

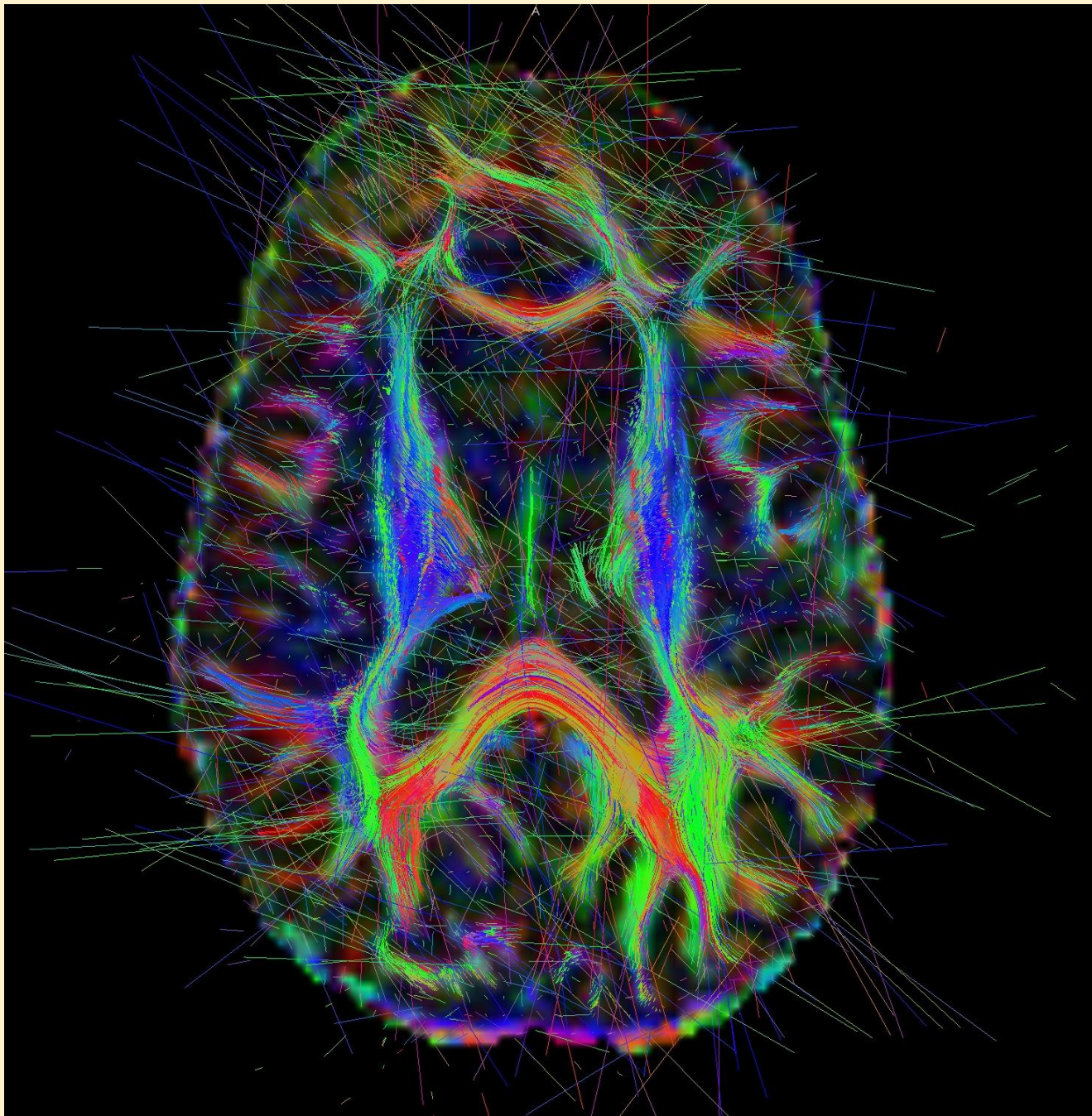
# THE ADOLESCENT BRAIN

## *& The Physiology of Addiction*

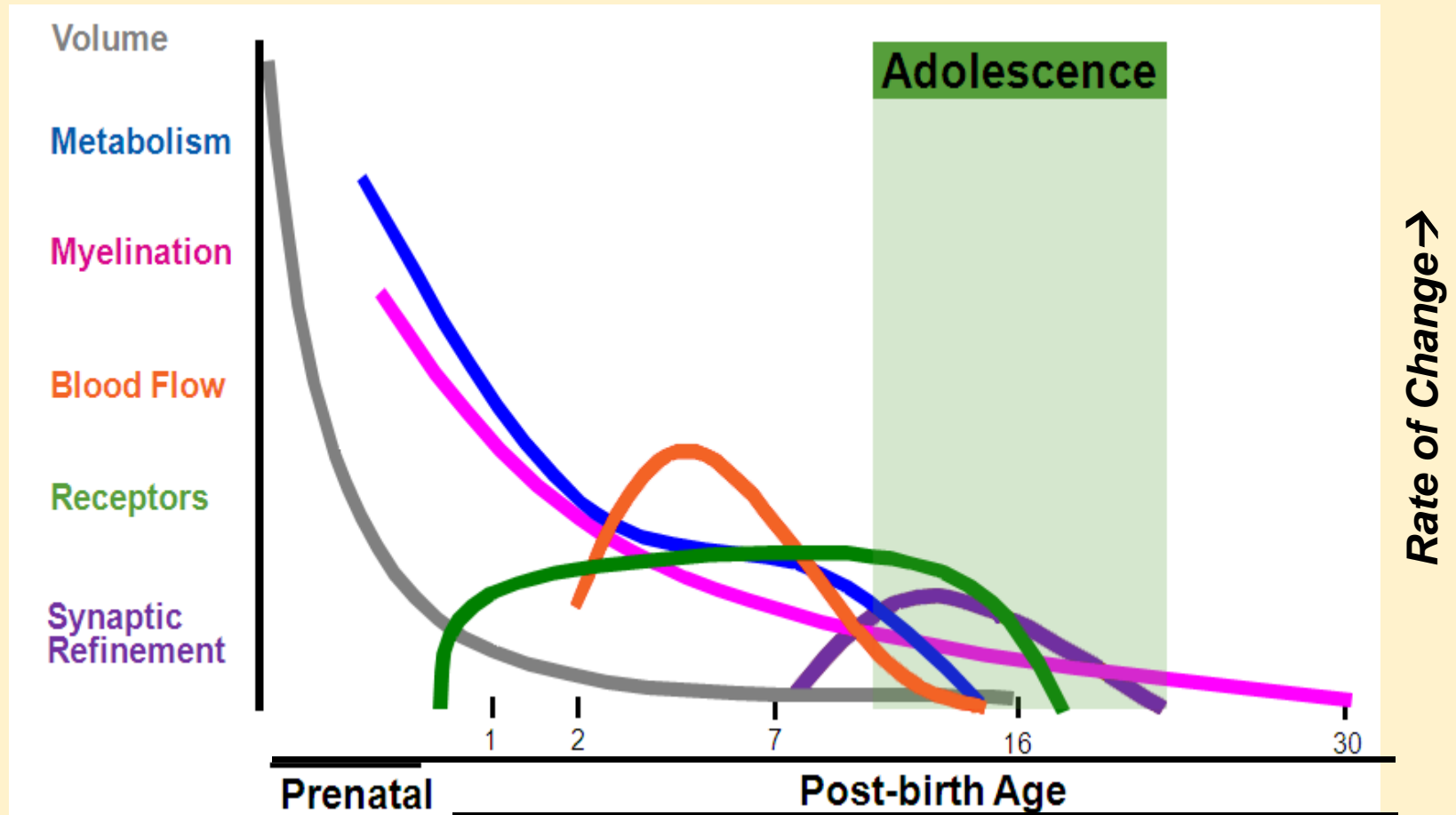
Ruth A. Potee, MD

Family Physician & Addictionologist, Valley Medical Group  
Medical Director, Franklin County House of Corrections  
Medical Director, Franklin Recovery Center  
Medical Director, Pioneer Valley Regional School District  
Chair, Department of Medicine, Baystate – Franklin Medical Center  
Co-Chair – Healthcare Solutions of the Opioid Taskforce

*Thanks to Tess Jurgensen and the OTF of Franklin County  
and North Quabbin for organizing these forums*

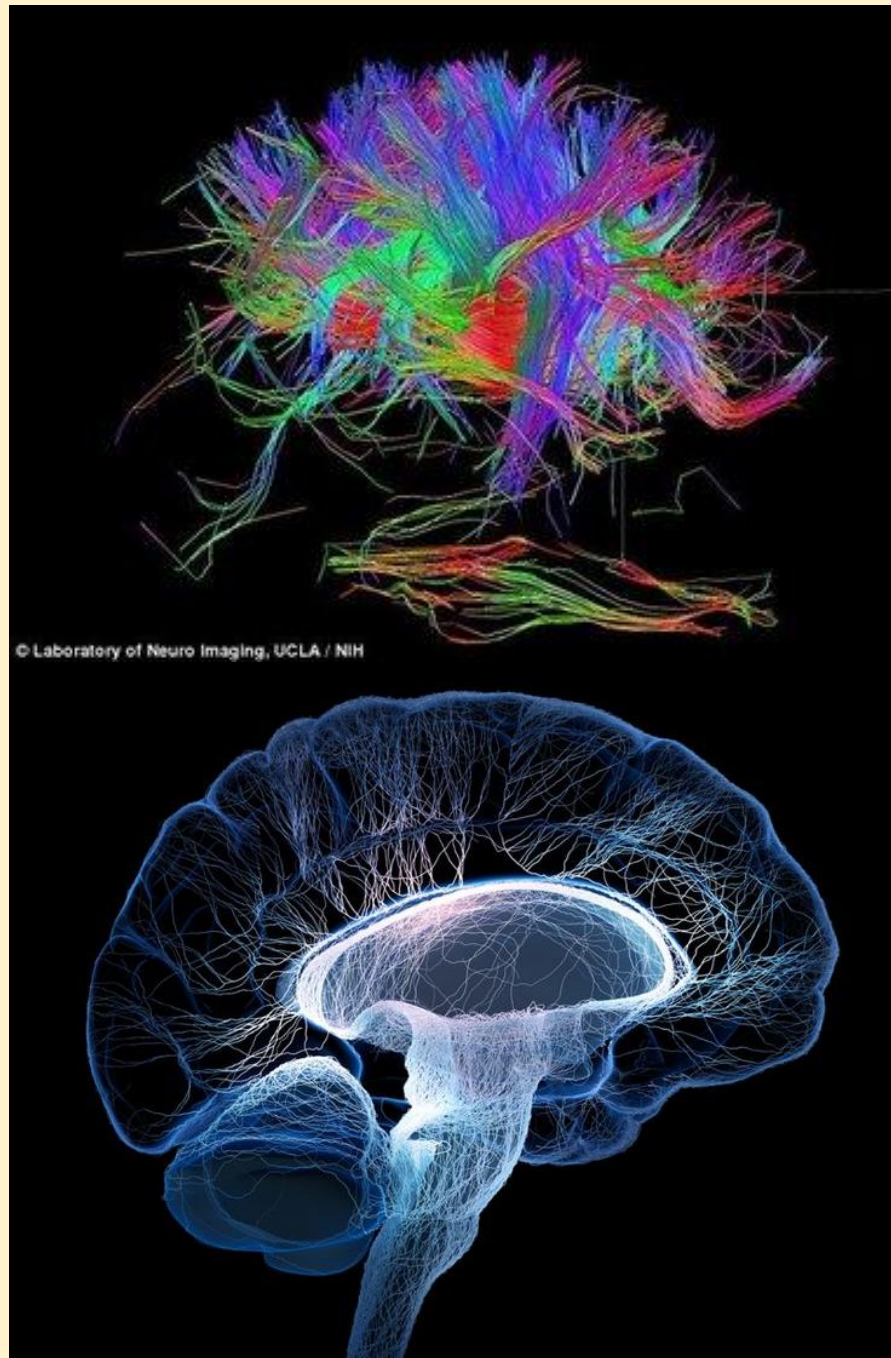


# Brain Development



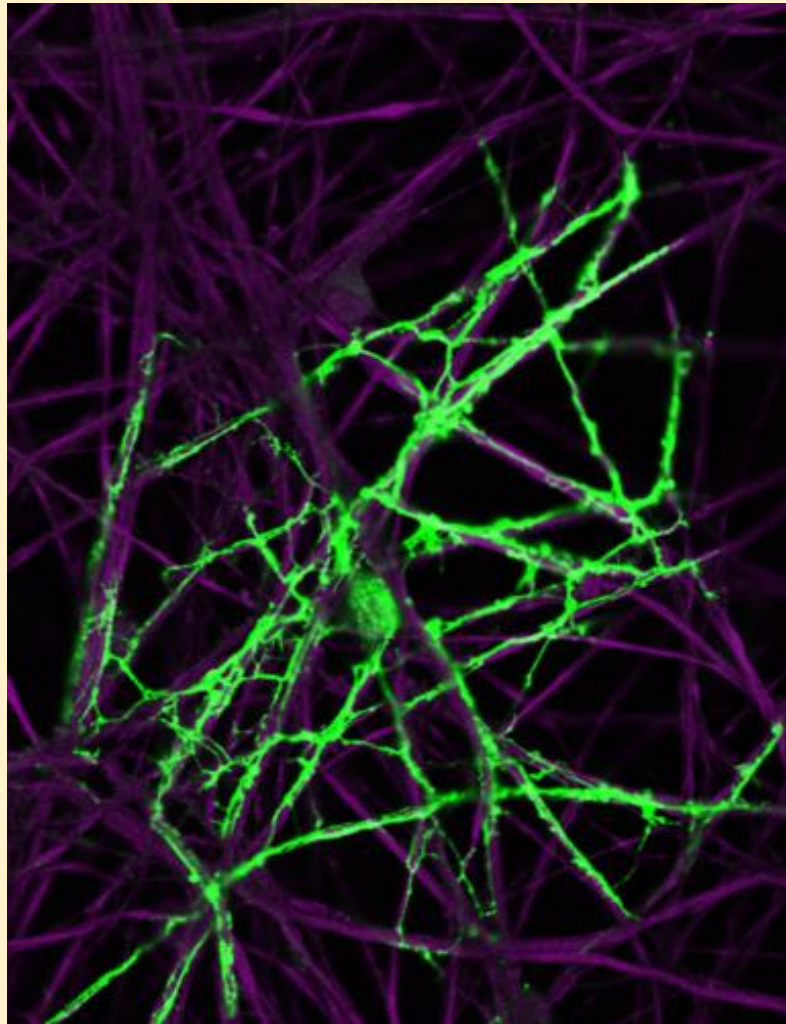
Source: Tapert & Schweinsburg, 2005





# Synaptic Refinement





Myelination

# This is Normal Development

Hypersensitive  
to Social  
Exclusion

Preference for  
Physical  
Activity and  
Sensation  
Seeking

More Risky  
Impulsive  
Behavior

Emotions Felt  
Very  
Intensely



Less than  
Optimal  
Planning

Less  
Consideration  
of Negative  
Consequences

Strongly  
Influenced by  
Friends and  
Peers

**"I'M NOT  
WHO YOU THINK I AM;  
I'M NOT  
WHO I THINK I AM.  
I AM  
WHO I THINK  
YOU THINK I AM."**

**~ THOMAS COOLEY**

#### The Looking Glass Self

Adolescents are more likely to compare themselves to others, feel that they are being compared or judged and place higher value on that judgement



# HIJACKING THE BRAIN

New research suggests that the brain's reward system has different mechanisms for craving and pleasure. Craving is driven by the neurotransmitter dopamine. Pleasure is stimulated by other neurotransmitters in "hedonic hot spots." When the craving circuitry overwhelms the pleasure hot spots, addiction occurs, leading people to pursue a behavior or drug despite the consequences.

## PATHWAYS TO CRAVING

Desire is triggered when dopamine, which originates near the top of the brain stem, travels through neural pathways to act on the brain. Drugs increase the flow of dopamine.

### Ventral tegmental area (VTA)

Dopamine is produced here and flows outward along neurons distributed throughout the brain's reward system.

### Dorsal striatum

Neurons here help form habits by identifying enjoyable patterns, such as the anticipation of buying drugs.

### Prefrontal cortex

The amino acid glutamate, produced here, interacts with dopamine to spark visualizations that cue cravings.

### Amygdala

Neurons here are stimulated by learned emotional responses, such as memories of cravings and pleasure.

### Orbitofrontal cortex

This hot spot gives a sense of gratification but is also the first to shut down if a person has indulged too much.

### Nucleus accumbens

A hot spot within this key part of the craving circuitry amplifies the response to pleasure.

### PLEASURE HOT SPOTS

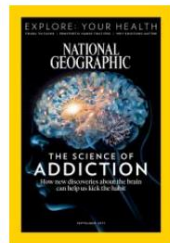
A system of small hedonic hot spots, unrelated to dopamine, provides temporary sensations of pleasure and forms a feedback loop with the reward system that controls desire.

### Brain stem

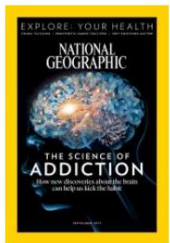
Basic visceral sensations and reactions to pleasure, such as smiling, originate from this hot spot.

### Ventral pallidum

Animal experiments show that damaging this hot spot can turn something that once gave pleasure into a source of disgust.



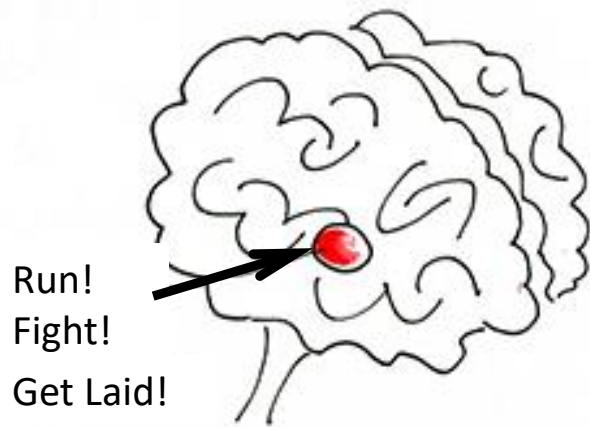
September 2017



September 2017

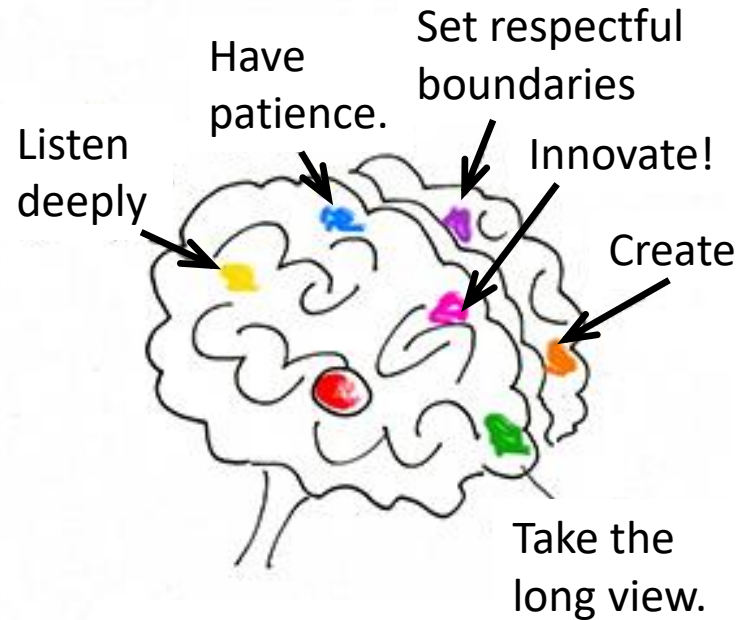


# EAT, DRINK, HAVE SEX (AND USE DRUGS)



Run!  
Fight!  
Get Laid!

Lizard brain advice



Listen  
deeply

Have  
patience.

Set respectful  
boundaries

Innovate!

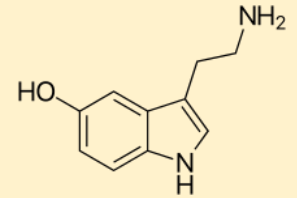
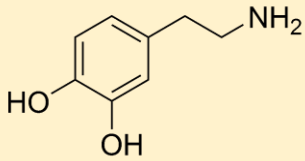
Create

Take the  
long view.

Cortex advice

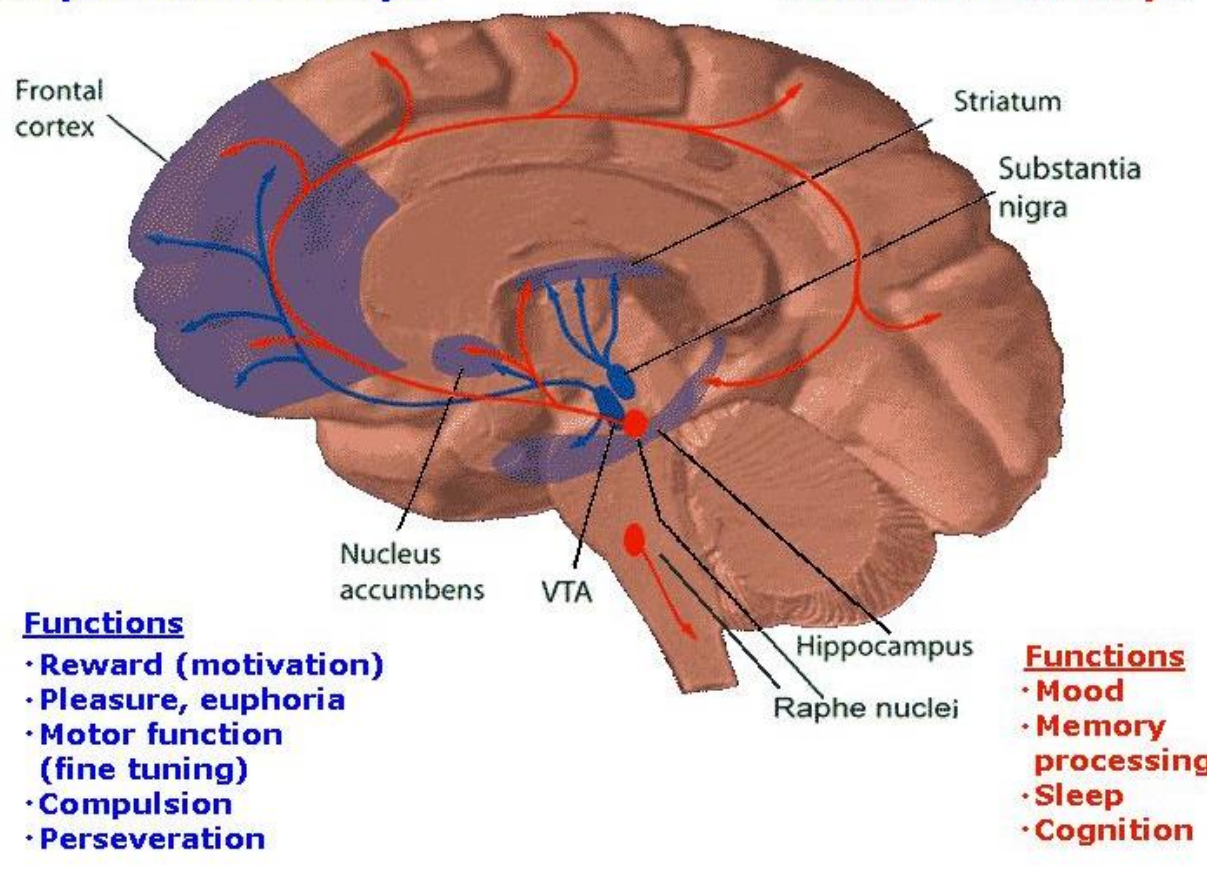
# DOPAMINE & SEROTONIN

## Location and Function



### Dopamine Pathways

### Serotonin Pathways



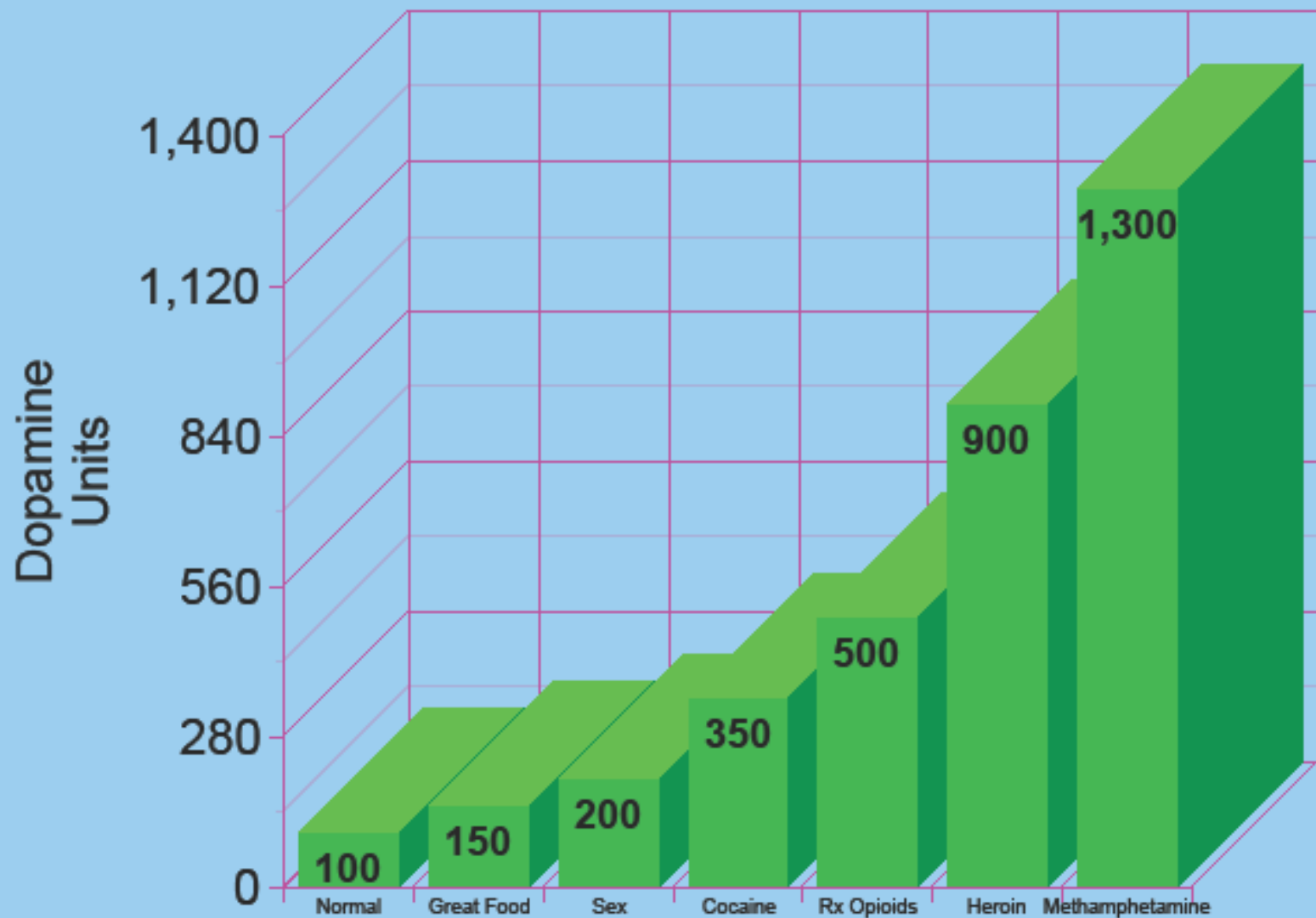




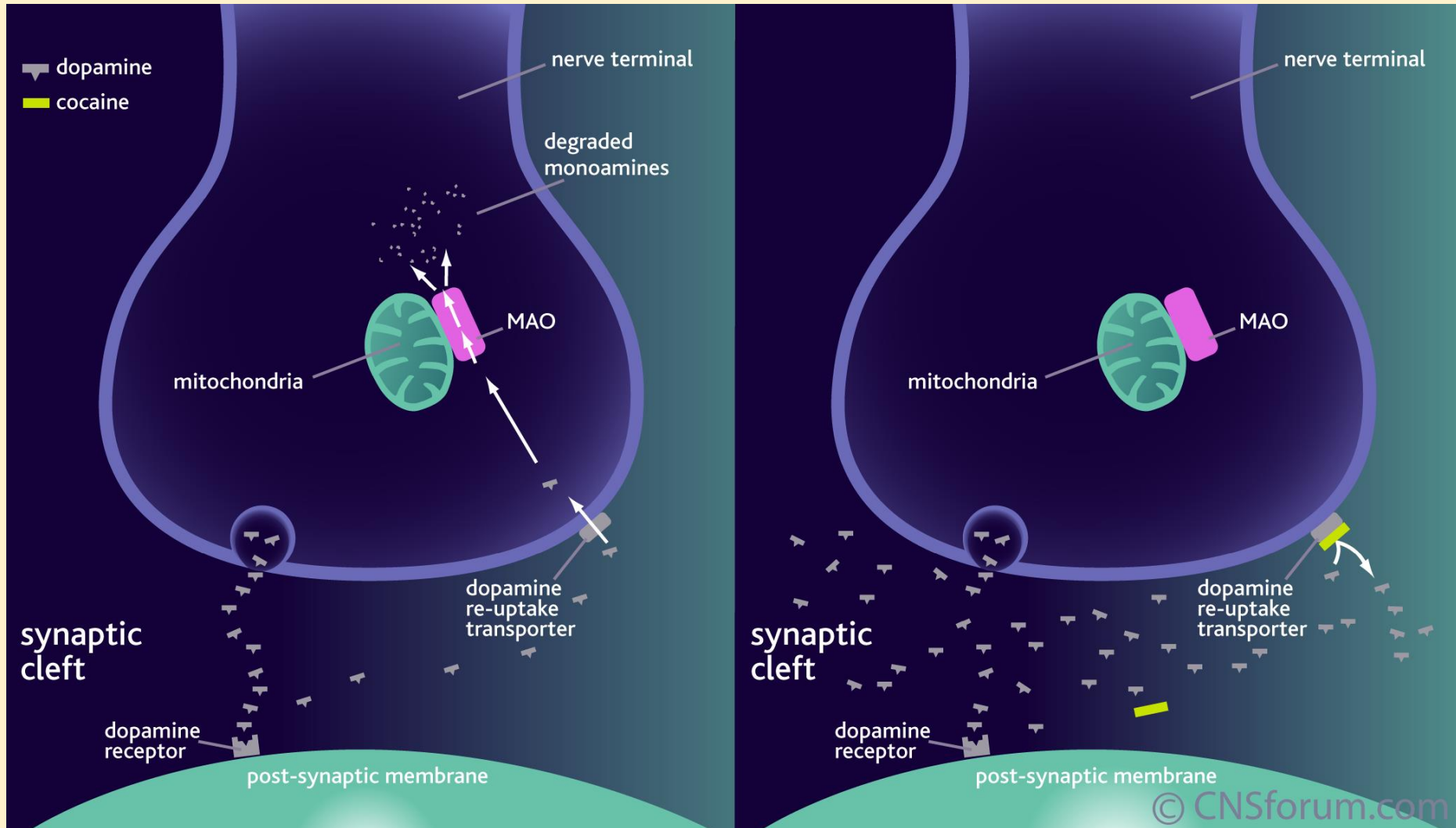
IT IS SAD  
TODAY.



## Dopamine Levels

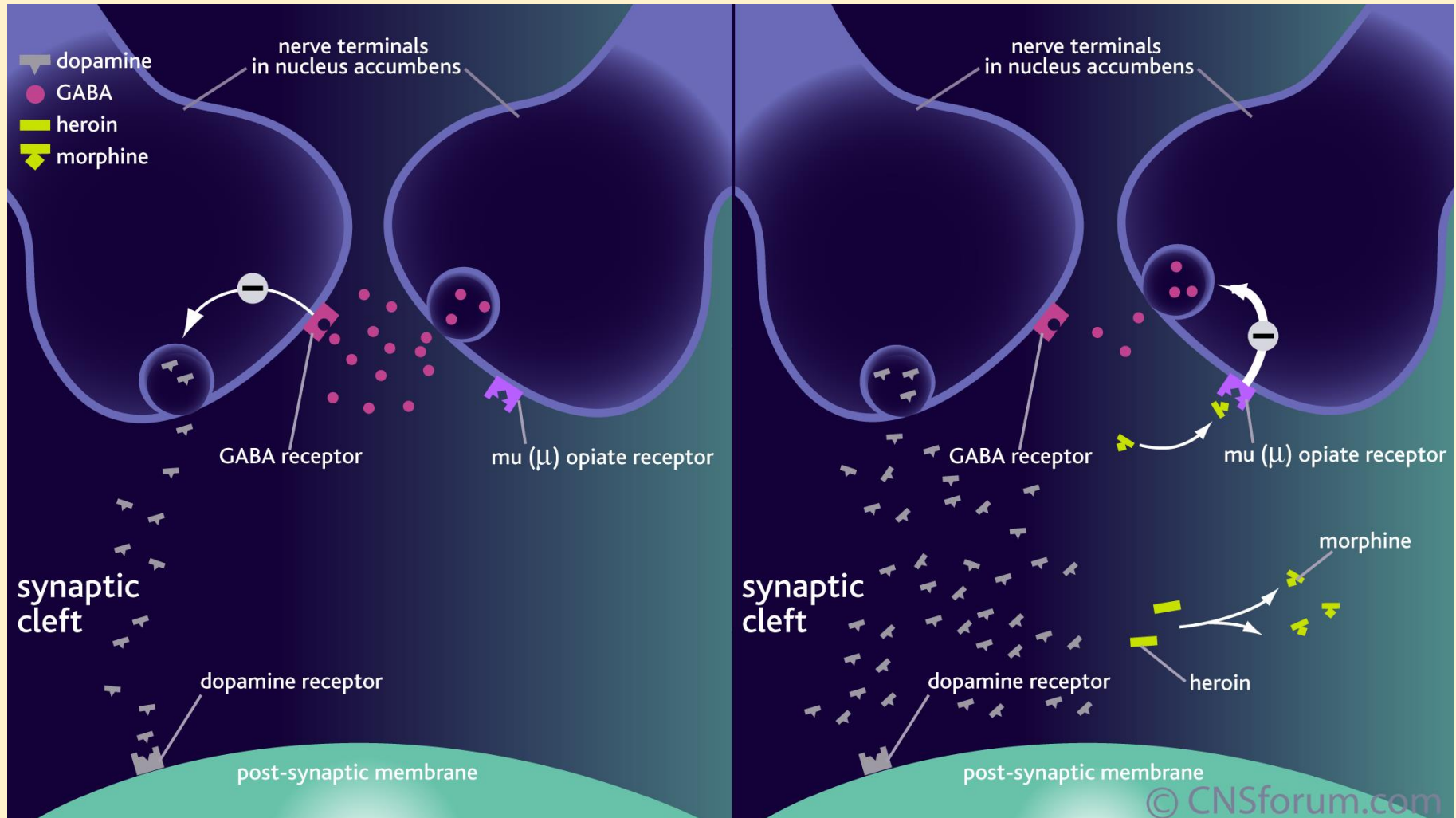


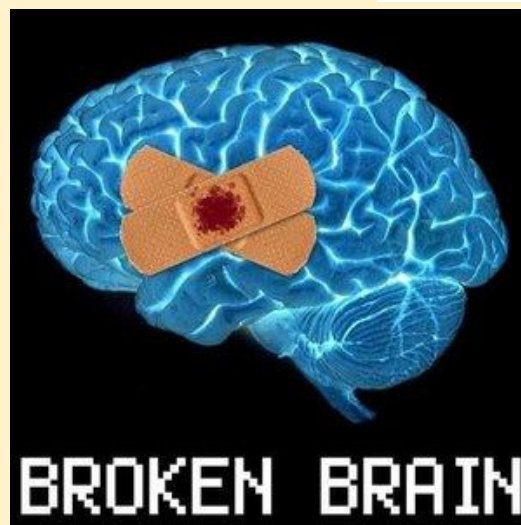
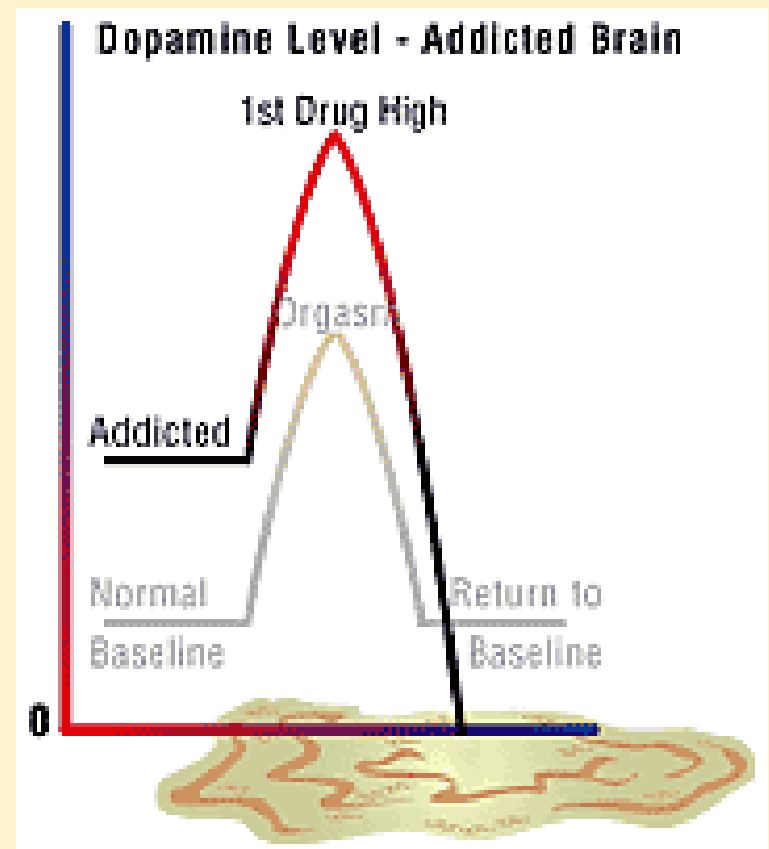
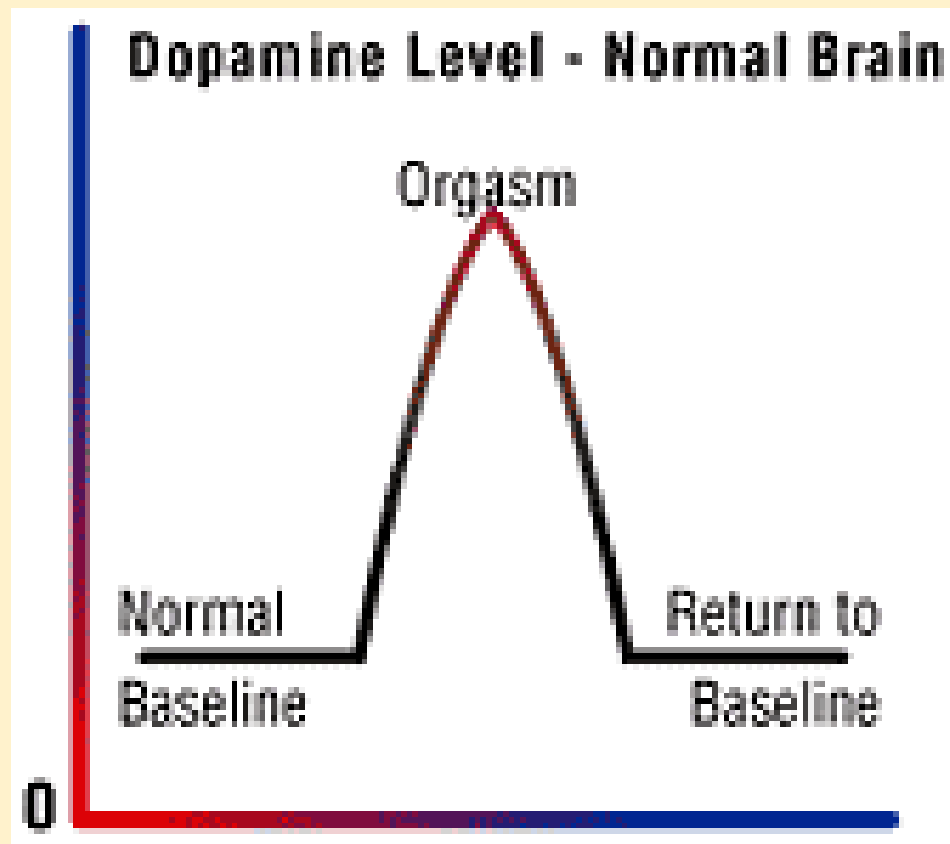
# How Cocaine Works





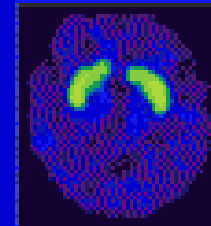
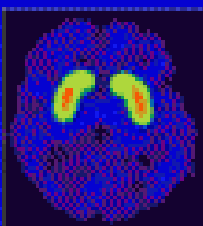
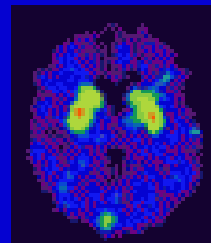
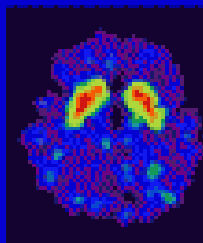
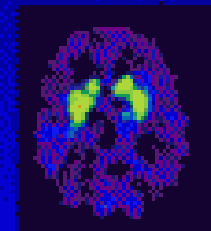
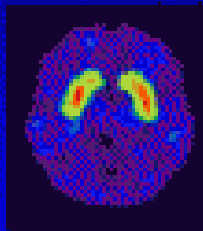
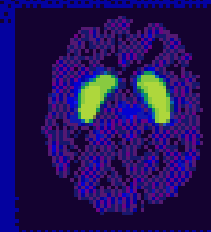
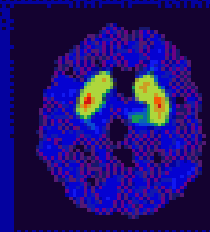
# How Heroin Works





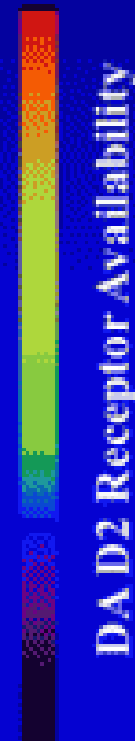
# *Functionally...*

## **Dopamine D2 Receptors are Decreased by Addiction**



Control

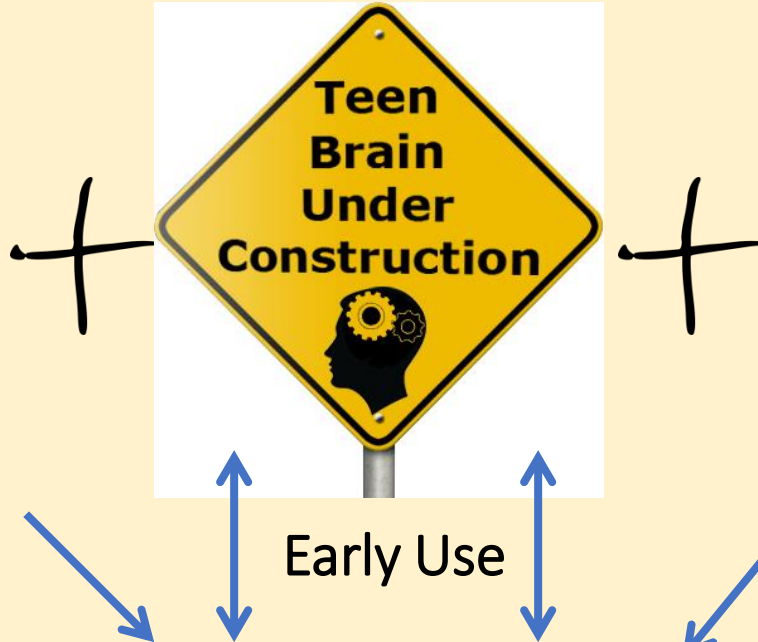
Addicted







Genetics



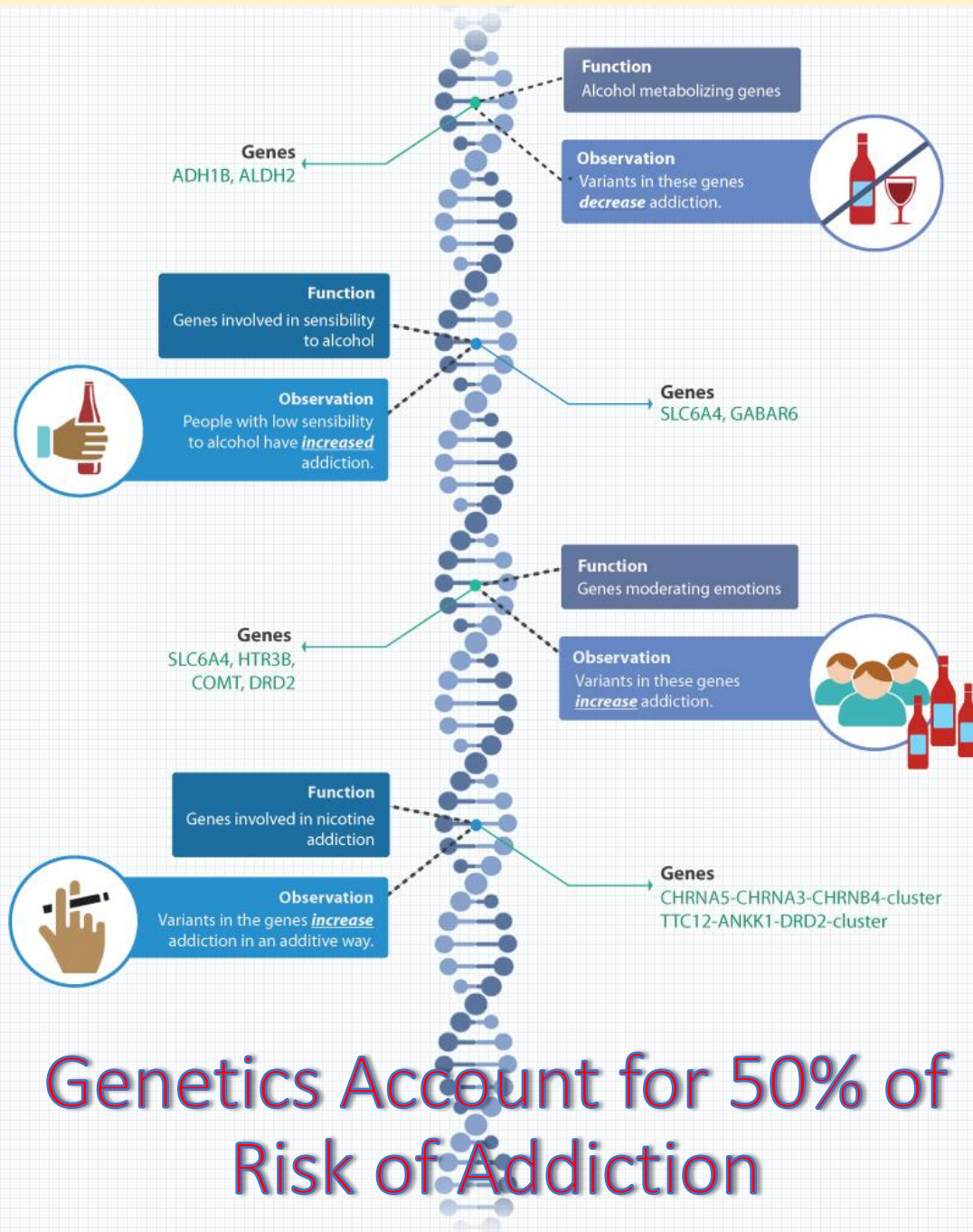
Early Use



Trauma



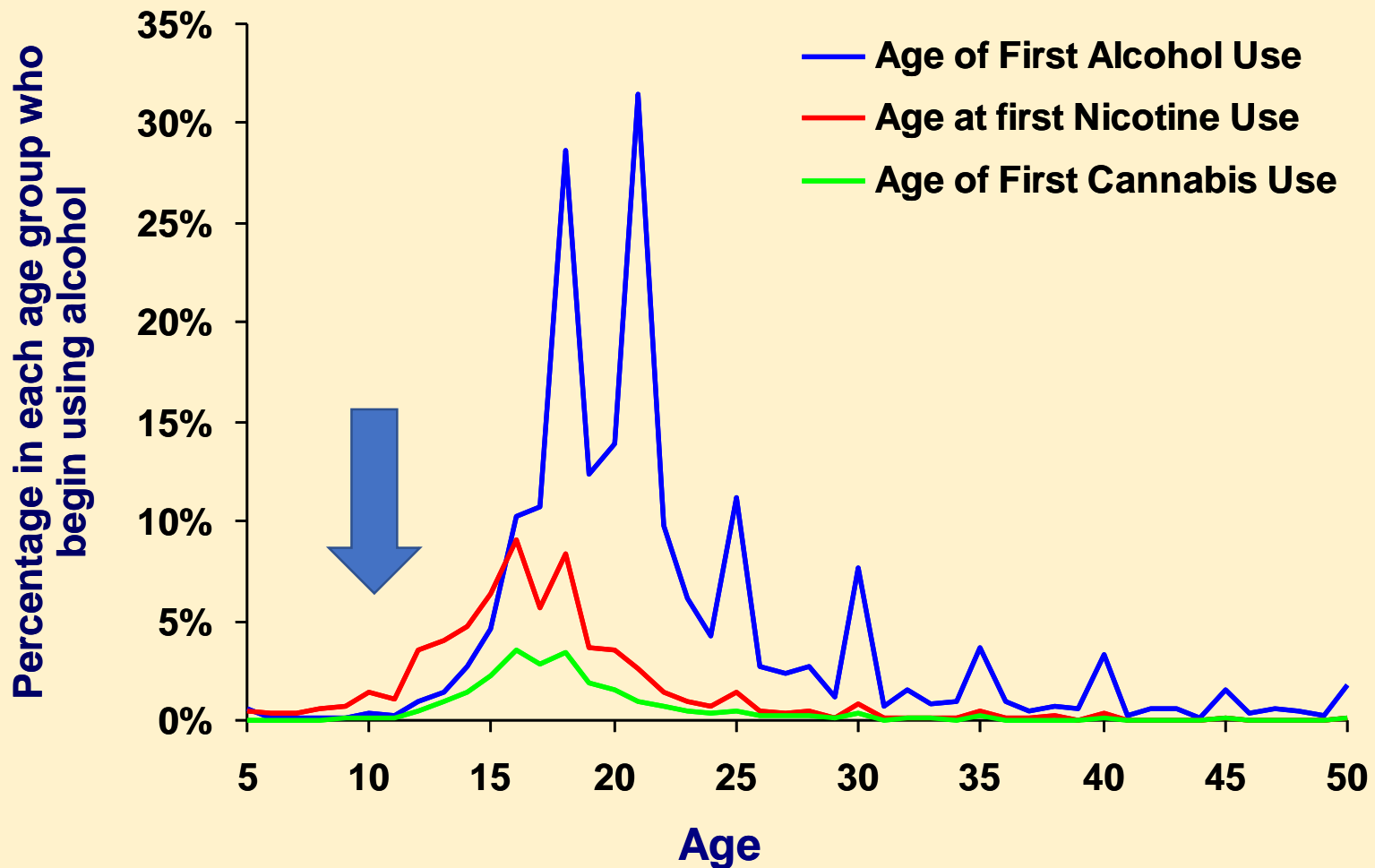
Poor Mental Health



Genetics Account for 50% of Risk of Addiction



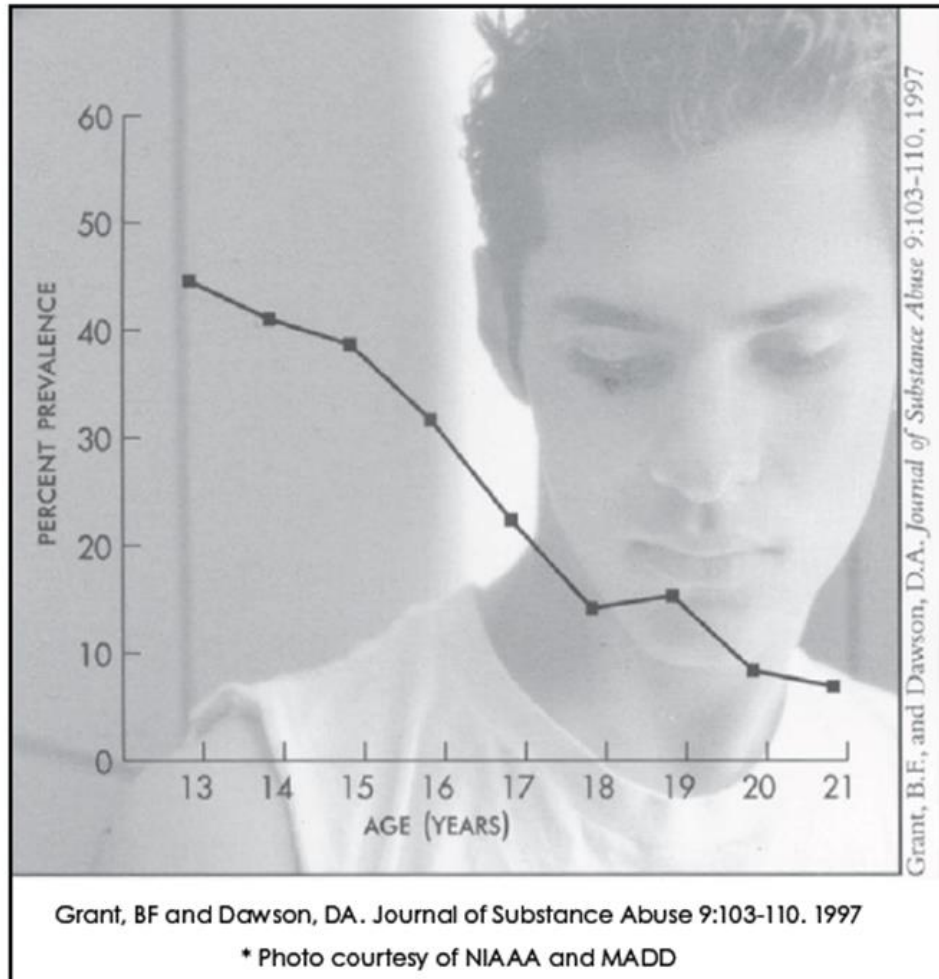
# Addiction is a Developmental Pediatric Disease



Source: NIAAA National Epidemiologic Survey on Alcohol and Related Conditions, 2003



# Teen Alcohol Use Wires The Brain For Addiction

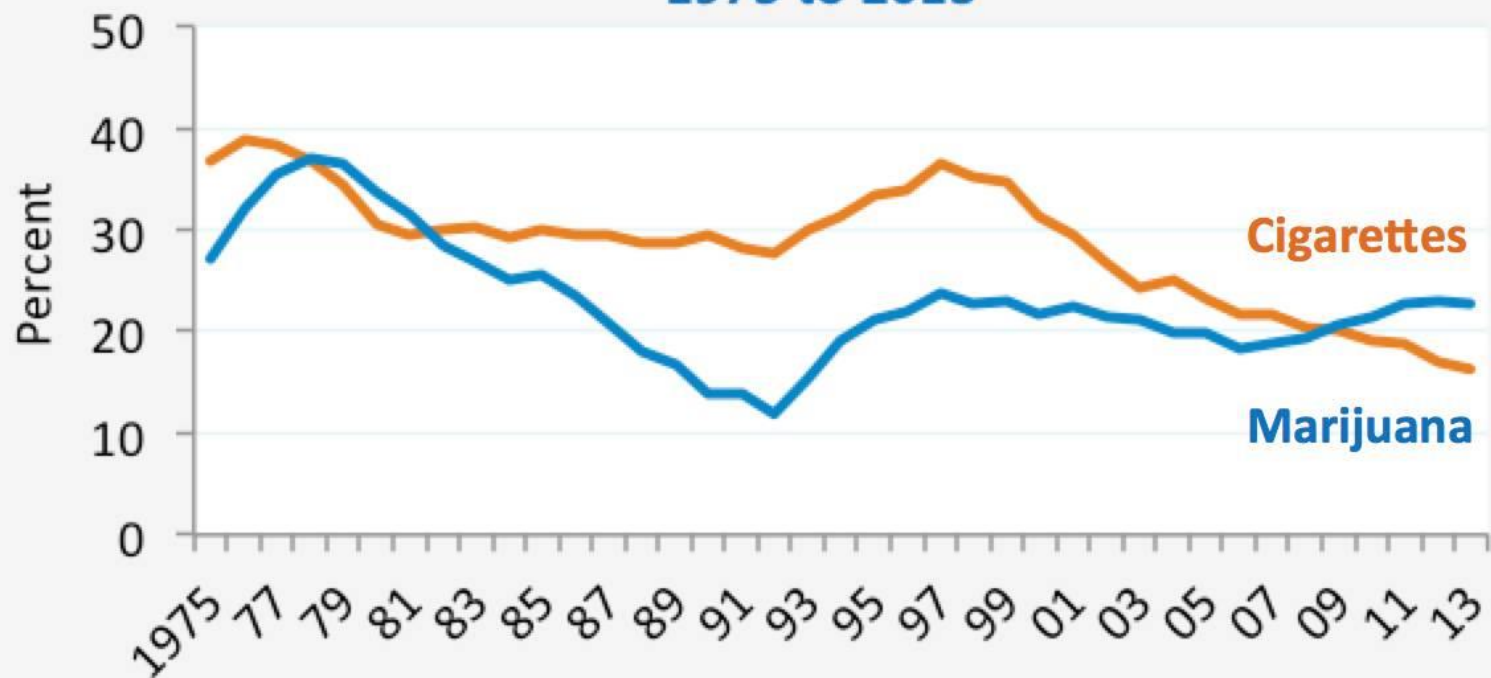


**40% of kids who begin drinking at age 15 will become alcoholics.**

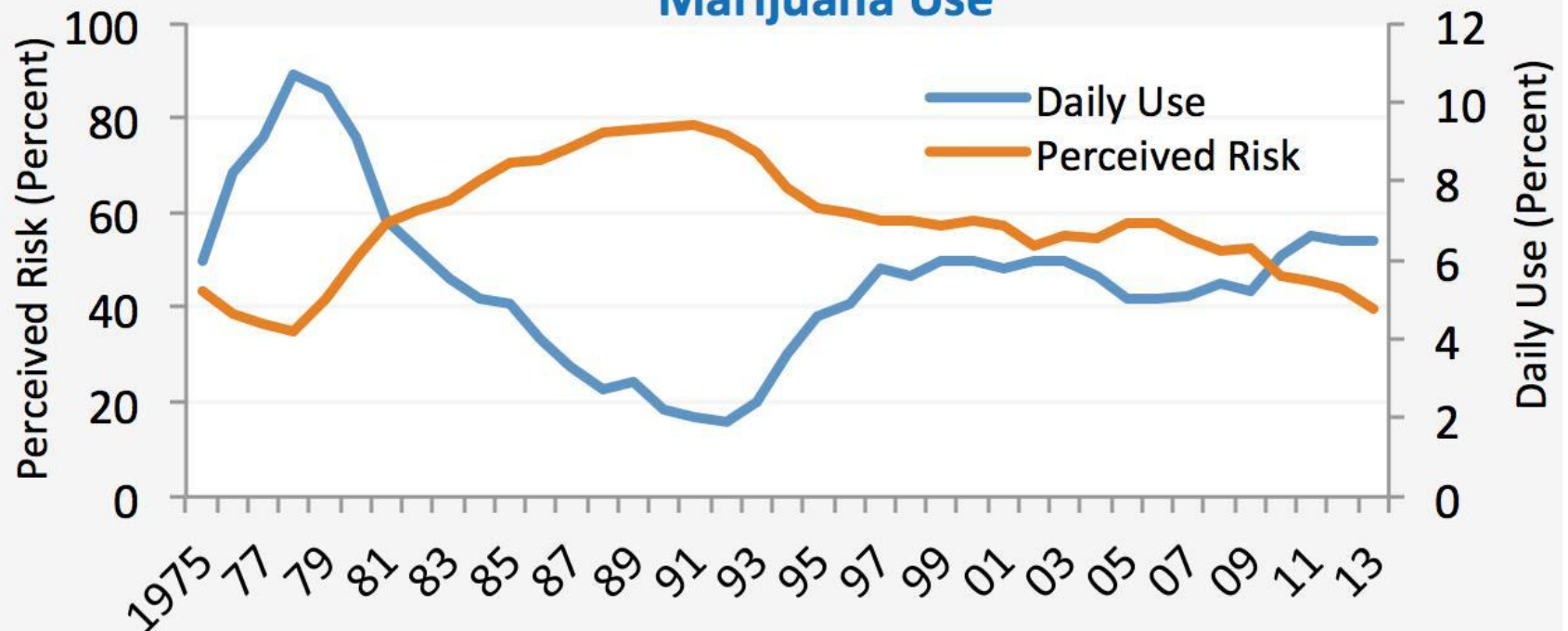
**Only 7% of those who begin drinking at age 21 become alcoholics.**



## Percentage of U.S. 12th Grade Students Reporting Past Month Use of Cigarettes and Marijuana, 1975 to 2013



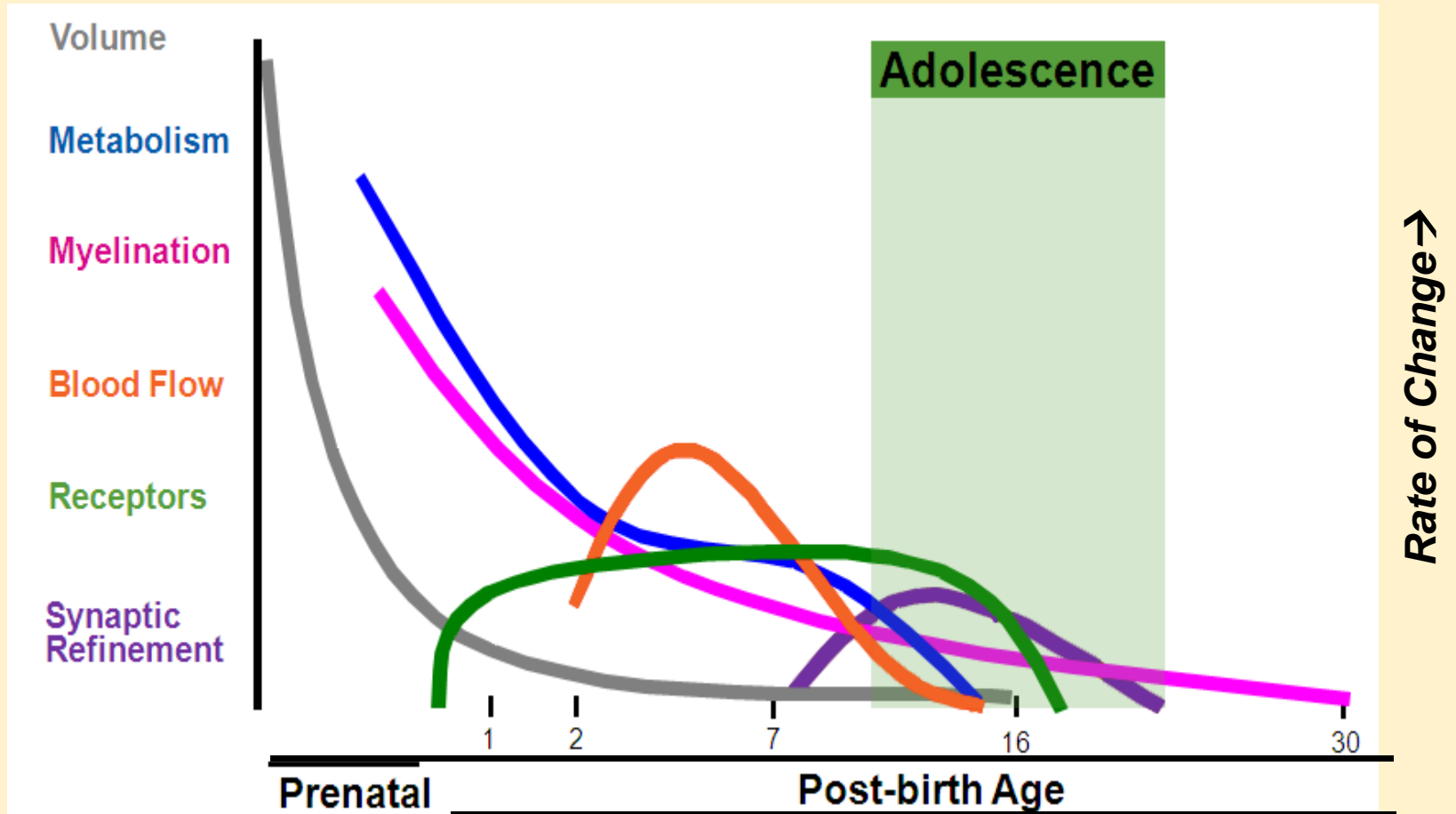
## Percentage of U.S. 12 Grade Students Reporting Daily Marijuana Use vs. Perceived Risk of Regular Marijuana Use



Source: The Monitoring the Future study, the University of Michigan



# Brain Development



Source: Tapert & Schweinsburg, 2005

Marijuana  
(Tetrahydrocannabinol)

**Drug**



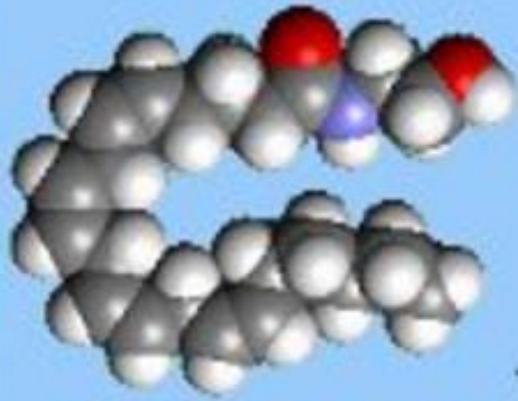
**THC**

Endo-cannabinoid  
(Anandamide)

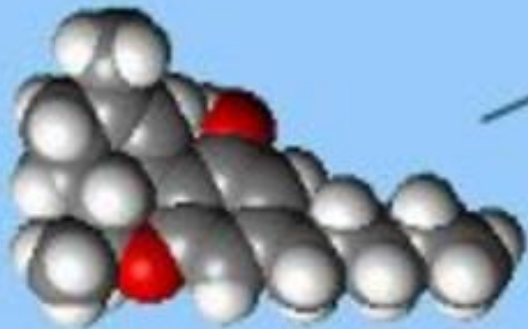
**Brain's Chemical**



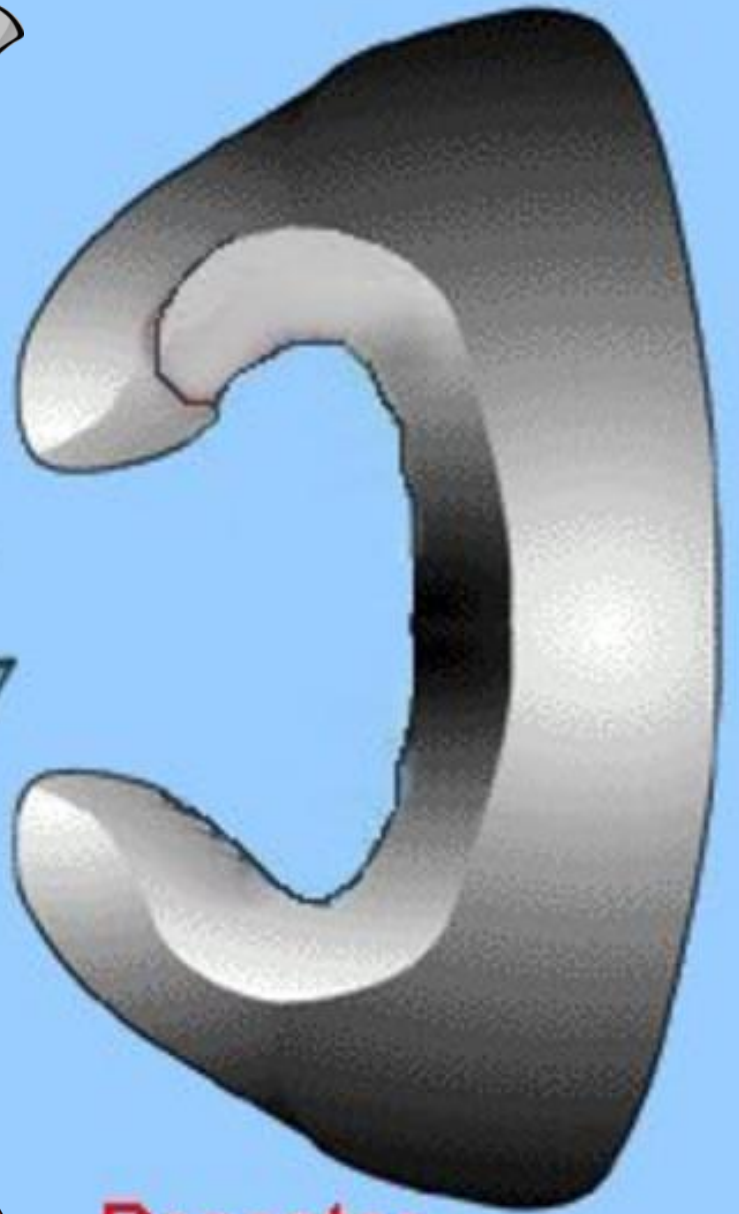
**Anandamide**



**anandamide**



**THC**



**Receptor**

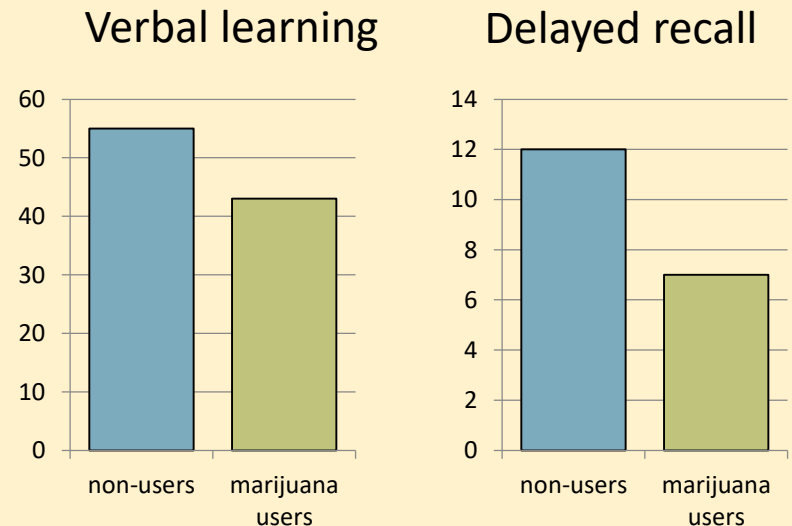


# Deficits in Cognitive Functioning Among Active Marijuana Users

Many studies show that adolescents who use marijuana heavily tend to score worse than non-users on tests of:

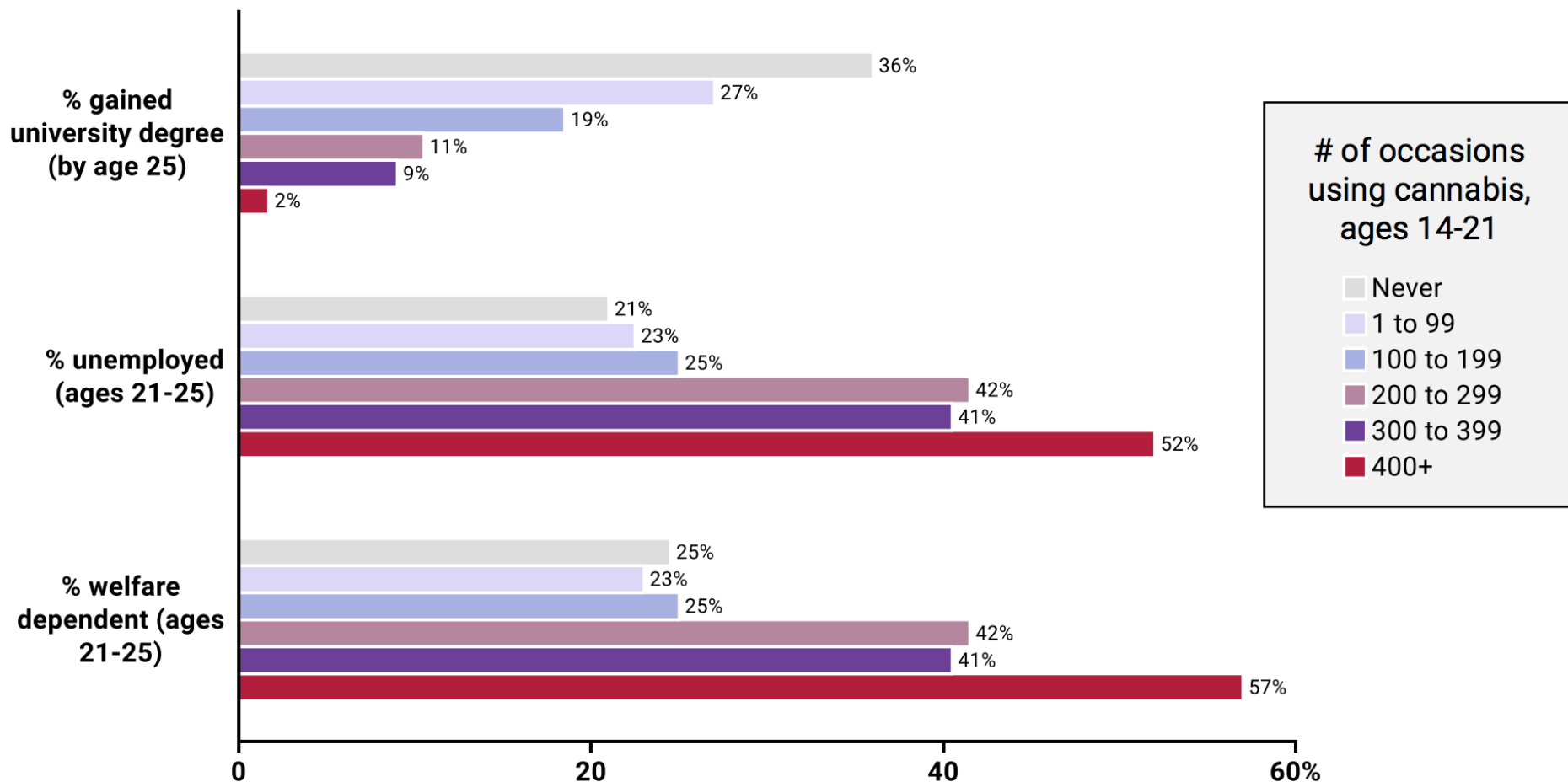
- attention
- verbal learning
- memory
- processing speed

... even when  
they are not high.



Messinis, et al 2006

## New Zealand study showing relationship between cannabis use and social outcomes



# Loss of Adult IQ with Marijuana Dependence in Adolescence

---

## Findings:

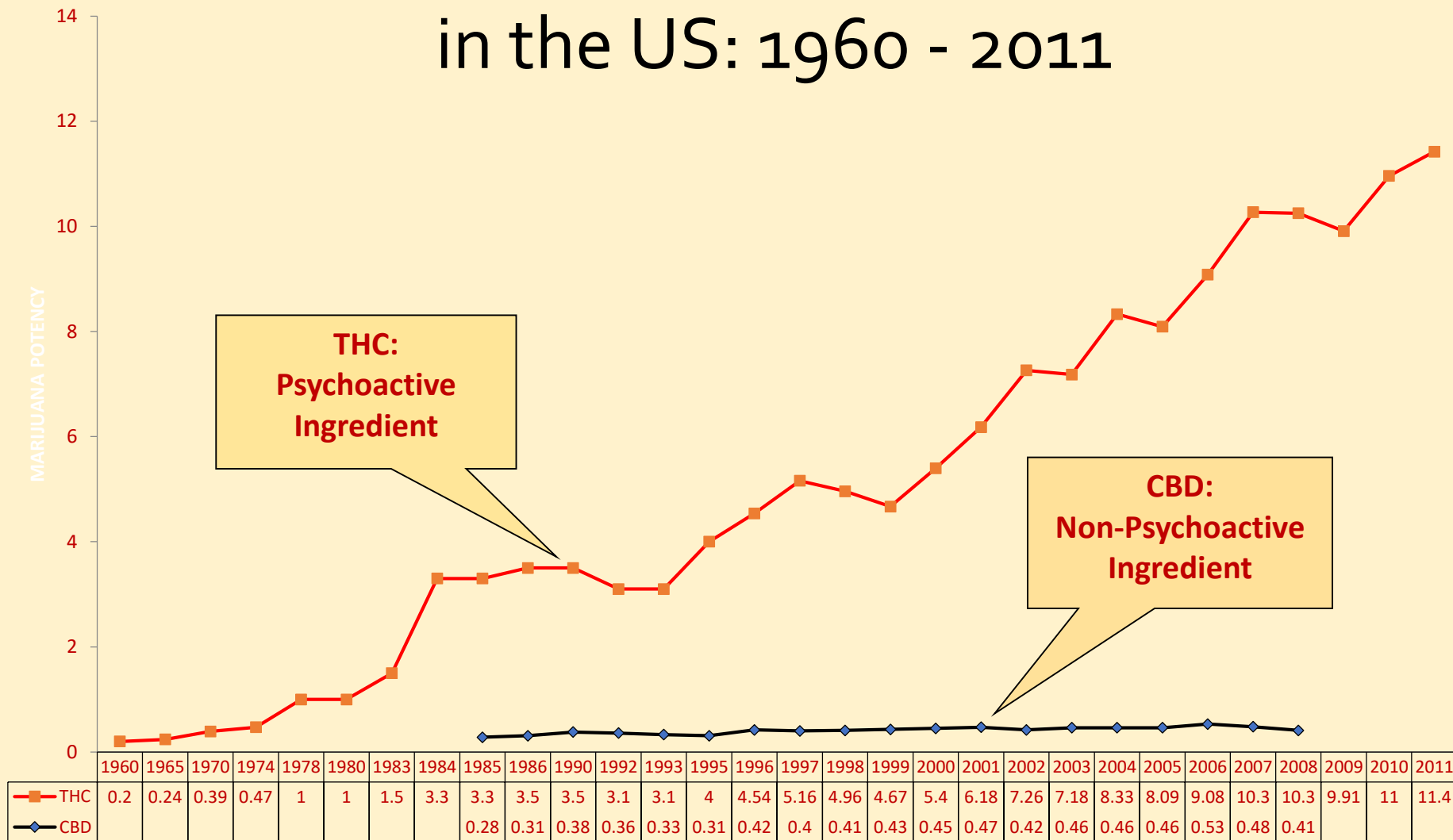
- **Those who developed marijuana dependence before age 18 showed IQ decline in adulthood.**
- The longer their dependence persisted, the greater the decline, with a decline of 8 IQ points for the most persistent users.
- **Those who began using in adulthood did not show IQ decline.**
- Quitting in adulthood did not restore functioning in those who began in adolescence.

### **Persistent cannabis users show neuropsychological decline from childhood to midlife**

Madeline H. Meier, Avshalom Caspi, Antony Ambler, HonaLee Harrington, Renate Houts, Richard S. E. Keefe, Kay McDonald, Aimee Ward, Richie Poulton, and Terrie E. Moffitt  
PNAS October 2, 2012. 109 (40) E2657-E2664



# Average THC & CBD levels in the US: 1960 - 2011



Data from the NIDA-sponsored Potency Monitoring program at the University of Mississippi, showing average THC and CBD levels in samples of marijuana seized by federal, state and local governments in each year shown.

# THC Concentrates



*"Green Crack" wax*



*"Ear Wax"*



Butane Hash Oil (BHO)



Hash Oil Capsules



*"Budder"*



*"Shatter"*

## SMOKING



PIPE



BONG



BUBBLER



DAB



JOINT



BLUNT

## BEVERAGES



TEA



SODA



ALCOHOL



MILK

## EDIBLES



CANDY



ICE CREAM



BAKED GOODS

## VAPORIZING



DESKTOP VAPORIZER



PORTABLE VAPORIZER

## OTHER



CAPSULES



SPRAY



TINCTURE

Ways to  
consume  
marijuana

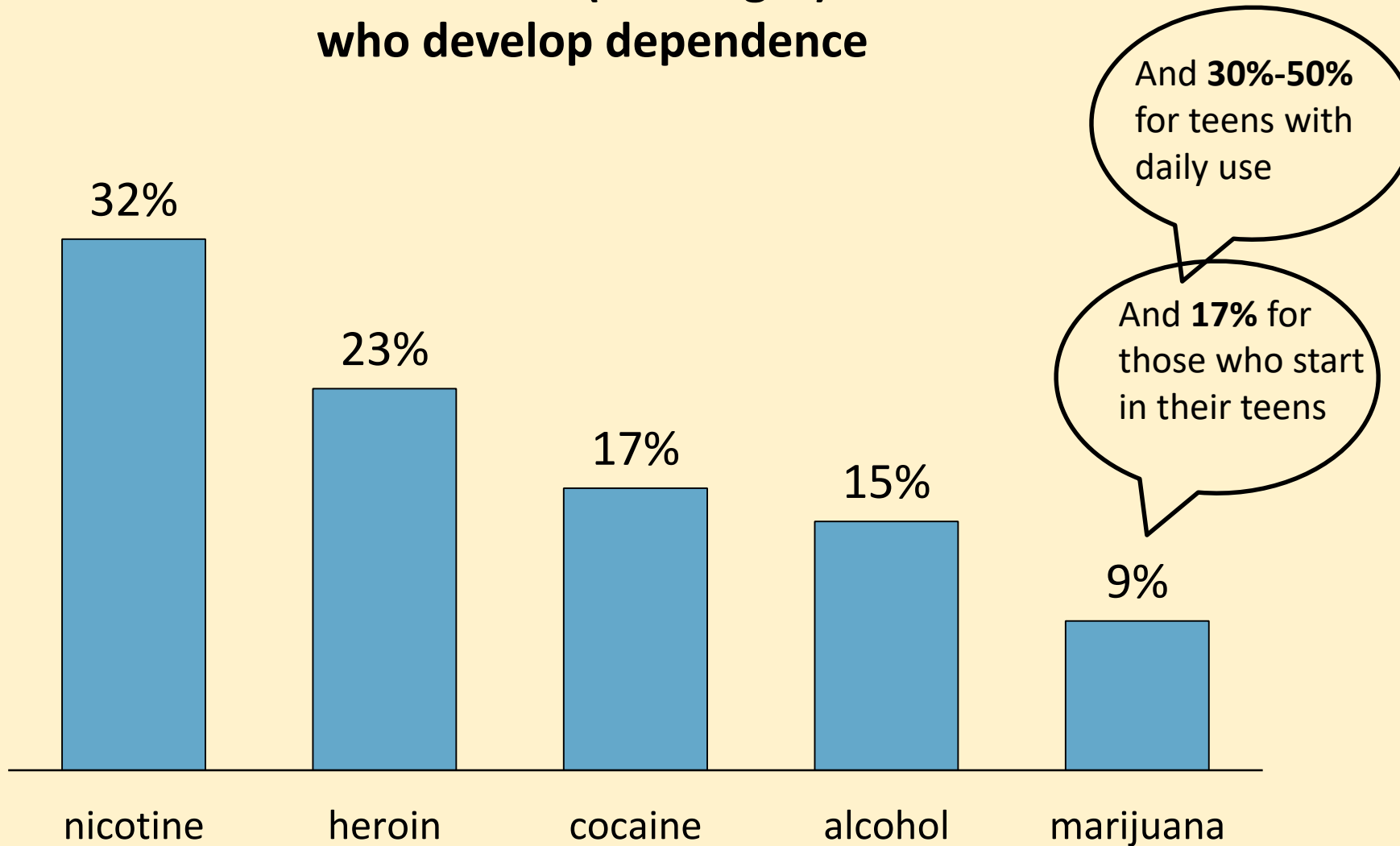






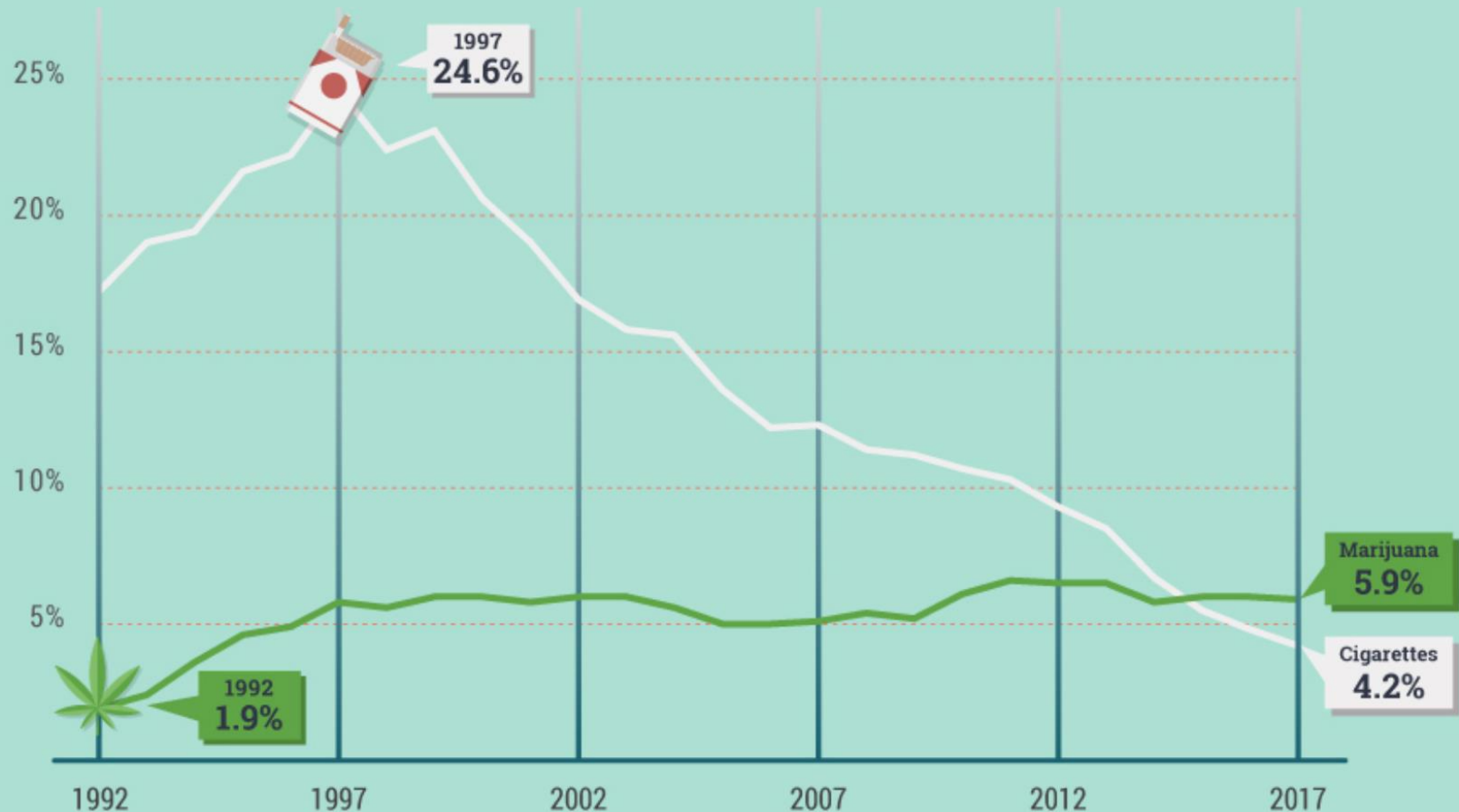
# Is Marijuana Addictive?

% of users (of all ages)  
who develop dependence



# TEENS MORE LIKELY TO USE MARIJUANA THAN CIGARETTES

## Daily use among 12th graders



National Institute  
on Drug Abuse

DRUGABUSE.GOV

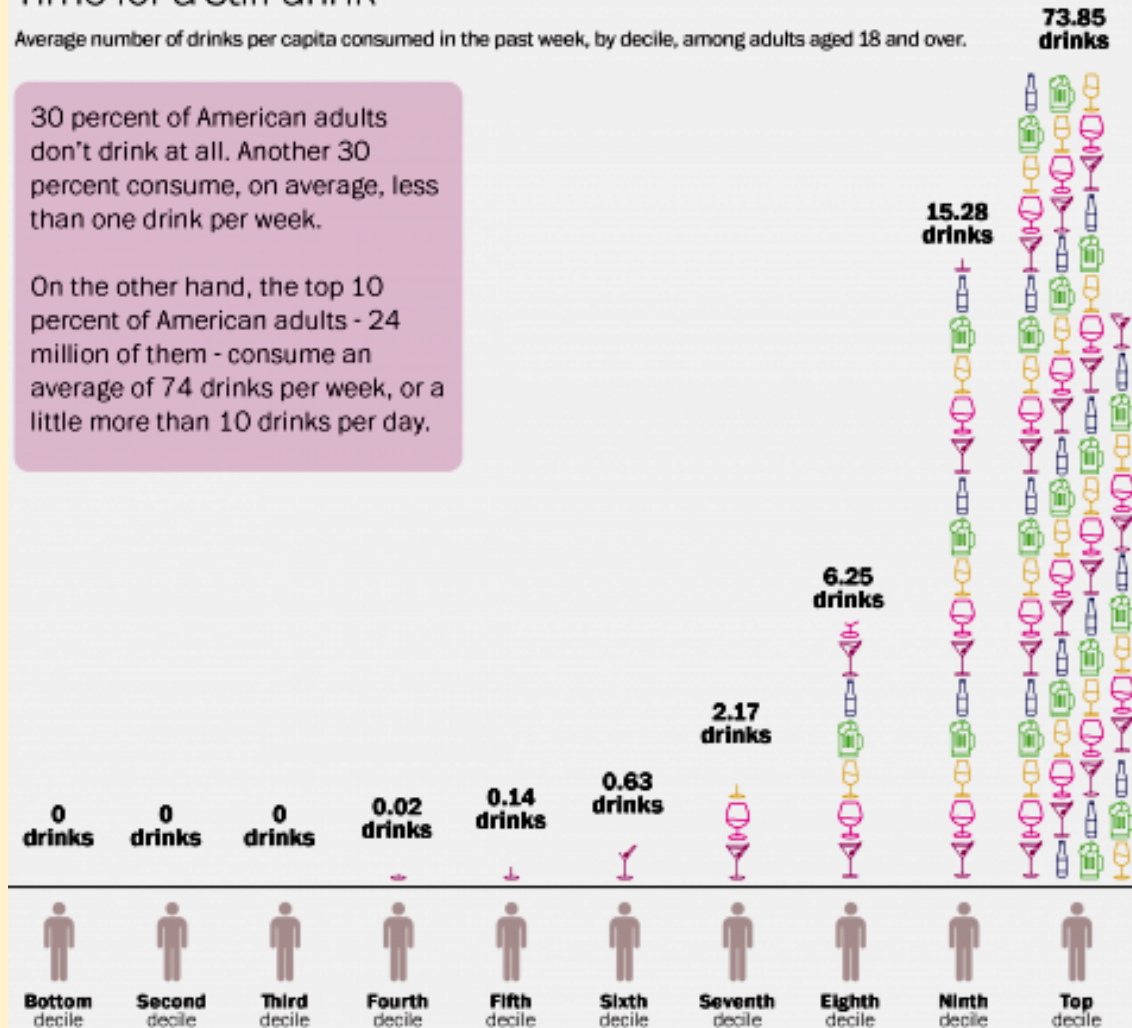
# Think you drink a lot?

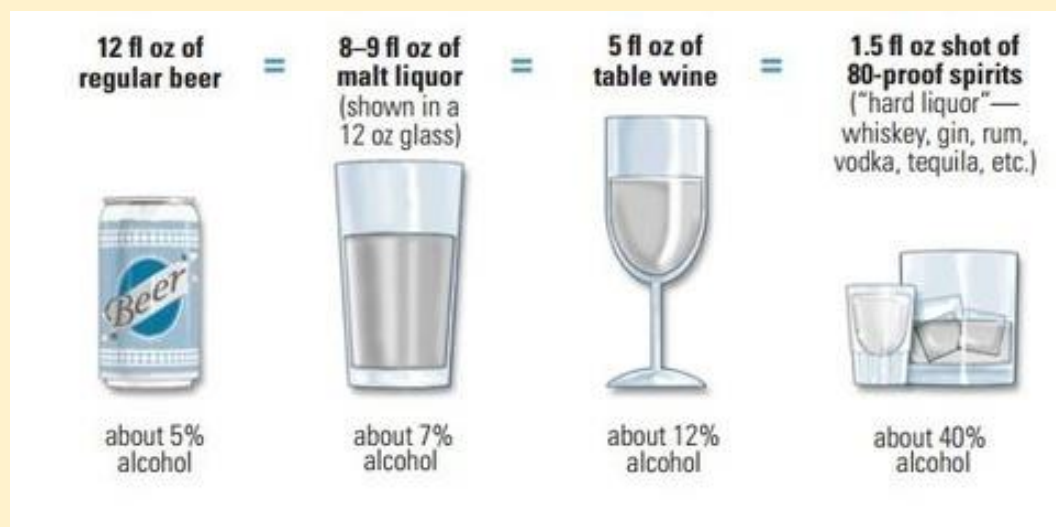
## Time for a stiff drink

Average number of drinks per capita consumed in the past week, by decile, among adults aged 18 and over.

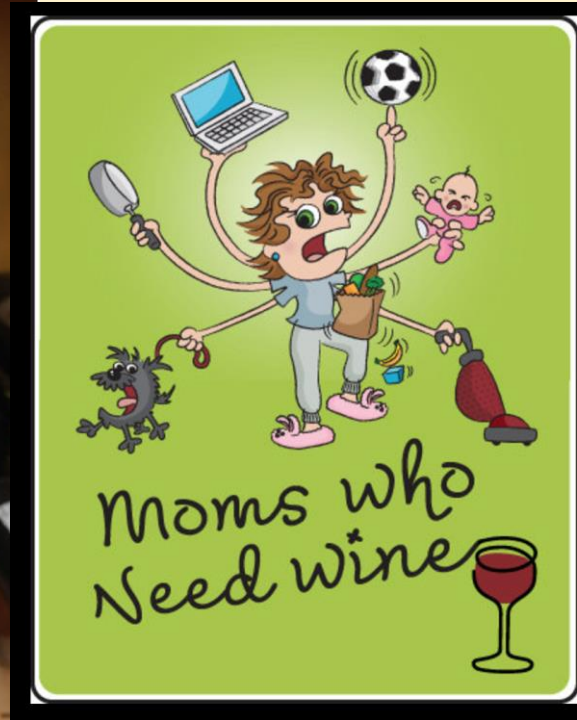
30 percent of American adults don't drink at all. Another 30 percent consume, on average, less than one drink per week.

On the other hand, the top 10 percent of American adults - 24 million of them - consume an average of 74 drinks per week, or a little more than 10 drinks per day.









# Association of parental supply of alcohol with adolescent drinking, alcohol-related harms, and alcohol use disorder symptoms: a prospective cohort study

*Richard P Mattick, Philip J Clare, Alexandra Aiken, Monika Wadolowski, Delyse Hutchinson, Jakob Najman, Tim Slade, Raimondo Bruno, Nyanda McBride, Kypros Kypri, Laura Vogl, Louisa Degenhardt*

**Interpretation** Providing alcohol to children is associated with alcohol-related harms. There is no evidence to support the view that parental supply protects from adverse drinking outcomes by providing alcohol to their child. Parents should be advised that this practice is associated with risk, both directly and indirectly through increased access to alcohol from other sources.

Countries by their Alcohol Consumption

Rank	Country	Consumption Per Capita in Liters
1	Belarus	17.5
2	Moldova	16.8
3	Lithuania	15.4
4	Russian Federation	15.1
5	Romania	14.4
6	Ukraine	13.9
7	Andorra	13.8
8	Hungary	13.3
9	Czech Republic	13
10	Slovakia	13
11	Portugal	12.9
12	Serbia	12.8
13	South Korea	12.3
14	Finland	12.3
15	Latvia	12.3
16	Croatia	12.2
17	France	12.2
18	Australia	12.2
19	Luxembourg	11.9
20	Ireland	11.9
21	Germany	11.8
22	Denmark	11.4
23	Bulgaria	11.4
24	Belgium	11
25	South Africa	11



## Adverse Childhood Experiences – ACEs

*Emotional Neglect*

*Abuse*

*Household Dysfunction*



# Relationship of Childhood Abuse and Household Dysfunction to Many of the Leading Causes of Death in Adults

## The Adverse Childhood Experiences (ACE) Study

Vincent J. Felitti, MD, FACP, Robert F. Anda, MD, MS, Dale Nordenberg, MD, David F. Williamson, MS, PhD, Alison M. Spitz, MS, MPH, Valerie Edwards, BA, Mary P. Koss, PhD, James S. Marks, MD, MPH

**Background:** The relationship of health risk behavior and disease in adulthood to the breadth of exposure to childhood emotional, physical, or sexual abuse, and household dysfunction during childhood has not previously been described.

**Methods:** A questionnaire about adverse childhood experiences was mailed to 13,494 adults who had completed a standardized medical evaluation at a large HMO; 9,508 (70.5%) responded. Seven categories of adverse childhood experiences were studied: psychological, physical, or sexual abuse; violence against mother; or living with household members who were substance abusers, mentally ill or suicidal, or ever imprisoned. The number of categories of these adverse childhood experiences was then compared to measures of adult risk behavior, health status, and disease. Logistic regression was used to adjust for effects of demographic factors on the association between the cumulative number of categories of childhood exposures (range: 0–7) and risk factors for the leading causes of death in adult life.

**Results:** More than half of respondents reported at least one, and one-fourth reported  $\geq 2$  categories of childhood exposures. We found a graded relationship between the number of categories of childhood exposure and each of the adult health risk behaviors and diseases that were studied ( $P < .001$ ). Persons who had experienced four or more categories of childhood exposure, compared to those who had experienced none, had 4- to 12-fold increased health risks for alcoholism, drug abuse, depression, and suicide attempt; a 2- to 4-fold increase in smoking, poor self-rated health,  $\geq 50$  sexual intercourse partners, and sexually transmitted disease; and a 1.4- to 1.6-fold increase in physical inactivity and severe obesity. The number of categories of adverse childhood exposures showed a graded relationship to the presence of adult diseases including ischemic heart disease, cancer, chronic lung disease, skeletal fractures, and liver disease. The seven categories of adverse childhood experiences were strongly interrelated and persons with multiple categories of childhood exposure were likely to have multiple health risk factors later in life.

**Conclusions:** We found a strong graded relationship between the breadth of exposure to abuse or household dysfunction during childhood and multiple risk factors for several of the leading causes of death in adults.

**Medical Subject Headings (MeSH):** child abuse, sexual, domestic violence, spouse abuse, children of impaired parents, substance abuse, alcoholism, smoking, obesity, physical activity, depression, suicide, sexual behavior, sexually transmitted diseases, chronic obstructive pulmonary disease, ischemic heart disease. (Am J Prev Med 1998;14:245–258) © 1998 American Journal of Preventive Medicine

## Finding Your ACE Score

**While you were growing up, during your first 18 years of life:**

1. Did a parent or other adult in the household **often or very often**...  
Swear at you, insult you, put you down, or humiliate you?  
**or**  
Act in a way that made you afraid that you might be physically hurt?  
Yes No If yes enter 1 \_\_\_\_\_
2. Did a parent or other adult in the household **often or very often**...  
Push, grab, slap, or throw something at you?  
**or**  
**Ever** hit you so hard that you had marks or were injured?  
Yes No If yes enter 1 \_\_\_\_\_
3. Did an adult or person at least 5 years older than you **ever**...  
Touch or fondle you or have you touch their body in a sexual way?  
**or**  
Attempt or actually have oral, anal, or vaginal intercourse with you?  
Yes No If yes enter 1 \_\_\_\_\_
4. Did you **often or very often** feel that ...  
No one in your family loved you or thought you were important or special?  
**or**  
Your family didn't look out for each other, feel close to each other, or support each other?  
Yes No If yes enter 1 \_\_\_\_\_
5. Did you **often or very often** feel that ...  
You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you?  
**or**  
Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?  
Yes No If yes enter 1 \_\_\_\_\_
6. Were your parents **ever** separated or divorced?  
Yes No If yes enter 1 \_\_\_\_\_
7. Was your mother or stepmother:  
**Often or very often** pushed, grabbed, slapped, or had something thrown at her?  
**or**  
**Sometimes, often, or very often** kicked, bitten, hit with a fist, or hit with something hard?  
**or**  
**Ever** repeatedly hit at least a few minutes or threatened with a gun or knife?  
Yes No If yes enter 1 \_\_\_\_\_
8. Did you live with anyone who was a problem drinker or alcoholic or who used street drugs?  
Yes No If yes enter 1 \_\_\_\_\_
9. Was a household member depressed or mentally ill, or did a household member attempt suicide?  
Yes No If yes enter 1 \_\_\_\_\_
10. Did a household member go to prison?  
Yes No If yes enter 1 \_\_\_\_\_

**Now add up your "Yes" answers: \_\_\_\_\_ This is your ACE Score.**

## WHAT ARE THEY?

# ACEs are ADVERSE CHILDHOOD EXPERIENCES

## HOW PREVALENT ARE ACEs?

The ACE study\* revealed the following estimates:

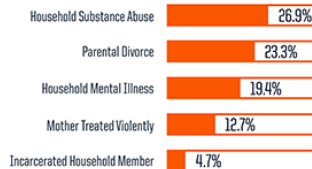
### ABUSE



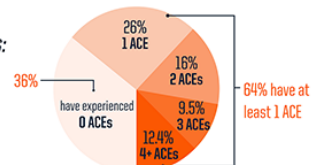
### NEGLECT



### HOUSEHOLD DYSFUNCTION



Of 17,000 ACE study participants:



The three types of ACEs include

### ABUSE



Physical



Emotional



Sexual

### NEGLECT



Physical



Emotional

### HOUSEHOLD DYSFUNCTION



Mental Illness



Incarcerated Relative



Mother treated violently



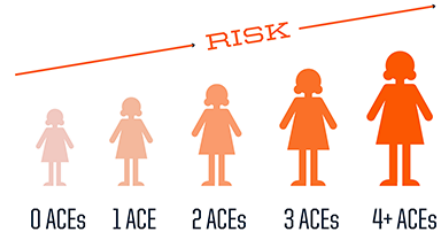
Substance Abuse



Divorce

## WHAT IMPACT DO ACEs HAVE?

As the number of ACEs increases, so does the risk for negative health outcomes



Possible Risk Outcomes:

### BEHAVIOR



Lack of physical activity



Smoking



Alcoholism



Drug use



Missed work

### PHYSICAL & MENTAL HEALTH



Severe obesity



Diabetes



Depression



Suicide attempts



STDs



Heart disease



Cancer



Stroke



COPD



Broken bones

# Talk Early, Talk Often

**“Delay, Delay, Delay or Avoid Altogether”**



Genetics

+



Trauma

+

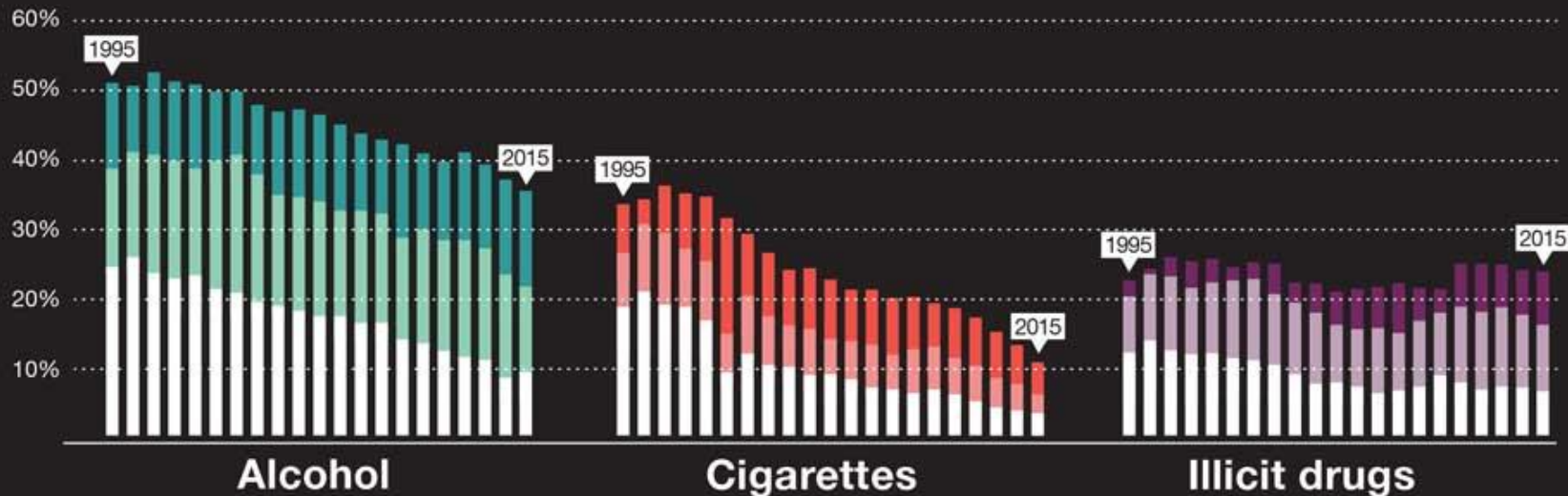


Early Use









# LAST TWO DECADES OF ALCOHOL, CIGARETTE, AND ILLICIT DRUG USE\*




\*Past-month use



2015

 35.3% OF 12TH GRADERS  
 21.5% OF 10TH GRADERS  
 9.7% OF 8TH GRADERS

 11.4% OF 12TH GRADERS  
 6.3% OF 10TH GRADERS  
 3.6% OF 8TH GRADERS

 23.6% OF 12TH GRADERS  
 16.5% OF 10TH GRADERS  
 8.1% OF 8TH GRADERS



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# TOBACCO PRODUCT USE BY HIGH SCHOOL STUDENTS (2011-2016)

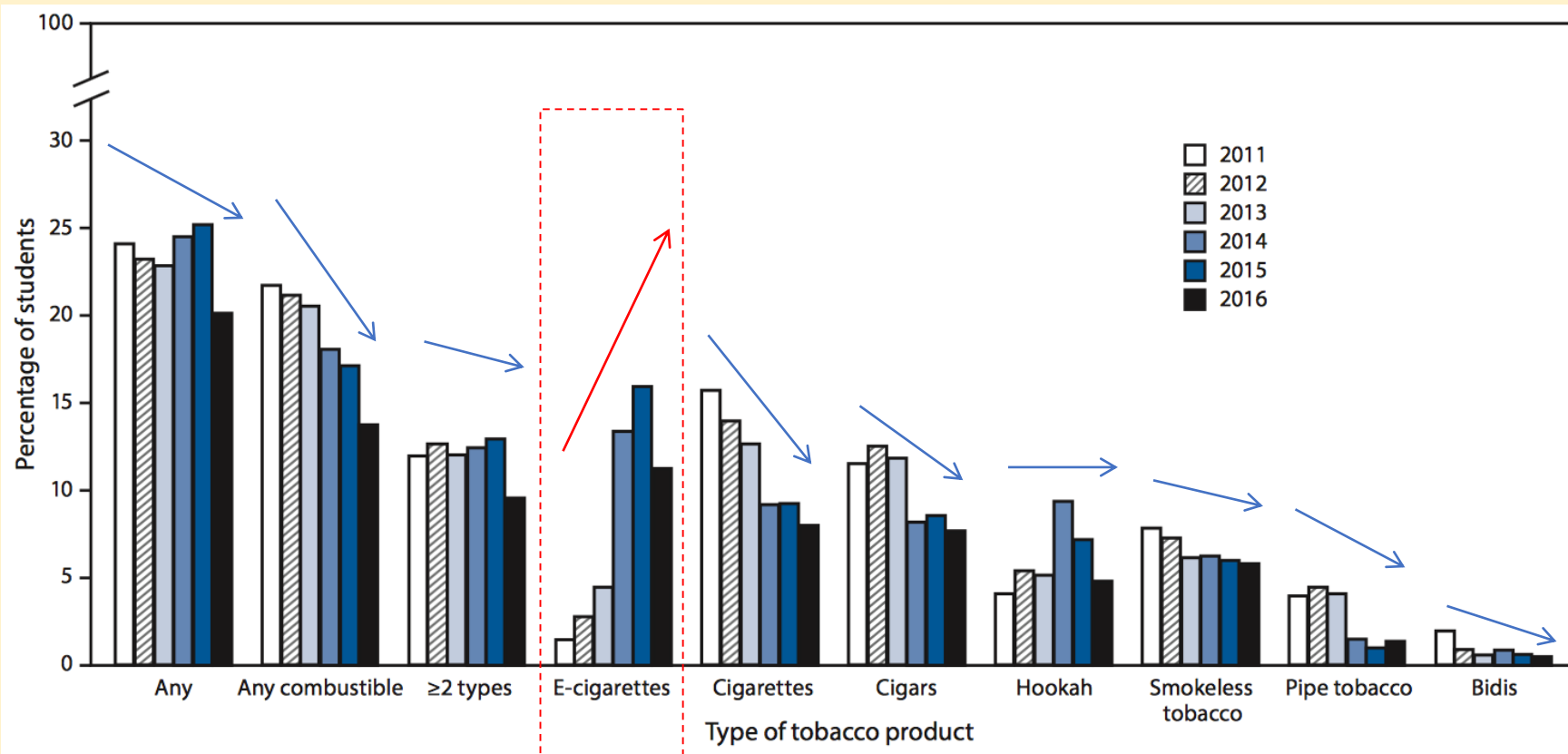
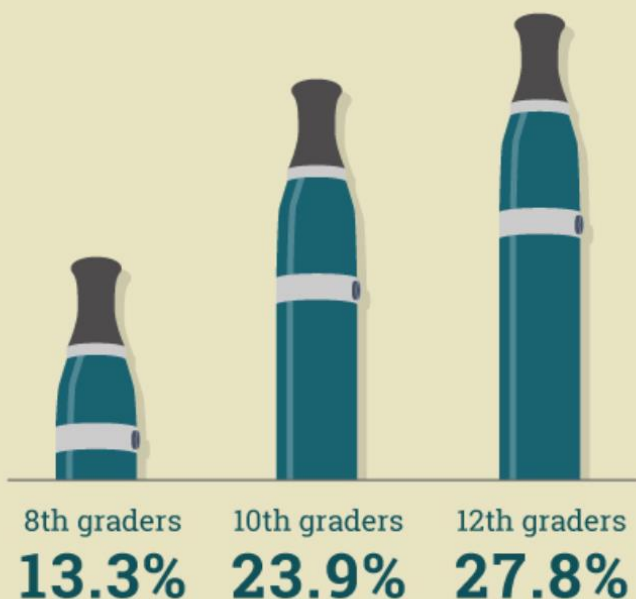
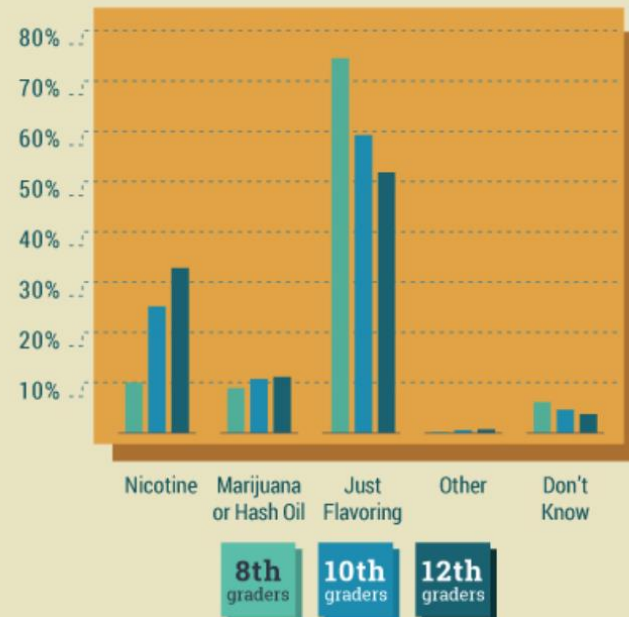


Figure 1. Estimated percentage of **high school students** who currently use any tobacco products, any combustible tobacco products,  $\geq 2$  tobacco products, and selected tobacco products – National Youth Tobacco Survey, United States. 2011-2016.

## PAST-YEAR E-VAPORIZER USE AND WHAT TEENS ARE INHALING



When asked what they thought was in the e-vaporizer mist students inhaled the last time they smoked, these were their responses:



NEARLY 1 IN 3 STUDENTS IN 12TH GRADE REPORT PAST-YEAR USE OF E-VAPORIZERS, RAISING CONCERNS ABOUT THE IMPACT ON THEIR LONG-TERM HEALTH.



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# The Nicotine Content of a Sample of E-cigarette Liquid Manufactured in the United States

Raymond, Barrett H. BSN, RN, FNP-S, NREMT-P; Collette-Merrill, Katreena PhD, RN; Harrison, Roger G. PhD; Jarvis, Sabrina DNP, FNP-BC, ACNP-BC, FAANP; Rasmussen, Ryan Jay MS, RN, FNP

Journal of Addiction Medicine: December 26, 2017 - Volume Publish Ahead of Print - Issue - p  
doi: 10.1097/ADM.0000000000000376  
Original Research: PDF Only

BUY PAP

Abstract

Author Information

SD = 3.3) nicotine. The labeled 18 mg/mL samples measured as little as 35% less nicotine and as much as 52% greater nicotine. In the 35 samples labeled 0 mg/mL, nicotine was detected ( $>0.01$  mg/mL) in 91.4% of the samples (range 0–23.9 mg/mL;  $M = 2.9$ ,  $SD = 7.2$ ). Six samples from 2 manufacturers labeled as 0 mg/mL were found to contain nicotine in amounts ranging from 5.7 to 23.9 mg/mL.

popular flavors from each manufacturer were purchased in nicotine concentrations of 0 and 18 mg/mL. Of the samples purchased ( $n = 70$ ), all were labeled as produced in the United States of America. The researchers anonymized the samples before sending them to an independent university laboratory for testing.

**Results:** The 35 e-liquid samples labeled 18 mg/mL nicotine measured between 11.6 and 27.4 mg/mL ( $M = 18.7$ ,  $SD = 3.3$ ) nicotine. The labeled 18 mg/mL samples measured as little as 35% less nicotine and as much as 52% greater nicotine. In the 35 samples labeled 0 mg/mL, nicotine was detected ( $>0.01$  mg/mL) in 91.4% of the samples (range 0–23.9 mg/mL;  $M = 2.9$ ,  $SD = 7.2$ ). Six samples from 2 manufacturers labeled as 0 mg/mL were found to contain nicotine in amounts ranging from 5.7 to 23.9 mg/mL.

**Conclusion:** This study demonstrates the nicotine labeling inaccuracies present in current e-liquid solutions produced in the United States. Incorrect labeling poses a significant risk to consumers and supports the recent regulation changes enacted by the US Food and Drug Administration. Additional routine testing of nicotine concentrations should be conducted to evaluate the effectiveness of the regulations on future e-liquid production.



## One Mad Hit Juice Box

- [NEwhere Inc. d/b/a Mad Hatter Juice](#)



E-liquid



Food product

## Whip'd Strawberry

- [Cosmic Fog Vapors d/b/a Next Day Vapor Products](#)
- [Elite Vaporworks](#)



E-liquid



Food product

## V'Nilla Cookies & Milk

- [Tinted Brew, Inc.](#)
- [Fog It Up](#)



E-liquid



Food product

# JUUL e-cigarettes

Some e-cigarette critics are calling the JUUL e-cigarette the “Apple of vaping” or the “iPhone of vaping.” With its relatively low entry price, sleek portable design, ease of use, and nicotine head rush it generates for users, JUULS are catching on with younger people.

**JUUL flavor pods**



\*Contains one JUULpod each of Virginia Tobacco, Cool Mint, Fruit Medley and Creme Brulee. Each JUULpod contains 0.7mL with 5% nicotine by weight, approximately equivalent to 1 pack of cigarettes or 200 puffs.

The design of the e-cigarette is about the same size as a cigarette and weighs a couple of grams.

**Charging dock**  
It looks like a USB thumb drive

**Body**

## **USB charging dock**

The battery is charged by dropping the body on a magnetic USB adapter. It takes an hour to fully charge and will last up to 200 puffs, a full day of regular use.

cigarette's body is designed to contain a built-in battery.

JUNE 15, 2015

# TIME

They're the most  
**powerful  
painkillers**  
ever invented.

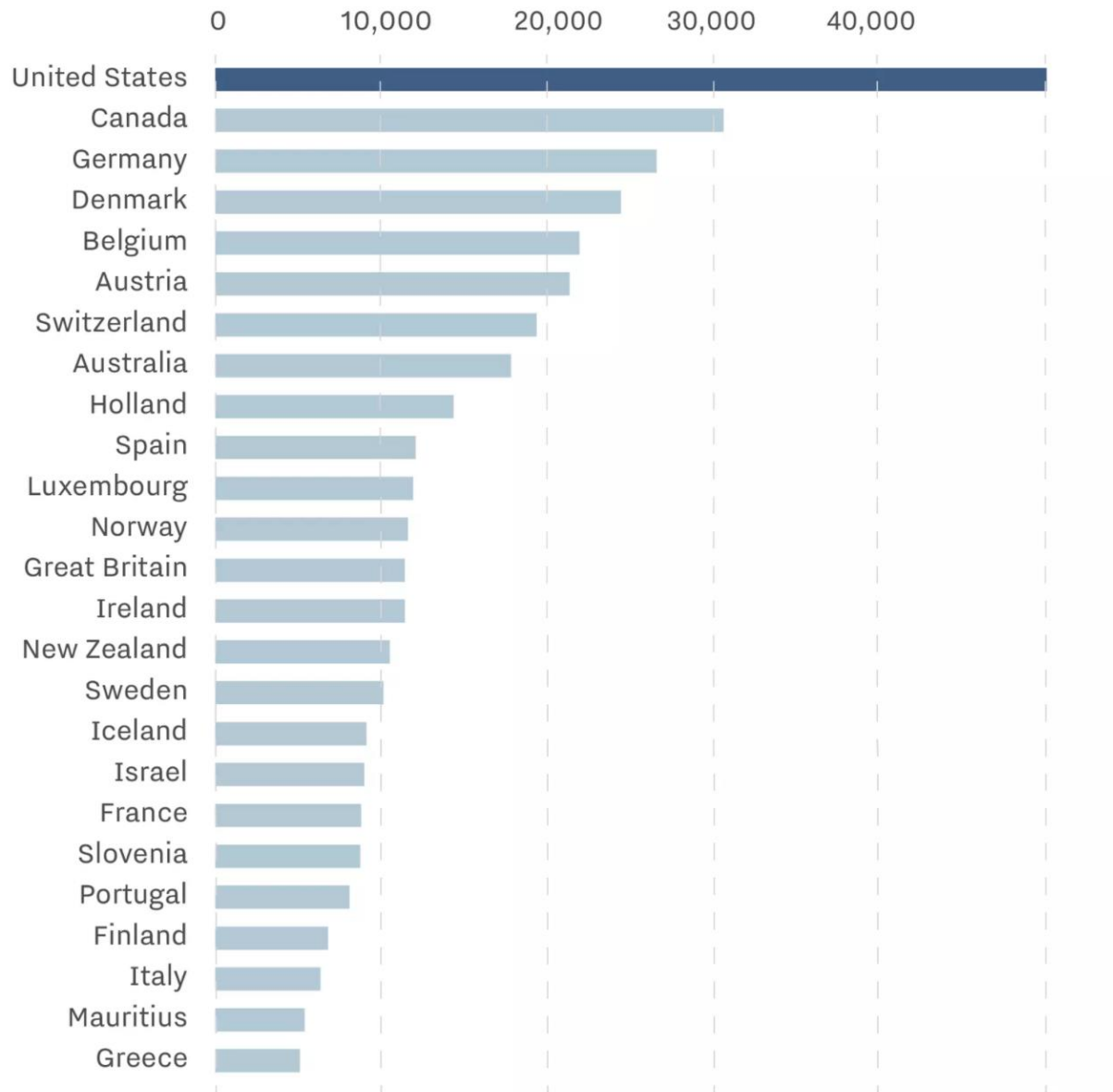
And they're creating  
the worst addiction  
crisis America  
has ever seen.

By Massimo Calabresi



time.com

## Standard daily opioid dose for every 1 million people



Source: United Nations International Narcotics Control Board

Credit: Sarah Frostenson

**Vox**



# Drug Deaths in America Are Rising Faster Than Ever

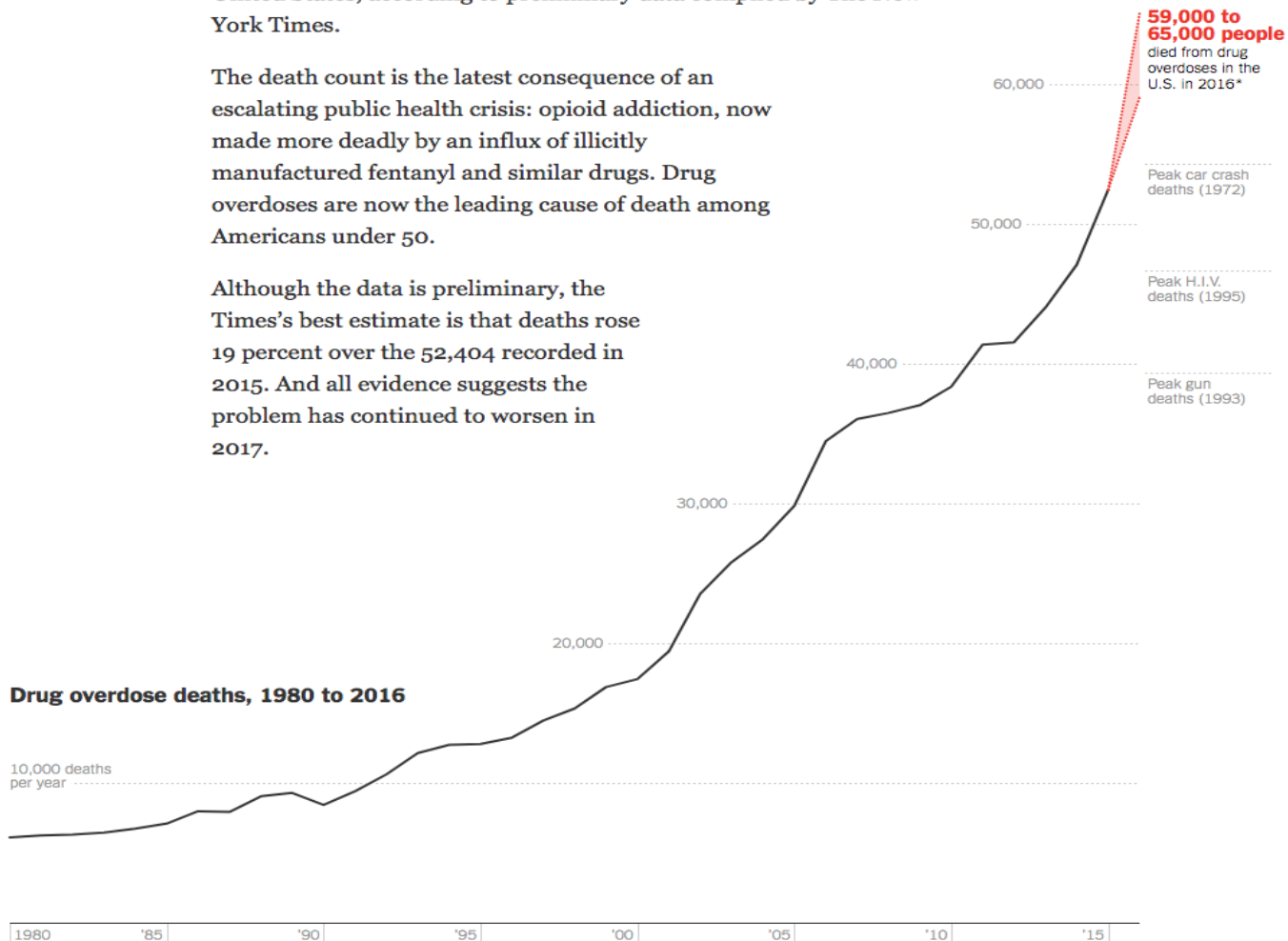
By **JOSH KATZ** JUNE 5, 2017

New data compiled from hundreds of health agencies reveals the extent of the drug overdose epidemic last year.

AKRON, Ohio — Drug overdose deaths in 2016 most likely exceeded 59,000, the largest annual jump ever recorded in the United States, according to preliminary data compiled by The New York Times.

The death count is the latest consequence of an escalating public health crisis: opioid addiction, now made more deadly by an influx of illicitly manufactured fentanyl and similar drugs. Drug overdoses are now the leading cause of death among Americans under 50.

Although the data is preliminary, the Times's best estimate is that deaths rose 19 percent over the 52,404 recorded in 2015. And all evidence suggests the problem has continued to worsen in 2017.

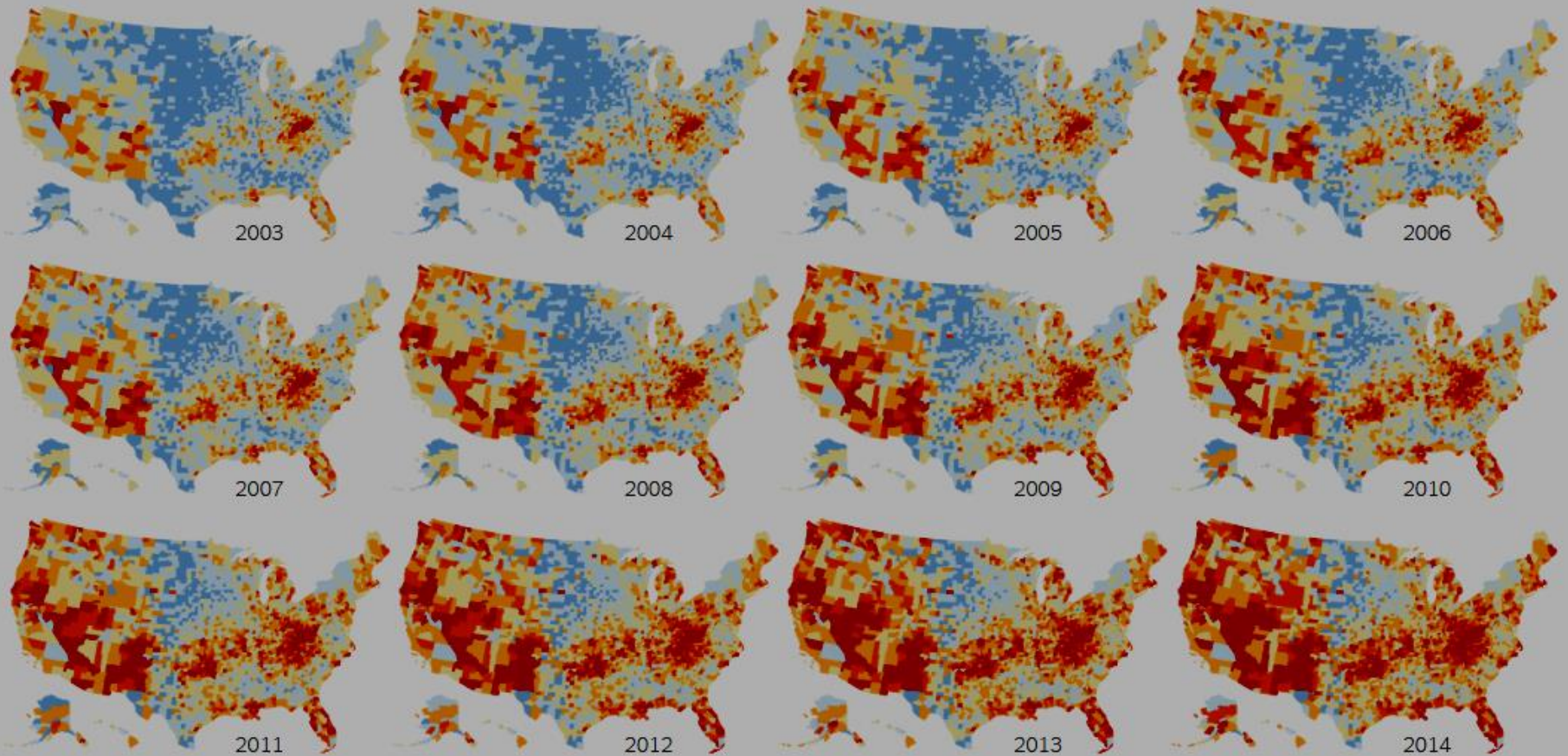
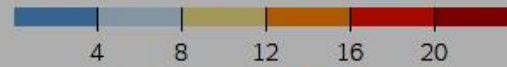


\*Estimate based on preliminary data

# Deaths Ripples Across America

By HAEYOUN PARK and MATTHEW BLOCH JAN. 19, 2016

Overdose deaths per 100,000



NYT January 19, 2016

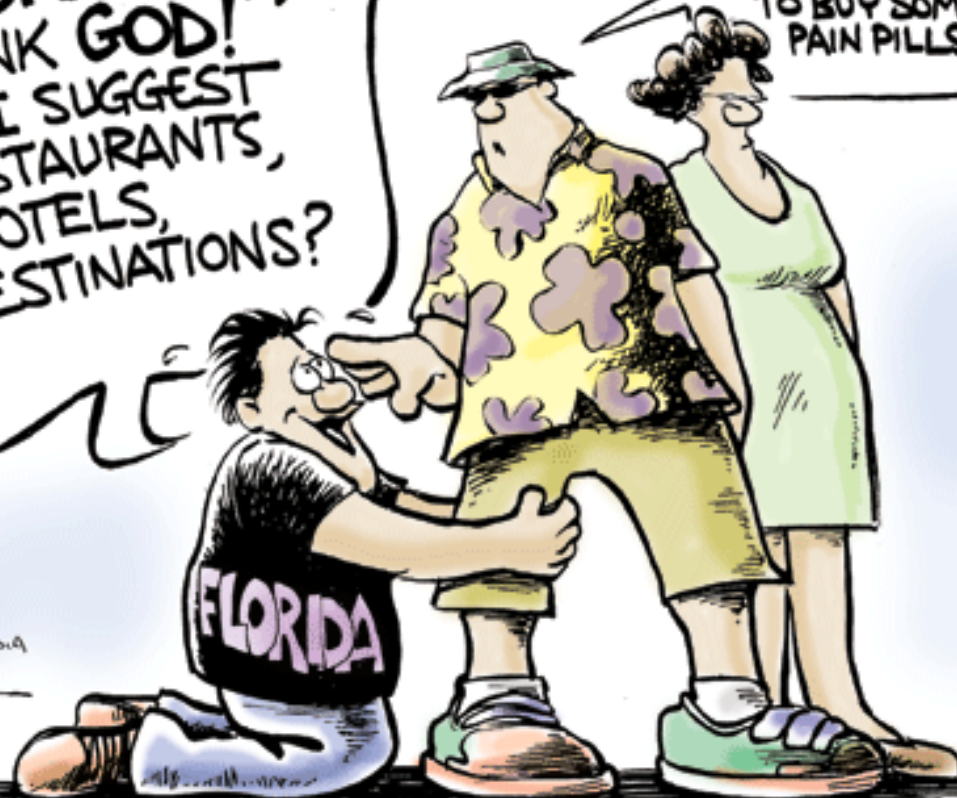




TOURISTS!!  
THANK GOD!!  
MAY I SUGGEST  
RESTAURANTS,  
HOTELS,  
DESTINATIONS?

WE'RE  
JUST HERE  
TO BUY SOME  
PAIN PILLS.

©2009  
TRIUMPH MEDIA  
7-21  
SOUTH FLORIDA  
SUN-SENTINEL





## Florida Shutting 'Pill Mill' Clinics



Tim Chapman/Miami Herald, via Associated Press

At an Aug. 15 news conference, Florida officials displayed prescription drugs that were surrendered to the state by pain clinics.

By LIZETTE ALVAREZ

Published: August 31, 2011

WEST PALM BEACH, Fla. — Florida has long been the nation's center of the illegal sale of prescription drugs: Doctors here bought 89 percent of all the Oxycodone sold in the country last year. At its peak, so many out-of-staters flocked to Florida to buy drugs at more than 1,000 pain clinics that the state earned the nickname "Oxy Express."

### Related

Times Topics: [OxyContin \(Drug\)](#)  
[Prescription Drug Abuse](#)

[Enlarge This Image](#)



Joe Raedle/Getty Images

Florida Gov. Rick Scott attends a

But with the help of tougher laws, officials have moved aggressively this year to shut down so-called pill mills and disrupt the pipeline that moves the drugs north. In the past year, more than 400 clinics were either shut down or closed their doors.

Prosecutors have indicted dozens of pill mill operators, and nearly 80 doctors have seen their licenses suspended for prescribing mass quantities of pills without clear medical need.

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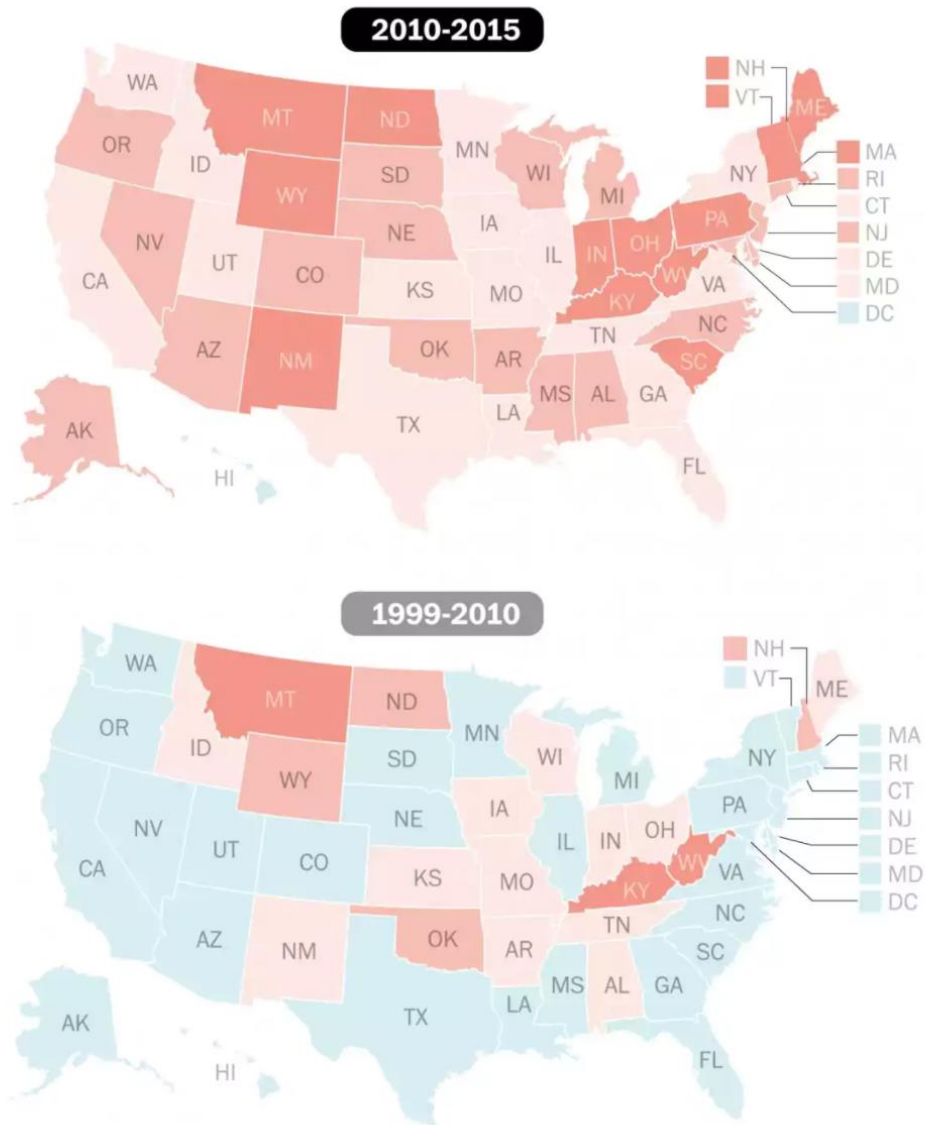
A cap, containing what looks like a dusting of heroin, sells for \$10.





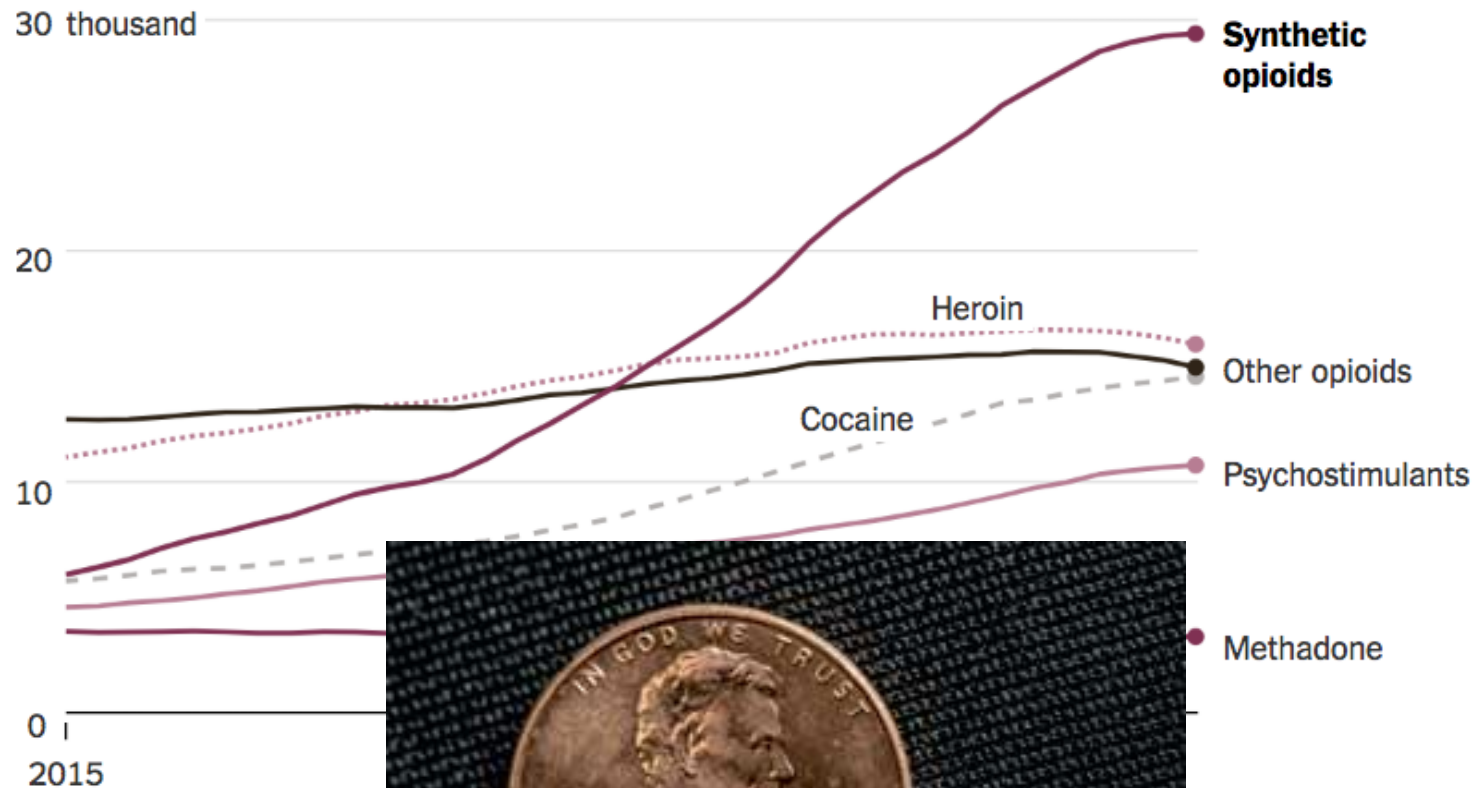
## DEATHS PER 100,000 PEOPLE. AGE 25 TO 44

Decline   Increase up to 10   Increase up to 20   More than 20



# Synthetic Opioids Are Driving Up the Overdose Rate

Overdose deaths in thousands in preceding 12 months



Note: These numbers are preliminary.  
Some deaths involve more than one drug.

By The New York Times |

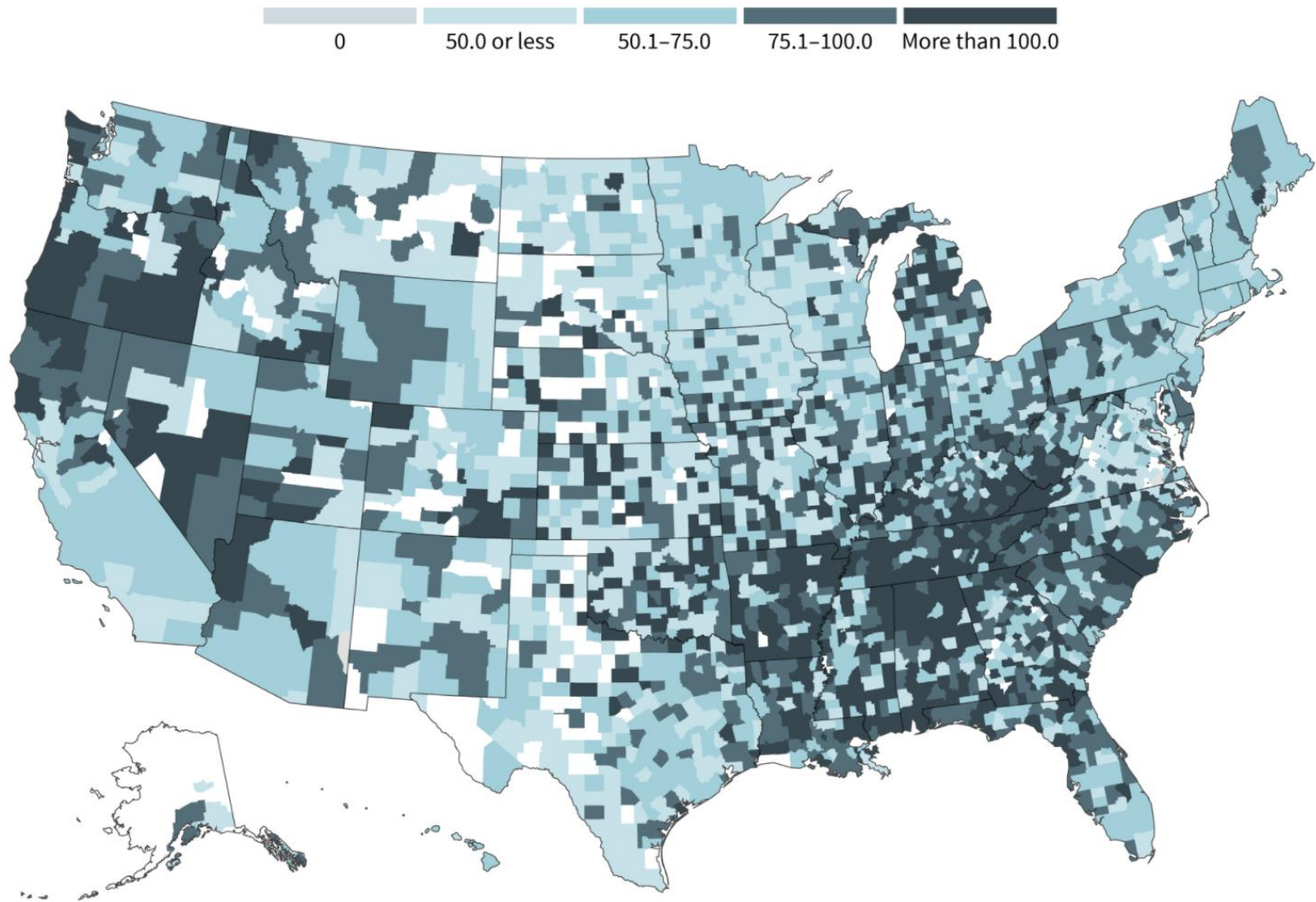


are not completed.

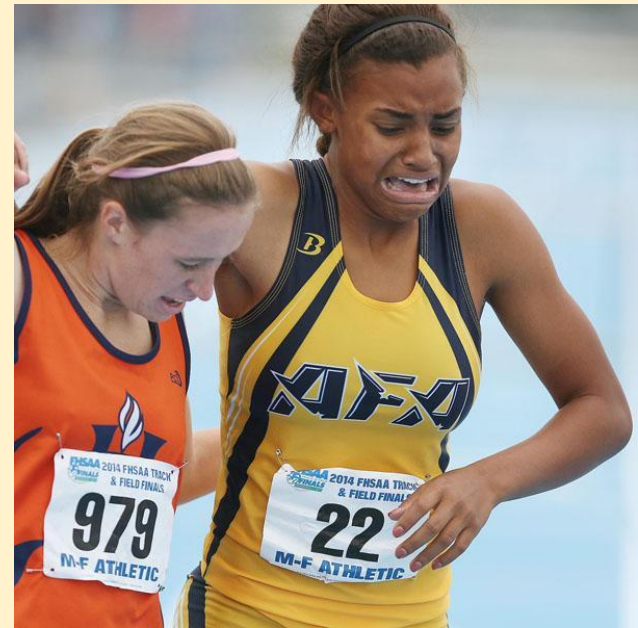
on



The map below shows the amount of retail opioid prescriptions dispensed per 100 people in 2016.

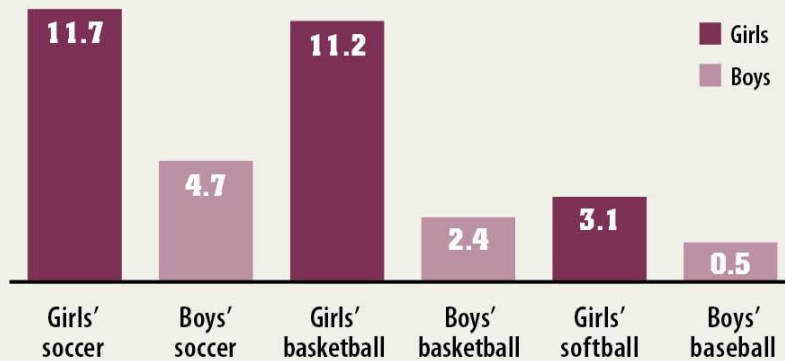


Note: Counties with insufficient data are left blank.



**FIGURE 2 High school ACL injury rates**

High school anterior cruciate ligament (ACL) injury rates per 100,000 athlete exposures (AEs) by sport and sex. (An athlete exposure is 1 athlete participating in 1 practice or competition.)



Adapted from Comstock RD, et al.<sup>3</sup>





**HELP**  
THOSE IN NEED



**GIVE**  
OVERDOSE RESCUE



**HOPE**  
FOR A LIFE SAVED

## Save a Life

Learn how to  
respond to an  
overdose emergency

Get Naloxone Now is an online resource to train people to respond effectively to an opioid-associated overdose emergency. Get Naloxone Now advocates for widespread access to overdose education and training in how to administer naloxone, the life-saving antidote for opioid-associated overdose. Get Naloxone Now seeks to increase the number of lives saved by bystanders and professional first responders (police officers, firefighters and EMTs). Find out how you can contribute to reducing overdose deaths by accessing our online training modules.

### INDIVIDUALS-GET TRAINED!

In as little as 20 minutes, you can learn techniques to save the life of a loved-one, friend, co-worker, neighbor ... anyone ... who is experiencing an overdose caused by prescription narcotics or heroin. You can also find out where you can obtain the lifesaving, easy-to-use antidote, naloxone, as well as access relevant

### INSTITUTIONAL PROGRAM

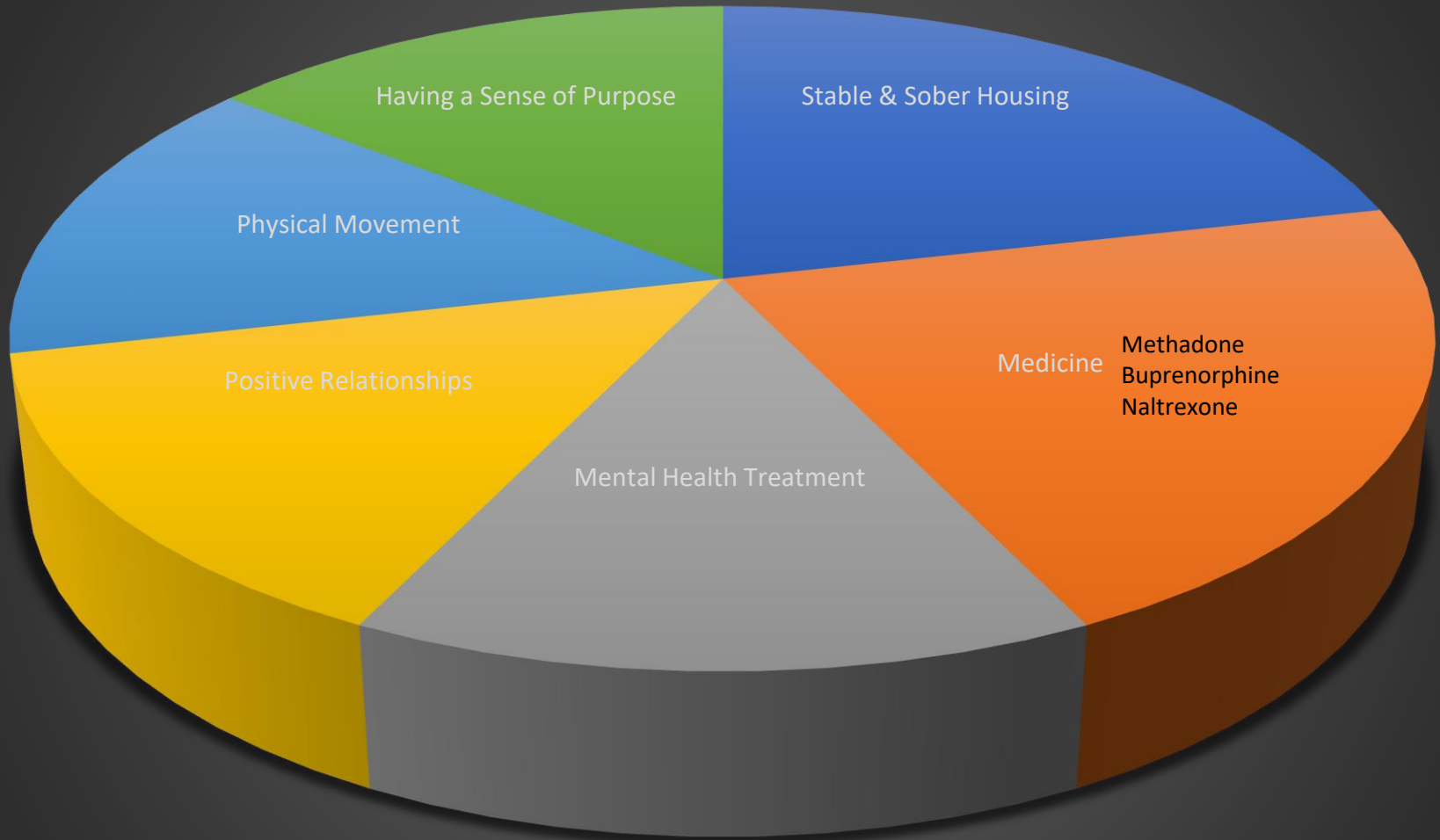
Central to our mission to save lives is our institutional program. Targeted online training is available to professional first responders (police officers, firefighters, EMTs) through use of our first responder computer-based module.

### HOW CAN YOU HELP

Our computer-based training modules can help you give someone a second chance, and spare those who love them the pain of a preventable loss of life or brain injury. The online training is provided free of charge. If you wish to obtain CE or CASAC credits (pending accreditation) after completing the module, a nominal



# What It Takes To Get Better



■ Stable & Sober Housing

■ Medicine

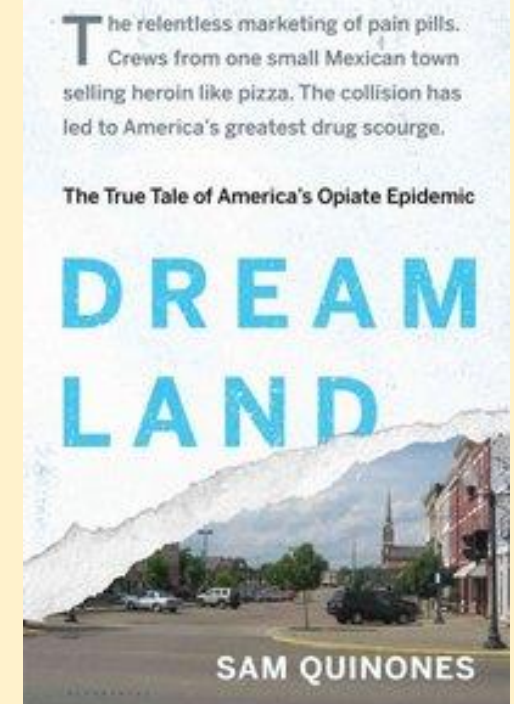
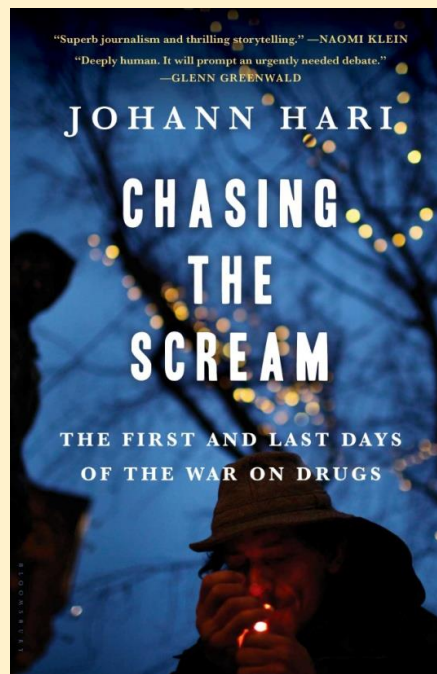
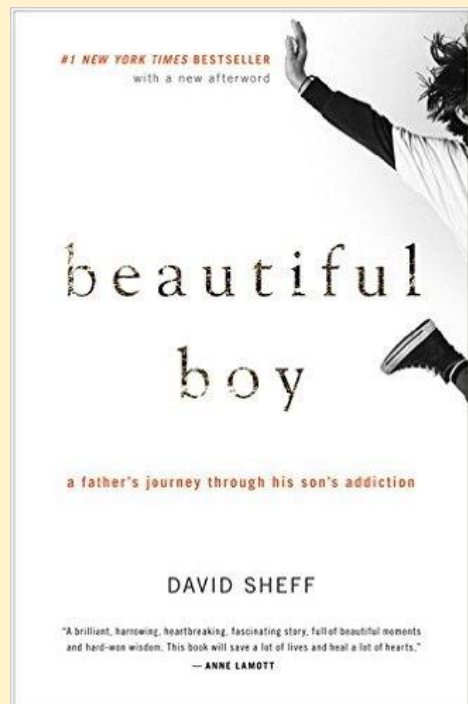
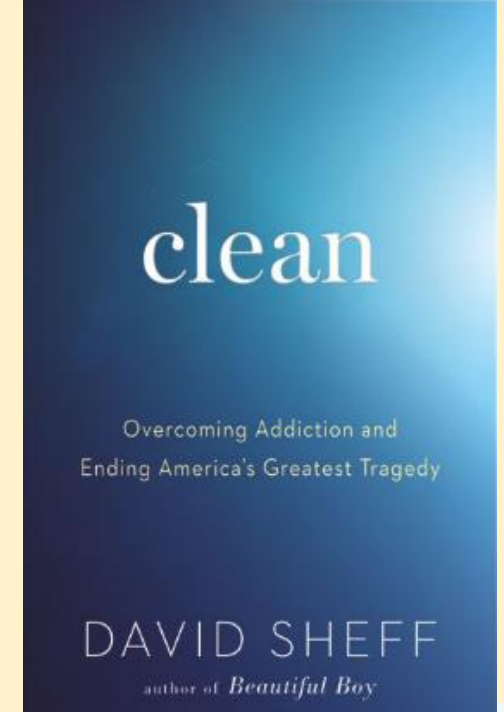
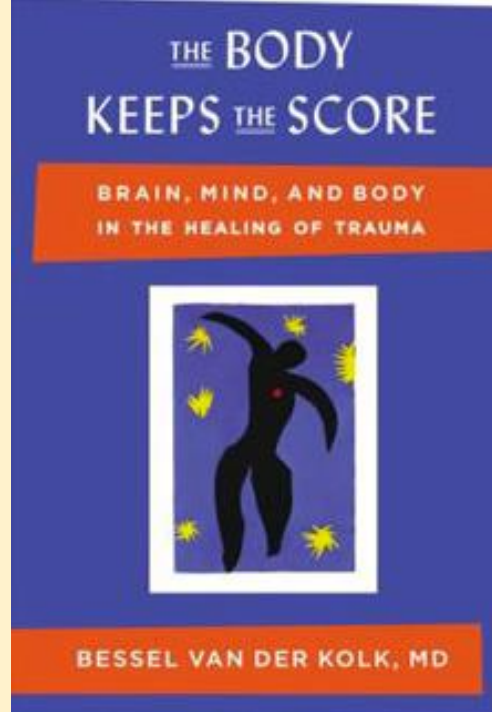
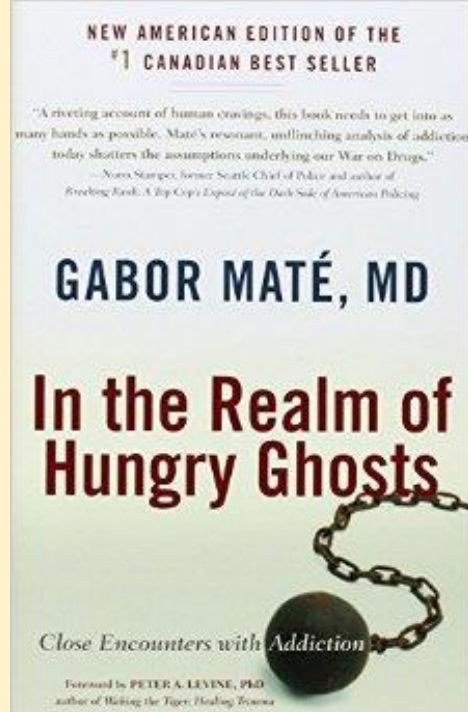
■ Mental Health Treatment

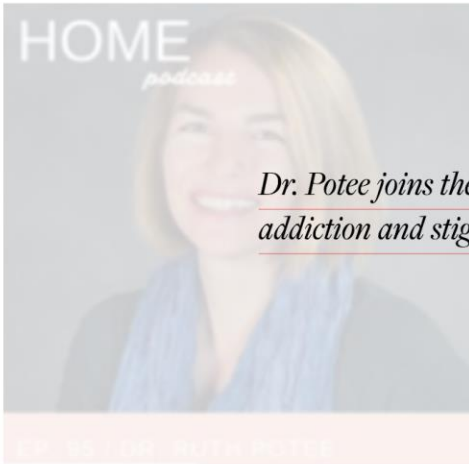
■ Positive Relationships

■ Physical Movement

■ Having a Sense of Purpose







*Dr. Potee joins the Home Podcast to talk about addiction and stigma*

HIPSOBRIETY.COM



*Dr. Potee on the impact of the opioid crisis upon children*

BOSTON GLOBE; MICHAEL LEVENSON



*CNN's Anthony Bourdain discusses addiction with Dr. Potee*

CNN; ANTHONY BOURDAIN



*Dr. Potee speaks with The Boston Globe about the lack of medication assisted treatment*

BOSTON GLOBE; KAREN D. BROWN



*Dr. Potee on opioid addiction among high school*

