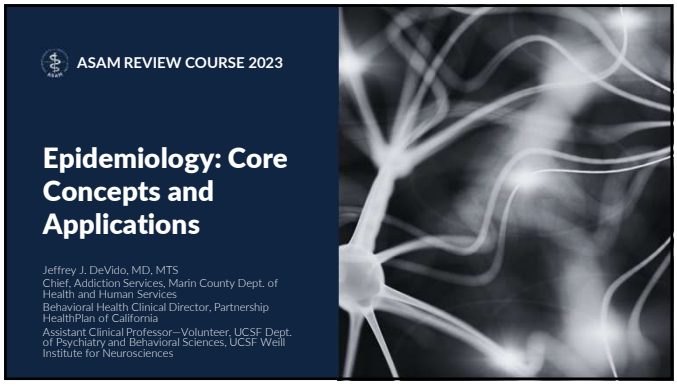
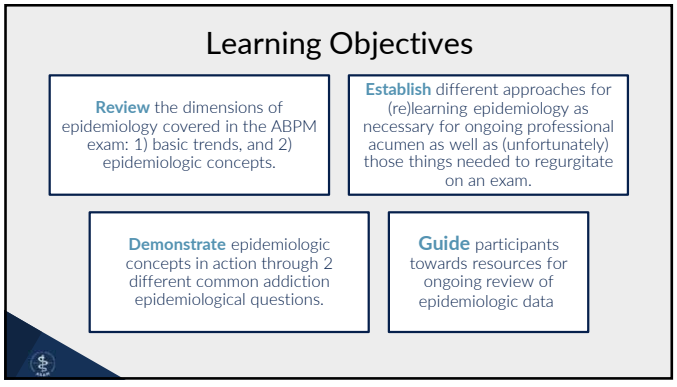

ASAM REVIEW COURSE 2023
Epidemiology: Core Concepts and Applications
Jeffrey J. DeVido, MD, MTS
Chief, Addiction Services, Marin County Dept. of Health and Human Services
Behavioral Health Clinical Director, Partnership HealthPlan of California
Assistant Clinical Professor—Volunteer, UCSF Dept. of Psychiatry and Behavioral Sciences, UCSF Weill Institute for Neurosciences

1


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.
REVIEW COURSE 2023

2


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

3

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

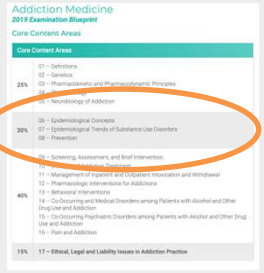
4

Two Ways to Think about Epidemiology

- What do I need to know for the test?
- What might I need to know professionally?

5

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 – Neurobiology of Addiction
20%	06 – Epidemiological Concepts 07 – Epidemiological Trends of Substance Use Disorders 08 – Prevention
40%	09 – Screening, Assessment, and Brief Intervention 10 – Withdrawal Management and Outpatient 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/

6

For the Test Strategy:

Some assumptions:

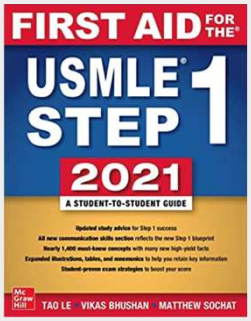
- All of you have had some rudimentary epidemiology/biostatistics
- Most of you have seen these concepts multiple times
- For the most part, you don't use these concepts as much as they come up on tests
- You scribble some notes on a cheat sheet to remind yourself as you're studying
- When you've been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

7

For the Test Strategy:

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

8



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

9

So…

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

10

Let's Do A Quick Matching Exercise:

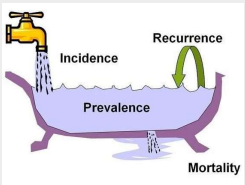
- Incidence
- Prevalence

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

11

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)



http://image.slidesharecdn.com/measurementinepidemiology-141121024727-conversion-gate01/95/measurements-in-epidemiology-15-638.jpg?cb=1416559706

12

Let's Start with A Quick Matching Exercise:

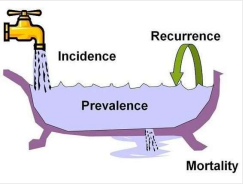
- Incidence
- Prevalence

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

13

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



http://image.slidesharecdn.com/measurementinepidemiology-141121024727-conversion-gate01/95/measurements-in-epidemiology-15-638.jpg?cb=1416559706

14

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

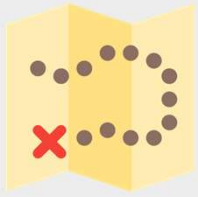
Tertiary Prevention

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/

15

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

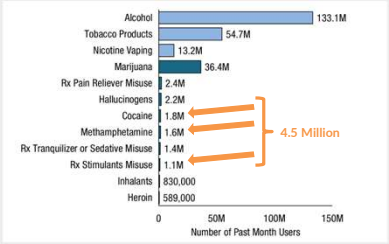


16

First: Big Picture

17

2021 NSDUH Prevalence: Past Month General Substance Use and Nicotine Vaping: Among People Aged 12 or Older; 2021



Rx = prescription.

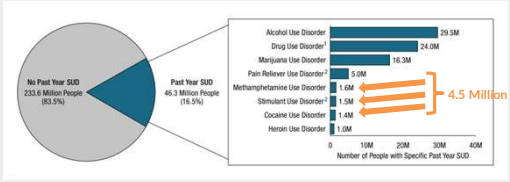
Note: General Substance Use includes any illicit drug, alcohol, and tobacco product use. Tobacco products are defined as cigarettes, smokeless tobacco, cigars, and pipe tobacco.

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.

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

18

People Aged 12 or Older with a Past Year Substance Use Disorder (SUD); 2021



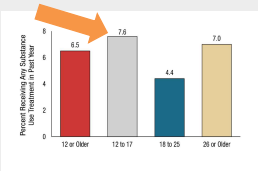
Note: The estimated numbers of people with substance use disorders are not mutually exclusive because people could have use disorders for more than one substance.
[1] Includes data from all past year users of marijuana, cocaine, heroin, hallucinogens, inhalants, methamphetamine, and prescription psychotherapeutic drugs (i.e., pain relievers, tranquilizers, stimulants, or sedatives).
[2] Includes data from all past year users of the specific prescription drug.

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

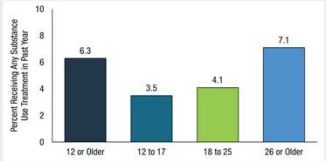
19

But do people get treatment?

2020



2021

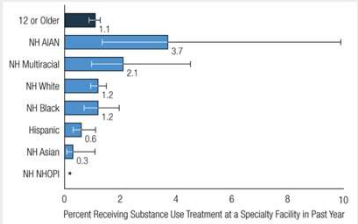


https://www.samhsa.gov/data/sites/default/files/reports/rpt39443/2021_NNR_figure_slides.pdf

20

But do people get treatment?

2021

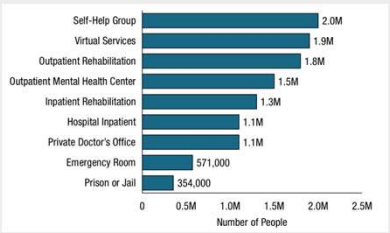


* Low precision; no estimate reported.
AIAN = American Indian or Alaska Native; Black = Black or African American; Hispanic = Hispanic or Latino; NH = Not Hispanic or Latino; NHOPI = Native Hawaiian or Other Pacific Islander.
Note: Error bars were calculated as 98 percent confidence intervals. Wider error bars indicate less precise estimates. Large apparent differences between groups may not be statistically significant.

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

21

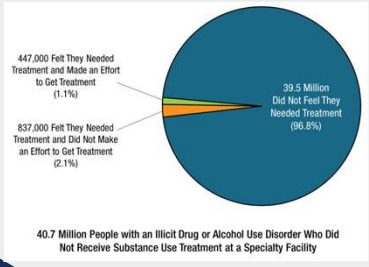
For the people who do get "treatment" where do people get it?



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

22

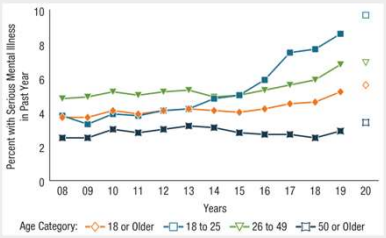
Perceived NEED for treatment (2020)



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

23

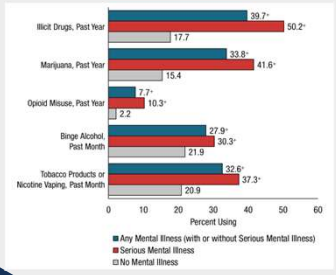
Serious Mental Illness in the Past Year: Among Adults Aged 18 or Older; 2008-2020



https://www.samhsa.gov/data/release/2020-national-survey-drug-use-and-health-nsduh-releases

24

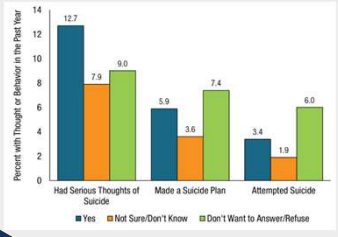
Substance Use: Among Adults Aged 18 or Older; by Mental Illness Status, 2021



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

25

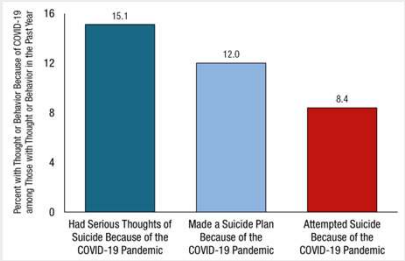
Had Serious Thoughts of Suicide, Made a Suicide Plan, or Attempted Suicide in the Past Year: Among Youths Aged 12 to 17; 2021



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

26

Suicidal thinking as a function of pandemic; 12-17 youth: 2021



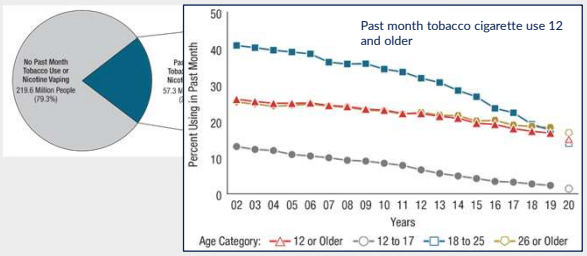
https://www.samhsa.gov/data/sites/default/files/reports/rpt39443/2021_NNR_figure_slides.pdf

27

Second: Looking a little closer by substance

28

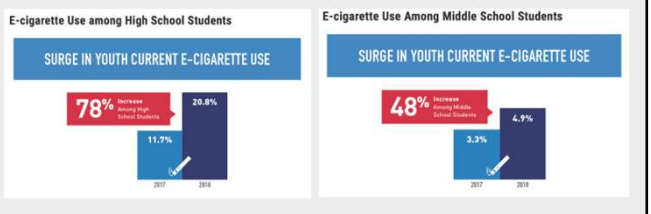
Tobacco, 2020



https://www.samhsa.gov/data/release/2020-national-survey-drug-use-and-health-nsduh-releases

29

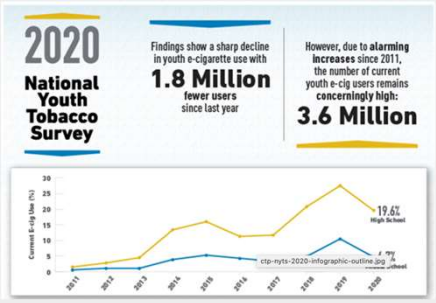
E-Cigarettes



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

30

But(t):

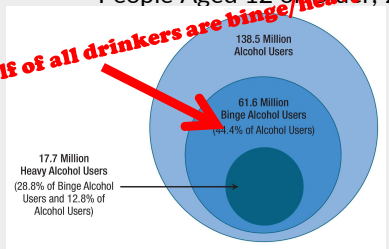


https://www.fda.gov/tobacco-products/youth-and-tobacco/youth-tobacco-use-results-national-youth-tobacco-survey

31

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

> Half of all drinkers are binge/heavy drinkers



73.4% 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/data-we-collect/nsduh-national-survey-drug-use-and-health

32

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

33

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

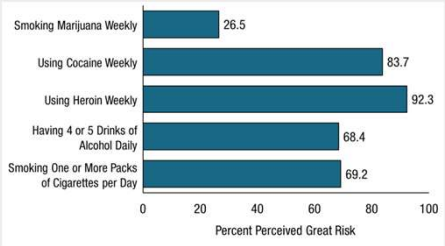
34

Yet…

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

35

Perceived Great Risk from Substance Use: Among People Aged 12 or Older; 2021

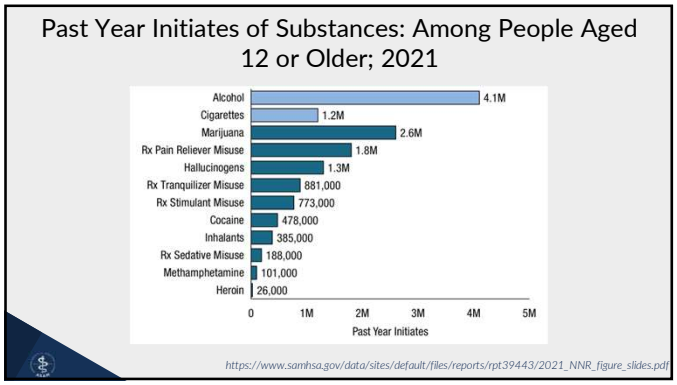


https://www.samhsa.gov/data/sites/default/files/reports/rpt39443/2021_NNR_figure_slides.pdf

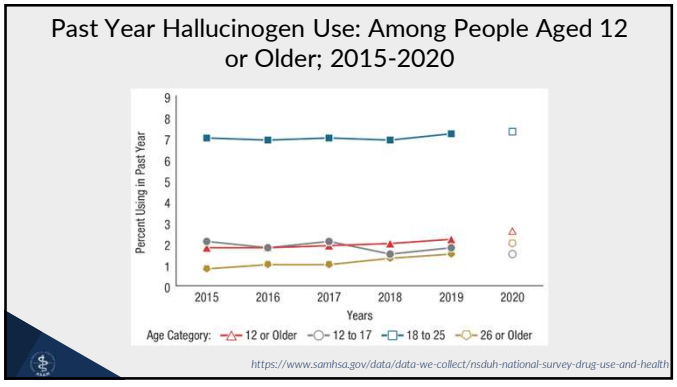
36


You can become a judge in High Times' "Cannabis Cup" and pick your favorite product!
A beginner's guide to weed: How to choose the right strain for you
Woody Harrelson opens The Woods cannabis dispensary in West Hollywood
FDA Warns Companies to Stop Making False Claims for THC and CBD Products
https://www.healthline.com/health-news/fda-warns-companies-to-stop-making-false-claims-for-thc-and-cbd-products
https://www.hollywoodreporter.com/lifestyle/lifestyle-news/woody-harrelson-opens-cannabis-dispensary-the-woods-west-hollywood-
healthline

37


Past Year Initiates of Substances: Among People Aged 12 or Older; 2021
Alcohol 4.1M
Cigarettes 1.2M
Marijuana 2.6M
Rx Pain Reliever Misuse 1.8M
Hallucinogens 1.3M
Rx Tranquilizer Misuse 881,000
Rx Stimulant Misuse 773,000
Cocaine 478,000
Inhalants 385,000
Rx Sedative Misuse 188,000
Methamphetamine 101,000
Heroin 26,000
0 1M 2M 3M 4M 5M
Past Year Initiates
https://www.samhsa.gov/data/sites/default/files/reports/rpt39443/2021_NNR_figure_slides.pdf

38


Past Year Hallucinogen Use: Among People Aged 12 or Older; 2015-2020
Percent Using in Past Year
0 1 2 3 4 5 6 7 8 9
2015 2016 2017 2018 2019 2020
Years
Age Category: 12 or Older 12 to 17 18 to 25 26 or Older
https://www.samhsa.gov/data/data-we-collect/nsduh-national-survey-drug-use-and-health

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Third: Other Important Parts of the Story

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Race/Ethnicity 2021

	National Average (%)	Black (%)	Asian (%)	American Indian/Alaska Native (%)	Hispanic (%)	Hawaiian/Pacific Islander (%)
Past Month Binge Alcohol Use (12+)	21.5	21.6	10.7	21.2	22.9	**
Past Month Heavy Alcohol Use (12+)	5.8	5.2	1.9	7.2	4.7	5.6
Past Year Illicit Drug Use (12+)	21.9	24.3	11.1	36.1	19.4	**
Past Year Marijuana Use (12+)	18.7	21.3	8.6	35	15.8	**
Past Year SUD (12+)	16.5	17.2	8	27.6	15.7	20.7
Suicidal Thinking Past Year (12+)	4.8	4.6	2.6	8.5	4.9	7.4

https://www.samhsa.gov/data/sites/default/files/reports/rpt31104/2019NSDUH-LGBA/LGBN202019%20NSDUH.pdf
https://www.samhsa.gov/data/report/2019-nsduh-detailed-tables

https://www.samhsa.gov/data/release/2021-national-survey-drug-use-and-health-nsduh-releases#annual-national-report

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Sexual Minority* 2021

	Straight (%)	Bisexual (%)	Gay (%)	Lesbian (%)
Binge Alcohol Use Past Month (18+)	22.5	33.1	33.1	28.0
Illicit Drug Use Past Month (18+)	13.3	37.7	31.3	25.3
Marijuana Use Past Month (18+)	12.2	35.2	24.7	21.7
Opioid Misuse Past Month (18+)	0.9	4.9	3.3	2.5
SUD Past Year (18+)	15.9	34.2	31.1	25.0
Suicidal Thoughts Past Year (18+)	3.7	22	14.2	9.5

* 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/release/2021-national-survey-drug-use-and-health-nsduh-releases#annual-national-report

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Nearly Half of State Incarcerees Suffer From Substance Abuse: Survey

By Blake Diaz | July 14, 2021

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https://thecrimereport.org/2021/07/14/nearly-half-of-state-incarcerees-suffer-from-substance-abuse-survey/

44

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

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

45

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[*,1]

[1]Department of Psychosis Studies, King's College London, Institute of Psychiatry Psychology & Neuroscience, London, UK; [2]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

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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

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What can we say about this study?

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1) Quality of evidence, based on study design.

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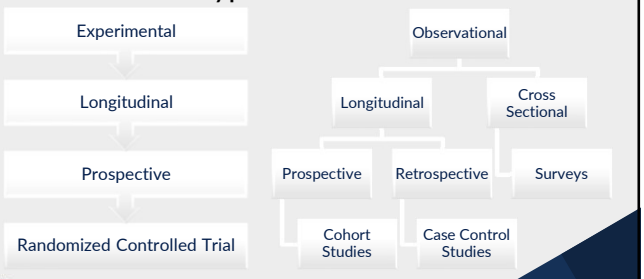
Types of Studies



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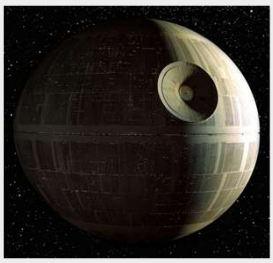
Quantifying Risk…



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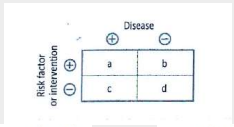
Quantifying Risk…



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

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

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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)

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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

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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

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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)

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Oh No, Not the "Null Hypothesis"!!!

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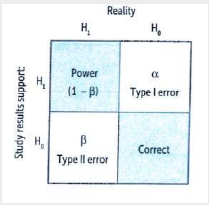
Oh No, Not the "Null Hypothesis"!!!



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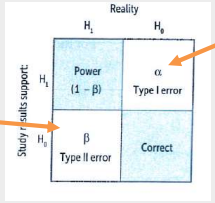
Oh No, Not the "Null Hypothesis"!!!

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

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2) An Association Was Found

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

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Why the heck is his urine toxicology screen negative?

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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?

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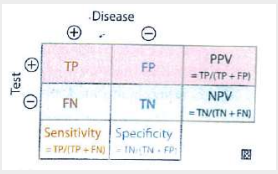
Sensitivity vs. Specificity



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

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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

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Whew!....

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

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3 CME Questions

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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

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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

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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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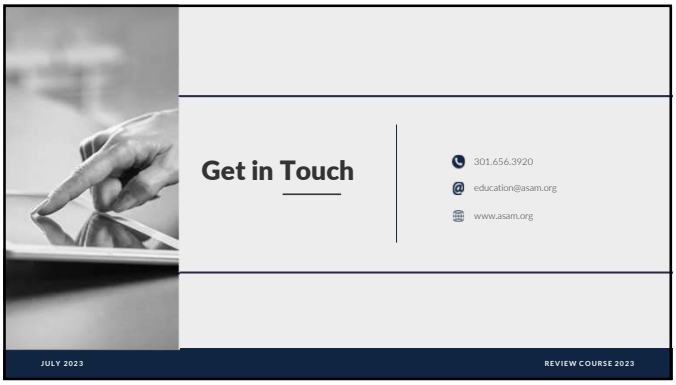

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