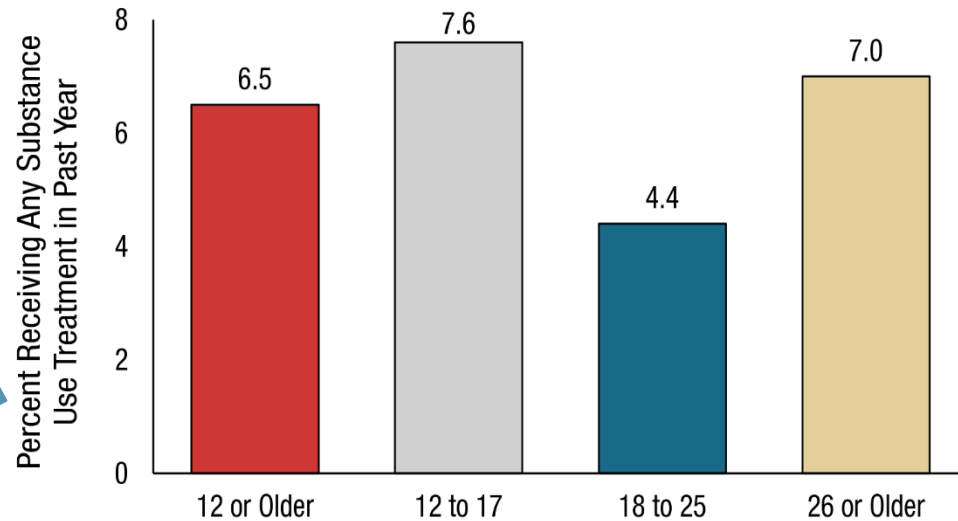


# People Aged 12 or Older with a Past Year Substance Use Disorder (SUD); 2020



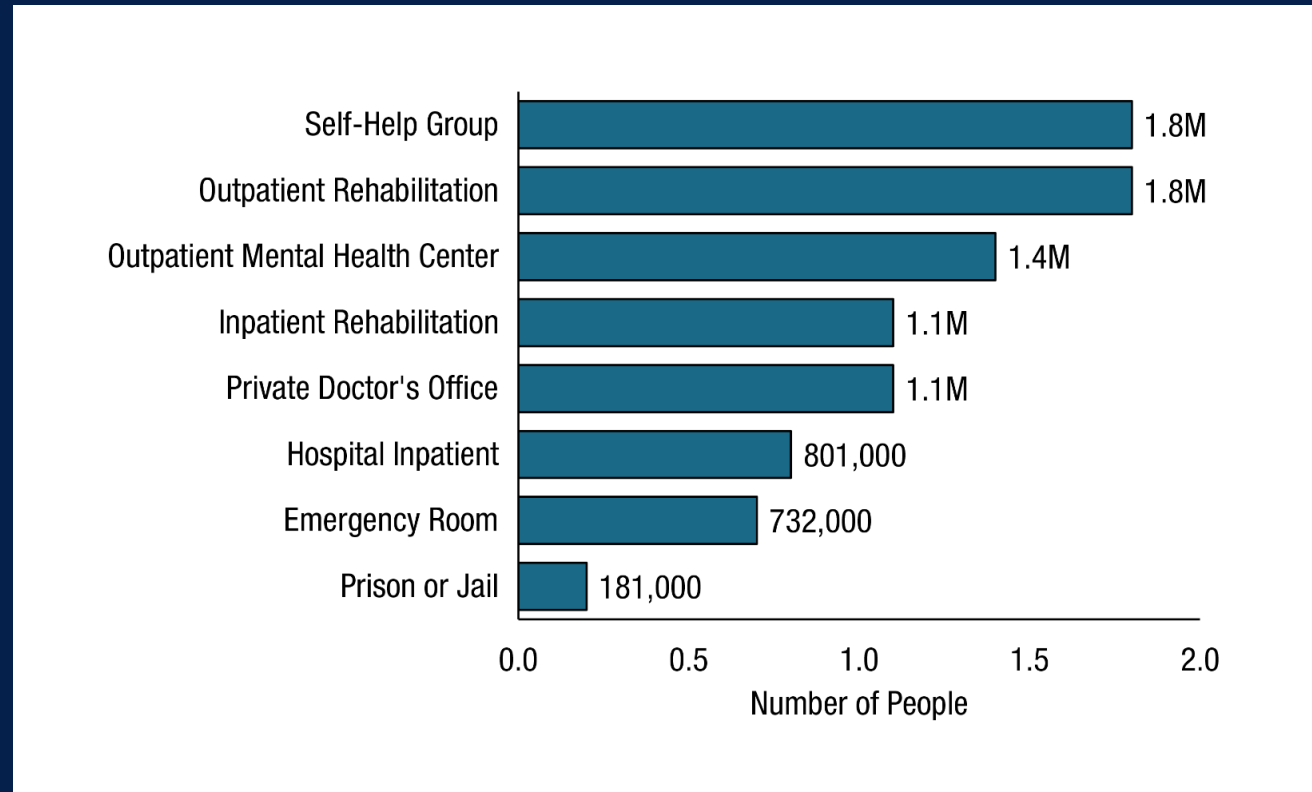
Note: The estimated numbers of people with substance use disorders are not mutually exclusive because people could have use disorders for more than one substance.

# But Do People Get Treatment?

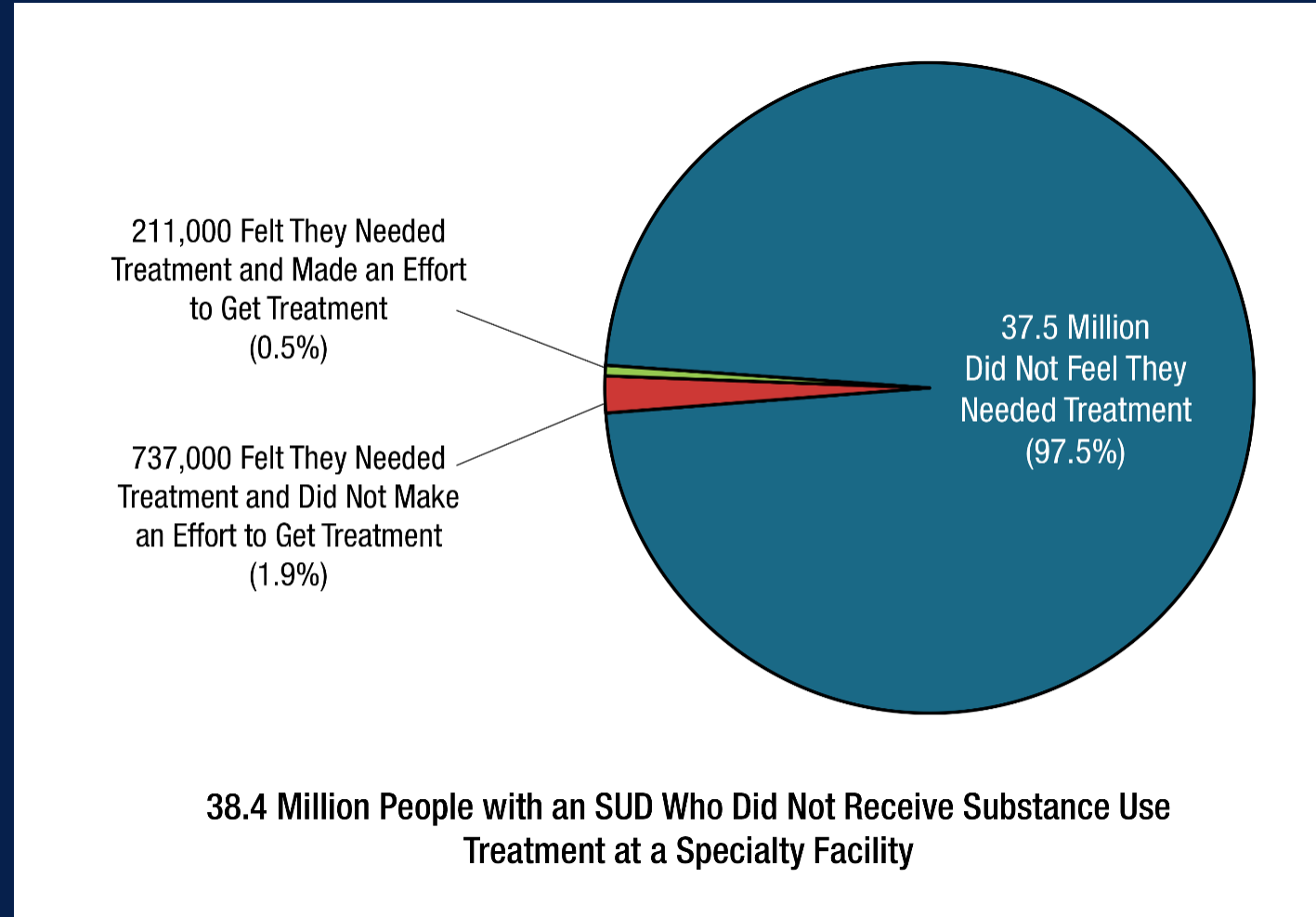




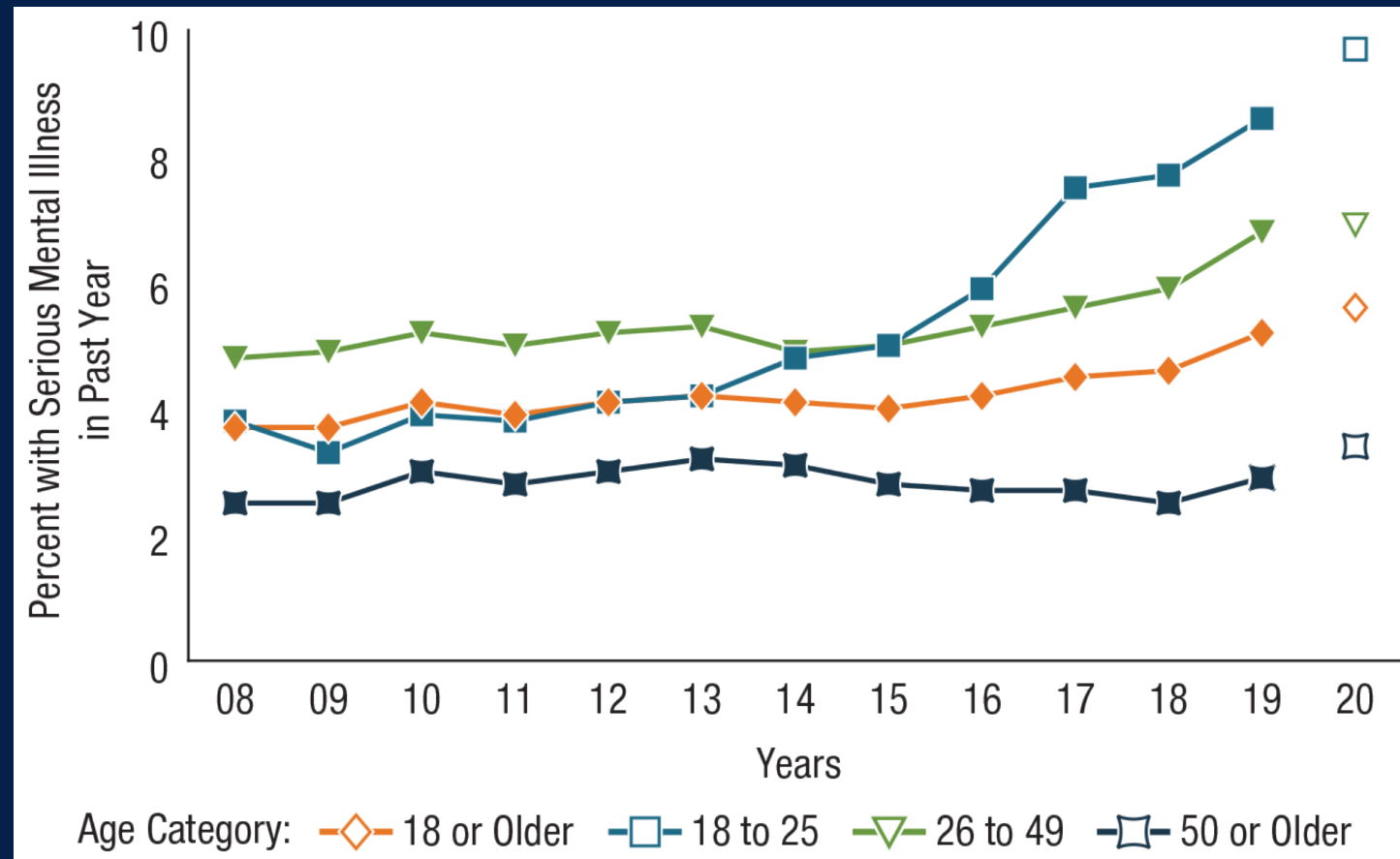
# For The People Who do Get “Treatment,” Where do They Get It?



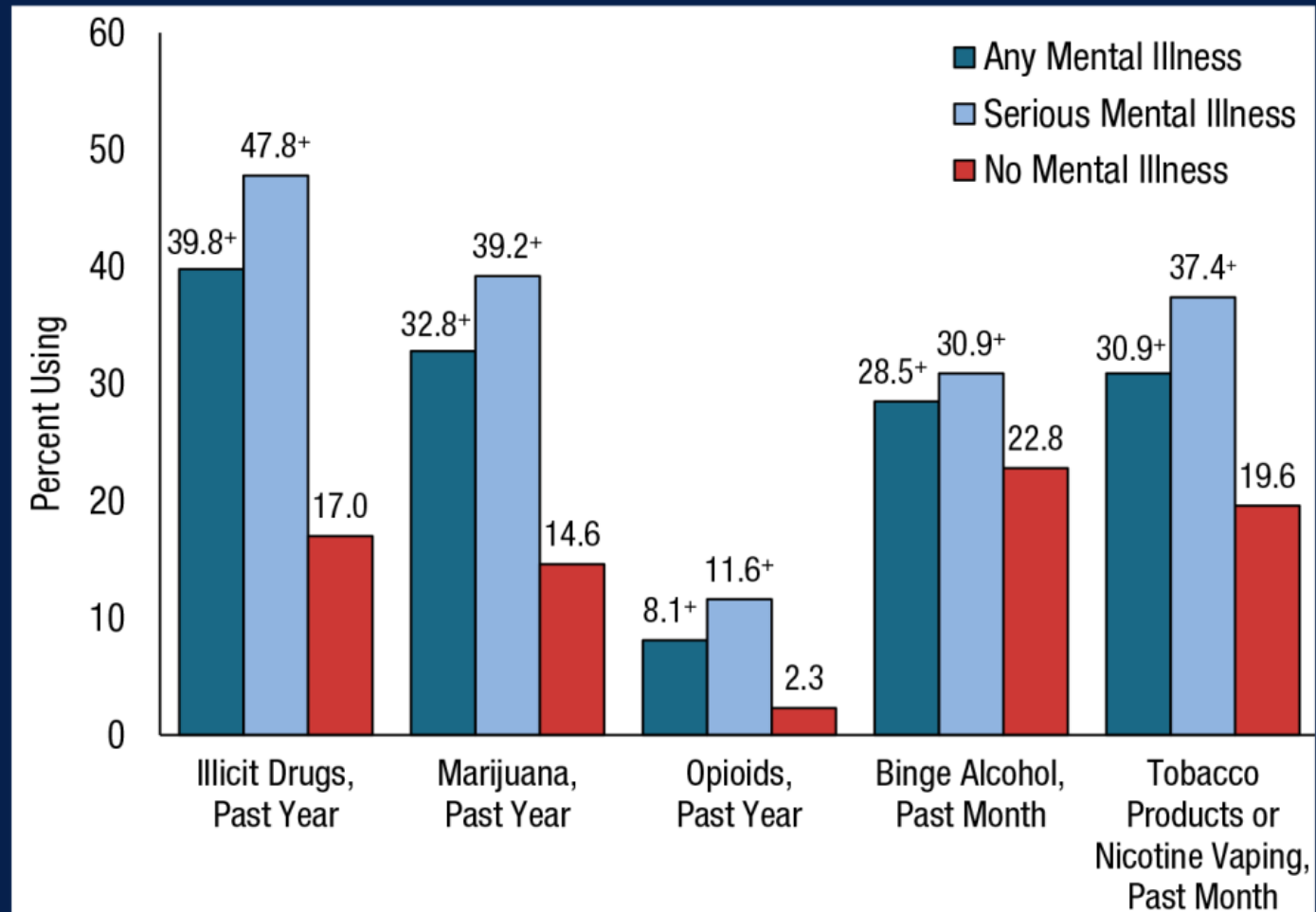
# Perceived **NEED** for Treatment (2020)



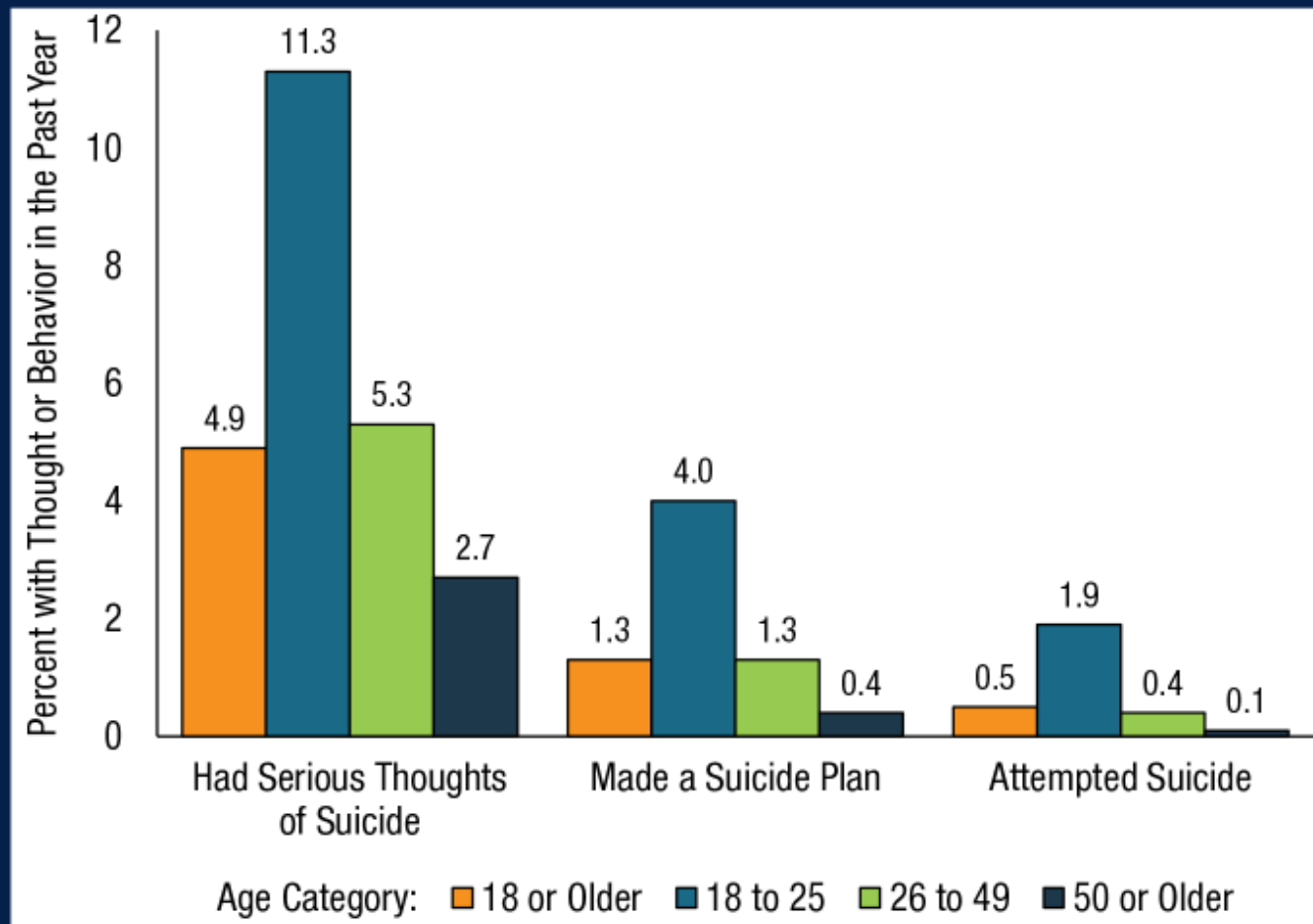
# Serious Mental Illness in the Past Year: Among Adults Aged 18 or Older; 2008-2020



# Substance Use: Among Adults Aged 18 or Older; by Mental Illness Status, 2020



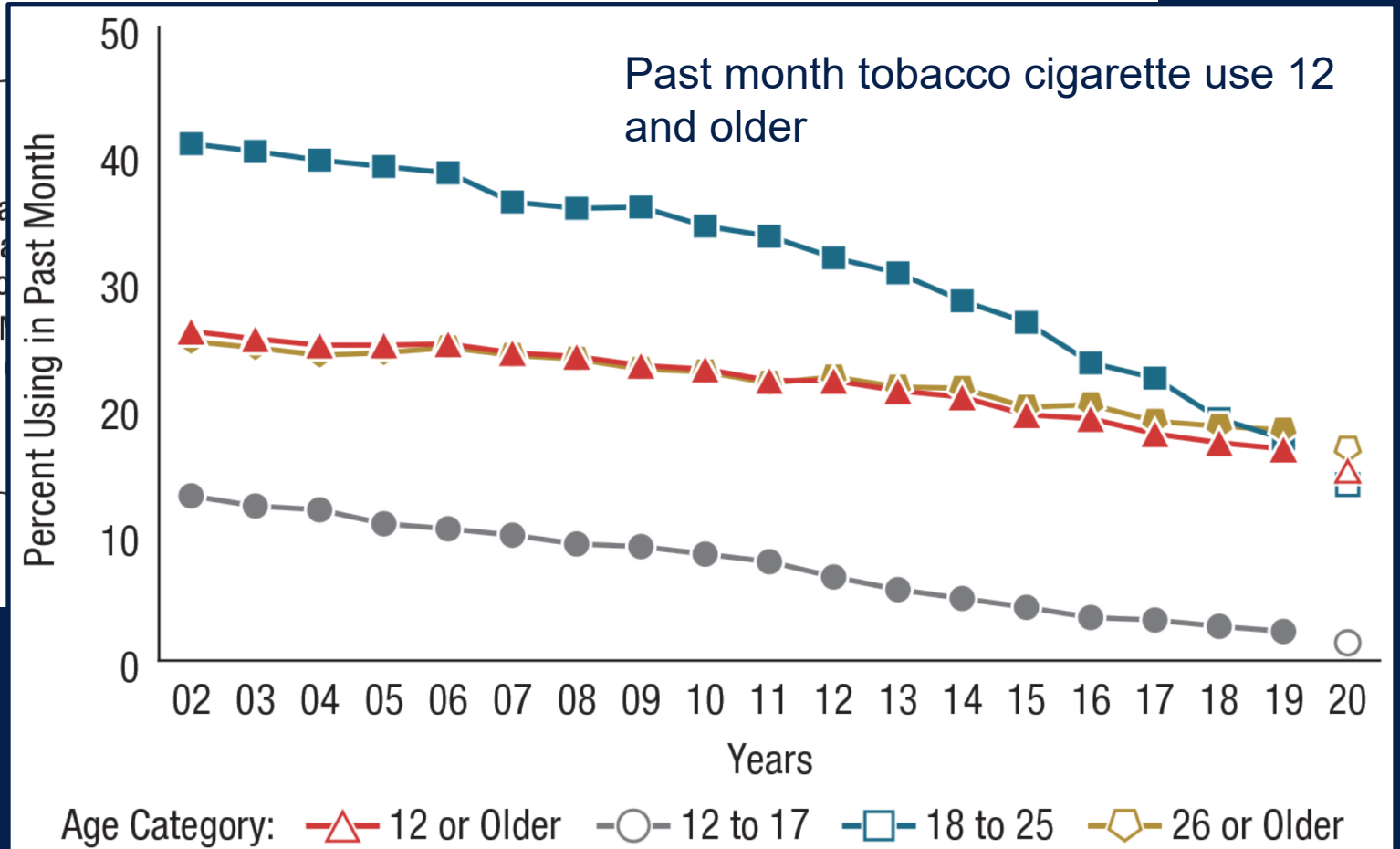
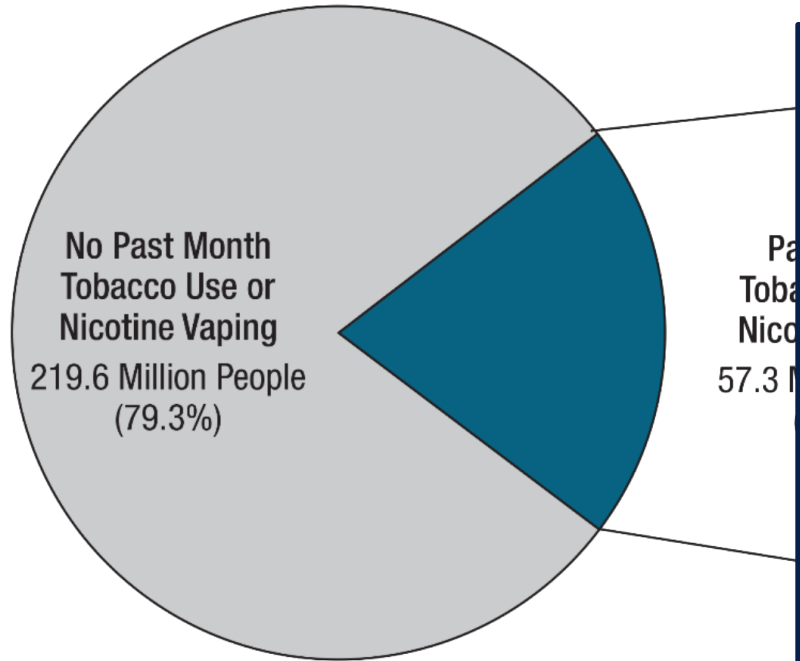
# Had Serious Thoughts of Suicide, Made a Suicide Plan, or Attempted Suicide in the Past Year: Among Adults Aged 18 or Older; 2020



# Second: Looking a Little Closer by Substance



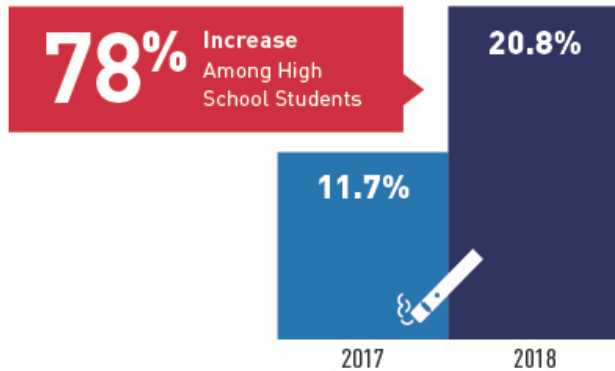
# Tobacco



# E-Cigarettes

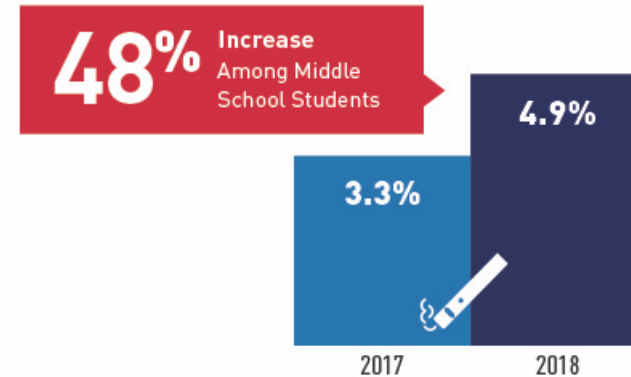
## E-cigarette Use among High School Students

### SURGE IN YOUTH CURRENT E-CIGARETTE USE



## E-cigarette Use Among Middle School Students

### SURGE IN YOUTH CURRENT E-CIGARETTE USE





# But(t):

## 2020

### National Youth Tobacco Survey

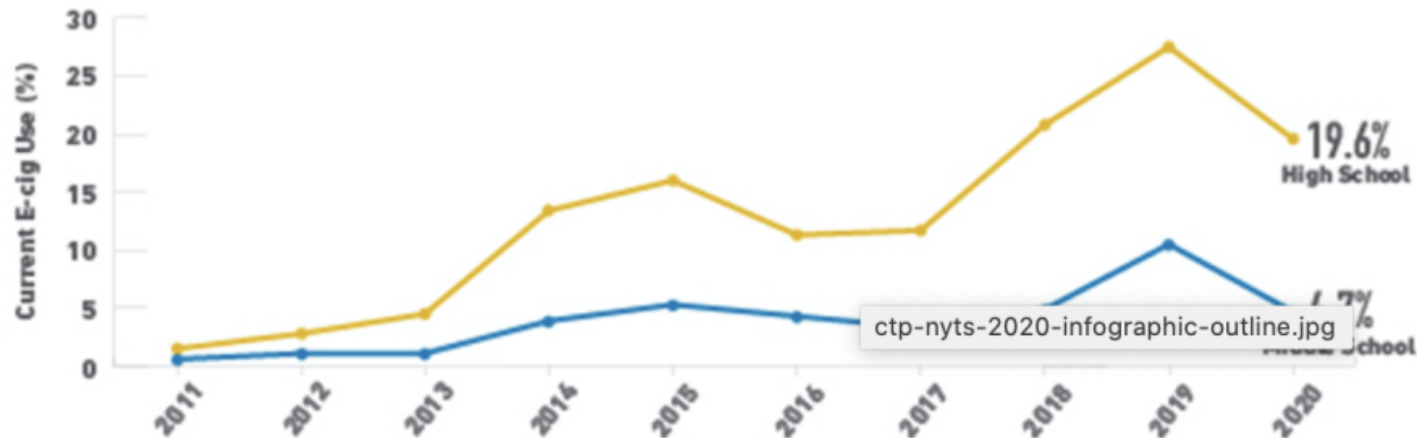
Findings show a sharp decline in youth e-cigarette use with

## 1.8 Million

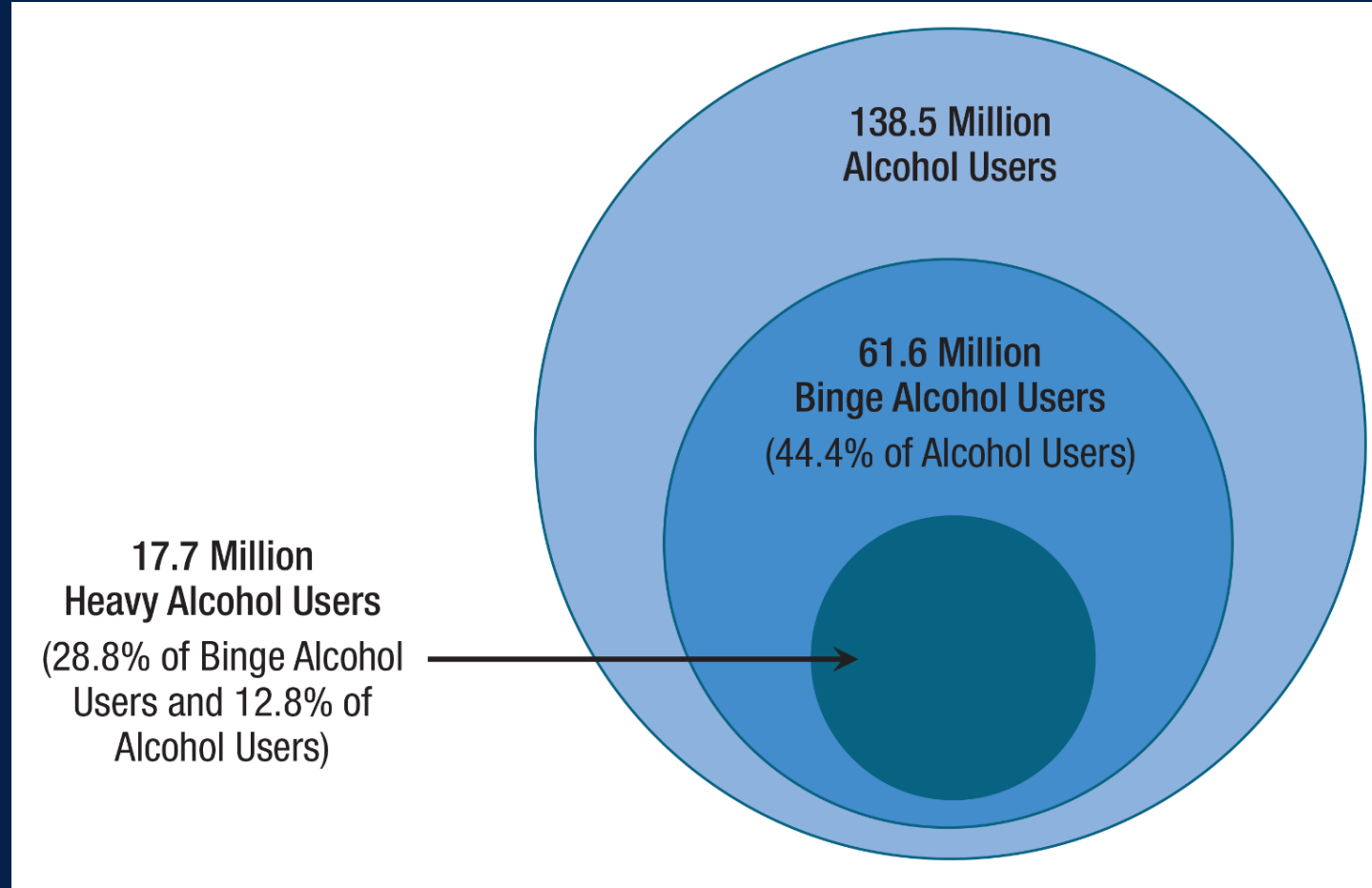
fewer users since last year

However, due to **alarming increases** since 2011, the number of current youth e-cig users remains **concerningly high:**

## 3.6 Million



# Current, Binge, and Heavy Alcohol Use: Among People Aged 12 or Older; 2020



- ◆ 73.4% of all SUDs in US are Alcohol (may be overlap).
- ◆ Half of all drinkers are binge/heavy drinkers.

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.

# 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



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

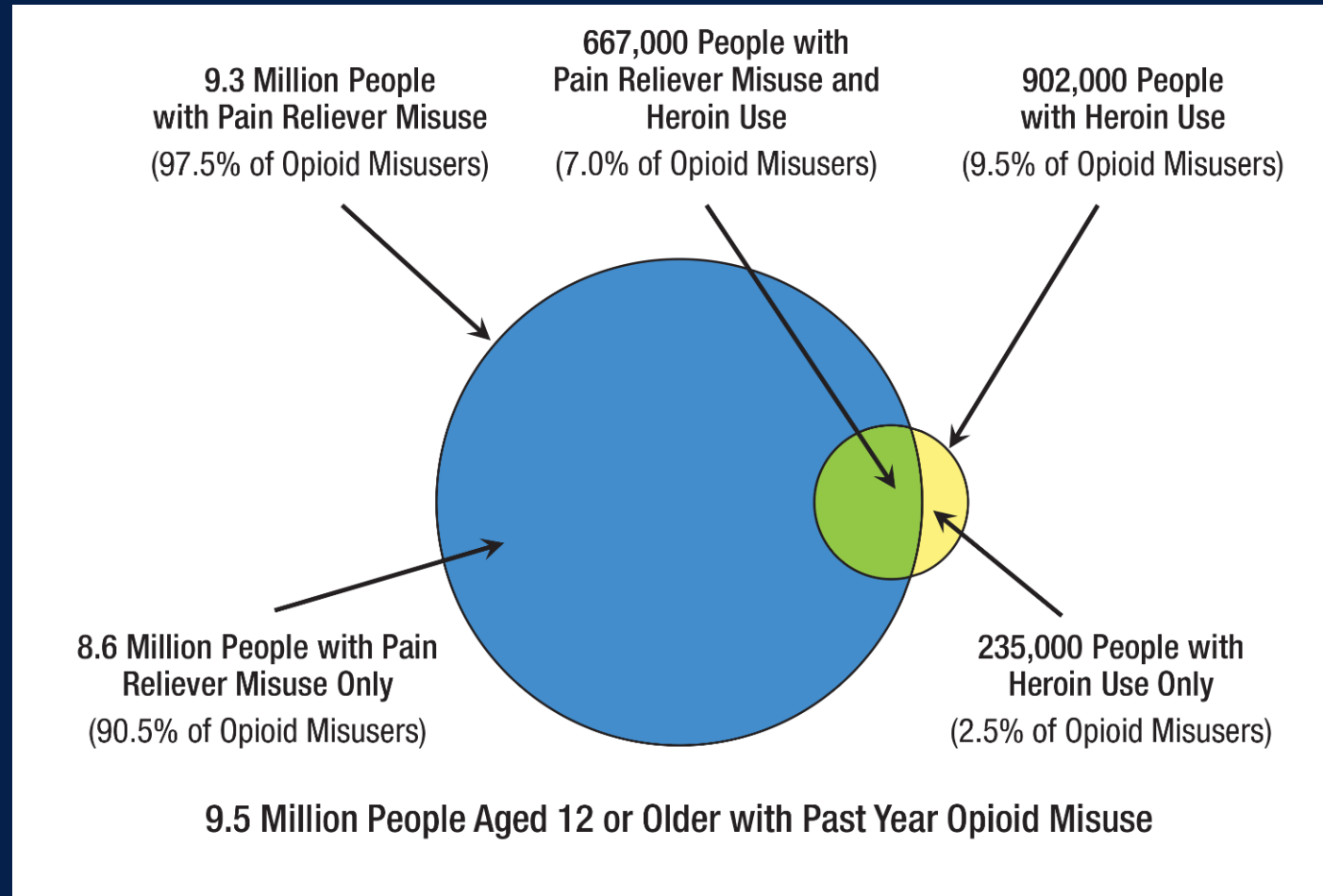
## BLOG

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

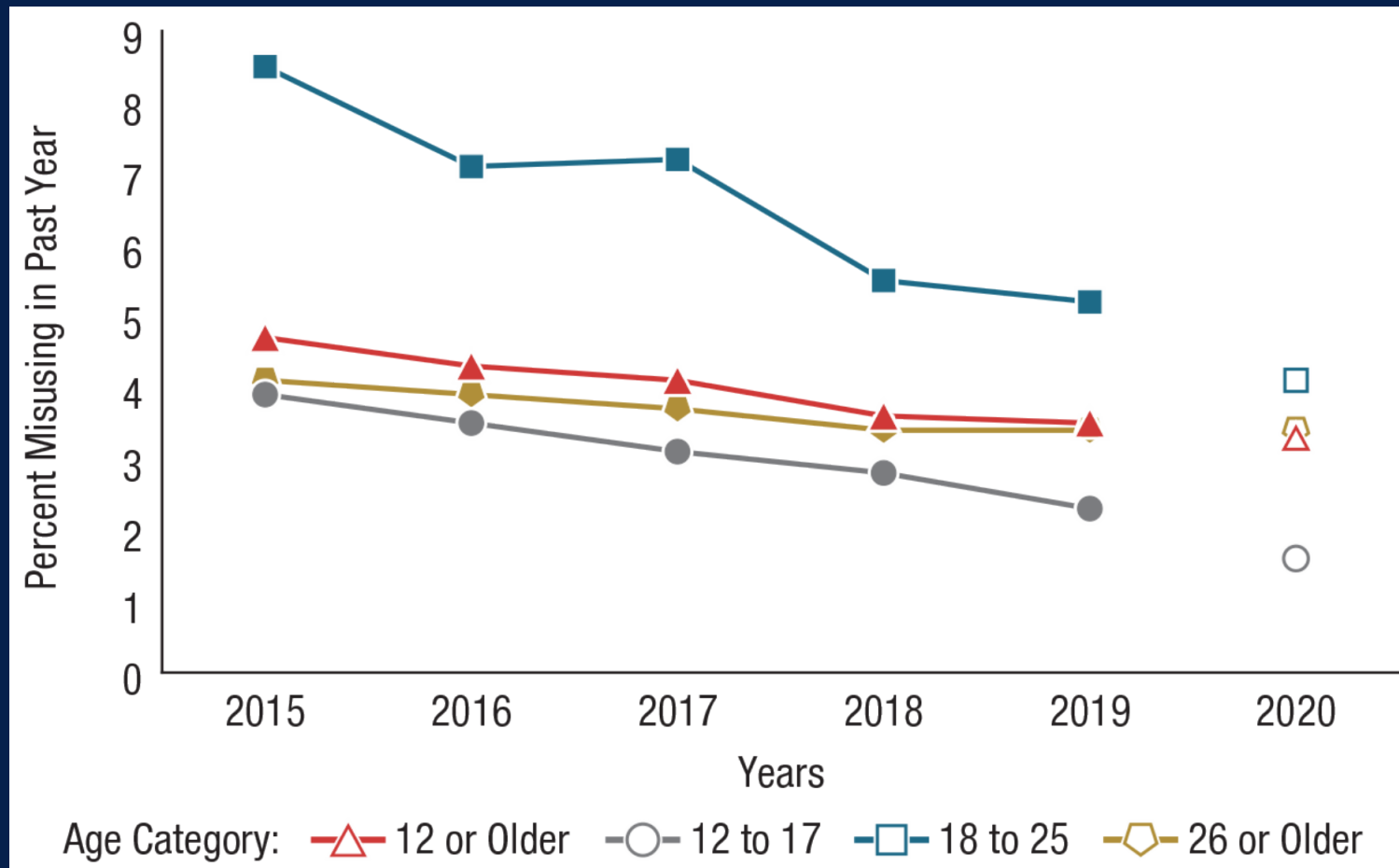
<https://www.caron.org/blog/alcohol-is-killing-more-people-than-the-opioid-epidemic>



# Opioid Misuse—Past Year (2020)

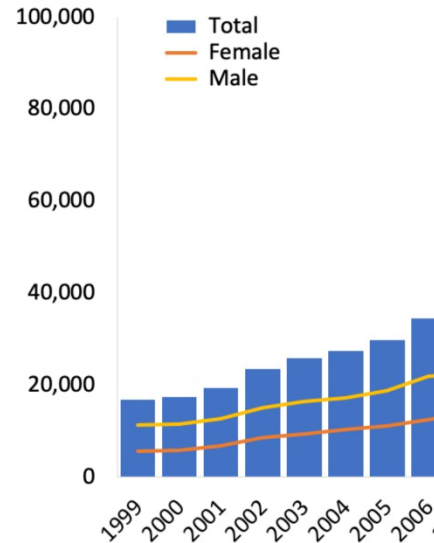


# Past Year Prescription Pain Reliever Misuse: Among People Aged 12 or Older; 2015-2020



# Yet...

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



\*Includes deaths with underlying causes of unintentional drug poisoning (X85), or drug poisoning of undetermined intent (Y90). 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%

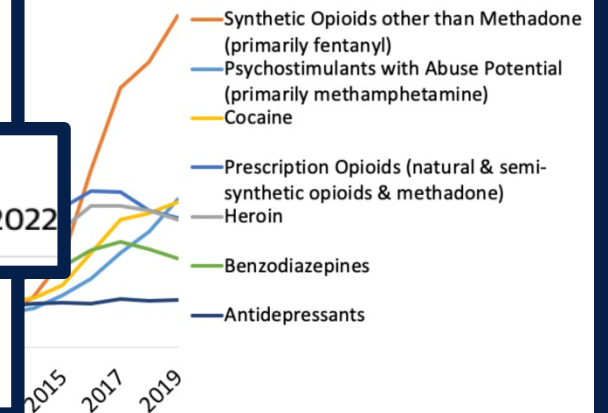
**A study found that more than 2m counterfeit pills were confiscated in the last quarter of 2021 alone**



**Erin McCormick**

12:00 UTC Thursday, 31 March 2022

**Involved Overdose Deaths\*,**  
All Ages, 1999-2019



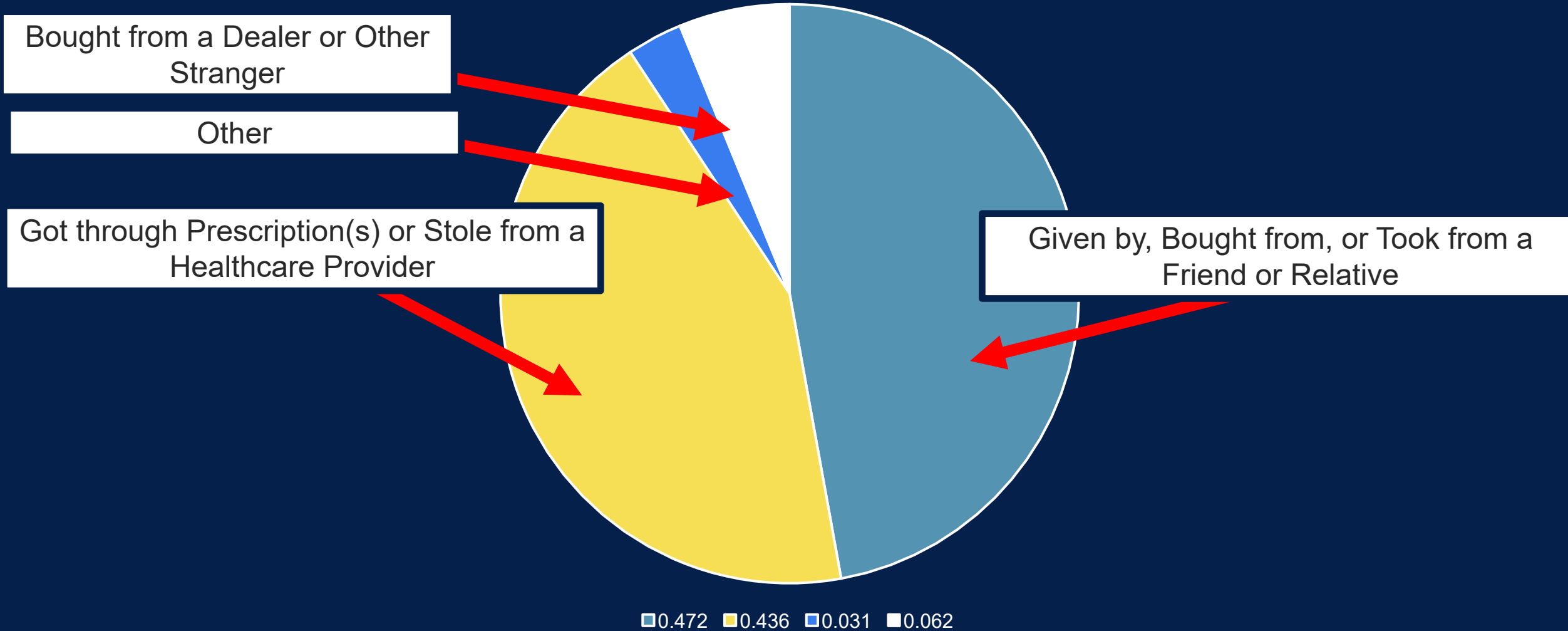
<https://www.theguardian.com/society/2022/mar/31/fentanyl-overdose-us-law-enforcement>

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.

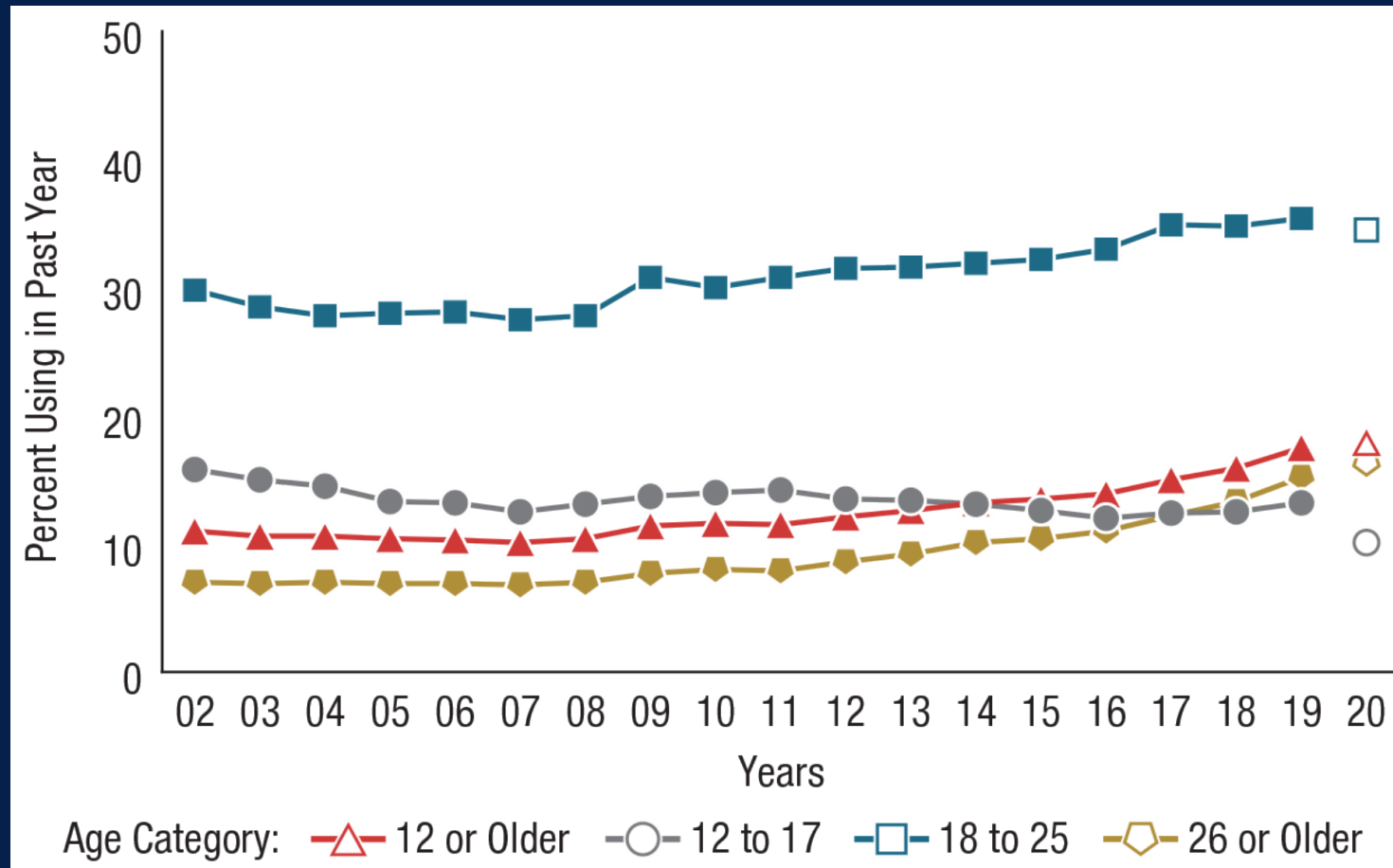
<https://www.drugabuse.gov/drug-topics/trends-statistics/overdose-death-rates>

# Opioids—Past Year

Where'd you get your misused prescription painkiller?

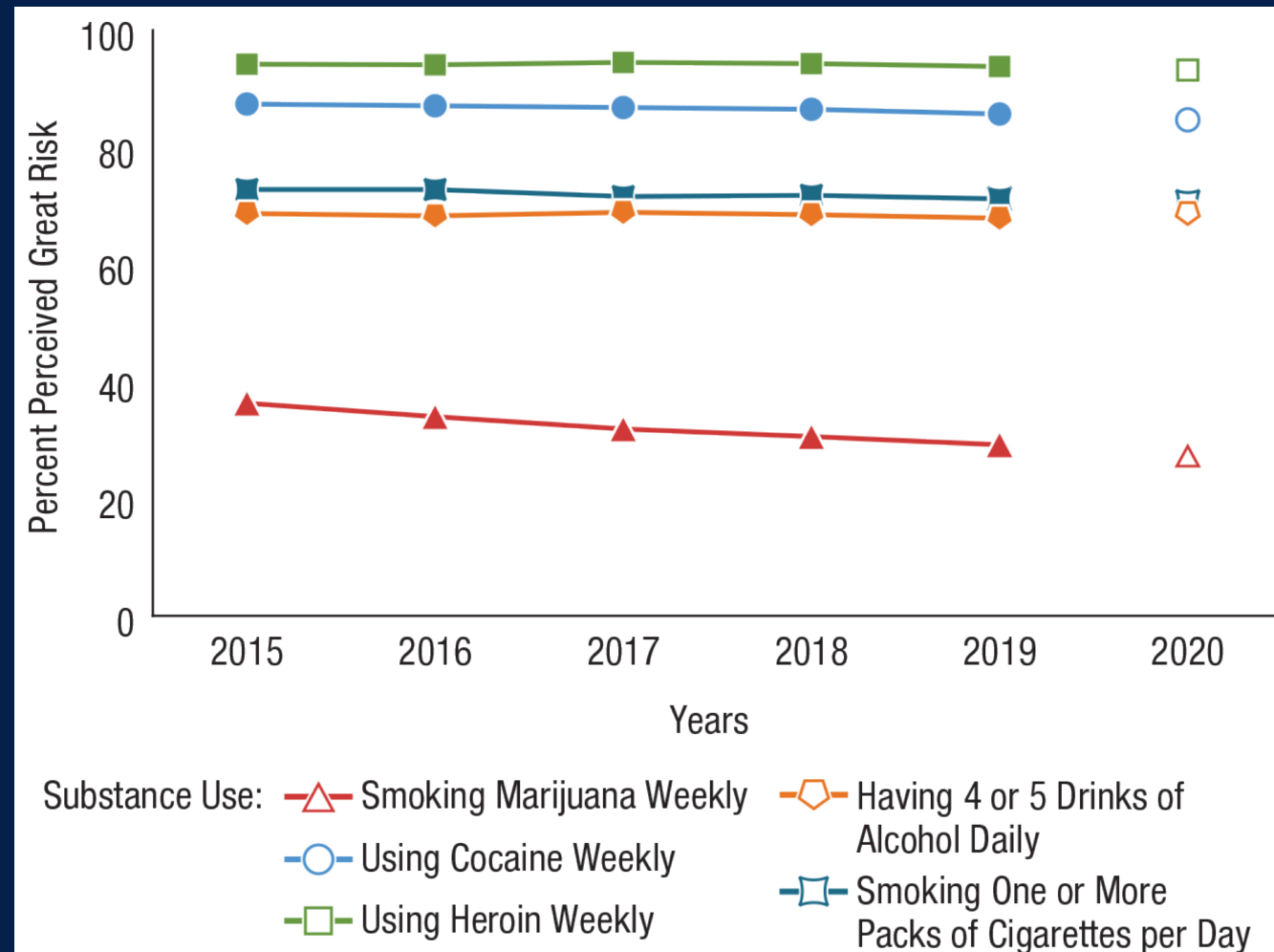


# Past Year Marijuana Use: Among People Aged 12 or Older; 2002-2020





# Perceived Great Risk from Substance Use: Among People Aged 12 or Older; 2015-2020



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

by Mason Carroll | Friday, May 13th 2022



High Times HEALTH NEWS ✓ Fact Checked

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

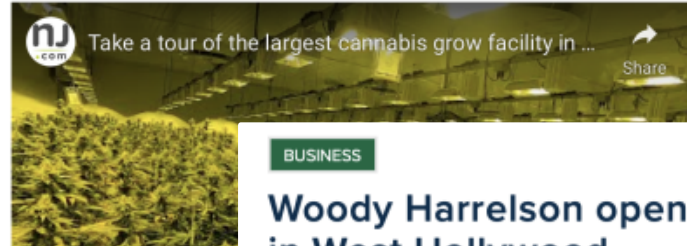


Written by Julia Ries on May 13, 2022 — Fact checked by Jennifer Chesak

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## 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."

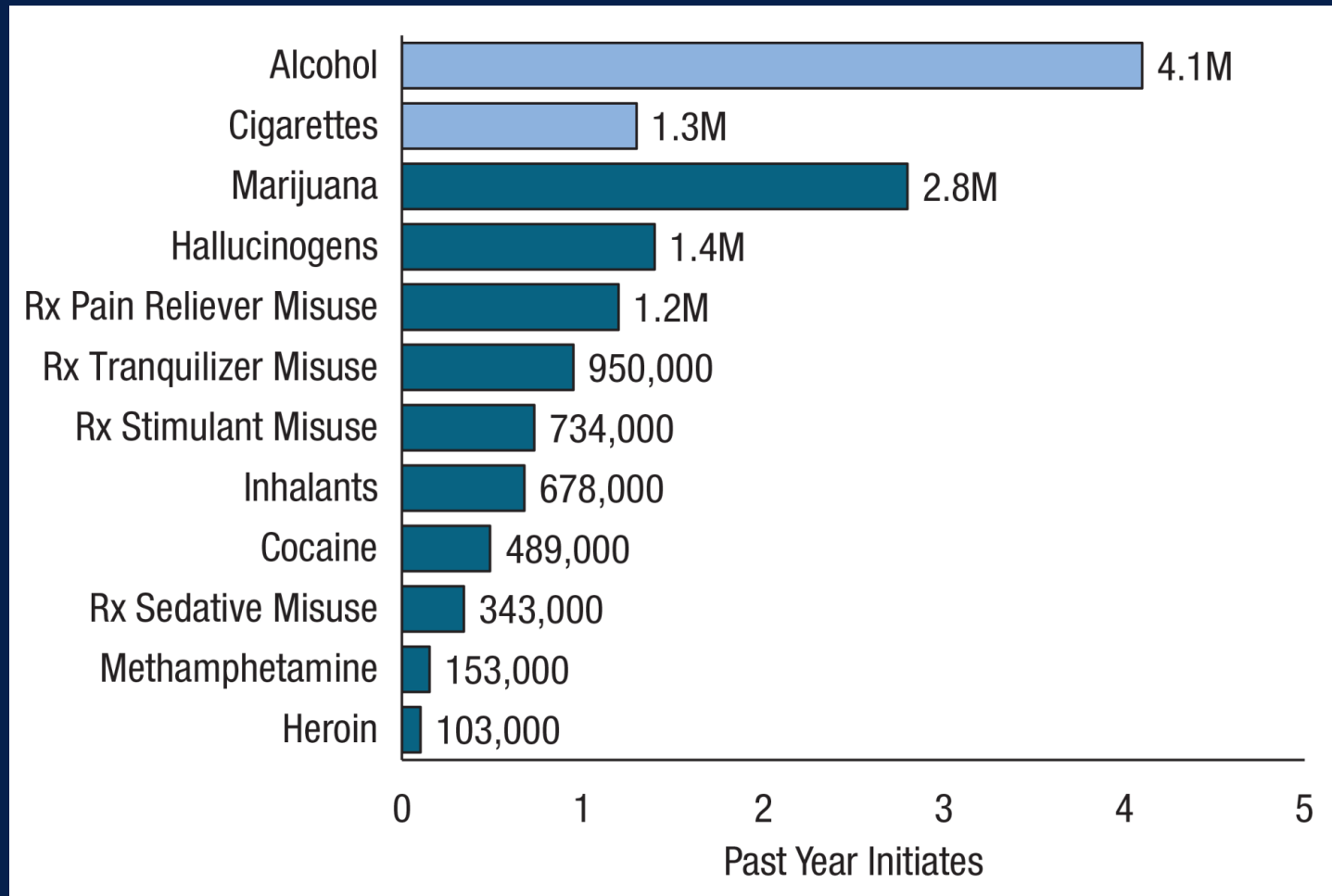
<https://www.hollywoodreporter.com/lifestyle/lifestyle-news/woody-harrelson-opens-cannabis-dispensary-the-woods-west-hollywood-1025140004/>

healthline

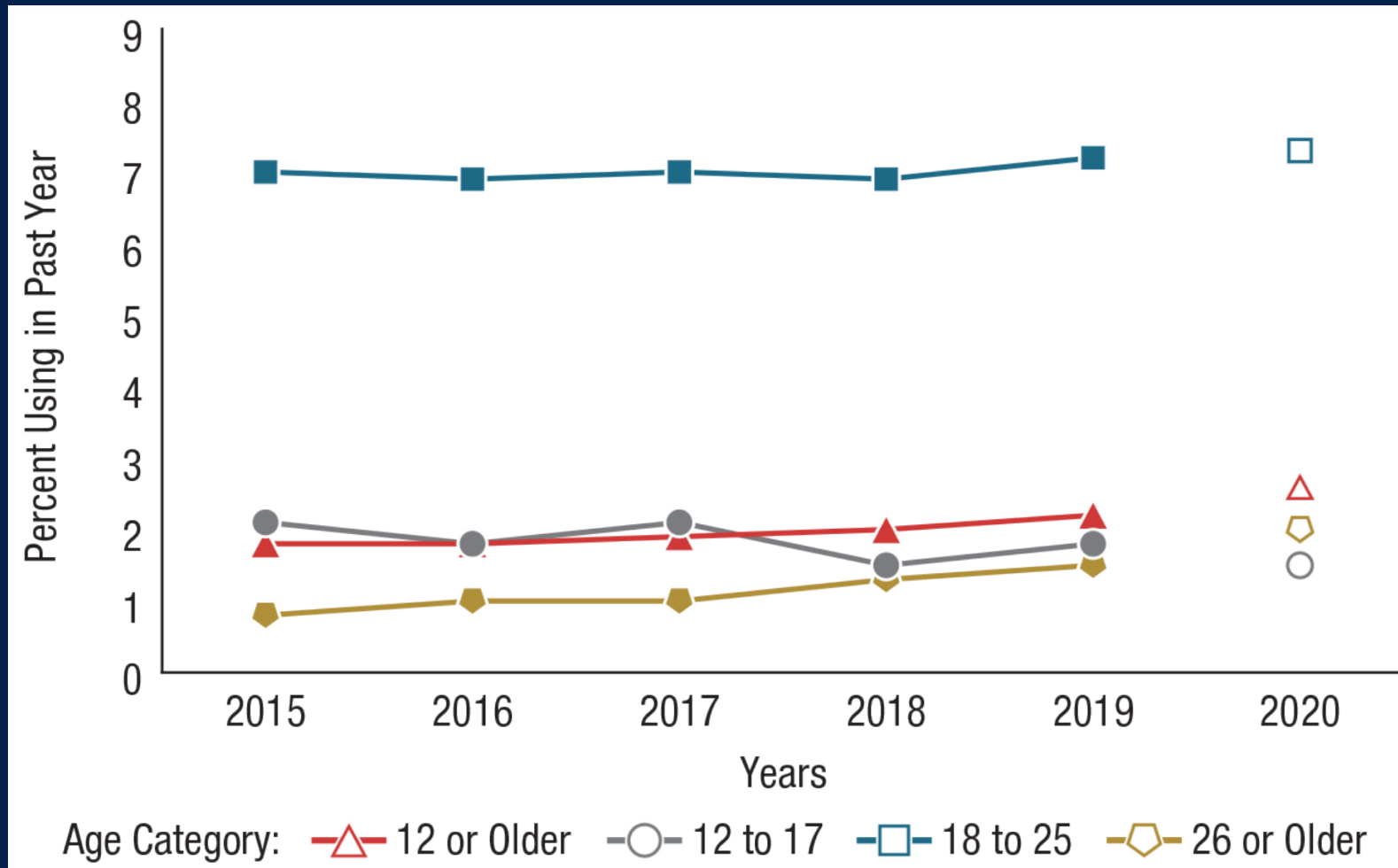
<https://www.healthline.com/health-news/fda-warns-companies-to-stop-making-false-claims-for-thc-and-cbd-products>



# Past Year Initiates of Substances: Among People Aged 12 or Older; 2020



# Past Year Hallucinogen Use: Among People Aged 12 or Older; 2015-2020



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

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](#).

## 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/LGB

	National Average (%)	African American (%)	Asian (%)	American Indian/Alaska Native (%)	Hispanic (%)	Native Hawaiian/Pacific Islander (%)	Sexual Minority (%)*
SUD Past Year (18+)	7.7	7.6	4.6	10.2	7.0	8.3	18.3
AUD Past Year (18-25)	9.3 (10.1)	5.3 (5.6)	7.4 (9.1)	12.9 (10.3)	8.7 (9.4)	na	12.0 (12.4)
Marijuana Use Past Year (18+)	18.0 (16.2)	20.0 (18.2)	7.9 (9.3)	20.4 (24.0)	15.2 (13.7)	14.6 (18.6)	43.6 (37.6)
Methamphetamine Past Year (26+)	0.8 (0.7)	0.3 (0.2)	0.1 (0.1)	2.3 (2.6)	0.8 (0.7)	1.6 (2.4)	3.6 (2.9)

**RED** = ABOVE national average

**BLUE** = BELOW national average

**PURPLE** = at national average

**( )** = 2018 percentages

\* Defined by SAMHSA as people who identify as lesbian, gay, or bisexual—NSDUH began collecting this data in 2015

<https://www.samhsa.gov/data/sites/default/files/reports/rpt31104/2019NSDUH-LGB/LGB%202019%20NSDUH.pdf>

<https://www.samhsa.gov/data/report/2019-nsduh-detailed-tables>



# Nearly Half of State Incarcerates Suffer From Substance Abuse: Survey

By **Blake Diaz** | July 14, 2021



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# 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

# So...



**NUMBERS**



U.S. Department of Health & Human Services

# ***SAMHSA***

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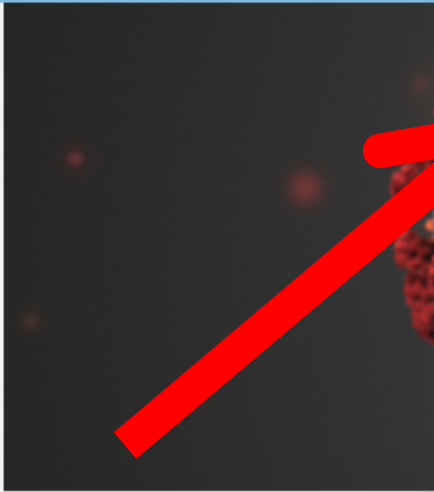
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# Let's Look at a Study...

- ◆ Question: Does Cannabis 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<sup>1</sup>, Marta Di Forti<sup>1</sup>, Cathryn M. Lewis<sup>2</sup>, Robin M. Murray<sup>1</sup>, and Evangelos Vassos<sup>\*,2</sup>

<sup>1</sup>Department of Psychosis Studies, King's College London, Institute of Psychiatry Psychology & Neuroscience, London, UK; <sup>2</sup>King's College London, Institute of Psychiatry Psychology & Neuroscience, MRC SGDP Centre, London, UK

\*To whom correspondence should be addressed; King's College London, Institute of Psychiatry Psychology & Neuroscience, MRC SGDP Centre, Box P082, De Crespigny Park, London SE5 8AF, UK; tel: +44-20-7848-5433, fax: +44-20-7848-0866, e-mail: [evangelos.vassos@kcl.ac.uk](mailto:evangelos.vassos@kcl.ac.uk)

# 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

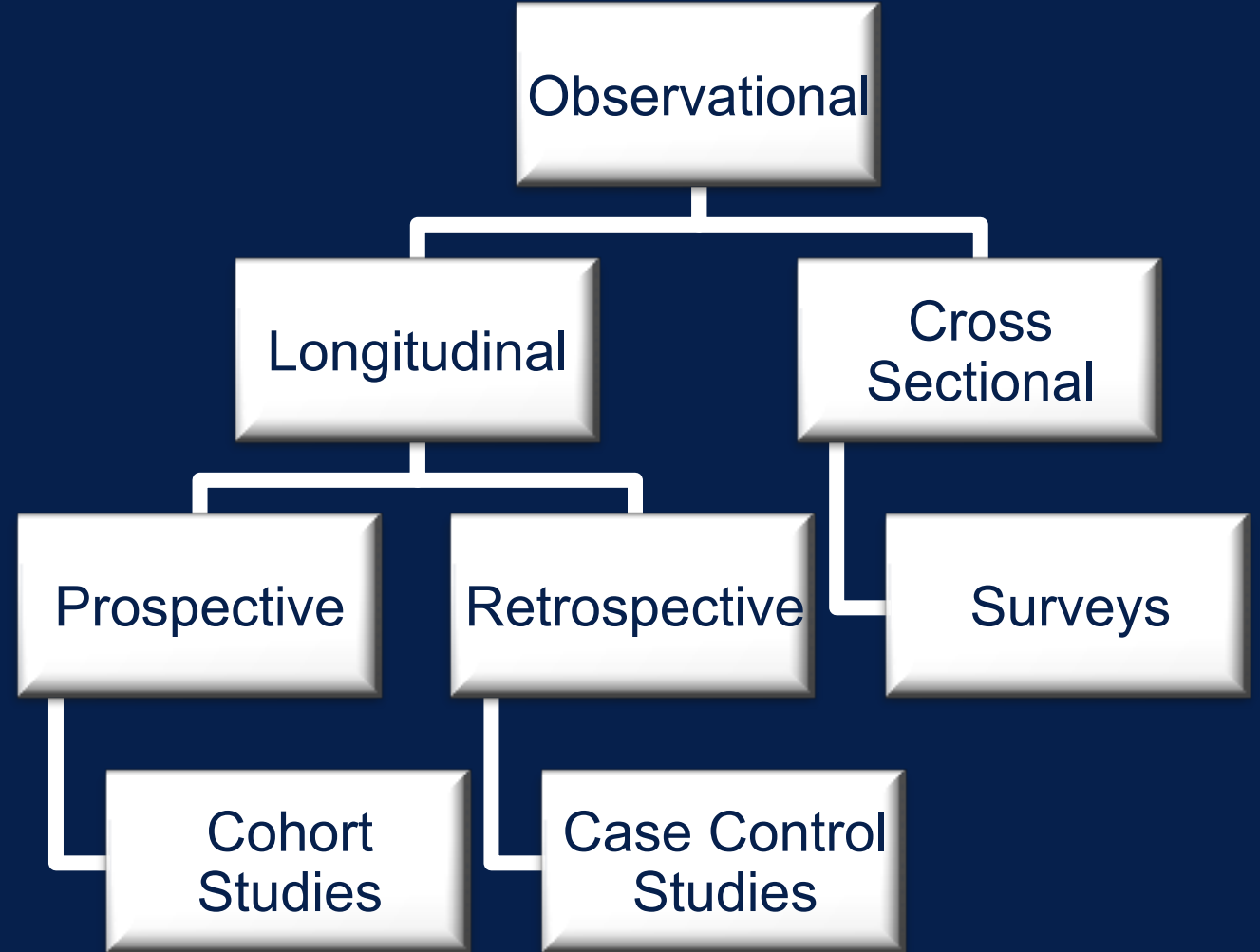
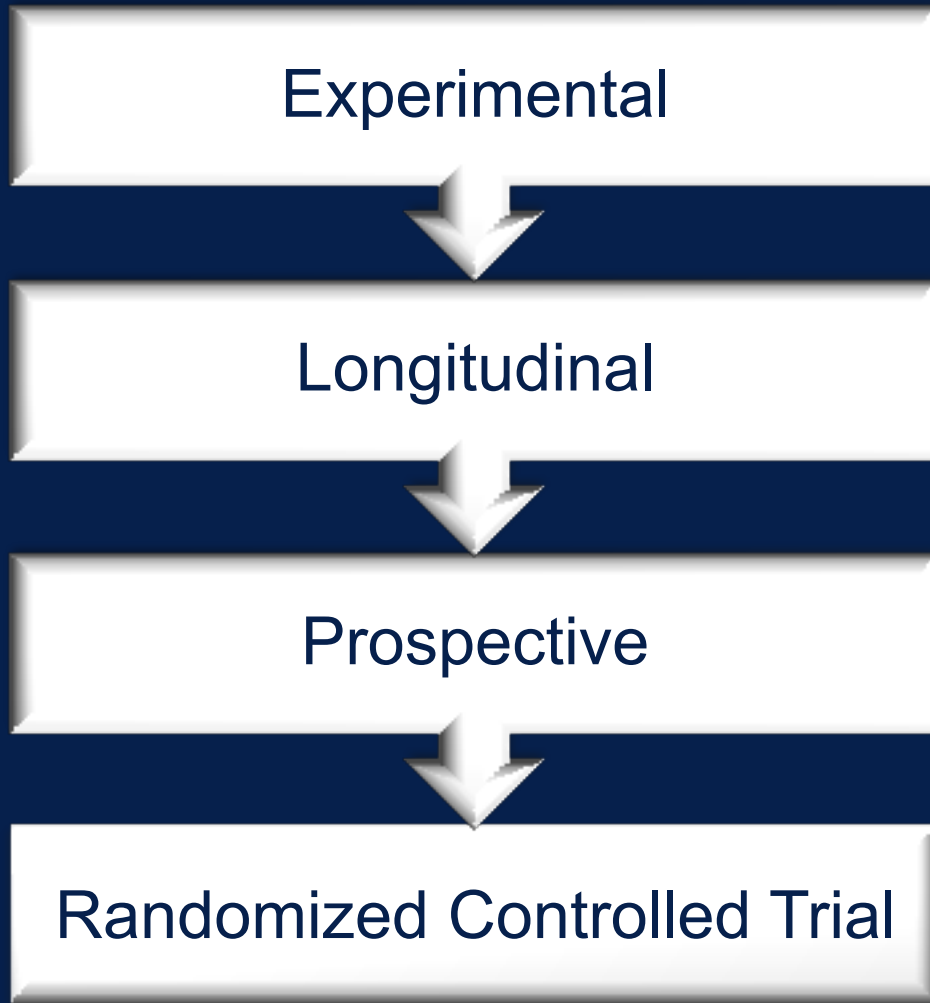
**What can we say about  
this study?**

# 1) Quality of evidence, based on study design.

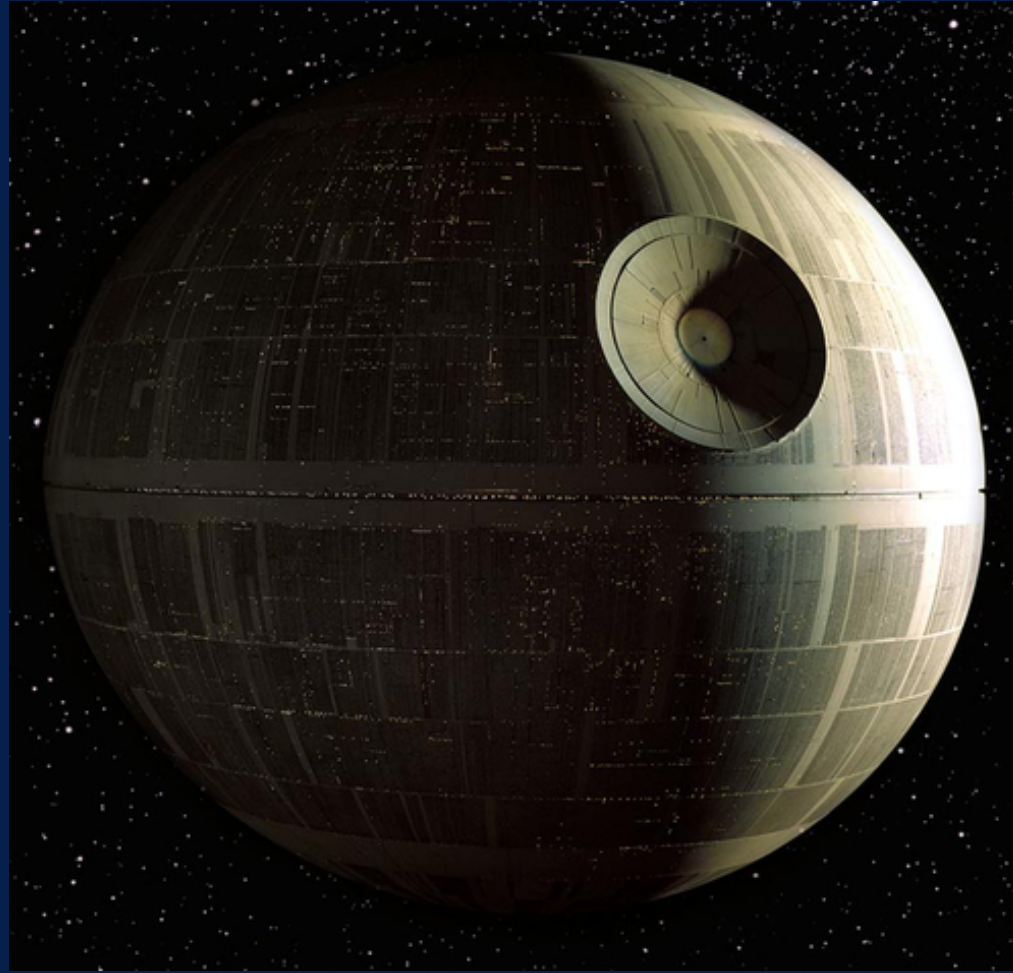




# Types of Studies



# Quantifying Risk...



# Quantifying Risk...

		Disease	
		⊕	⊖
Risk factor or intervention	⊕	a	b
	⊖	c	d

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

$$NNH = 1/AR$$

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

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

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

$$NNT = 1/ARR$$

# Odds Ratio--more

- ◆ What is an odds ratio?

## Ratio of Odds

- ◆ The higher the odds ratio, the stronger the association between the exposure and the outcome appears to be.
- ◆ If the odds ratio is 1, then that means that the ratio of the odds shows NO ASSOCIATION between the exposure and the outcome.
- ◆ 
$$\frac{\text{(Those with the disease who were exposed / those with the disease not exposed)}}{\text{(those without disease exposed / those without the disease not exposed)}}$$

# Odds Ratio—An Example

- Imagine: The relationship between getting breast cancer and driving an American car vs. not.
  - If there is no correlation between these two, then the ratio of those with disease who drove American cars/those with the disease who didn't, would be close to 1, and a 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...

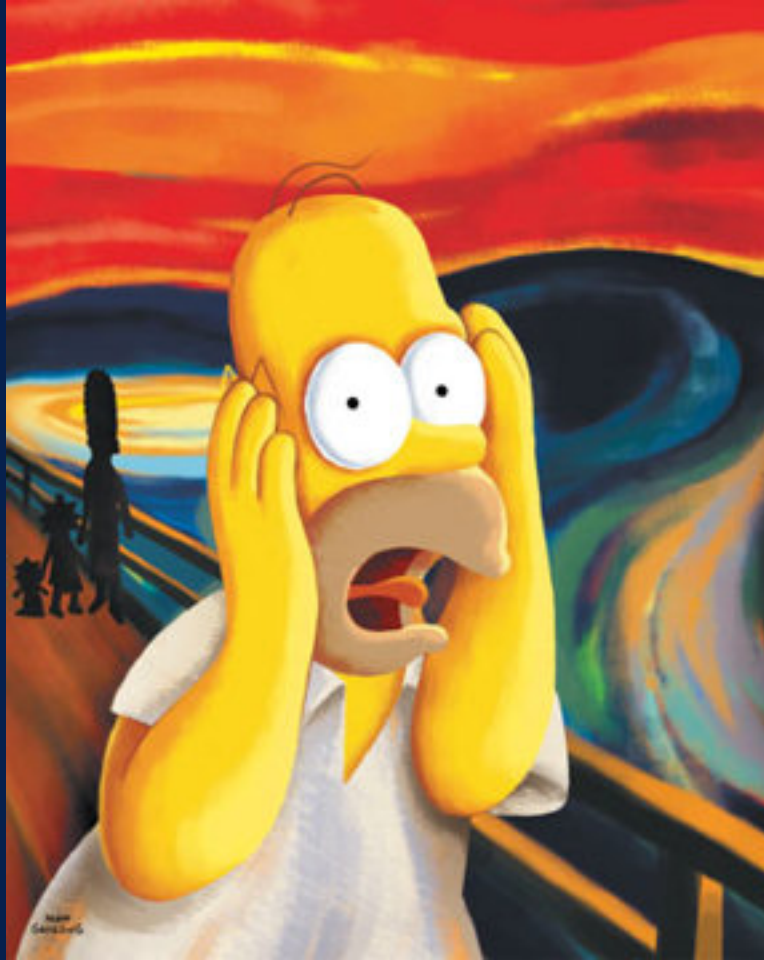
## 2) An ASSOCIATION Was Found

- ◆ 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 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”!





# Oh No, Not the “Null Hypothesis”!

		Reality	
		$H_1$	$H_0$
Study results support:	$H_1$	Power ( $1 - \beta$ )	$\alpha$ Type I error
	$H_0$	$\beta$ Type II error	Correct

# Oh No, Not the “Null Hypothesis”!

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

		Reality	
		$H_1$	$H_0$
Study results support:	$H_1$	Power ( $1 - \beta$ )	$\alpha$ Type I error
	$H_0$	$\beta$ Type II error	Correct

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

## 2) An Association Was Found

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

**Why 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

		Disease		
		⊕	⊖	
Test	⊕	TP	FP	PPV = $TP / (TP + FP)$
	⊖	FN	TN	NPV = $TN / (TN + FN)$
		Sensitivity = $TP / (TP + FN)$		Specificity = $TN / (TN + FP)$

**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!





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